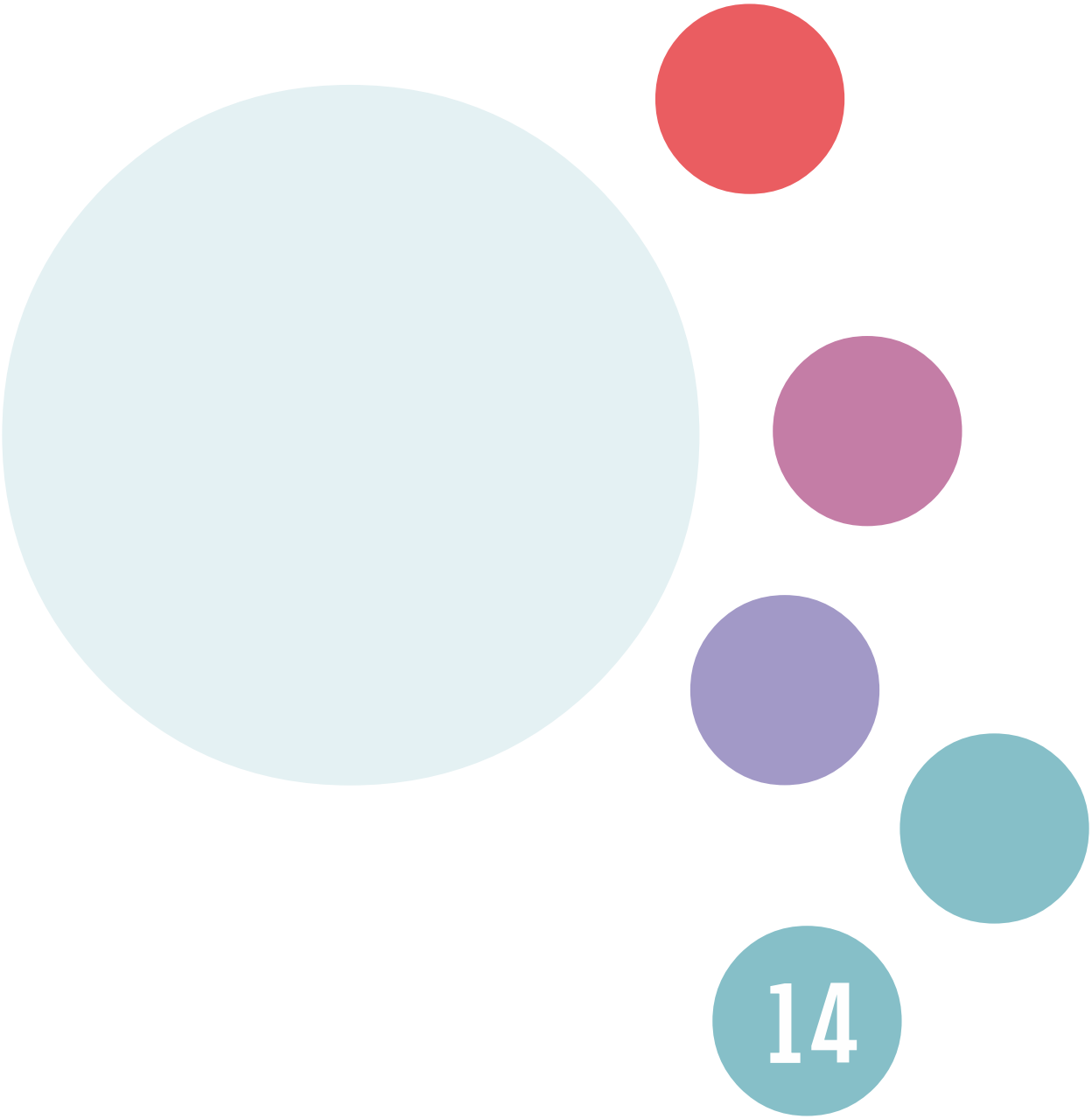
E-learning: Unlocking the Gate to Education around the Globe

14

14th conference reader

Centre for Higher Education Studies
Prague 2019



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Content

Dear Readers,

We are very pleased to present you with the proceedings of the 14th international conference *DisCo 2019: E-learning - Unlocking the Gate to Education around the Globe*, which was held June 20 - 21, 2019 in Prague, Czech Republic and organized by The Centre for Higher Education Studies and The University of West Bohemia. Enjoying the pleasant atmosphere of the conference venue in the seat of Microsoft Prague, over 100 participants from 17 countries took part in this event.

The conference opened with an interactive keynote speech by Tom Wambeke, Chief of Learning Innovation at the International Learning Centre of International Labour Organization, Torino, Italy. He presented a lecture called *A deep dive into the future: exploring e-learning scenarios using strategic foresight.*

On Thursday morning, participants also had a chance to learn how to distinguish real images and videos from the fake ones during the workshop led by Yulii Grek-Krylova. In the afternoon, the second keynote speaker Marco Spruit, an associate professor in the Information and Computing Sciences (ICS) department at the Faculty of Science of Utrecht University (UU) in The Netherlands, introduced how to use data in student instruction. He showed how to teach the basics of data science at university and how information science and other disciplines can work together. It showed a very useful symbiosis of three components: knowing what we are doing and aiming at, being able to name problems and data sources, and then using data analytics to gradually look for answers. The speaker also highlighted the necessity of asking the right questions. Nowadays, we are living in the data era and we do not have to collect it in many cases. There is a huge number of data already available but we need to know how to use it and mine it properly.

On Friday morning, participants could visit a workshop developed by Microsoft about *Artificial Intelligence in Education*. Further, the third keynote Maurizo Gentile, an Associate Professor of Teaching Methods and Special Education at LUMSA University of Rome and a Professor of Technologies for Learning at Sapienza University of Rome spoke about *Digital videos in teacher education: a professional vision model and four training strategies.*

A panel discussion on the topic *Future of Education* followed. Our keynote speakers and Anastasia Misseyani from The American College of Greece participated in the discussion. Attention was paid to issues of online education, the future of universities and the social competencies of teachers, and how it is possible to transfer them to the online environment. Again, it was an interesting shift for me where no one needs to discuss if "machines will

replace us", but the panellists thought carefully about where and how technology and global communities could help educators to engage in what really their specific domains of expertise are. I would like to emphasize that such a concept can significantly strengthen the credibility of the teaching profession.

We will need agility in education and a clear political vision/decision on what kind of education we strive for. The main trends in education are: an exponential speed of changes, a competence of learning how to learn and an internalization of HE.

The forthcoming trend will be a combination of humans and an artificial intelligence. We might expect a paradigm change in education based on a block-chain.

During the day, other interesting workshops from Microsoft were presented. Their topics were *Artificial Intelligence*, *Microsoft Notes* and *Forms & Minecraft.*

If we compare this conference with the previous years, we can observe two trends. The first one is the emphasis on competencies that appear as an emerging topic in didactics, online education, assessment, tutoring and an inverted classroom. Many contributions aimed at their development or evaluation.

The second point was to turn away from the LMSs, which seemed to interest almost no one anymore. Except for about one marginal mention, presenters paid no or very little attention to them. In general, the technical level played a leading role in specific educational situations which can be read as a signal that the EdTech community has gradually matured and that it can find its areas of interest outside specific technical applications or plugin analysis. This is also related to the shift in the average structure of papers which more strongly mentioned the support in the literature and worked with more demanding and ambitious methodologies rather than with unsophisticated questionnaires.

Now, I would like to point out several interesting papers from our collection. Michal Černý in his paper called *Digital Competence: from Self-evaluation to Analysis of Students Learning Behaviour* focuses on how students behave in the digital competence development courses.

Lucie Rohlíková et al. in their *All Pre-service Teachers Training in the Virtual Classroom: Pilot Study* presented how Virtual Reality could be used to develop teaching competencies of future teachers of geography.

Hana Tulinská in *Cross-Age Peer Tutors as Important Actors of University Online Courses –Information Literacy Course Case Study* shows what it means for a student to mentor younger classmates, what it feels like and how they reflect it.

Emilda Roseni's *Case of Albania: Measurement and Assessment as Main Components in the Curriculum of Foreign Languages* is an example of a topic that has appeared relatively strongly this year, namely in language education and possibly in international comparisons of different approaches and contexts. That is also a reason why after Maurizo Gentile's keynote speech, we are opening this book with a section on language teaching.

The closing section of the conference reader offers abstracts of contributions submitted in a form of a presentation.

Finally, we would like to express gratitude to our partners for their sponsorship and support. First of all, we thank The Central European Initiative, our general partner. We are also grateful to Microsoft for being our host and for delivering very interesting workhops to our international audience. Our thanks go to AAEI (Association of Adult Education Institutions) the Czech Republic, Navreme Boheme s.r.o, Prague Development Center, Veriod, Czech Association of Distance Teaching Univeristies (ČADUV) and media partner portals Open Education Europa and Edumenu; further, also to journals Andragogika v praxi, Aula, RicercAzione, Firemní vzdělávání and Ikaros. Last but not least, we really appreciate the enthusiasm and work of the Programme and Organizational Committees as well as our volunteers. Without their great effort and help, the organization of such an event would not be possible.

Jan Beseda, Centre for Higher Education Studies

Articles

Keynote speech

DIGITAL VIDEOS AND TEACHER EDUCATION: A RESEARCH-TRAINING FRAMEWORK

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Key words: Digital videos**,** Professional vision, Teacher Education, Training strategies, Assessment for learning.

Abstract: The article proposes a research-training framework about the use of videotaping in teacher education. It deepens two issues: a) the construct of *professional vision* and sub-processes that teacher activates during the observation of videos; b) the training approaches designed to develop the teachers' competence to view a set of teaching actions. The *professional vision* is the process of noticing noteworthy events and making sense of them. In this context, it is interesting to investigate the relationship between general pedagogical knowledge and professional reasoning. Four training strategies activate del professional vision process during the use of digital videos in teacher education. The first strategy addresses to stimulate the interpretation of teaching events without a preliminary and formal knowledge of pedagogy underlying the observed teaching actions (*example-rule strategy*). The researchers recommend its use for in-service teacher training. A second way addresses both the knowledge of educational principles and the development of decision-making abilities (*rule-example strategy*). The authors suggest its use in pre-service teacher education. A third strategy is called "video club". It consists of a group of teachers who meet to watch and discuss excerpts of videotapes of their instruction. The last approach consists in one 20-hour course organized in three phases: 1) three workshops, 2) the videotaping of teaching actions performed in the classrooms, 3) the shared analysis of videos. This training strategy was developed in the context of research-project focused on understanding and practicing the *assessment for learning* approach. The aims of the project were: a) to design one in-service teacher education course based on digital videos; b) to study the interpretative frames that teachers activate when watching videos; c) to promote the *assessment for learning* approach.

Introduction

A high-quality of teacher education is critical to be effective in today's classrooms (INDIRE 2016). This topic is the heart of the European strategy to improve the quality of teaching (European Commission/EACEA/Eurydice 2015). In international surveys (OECD 2014) and public opinions (Economist 2016; Repley 2010; Leslie 2015) it is affirmed that several factors might influence students' learning. On all it merges the quality of teaching. But, how do we learn about the teaching competence? The most recent orientations highlight the transition from an innate approach ("good teachers are born") to a constructivist approach ("good teachers are made"). The latter is based on the following elements: a) the cycle "experience/reflection/improvement"; b) the mastery of pedagogical and content knowledge; c) the realization of collaborative action-research among peers; d) teachers' educational leadership.

In the in-service teacher education, it observes a change of paradigm: from a professional development view (Joyce and Showers 1980) to a professional learning perspective (Lieberman 1995). The former is based on the following principle: teachers' professional development mostly depends on the elements that feature the in-service teacher training (Showers, Joyce and Bennet 1987). If the training provides good theories, the observation of an expert while he/she applies the theoretical approaches, the practice of participants, and a feedback about the way they practiced, we can expect that teachers would apply the new professional knowledges, regardless of the classrooms' or schools' features in which they work.

An excessive emphasis on what portrays a training risk to overlook the complexity of teaching action (Grossman, Hammerless and McDonald 2009). The core aspect of such complexity refers to the task of integrating "the what" to teach, "the how" to teach, and "the why" choosing to teach according to a certain teaching method, rather than another (Gentile 2012). According to this hypothesis, teachers' professional development depends on the connections between subject-matter and teaching methods (Shulman and Shulman 2004). Following this line of reasoning, we developed a research-training framework called "Teacher Education Via Video" (TEVV), in which content and pedagogy must be intended as a whole, in order to understand the principles and procedures on which a certain strategy is based, and the connections between the strategy itself and learning, the building of knowledges and the skills to apply them (Gentile and Tacconi 2018; Shulman 1986). In brief, we are focusing on how teachers shape their learning (Lieberman and Pointer Mace, 2008).

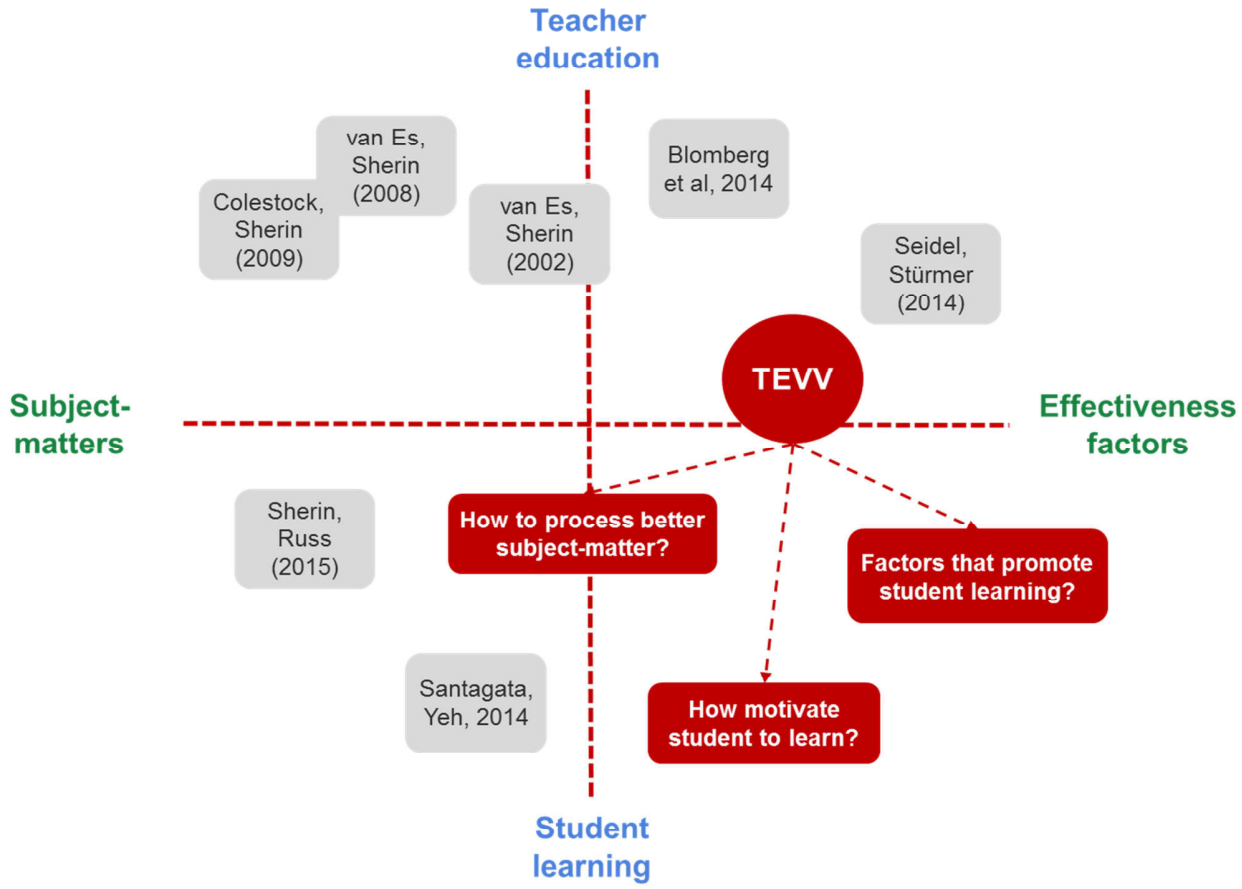
TEVV is a research-training framework that poses the digital video tools to help the development of pedagogical knowledge about the high effect-size factors in teaching and learning processes (Hattie 2009; 2012). The research-training framework is articulated into three studies. The first study described a *professional vision model* and the cognitive processes that portray it (Gentile and Tacconi 2016; 2018). The second study is aimed to give an empirical base (Sherin and Russ 2015) to the *professional vision model* through a 20-hours teacher training that involved 53 teachers of 8 middle and high schools. The third study is focused on the impact of the relationships between digital videos and teacher training strategies (Seidel and Stürmer 2014). We get data about this third line of research through an experimental that involved 80 future teachers engaged in an academic course.

The research-training framework embraces three topics: a) the methods and tools of teacher education; b) what works in teaching and learning; c) the cognitive and motivational processes of students. To grasp the connections between the three topics, the Picture 1 shows the conceptual positioning of TEVV regarding to dimensions. The first dimension captures the relation between subject-matters and effectiveness factors, outlining "what" and "how" we teach. The second dimension defines the relation between student learning and teacher education. This dimension implies a connection between teachers' learning and students' learning.

These labels present a more explicative and wide meaning of the field of investigation in which the framework is placed, as well as it offers the chance to allocate individual authors, research-training and models that researchers are carrying on in different countries. The authors positioned in the semantic field are representative of trends that we consider an important benchmark. The quoted studies reflect empirical

researches and theory focused on the use of videos as training tools in pre-service and in-service teacher education. This explains the gap in the quadrant that intersects the student learning/effectiveness factors. The red circle draws the positioning of TEVV framework. The framework is focused on teacher education and the design of trainings. We are interested on how helping teacher to build pedagogical knowledge. For these reasons, we are interested to explore these issues: which student or teaching factors can help teachers to work with student thinking? How they can help student to process better the subject-matter? How they can motivate student to learn?

PICTURE 1. CONCEPTUAL POSITIONING OF TEVV RESEARCH-TRAINING FRAMEWORK



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The paper is articulated in four sections. The first section shows the details of a *professional vision model*, intended as a process that teachers use to watch and think to the teaching facts (Gentile and Tacconi 2016). The second and third sections present three training strategies associated to the use of videos in teacher professional learning (Gentile and Tacconi 2018; Seidel and Stürmer 2014). The last one shows a

fourth strategy called “video club”. It consists of a group of teachers who meet to watch and discuss excerpts of videotapes of their instruction (van Es and Sherin 2008).

A professional vision model

The videos of teaching actions became one of the most used tools both in academic courses and in teacher training. Their use has been gradually affirmed, until becoming one of the most used instruments in improving the quality of teaching (Calandra and Rich 2015; Gaudin and Chaliès 2016). This fact suggests an accurate consideration and research programs with the aim of understanding if and how videos can help teachers increasing their professional knowledge (Bakkenes, Vermunt and Wubbels 2010; Lieberman and Pointer Mace 2008). For example, pre-service teachers struggle in understanding the complexity of teaching events, so as to perceive themselves as unable in applying the pedagogical theories studied in academic courses (Seidel and Stürmer 2014). Training teachers to the ability of analyzing video can become an activity aimed to the promotion of high-quality professional knowledge. In relation to this the question is: with which training strategies and tools pre-service teacher can live an experience of vicarious learning (Bandura 1986) in order to facilitate the access to a richer set of pedagogical facts and principles? A high ability of analyzing the teaching fact can promote the ability of applying professional knowledge to a wide teaching context. On the other hand, a low level can indicate the presence of a system of fragmented knowledge weakly organized. Consequently, one of the priorities of academic courses for teachers should be building an integrated system of pedagogical and practice knowledge. This priority implies the elaboration of a *professional vision model*.

Teacher professional vision

What teachers observe about themselves and others depends on knowledge and reasonings that take place during the work experience. So, it is possible to identify a system of situated cognitions consisting of beliefs, knowledge, experiences, frames. We call it *professional vision*: a subjective way of looking at events that occur in a specific professional field (Gentile and Tacconi 2016). While watching a video, teachers tend to highlight educational situations that are noteworthy and reflect on them with the purpose of searching meaning to what they see (Van Es and Sherin 2002). The training activities should help teachers to create a close relationship between “what I see” and “what I think” (Blomberg et al. 2014). But which are the operations activated by teachers during the vision of videos? The TEVV framework suggests a process articulated in four operations.

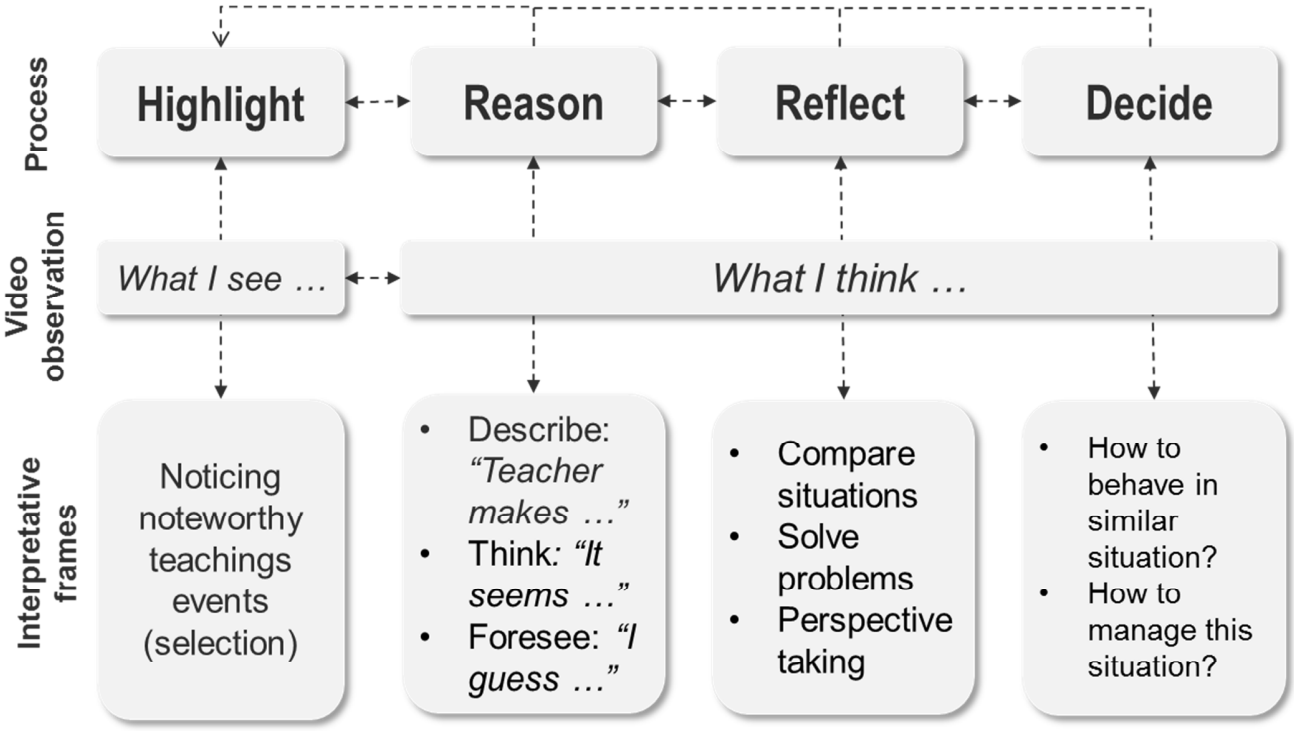
1. *Highlight*. It means the teacher selects the content of videos noticing the most relevant educational fact (van Es and Sherin 2008; Seidel and Stürmer 2014; Seidel and Shavelson 2007).

2. *Reason*. It means the teacher thinks on what observed activating three operations: a) describe ("teacher makes …"); b) think ("I think that…"; "I believe that…", "It seems to me that…"; c) foresee ("I imagine that…"; "I expect that…") (Seidel et al. 2011; van Es and Sherin 2002).

3. *Reflect*. It means the teacher compares situations, makes assessments, identify him or herself in the videotaped teacher, think on how to solve the observed teaching problems (Colestock and Sherin 2009; van Es and Sherin 2008).

4. *Decide*. It means the teacher thinks of how to respond to students in the case he/she would have to face situations like the ones in the videos: "How would I have acted…?"; "how would I have managed …?" (Sherin and Russ 2015; Rodgers, 2002).

PICTURE 2. PROFESSIONAL VISION MODEL



Source: (Gentile, Tacconi 2016)

The Picture 2 shows the *professional vision* as a subjective process that teachers use to watch and think to the educational facts that occur in the classroom during the vision of the videos (Sherin and Russ 2015). During video observation, teacher activate clusters of interpretative frames in relation to four operation highlighted in the model.

Professional vision and pedagogical knowledge

In the videos are contained several educational and teaching events. Some of them play a critical role in student learning, some others not. The identification of a noteworthy event consists in the teacher's ability in paying attention to aspects that are crucial in the learning process of students (Seidel and Stürmer 2014). In this case, videos work as first stimulus of knowledge activation (Kersting 2008). But, on which elements should we focus? The meta-analysis, elaborated by Seidel and Shavelson (2007) and by Hattie (2009, 2012) on the effects of a range of educational, cognitive and motivational factors, offer a first knowledge base (Table 1). Seidel and Shavelson (2007) indicate the followings between the factors that can have a significant impact on learning: a) goal setting; b) orientation of learning towards goals; c) activation of student thinking through challenging tasks; d) support student through constructive feedback; e) supportive learning climate by taking students' needs seriously. From Hattie (2009; 2012), the TEVV framework assumes the following factors: a) how to develop high expectation for each student; b) how to provide better feedback to student; c) reciprocal teaching; d) teacher-student relationship; e) how to better teach metacognitive strategies; f) teaching study skills.

TABLE 1. LISTS OF HIGH-EFFECT SIZE FACTORS

Seidel and Shavelsons' meta-analysis (2007)*	Hattie's meta-analysis (2009, 2012)**
1. Goal setting	1. How to develop high expectation for each student
2. Orientation of learning towards goal	2. How to provide better feedback to students
3. Activation of student thinking through challenges tasks	3. Reciprocal teaching
4. Support student through constructive feedback	4. Teacher-student relationship
5. Supportive learning climate by taking students' needs seriously	5. How to better teach metacognitive strategies
	6. Teaching study skills

*Source: Adapted from: (Seidel, Shavelson 2007.)
**Source: Adapted from: (Hattie 2009, 2012)

Why do we consider these lists? Most of these factors can be subject of video-observation, consequently, they can be elements of professional knowledge to include in teacher education. The hypothesis is that a good professional vision implies the ability to think about teaching drawing on their own pedagogical knowledge (Shulman 1987). If professional vision is nurtured by the knowledge of what works in teaching and learning (Hattie 2009; 2012), the integration of these with content knowledge and video-taped experience may form a system of professional cognitions that shade light on those elements that have a critical role in students learning.

Application of the professional video model in a 20-hours teacher training

A 20-hours teacher training was designed in order to apply the professional vision model to a teacher education activity. The teacher training had two aims. Firstly, help the development of pedagogical knowledge about a high-effects size factor in teaching/learning processes. I refer to "how to provide a better feedback to students" (Hattie and Timperley 2007). In Hattie's meta-analysis (2009; 2012),

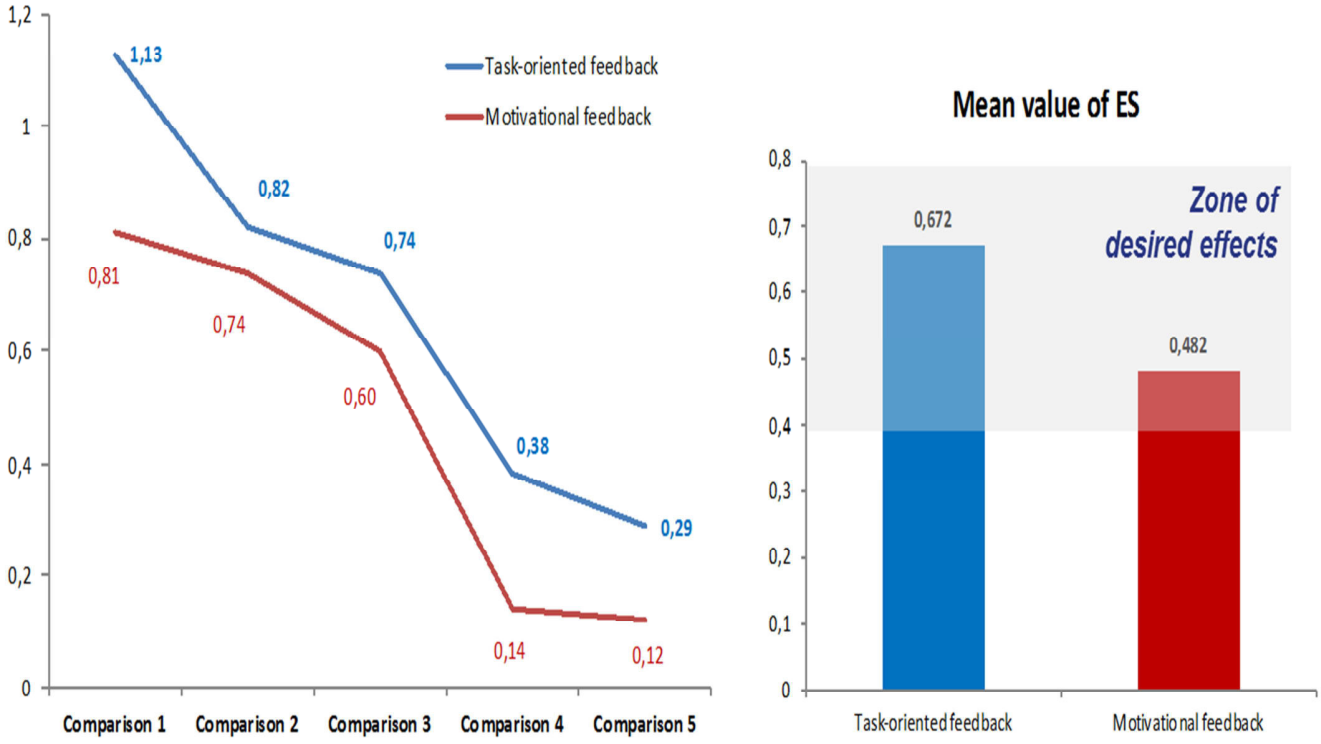
feedback has a 0.75 ES, calculated upon more than 1.000 studies. Secondly, give an empirical base to the professional vision model. In relation to the second goal we collected 51 interviews. Each teacher observed his video-taped feedback activity performed in the classroom. The teacher stopped the player every time he noted a noteworthy fact. Right after the stop the teacher commented aloud his stopping point. All the interviews were video-taped. We involved 53 teachers of middle and high school. The total of involved schools was 8, all sited in the Province of Verona and Venice.

How to provide a better feedback to students: a three facets model

The section discusses a brief theoretical and empirical summary on "how to provide a better feedback to students". With the feedback, the teacher formulates responses, gives corrective indications, offers insights on "how" and "why" a result was achieved (Hattie 2012). We can term this feedback as task-oriented feedback. Another kind of feedback consists in praises, positive reinforcements, social recognitions (Heitnik et al. 2016). The main goal of this second kind is to motivate student to learn. We can term it a motivational feedback. The feedback may be more effective if is "just in time", "just for me", "just for where I am" in the learning process (Hattie 2012, p. 122). We can term it as a student-oriented feedback. The effect on learning is greater when the goal of feedback is to provide instructions to improve the performance of a task; in contrast, we observe lower level effects when teachers communicate praises or positive reinforcement (Hattie and Temperley 2007).

The Picture 3 shows five comparisons of couples of studies in which researchers calculated the ES of feedback and praises on student learning (Hattie and Temperley 2007). In all comparisons the task-oriented feedback has a better effect on student learning if compared with praises and positive reinforcements. In studies that evaluate the effect of task-oriented feedback, the mean value of ES is 0.67. Conversely, the mean value for praises and reinforcement is 0.48. However, according Hattie's meta-analysis (2009, 2012) both values fall in the zone of desired effects. We didn't tell teachers about not praising students. We suggested to mix the three typologies of feedback, by mostly focusing on task-oriented feedback.

PICTURE 3. TASK-ORIENTED FEEDBACK VS MOTIVATIONAL FEEDBACK



Source: Adapted from: (Hattie, Timperley 2007)

Different are the moments in which to communicate feedbacks: a) after the correction of a written test or during an oral test (Gentile and Ramellini 2000); b) while students carry out an assignment or a project, individually or in group (van de Pol et al., 2012); c) during a classroom discussion (van de Pol et al. 2011; Voerman et al. 2012). The 53 teachers involved in TEVV provided feedbacks to students across 13 different teaching situations. For example, we collected 16 videos in which the feedback was used after the correction of a test. In 7 of them, the feedback was communicated during a group project. In 5 videos, the feedback was communicated during a group work. In 4, during a personal project, and so on.

Four training activities and vision protocol

The 20-hours training was divided into four activities: a) a kick-off meeting; b) three workshops; c) videotaping of activities performed in the classrooms; d) video observation of own activity performed in the classroom (Picture 4). Below, some details about the fourth training activity. It is closer to the use of video for building a system of professional situated cognitions. Through it, we collected data in order to give an empirical base to the *professional vision model*. The hypothesis is that the video observation may

promote the teacher's professional knowledge. To collect data, the video observation was designed following three phases.

1. *Introduction* the vision of video with the following statements: "We will watch together the videotape of your lesson. You can stop the vision in any moment and comment what you have seen".

2. *Stopping point and comment* (Jacobs and Morita, 2002). Right after the stop, we encouraged an analysis by formulating two questions. The first is a prompt question: "What have you seen here?" The second is a probe question: "Have you noticed anything else?" or "Do you want to add something?"

3. *Vision closing*. To conclude the analysis, we posed three questions: "How do you think you managed the feedback during the practice?"; "Which aspects of the feedback do you think you used more and how you used them?"; "How have you seen yourself, and what have you seen of yourself?"

The video observation was taped and once the vision protocol was concluded, we turned off the taping of the interview and gave a feedback to the teacher, expressing appreciations and suggesting improvements or integrations.

PICTURE 4. THE FOUR TRAINING ACTIVIES OF THE 20-HOURS TEACHER TRAINING VIDEO OBSERVATION

Source: Own

Method and contents of analysis

The analysis of the interviews is focused on three elements. Firstly, the *number of stopping points*. It is useful and interesting to understand how the stopping points are distributed, for example, in respect to teachers' background variables (e.g., sex, age, grades, seniority, professional status, subject-matter, teaching situation, etc.), and if a high or low number of stopping points per teacher can be correlated to one or more background variables. Secondly, number of *comments and content units*. After a stopping point, the teacher started commenting what he or she had been noticed. Thanks to the stopping point the teacher demonstrates to have selected a noteworthy aspect. Changes of focus during a comment allow the identification of content units (Jacobs and Morita 2002). Our objective is understanding how the content units are distributed, considering the background variables, and if a low or high number of content units can be an indicator of high or low level of professional vision competence. Thirdly, *interpretative frames*. The goal is understanding with which *interpretative frames* teachers observe the videos. For instance, a way to vision a video is to relate events by "cause and effect" (Sherin and Russ 2015). Another way is to identify "specific elements" that take place across multiple teaching context (Sherin and Russ 2015, p. 11). The purpose is figuring out which and how many of these schemata trigger during the vision, how they connect to content units, how they activate each other, and if they can be classified in more general cluster, corresponding to the four general cognitive operations of *professional vision model*.

Two training strategies and the use of video in pre-service teacher education

The simple vision of a video is not enough in order to generate an accurate comprehension of the teaching/learning processes. The effectiveness of such instruments depends on the training strategies that are put into action (Seidel and Stürmer 2014).

Rule-example vs Example-rule

Referring to a classification proposed by Seidel and colleagues (2013, p. 58), two overall teaching strategies can be highlighted, both oriented to the development of professional vision competence. The first strategy presents the pedagogical principle to pursue, followed by an example of application through a video. The authors define this strategy as rule-example. The second strategy firstly shows the video. Afterwards, it asks teachers to note teaching facts, facilitating the learning of new pedagogical knowledge that help to do better in classroom. The authors define this strategy as example-rule.

In the rule-example strategy, teachers receive fundamentals of pedagogical knowledges. Then, they are asked to watch a video and to take notes, to think on what noted, recalling the pedagogical knowledge earlier received (Seidel, Blomberg and Renkl 2013). The focuses of observation are expert teachers, videotaped during the performance of successful activities: exemplary lessons, with total or near-total

absence of critical incidents and with positive feedback from the students. In this case, the stimulated reasoning would sound like this: “it is good to do so, if you want to achieve a good educational finding”. It is mostly practiced in pre-service teacher education, in order to teach fundamental pedagogical knowledge, or the use of educational principles and teaching strategies that work. The overall scope is learning to vision applying a system of pedagogical knowledge. The rule-example strategy can be defined as a strategy of direct instruction.

In the example-rule strategy, before the vision of the video, it is not provided any pedagogical knowledge about principles, teaching strategies and research evidences (Seidel, Blomberg and Renkl 2013). Teachers observe their videos or other teachers’ videos, they take note about what they’ve watched, subsequently they acquire pedagogical knowledge with the aim of improving their teaching methods. The vision of their own videos can be done individually or shared with colleagues of their own school (see the next section).

The observation of personal teaching actions may improve the professional vision competence. The hypothesis is that the exercise of vision would produce a gradual improvement of own teaching practices (Kleinknecht and Schneider 2013; Tacconi and Mejia Gomez 2012). The videos can give back to the observers the knowledge about facts that during the classroom teaching remain in the background (Borko et al. 2008; Snoeyink 2010). The general scope is learning to vision the teaching practice, searching useful knowledge to solve the educational problems met in classroom. The perspective is about professional development finalized to improve personal teaching competences. This second strategy refers to knowledge construction approach, in which it is stated that learning is meaningful when is the outcome of a process of guided discovery (Lucariello et al 2016).

After this general distinction, it is necessary to affirm that, regardless of whether it works in academic courses or in-service training activities, researchers and trainers can provide hybrid purposes, while working with one of the two strategies or on of the two categories of teachers: pre-service or in-service teachers.

Digital videos and teacher training strategies: direct instruction vs knowledge construction

We recently closed an experimental study that involved 80 future teachers engaged in a academic course for attaining a national qualification in special education. The teachers were randomly assigned to two experimental conditions. The teachers watched two clips in which two teachers communicate feedback to student with special educational needs. One group worked to the videos with a *knowledge construction*

approach, the other one worked with a *direct instruction approach* (Blomberg et alii, 2014). The Table 2 shows the methods used for leading the two training activities.

In each experimental condition we designed five training activities. We have chosen activities that could well feature an experimental condition, putting it in contrast with the other one. The first condition is portrayed for an activity of discovery and sharing with peers. The second is portrayed by activity of understanding and applying pedagogical knowledge about the feedback. Two different researchers lead each condition. At the end of each training we collected data on teachers' background variable, on three facets of feedback, on perceived individual change after participation to the training, on self-efficacy ("how much feel me skilled to communicate feedback to the students"). Two the aims of the study: a) verify if the groups differentiate the responses at the treatments in relation to feedback, perceived individual change and self-efficacy; b) verify if there is an interaction between the treatments and the background variables in the same dependent variables

TABLE 2. SEARCHING THE RELATIONSHIP BETWEEN DIGITAL VIDEOS AND TEACHER TRAINING ACTIVITIES

STARTING AT 2:00 P.M. *Each group together for a general presentation*			
Timing	Knowledge construction approach: training activities	Timing	Direct instruction approach: training activities
15'	First vision of clips on feedback and production of individual notes.	30'	Brief lesson on "how to provide a better feedback to students".
60'	Sharing notes in small groups.	25'	Comprehension test: 10 questions answered in small group.
60'	Sharing notes in whole class.	45'	An instructional design task in 3 phased: individual, pair, small group.
Break 3:30 p.m.		Break 3:45 p.m.	
15'	Second vision of clips.	60'	Examples: presentation of two teaching cases.
45'	Data collection.	60'	Vision of clips and data collection.
ENDING AT 6:00 P.M			

Source: Own

Activate professional vision through "video club"

In the previous sections we have discussed three video-based training strategies thought in relation to the *professional vision model* presented in Picture 2. The use of digital videos in teacher education may help teachers to improve their teaching activity considering what works in teaching and learning. This section provides a brief view of a fourth strategy called "video club". Video club consists of a group of teachers who meet to watch and discuss videos from their own classrooms. The essential elements of a "video club" are three: a) a series of meetings scheduled during school year; b) each teacher shares clips from his or her own classroom 2 or 3 times throughout the year; c) an average of two clips being watched and discussed at each meeting (van Es and Sherin 2008).

Each "video club" meeting has two phases. Prior to meeting, a researcher videotaped teachers' lessons. During the videotaping, the researcher attempts to capture the key facts, for example, zooms out with the purpose to record much of the interactions that took place in the classroom. After taping, the same researcher reviews the video and identifies noteworthy points. For example, the researcher highlights an excerpt in which students show some confusion about a teacher's explanation. For each classroom, one 5-7 min long excerpt is selected, and a relative transcript is prepared. During the meeting, the researcher assumes the role of facilitator, begins the discussion, introducing, for example, the main subject-matter themes and the context of the lesson. The facilitator prompts the teachers to examine students' responses to teacher's explanation, their ideas, thinking and understandings about subject-matter. In order to promote the teachers' analysis, facilitator may formulate questions ("what did you notice"; "If Philip knows mathematical facts, why he didn't answer to teacher's questions?"); encourage teachers in using evidences from video ("what did you see in the clip that makes you state that") or in interpreting what they observed ("What about Philip's understanding of calculation rule?").

From that description, both the facilitators and teachers play an important role in shaping the discussions during the meetings (van Es and Sherin 2008). The facilitator does not have dominant perspective about what are "worthy interpretations". Teachers can offer and debate a variety of interpretations. For these reasons, the main goals of "video club" are the following: a) identifying the noteworthy events in a teaching situation; b) using knowledge from one's context (school, classroom, subject-matter) to reason about these events; c) making connections between specific teaching facts events and pedagogical knowledge (principles of teaching and learning, strategies, student thinking, etc.).

The shared vision can have both potentialities and limits. For example, among potentialities, it can underline the identification process among colleagues. Discovering that a colleague faces teaching problem

like their own can reduce the gravity of personal difficulties and offer sprouts for a possible solution. A second potentiality is the shared interpretation of the educational facts, and a discussion about alternative teaching solutions (Borko et al. 2008; Harford, MacRuairc and McCartan et al. 2010).

Among the limits, it was found the reject to carry out in-depth analyses of personal videos, on behalf of the teachers and of their colleagues, a reaction that could take place in the context of group dynamics (Eraut 2000). Different measures can reduce these limits. A first one is the definition of mutual norms of respect and trust (Lasagabaster and Sierra 2011; Ostrosky et al 2013). The teachers need to perceive a safe interpersonal climate, in order to decide to commit themselves in the analysis, discussion and interpretation on their own videos (Borko et al. 2008). A second measure is assuring teachers that videos do not have evaluative purposes, and that the content of videotapes and of discussions will not be for any reason disclosed outside of the teacher education setting (Snoeyink 2010). A third measure consists in defining a good mix between shared vision and individual vision (Borko et al. 2008). The shared vision focuses the attention on a selection of events common to all videotaped teachers. In contrast, the individual vision can focalize on the integral vision of their own video. In this way, it is suggested to properly organize the vision, following for example the vision protocol described in the second section of this article, since the task of observing oneself is more complex than the task of observing a colleague (Kleinknecht and Schneider 2013).

Conclusion

Teaching is a complex job and we have proposed to explore this complexity trough the *professional vision model* (Gentile and Tacconi, 2016) and the use of digital videos in the teacher education (Lieberman and Pointer Mace 2008). This complexity implies the integration of "what", "how", "why" teaching a subject-matter according to broader principles of teaching and learning (Gredler 1992). According to this hypothesis teachers' professional development depends on the connections between curriculum contents and pedagogical knowledge (Shulman and Shulman 2004). Curriculum contents and pedagogical knowledge should be kept together in such a way as to understand the principles of a teaching strategy and the connections that it has with subject-matter, students, classroom practice, and so on (Shulman 1986).

The video-based teacher education works if the use of video is integrated in a broader training strategy, and above all, the *professional video model* guides the teacher instructors to facilitate the selection of meaningful teaching facts, the reasoning about these facts, the connection between facts and pedagogical knowledge.

It can mix training strategies according to the recipients and learning contexts. The golden rule could be the following: in academic course it's better to adopt a rule-example strategy that helps pre-service teachers to understand and apply pedagogical knowledge. In contrast, in the in-service training it's better to adopt a knowledge construction approach that help in-service teachers integrate new pedagogical knowledge in the own system of situated cognition. It can consider the "rule-example" as a *direct instruction* strategy, while the "example-rule" and "video-club" as *knowledge construction* strategy. The 20-hours teacher training, described in the second section, could be a good mix between two strategies.

Like any other adult learning activity, the design of video-based teacher education is labor intensive. There are two orders of problems. Firstly, on one hand, designing and selecting contents and pedagogical knowledge (Shulman 1986), on the other hand, designing and selecting teacher training strategies (Blomberg et al. 2014). Secondly, proofing the use and maintenance along the time of what has been learned (Baldwin and Ford 1988), consequently, evaluating the impact of teachers' professional knowledge on students' learning (Dagen and Bean 2014). In designing a video-based learning academic course or a teacher training for continuous professional development, the most complex work consists into the care of the teachers' learning process: from understanding to transferring the professional knowledge into the work (Salas and Cannon-Bowers 2001). We should focus our attention on these elements. It is the system of learned professional knowledge that can make the difference in innovation and quality of teaching.

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Language education

VIDEO IN FORMAL AND INFORMAL LEARNING PROGRAMMES

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Key words: Digital learner, Corporate education, ESP - English for Specific Purposes, Multimedia, Tertiary Education, Video learning

Abstract: Digital generation is typically represented by people who are constantly immersed in virtual environments which encourage them to perform numerous types of interactions. This is a close parallel to a simple premise that digital learners of today expect the same from schools, their teachers and learning environments – and also from their employers. Therefore, it is not surprising that multimedia in teaching English for Specific Purposes has become widely used. Corporate education design is changing in a dramatic way. The objective of this paper is to examine, analyse and critically evaluate the impact of new technologies on the changing landscape of instructional design methods currently used both in the world of tertiary education and corporate education. Also in the corporate world, current data on the implementation of the video format into the design of corporate learning materials has been collected, curated and interpreted. It is in the vested interests of the authors to bridge these two worlds and emphasize the importance of video learning as a method of instruction thank to which learning can become not only relevant and engaging but also useful and fun. In order to reach the objectives of this paper, the authors have brought selected results from two research projects: a multi-country survey designed as an empirical probe focused on the current preferred ways of using video formats and other multimedia in teaching English for specific purposes and an empirical probe of Czech Top 100 companies bringing an insight into the use of video formats in corporate education in the Czech Republic. Though a multi-country survey might represent a challenge, its implementation represents an important step towards the internationalization character of the study.

Introduction

Digital generation immersed in virtual environments and used to perform multiple tasks at the same time is entering the university classrooms as well as performing daily operations in businesses. Tertiary educators as well as corporate lecturers are expected to provide similar experience to this generation of digital learners.

The objective of this paper is to examine, analyse and critically evaluate the extent of educational videos and multimedia integration into the portfolio of teaching methods and their impact on the changing landscape of instructional design methods currently used both in the world of tertiary education and corporate education. In this study, the authors have brought selected results from two research projects: a multi-country survey designed as an empirical probe focused on the current preferred ways of using video formats and other multimedia in teaching English for specific purposes and an empirical probe of Czech Top 100 companies bringing an insight into the use of video formats in corporate education in the Czech Republic.

Theoretical background and literature review

Educators across all disciplines frequently face the necessity to innovate and adjust instructional methods based on the social, linguistic, cultural, and learning needs of their students. Parson et al. (2018) further claim that this *adaptive instruction* (as the concept is called in their article) is *"socially constructed as teachers metacognitively reflect on students' needs [..]"* (Parson et al. 2018 2) This social

constructivism is reflected in the need of learners to actively and socially construct and shape the teaching-learning processes. (Tracey & Morrow 2012).

Increasingly, the educational content is being modernized and updated hand-in-hand with technological advancement as well so that the state-of-the-art instructional approaches in the given field of studies can be offered to students. A practical example was provided by Evans and Schenarts (2016) in their article about medical learners using multiple platforms (online resources, videos, podcasts) which, according to the authors, promotes learning and helps gaining information. Frequently, after students leave the educational institution, *"they will almost certainly be users and/or architects of new and changing applications of computer technologies throughout their lives."* (McFarlane 2019, 2). With digital generation represented by people constantly immersed in virtual environments, the task to be fulfilled by educators is even more challenging as digital learners of today expect very similar stimuli from schools, teachers and learning environments.

Teachers of ESP (English for Specific Purposes) and EFL (English as a Foreign Language) are no exception. Often, the opposite is true. These professionals frequently bring educational content in its original language and thus inviting experts from various fields into a language classroom in a form of open access videos, TED talks, etc. The authors Danilina and Shabunina (2018) highlight the importance of unadapted materials (e.g. TED videos) which could offer exposure to real-life language. Overall, language learning can be made more meaningful and engaging.

Nowadays, the method of BYOD (*Bring your own device*) is sometimes utilized in a language classroom as majority of students is equipped with their own portable devices (e.g. smartphones) and/ or could share one per pair. Based on the course content, the instructors are to evaluate whether or not the BYOD method fits appropriately.*"This indicates that teachers need to improve their pedagogical approaches and intentionally adopt innovative pedagogy along with technology through professional development"* (Song & Kong 2017, 45) Language teachers are very progressive professionals and it is not surprising that multimedia and mobile learning devices in teaching ESP/EFL have become a widely common feature. The innovative methods of teaching and learning can boost students' motivation and as a result deepen the language skills. A study by Yamada et al. (2011) *"revealed that the use of mobile learning materials had a positive effect on students listening comprehension and motivation to learn"* (Yamada et al. 2011 in Dashtestani 2016, 450)

The phenomenon of multimedia used in teaching, including educational videos, is increasingly appearing in university education as well as corporate training as it allows for the first-hand experience with the topic. A benefit for instructors in creating educational videos is described by Brame (2015). The author highlights the possibility to reuse the materials. However, the emphasis is put on packaging the

videos with appropriate text and contextualizing them for the particular group and environment for which they will be used.

Frequently, videos offer illustrative and practical materials, often including instructions of some type. So far, the videos have been mostly used in a rather passive mode, i.e. for watching a particular scene, listening to native speakers, or inviting experts to the classroom via TED videos. On the contrary, despite the existing and easily available applications, e.g. video apps for creative use in ESP classroom, the process of multimedia creation as a method of instruction and/or learning is still an exceptional approach. Iammarino (2011) has undertaken a study in a university ESP class with the use of the iMovie. Her findings show that the skills obtained via the digital media utilization are useful not only for improving the skills of a foreign language but can be also transferred to the working world. As Gorina (2016) explains, there is the need for better integration of higher education and employer's demands. In connection with the previously mentioned study and based on their own teaching experience, the authors of this paper are convinced that both teachers and learners can benefit from this method of instruction as learning can become not only engaging and fun but also useful and relevant for the world of work.

The authors of this paper believe that there is a strong reason for the profound modification of the blend of teaching methods, i.e. the digital learner and his/her expectations. Jukes and Schaaf suggest nine core learning attributes of digital generation. Digital learners prefer (1) receiving information from multiple, hyperlinked digital resources; (2) parallel processing and multitasking; (3) processing pictures, sounds, color, and video to text processing; (4) networking and simultaneous collaboration with many other learners; (5) just-in-time learning; (6) learning that is simultaneously relevant, active, instantly useful, and fun. At the same time, (7) they unconsciously read text on a page or screen in a fast pattern; (8) they look for both instant and delayed gratification and rewards, and (9) they live a hybrid existence, i.e. real world experiences and a virtual environment. (Jukes & Schaaf, 2019) In view of these attributes learning materials' designers can clearly see the necessary modifications to be done. The most challenging task is to consider all these aspects as "one whole" since the focus on one or two points only will hardly bring the desired effect. However, it might be beneficial to start with a greater portfolio of choices given to students at school. *" [..] in schools, many of the digital generations have little sense of, or opportunity for, ownership of their lives or learning. They lack the choices as to what books to read, what instructional tools to use, what products to create, or how to learn new information."* (Jukes & Schaaf 2019, p. 61)

PICTURE 1. A DIGITAL LEARNER IMMERSED IN VIDEO LEARNING

Source: authors' own elaboration (2019) using the visual purchased from Shutterstock

Research purpose, methods, tools and research questions

The purpose of this paper is to examine the changing landscape of instructional design from the viewpoint of the state-of-the-art innovative methods. The authors will examine, analyse and critically evaluate the impact of new technologies on the changing landscape of instructional design methods currently used both in the world of tertiary education and corporate education. Special focus is given to a video format, i.e. one's own design proposal and shooting videos and/or using high quality open access videos.

A two phase research among academia and corporate sphere has been designed to gather data on innovative instructional methods incorporating video/ multimedia.

The first study includes an empirical probe focused on the current preferred ways of using video formats in teaching English for specific purposes. In particular, the multi-country research probe on the use of educational videos incorporated into instructional materials brings insight into the work of language specialists and represents an important step towards the internationalization character of the study. Language departments of partner universities as well as random colleges and universities across Europe were sent an e-mail with a link to an electronic questionnaire. The research sample consisted of 63 language professionals from 14 European countries. The research was carried out in the period from January to December 2018 and the response rate reached 17 percent.

In an attempt to meet the objectives of the first study, the following research questions have been formulated. First, the research question pertaining to the teachers' practice in the process of adapting and

using free access videos for their classes was formulated. Then, the research questions (RQs) concerning the frequency of use of these videos in classes and teachers' attitude to vlogging were examined.

RQ1: To what extent do EFL teachers adapt their materials and use free access videos for their classes?

RQ2: How frequently do teachers use their own materials (including videos)?

RQ3: How frequently do teachers use vlogging as a tool of instruction?

In the second study, the phenomenon of video use within corporate education and training is in the spotlight. In order to obtain up-to-date data from the corporate environment, the total of 100 best companies ranked according to the achieved turnover in 2018 operating on the territory of the Czech Republic were approached through an online questionnaire survey. The study Czech TOP 100 (100 TOP - CZECH TOP 100, 2019) provided the source data set. In an attempt to ensure the highest possible expertness, the questionnaire was handed over to CLOs (Chief Learning Officers), or CHROs (Chief Human Resources Officers). Data collection took place between May 17, 2019 and June 6, 2019.

It is in the vested interest of the authors of this article to bridge the world of academia and corporate practice and find out the actual situation with the use of video formats in the current design of corporate educational courses and training. Therefore, the above-mentioned three questions bringing an insight into the world of tertiary education have been complemented by another set of three questions from corporate education and training.

RQ4: In the design of corporate learning and training, we use a mix of various teaching methods and multi-faceted educational resources (lectures, seminars, e-learning courses, mobile courses, mobile MOOCs - Massive Open Online Courses, webinars, educational videos, etc.)

RQ5: In the process of designing training courses, we use our own videos with the aim to provide employees with specific knowledge and skills.

RQ6: In the process of designing training courses, we use high quality open access educational videos.

As for the used research tools, in both studies, the online questionnaires have been designed with the help of a PC application of Survey Monkey. The authors highly appreciated the new functions added to the professional version which enable to work faster and provide survey outputs, including graphical representation of data, which look very professional.

In order to reach the objectives of this paper, the authors used the following *research methods*: (1) explanatory analysis, (2) data collection and curation, (3) synthetizing and interpretation.

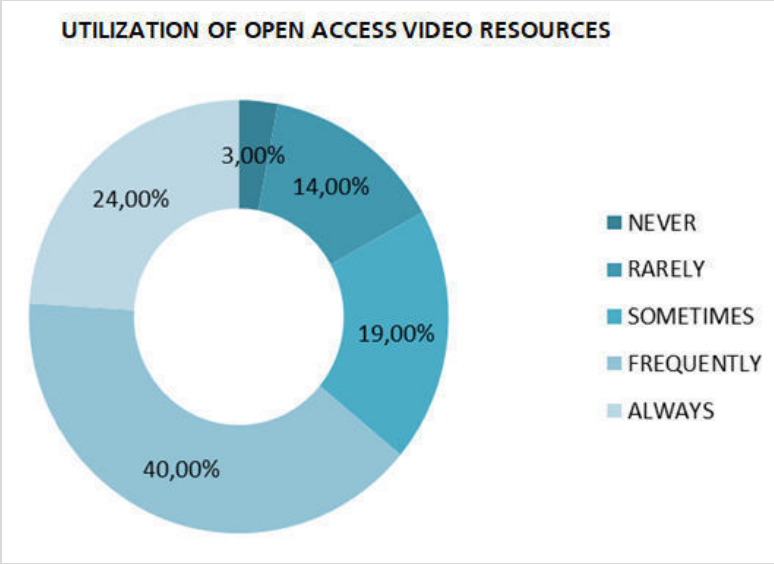
This section presents readers with major findings of the two phase research carried out among academia and corporate spheres. In the first phase (RQs 1-3), data was collected among tertiary educational institutions' pedagogues and main attention was given to the adaptation of their teaching materials with focus on incorporation of open access videos as one of the innovative instructional methods. Second phase of the research (RQs 4-6) targeted on the utilization of videos in corporate educational practice. The most important findings follow below while the answers are organized according to the sequence of the research questions.

RQ1: To what extent do EFL teachers adapt their materials and use free access videos for their classes?

63 language teachers across Europe, majority of whom (94%) teach university or college foreign language classes, responded to the questionnaire. The research probe has shown that in 90 % cases these professionals adapt their materials for language instruction very frequently (55%) or always (35%). The reasons to innovate instructional materials and the ways/methods of teaching are mostly attributed to the technology obsolescence; the other two important causes of adjustment are content innovation (need to cover the state-of-the-art topics from the given field) and mixed ability/multiple level classes.

Graph 1 depicts the utilization of open access video resources among the respondents where only 3 percent of respondents never incorporate this type of multimedia into their class. On the other hand, the remaining 97% utilize this source with almost two thirds of professionals routinely exposing their students to these freely downloadable audio-visual materials in English (40% frequently, 24% always).

GRAPH 1. UTILIZATION OF OPEN ACCESS VIDEO RESOURCES



Source: authors' own elaboration (2019)

It is definitely easier for educators to grab off-the-shelf solutions in case they are available, match the course contents perfectly and fulfill the educational needs of the group of learners or individuals. Those teachers who have devoted their careers to tertiary education know that it is not always possible or that we simply want to move somewhere further. Therefore 84% of ESP/EFL teachers use their own materials (on the scale from "rarely" to "often") including videos; simultaneously, 35% of respondents have even started preparing their own vlogs as a very modern form of multimedia being utilized in language teaching (see Charts 1 and 2).

RQ2: How frequently do teachers use their own materials (including videos)?

CHART 1. THE USE OF VIDEOS IN EFL

Description	Never	Rarely	Sometimes	Frequently	Always
Own materials including videos	16%	11%	28%	27%	18%

Source: authors' own elaboration (data collected in 2018)

RQ3: How frequently do teachers use vlogging as a tool of instruction?

CHART 2. THE USE OF VLOGGING

Description	Never	Rarely	Sometimes	Frequently	Always
Vlogging	65%	26%	9%	0	0

Source: authors' own elaboration (data collected in 2018)

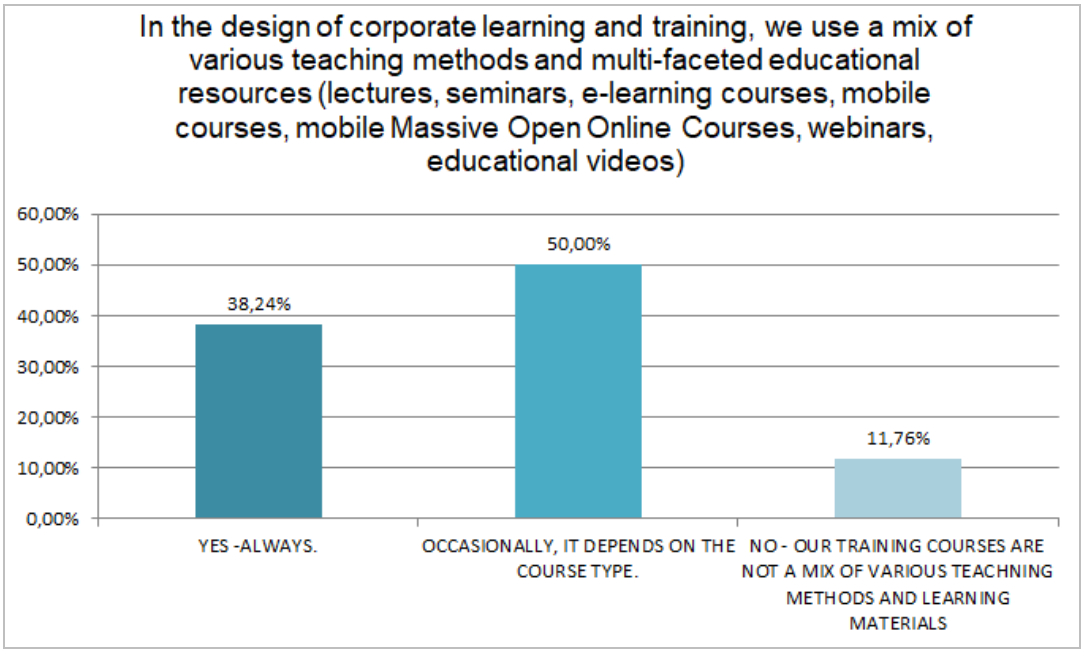
It is not unusual that language professionals at universities are often involved in corporate education as well. Either because their universities offer courses for businesses, MOOCs for general public, or they are involved in corporate training based on their own initiative. The video format as the most preferred way of

consuming information in general is increasingly appearing among the range of instructional methods used not only in EFL classes.

Due to the fact that the generation of millennials (or also labelled as Generation Z) is currently entering (or is about to enter) their first jobs, the authors' carried out the second study aiming at collecting fresh data documenting the current situation in corporate training. Selected findings presented below complete the full picture. In order to stay consistent, main focus is again given to the use of videos as educational content communication channels.

RQ4: In the design of corporate learning and training, we use a mix of various teaching methods and multi-faceted educational resources (lectures, seminars, e-learning courses, mobile courses, mobile MOOCs - Massive Open Online Courses, webinars, and educational videos) (34 answers)

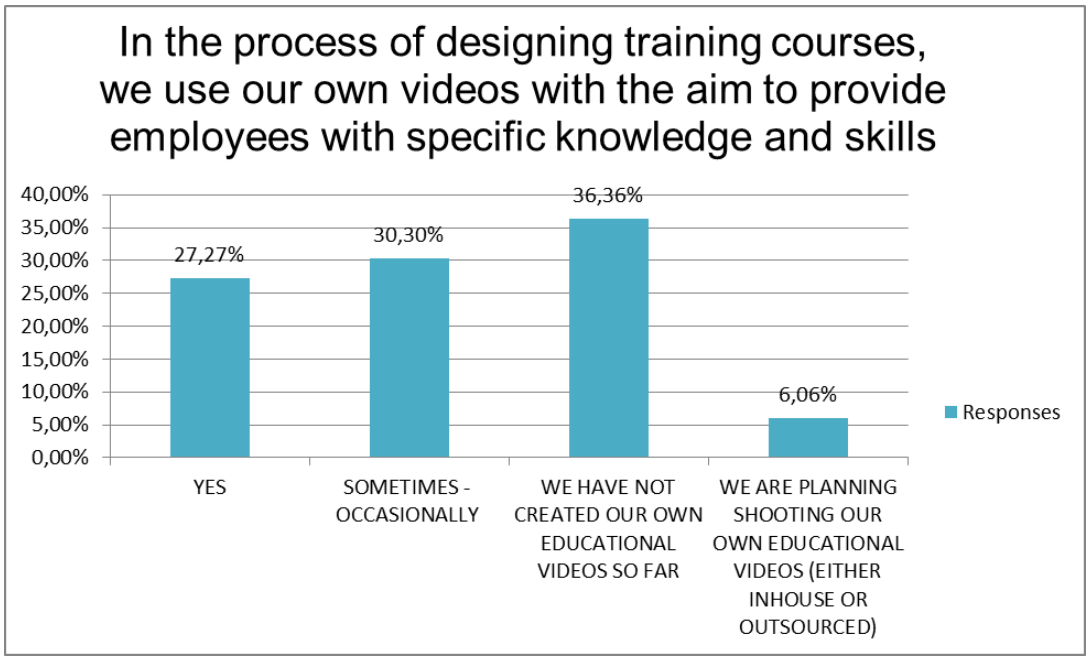
GRAPH 2. COMPOSITION OF CORPORATE EDUCATION LEARNING AND TRAINING MATERIALS



Source: authors' own elaboration (2019)

RQ5: In the process of designing training courses, we use our own videos with the aim to provide employees with specific knowledge and skills. (33 answers, 1 skipped)

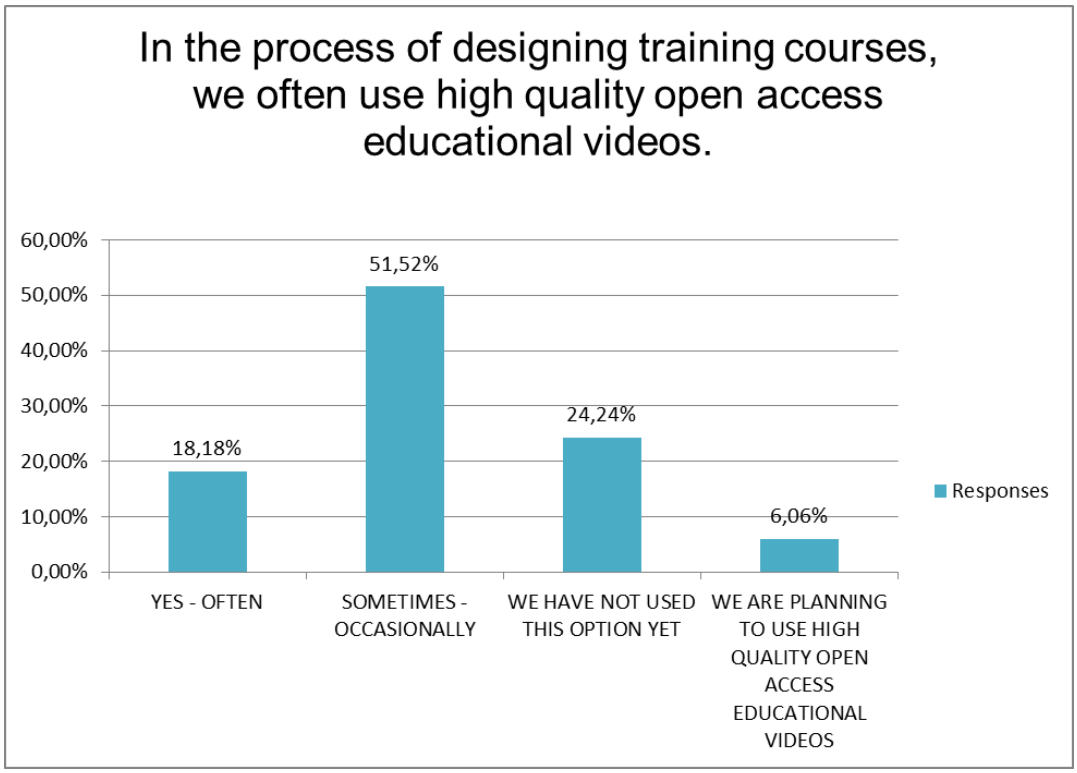
GRAPH 3. CREATING ONE'S OWN VIDEOS IN CORPORATE TRAINING



Source: authors' own elaboration (2019)

RQ6: In the process of designing training courses, we use high quality open access educational videos. (33 answers, 1 skipped)

GRAPH 4. UTILIZATION OF OPEN ACCESS EDUCATIONAL VIDEOS IN CORPORATE TRAINING



Source: authors' own elaboration (2019)

The obtained data and their evaluation provided measurable evidence in connection to the authors' original assumptions concerning the situation in corporate education with respect to the level of use of educational video formats. The above-mentioned respondents' answers to RQ4, related to the companies'

use of a mix of different learning methods and materials to design a corporate training, are a positive signal since a wide portfolio of instructional methods is a prerequisite for enriching the "educational mix" with another educational format, that is, free video format resources. In RQ5, 36.36 % of respondents have never tried to prepare their own educational videos. Needless to say that - for example - induction sessions for new employees in the form of video are definitely worth creating, not only due to financial reasons but also due to operational ones. Last but not least, open access educational video courses represent a cost-efficient option for companies. Moreover, topical content of courses provided from a global perspective offers a chance how to increase the relevance of corporate training courses. Further, research into the level of awareness of the existence of MOOCs (Massive Open Online Courses) is suggested by the authors of this paper as the next research direction. MOOCs offered by prestigious providers, which as a rule work closely with world-class American and European universities, can help companies to reach a higher level of competitiveness and reduce educational costs.

Conclusion

The paper incorporating the two phase research has brought insight into current use of video and multimedia in tertiary ESP instruction and corporate education across different industries in the Czech Republic based on the theoretical as well as practical findings that educators across all disciplines frequently face the necessity to innovate and adjust instructional methods. Delivered by world-class experts, video-format educational materials enable facilitators to invite top experts (usually English-speaking) in the particular field of interest which enriches a class of ESP/EFL as well as corporate tutorials enormously. The educational material does not necessarily have to be in English; in harmony with the purpose of the particular educational unit, it can be in the native language of learners and/or subtitled.

In the first study, it has been found out that a vast majority of ESP instructors (90% of respondents) adjust their instructional materials to a certain extent (55% frequently, 35% always) and change tools and methods of instruction. The reasons most frequently mentioned were: technology obsolescence, content innovation and mixed ability/multiple level classes. As far as the video/ multimedia incorporation is concerned, 97% of ESP tertiary instructors utilize open access video resources with almost two thirds of professionals routinely exposing their students to these freely downloadable audio-visual materials in English (40% frequently, 24% always).

Also the second study unveiled interesting facts. Open access professional educational videos are always incorporated into corporate educational courses in less than 20%, while slightly over 50 % of respondents use them occasionally. However, almost ¼ of respondents has never made use of the open access video courses in the design of their corporate training.

Despite certain limitations of this research consisting namely in the lack of deeper investigation of the research findings' reasons and moderate response rate, there are important implications originating from both research studies. Firstly, methods of instruction, tools and teaching methods undergo frequent changes as a reaction to the rapidly changing needs of learners and dynamic technological advancement; secondly, in corporate education, significant savings and cost reduction could be reached in case a higher percentage of corporate training content and formats' providers proactively used open access educational courses; and finally, digital learners with their digital learning needs should be given a greater autonomy in the selection of instructional tools and/or ways and approaches to new information acquisition. Due to the fact that sophisticated technologies are already in place, there is absolutely no reason why not to use them for the benefit of digital learners and, subsequently, for the benefit of our society.

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TECHNOLOGICAL ADVANCEMENT SHAPING INNOVATION OF INSTRUCTION IN CORPORATE EDUCATION

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Key words: Industry 4.0, Corporate education, Innovation, Educational videos, LMS and MOOC

Abstract: In corporate education, technological advancement strongly influences the learning contents as well as the media and tools used for instruction as innovation drives the need of companies to upskill their personnel. The phenomenon of Industry 4.0 is visible in practice with institutions and companies incorporating breakthrough technologies on daily basis. This fast and challenging technological advancement also shapes innovations in corporate training and its instruction because the transfer is utilizing the newest information & communication technologies. The learning process is increasingly becoming more flexible and mobile. Innovative possibilities of corporate training can include, for example, commercial or open-source Learning management systems along with e-learning, Massive Open Online Courses offered by the most renowned universities or in-house tailor-made courses prepared by company experts. Frequently, companies educate their external as well as internal stakeholders with the use of video spots on their websites. Multimedia spots also represent a common element shared by all the above possibilities of corporate education. Therefore, the author of this article aimed to find out whether internal expertise of companies is utilized in preparation of in-house video-learning materials among companies in the Czech Republic thus cutting additional spent on outsourced education. The objective of the paper was to examine and analyze innovative tools of corporate education in theory and practice. Further, based on an empirical probe among Czech companies, to explore the use of audiovisual guides and video-recorded educational materials created in-house. The collected data was processed with the use of the statistical software SPSS. The hypotheses that 50% of companies frequently make their own videos had to be rejected. It was discovered that video spots are commonly (in more than 75% of cases) recorded by 9% of the researched companies.

Introduction

Rapid technological advancement and fast-paced process of innovation are phenomena which companies, organizations, governmental bodies as well as educational institutions nowadays have to face. The phenomenon of Industry 4.0 is visible in practice: many institutions and companies start incorporating breakthrough technologies into data mining, production processes and their daily operations. In order to name just a few, these are: machine-to-machine technology (M2M), Internet of Things (IoT), Augmented Reality (AR) or Artificial Intelligence (AI) which can, for example, facilitate decision-making, improve efficiency of operations and new products' design and features. Indeed, the rapidly evolving technology has an impact on business sphere. It influences production, daily operations, warehousing and shipping, administration, management, etc. but it also greatly shapes types and forms of personnel education. Technological development makes a significant difference to an essential part helping to create success of the company: qualifications of employees.

In corporate education, technological advancement strongly influences the learning contents as well as the media and tools where learning is becoming more flexible and mobile. For example, there is a visible shift from the use of desktops through laptops to mobile learning and further to learning through various wearables. Innovative methods of instruction are being engaged; ways of gathering information by trainees and learners are changing hand in hand with the speed of technological advancement. Innovative possibilities of corporate training might include: (a) internal or external learning management systems (LSMs) along with e-learning, (b) Massive Open Online Courses (MOOCs) offered by the most renowned universities or (c) in-house employee training courses prepared by companies themselves.

Frequently, the form of instruction and content provision are based on video sequences which, in these days, are also possible to be produced “in-house” by ICT experts and professionals providing the expertise on a certain subject (subject-matter experts).

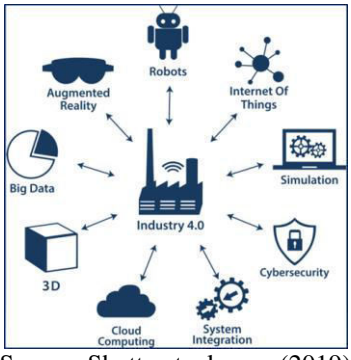
The author of this article aims to find out whether internal expertise is utilized in preparation of in-house video-learning materials among companies in the Czech Republic thus saving additional costs. Therefore, the objective of this paper is to examine and analyze innovative tools of corporate education in theory and practice, and, based on an empirical probe among Czech companies, to explore the use of audiovisual guides and video-recorded educational materials created by company experts in-house.

Theoretical background and literature review

Fast changes and technological innovations in the business environment contribute to increased obsolescence in skills and knowledge and force organizations to renew their skill base regularly. (Dill & Craft Morgan 2017). Digital technologies have fundamentally changed the nature of business environment and occurrence of the so called digital enterprises is rising. European Commission (2015) describes digital enterprises as entities which are characterized by a high intensity of utilization of novel digital technologies in order to sharpen business intelligence, invent new business models, improve business operations, and engage with stakeholders and customer. They also help create the jobs and growth opportunities of the future.

These are impacts of the so called Industry 4.0; a trend characterized by digitalization and automation in production and changes on the labor market. The concept was introduced in Hannover in 2013. The image below (Picture 1) sums up the Industry 4.0 traits which are or soon will be included in daily operations of companies inevitably demanding higher qualifications of employees in companies. The fourth industrial revolution is characterized by: the Internet of Things, simulation, cybersecurity, system integration, cloud computing, 3D, big data, augmented reality and robots.

PICTURE 1. INDUSTRY 4.0 CHARACTERISTICS



Source: Shutterstock.com (2019)

Undeniably, Industry 4.0 shapes the future path for all areas of manufacturing; Kamble et al. (2019) in their study based on data from 205 managers in 115 manufacturing firms even prove positive effects of Industry 4.0 on sustainable organizational performance and lean manufacturing processes.

Skilled and well-trained human resources with digital competence in companies will definitely be needed in the digital society more than ever. In organizational learning and teaching, knowledge management is becoming more demanding in order to develop employees' competency. Internal training experts as well as external educators must be prepared to provide information about technological innovations but - at the same time - instructors as well as trainees will be forced to use more sophisticated forms of information and communication technology (ICT) as a tool for the acquisition or transfer. Yunis et al. (2018) emphasize the role of ICT as a major driver of enhanced organizational performance and economic growth.

Companies can provide their employees with ad hoc training activities as well as planned continuous improvement of knowledge and skills. Below mentioned, the readers can find some of the most modern ways of corporate education and training currently utilized.

Frequently used training methods take a form of blended learning or pure e-learning supported by an electronic platform of a *Learning management system (LMS)*. Such a system can be developed by ICT experts for particular companies but open sources platforms could be used as well. These are Moodle or Mahara. Commercial LMSs are, for example, Blackboard, eCoach, Docebo, LearnUpon, Litmos LMS and others. Based on the server *Reviews for Business: Finances online*, the following traits were identified by Chang (2019) as important design factors of LMSs affecting user engagement:

"A user-friendly structure, avoidance of too many tools and links, support for privacy and anonymous posting, and more customizable student-centered tools"

Professionals across all business fields can also apply and take free courses increasing the level of their knowledge in the required field at many renowned universities and educational institutions that offer the so called Massive open online courses (MOOCs). MOOCs as a tool of corporate education have seen the fastest adoption rate in recent years (De Coutere 2014). In their study, Christensen et al. (2013) showed that mainly job-related knowledge and skills is sought after by working professionals who make up around 60% of MOOCs participants. Based on Faizi and El Fkihi (2017), if companies wisely monitor the offer portfolio of MOOCs, these online learning resources can considerably decrease the corporate training costs. These authors also believe that the thoroughly chosen MOOCs shall be incorporated into planned training activities in organizations.

The two above described methods are usually suitable for English speaking personnel ever though the LSM can offer environment for all employees of Czech companies who do not speak English. Other

frequently used possibilities in corporate education are courses prepared in-house by both ICT experts and professionals of given fields of expertise. Here, face to face form as well as electronic platform might be utilized inclusive of recorded instructional materials and video-based tutorials. Effectivity of technology-supported learning was described by Chen et al. (2019). In their study, the team focused on modern technology-supported learning and discovered that video-based (as well as other technology-supported learning) significantly improved students' knowledge and skills.

The above section described methods of teaching/ learning which had one common trait: they enable and strongly support the use of multimedia spots in the course instruction. The next part of this paper looks at current corporate practices of video use in education.

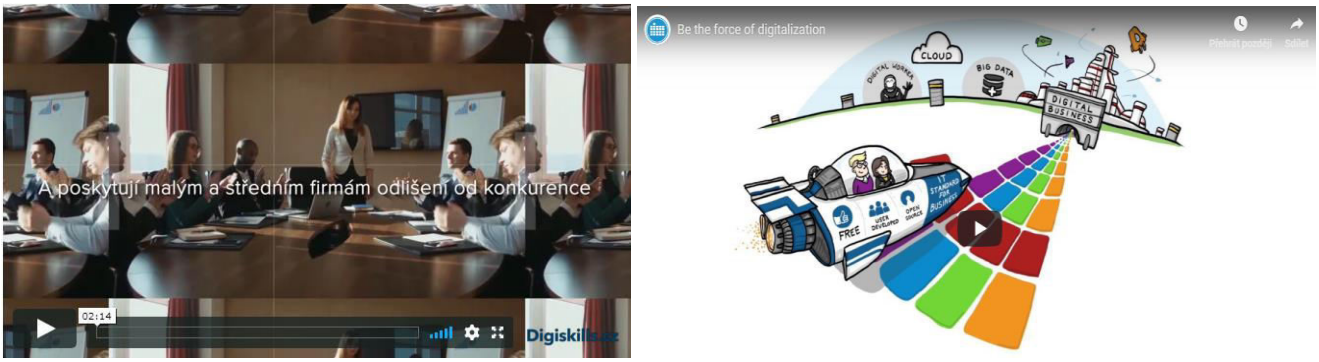
Video used for education of external and internal stakeholders in corporate practice

In the Czech Republic, *Association of Small and Medium-Sized Enterprises and Crafts*[1] declared the year 2019 as the Year of digital entrepreneurship. The project strives to help Czech companies seek, implement and put into practice digital innovations in order to increase productivity and digitalize products and services. On their website, they show educational videos about the project supporting SMEs as well as educational videos with content helping entrepreneurs in their everyday operations.

IT for Business[2] is a website offering information for internal and external audience about new trends in business. In addition to verbal explanation of the process of *digitalization*, the company also presents a video spot called *Be the force of digitalization*.

As visible from many corporate websites, multimedia plays a key role in spreading information and in having a leading position among educational activities and methods (Picture 2).

PICTURE 2. EDUCATIONAL VIDEOS ON CORPORATE WEBSITES



Sources: https://www.rokdigitalnihopodnikani.cz/ and https://www.itforbusiness.org/

Research purpose, tools, question and hypothesis

Firstly, the purpose of this paper is - based on literature review - to describe the most frequently used methods of corporate education all of which enable the multimedia component of instructional video. The second goal is the study of corporate education and examination of the use of videos made within

[1] http://amsp.cz/?s=rok+digit%C3%A1ln%C3%ADho+podnik%C3%A1n%C3%AD
[2] https://www.itbusiness.cz/

companies using their own personnel (ICT experts and professionals of given fields) thus saving costs on shooting educational videos by external companies.

The following methods of research have been used: explanatory analysis, data gathering and mining, and data interpretation.

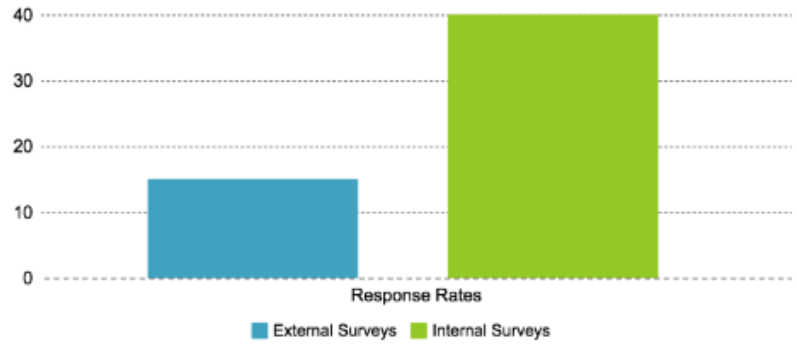
As a research tool, an online multiple-choice questionnaire had been designed and sent to potential respondents among one hundred Czech companies via emails. The target respondents were Human Resource or Chief Learning officers. They were asked to answer 5 questions out of which, for the purpose of this study, one was chosen. As for data processing, the SPSS was used to process the data and to run the binomial test in order to reject or accept the formed hypothesis.

The *research question* was as follows: *Do you use in-house videos frequently (= more than 75%) for employee education in your institution?* As creation of videos is quite a common phenomenon, the author estimated that about 50% of companies are able to shoot their own educational videos frequently thus saving costs on employee training otherwise spent on outsourced services. The *hypothesis* was formulated as follows: *50% of the surveyed companies frequently (= more than 75%) create their own videos in-house*.

Results

This section presents the data and results obtained from the research. The response rate was 35 percent, which is the above-an-average return of answers. Below, the score showing the generally received rates of internal (30-40%) and external (10-15%) surveys are presented based on *Surveygizmo* server (Graph 1).

GRAPH 1: EXTERNAL VS. INTERNAL SURVEYS RESPONSE RATES



Source: https://www.surveygizmo.com/resources/blog/survey-response-rates/

The chart below (Table 1) shows answers processed by SPSS to the research question *"Do you use in-house videos frequently for employee education in your institution?"* Out of the 35 respondents, 9 voted for "yes frequently", 10 chose "occasionally", 13 opted for "no", 1 respondent did not answer this particular question and 2 companies chose "other" as a response.

TABLE 1: RESEARCH QUESTION 1 IN SPSS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes frequently	9	25,7	26,5	26,5
	occasionally	10	28,6	29,4	55,9
	no	13	37,1	38,2	94,1
	other	2	5,7	5,9	100
	Total	34	97,1	100	
	Missing	1	2,9		
	Total	35	100		

Source: Own elaboration

Due to the formulation of the hypotheses and the test used (binomial test), the categories of responses other than "yes frequently" were merged into the "no" category. A hypothesis H_0 which had been formulated before the research was then challenged with the use of the binomial test on SPSS in order to enable acceptance or rejection of the hypothesis. H_0 = *50% of the surveyed companies frequently (= more than 75%) make their own videos in-house*. (π_{yes}=0,5). An alternative hypothesis H_1 was formed as follows: *Less than 50% of the surveyed companies frequently make their own videos in-house* (π_{yes} <0,5).

PICTURE 3: BINOMINAL TEST

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
We use own videos with the aim to provide our emploees with an opportunity to gain specific knowledge and skills	Group 1	yes	9	,26	,50	,009
	Group 2	no	25	,74		
	Total		34	1,00		

Source: Own elaboration

Based on the binomial test (Picture 3), the author can claim that on the 5% level of significance, the null hypothesis is to be rejected (one-sided significance is 0.045) and the alternative hypothesis is to be accepted: less than 50% of the surveyed companies frequently record their own educational videos.

Altogether it was found that 9% from the research sample and 26% from the responding companies frequently prepare educational videos in-house; 10% from the research sample and 29% from the responding firms shoot their videos only occasionally.

Conclusion

This paper has brought insight into current methods of corporate education in the Czech Republic; it has also revealed the main drivers of current changes in this field. Based on the theoretical findings and literature review, the author can claim that fast changes and technological innovations in the business environment contribute to increased obsolescence in skills and knowledge and force organizations to renew their skill base regularly. The main driver of innovation in corporate education is the phenomenon of Industry 4.0 described in the article. In corporate education, this fast technological advancement strongly influences the learning contents as well as the media and tools where learning is becoming more

flexible and mobile with the transfer from desktop PCs to mobile devices and wearables being more customarily used for educational purposes. The three main frequently applied possibilities of corporate education were identified: LSMs, MOOCs and internally prepared training and educational courses of own design. An element of multimedia in a form of educational videos is a common trait noticed within organizational education or on corporate websites where companies regularly explain certain phenomenon to their internal as well as external stakeholders via educational multimedia spots. The ICT and multimedia supported instruction can contribute to significantly better learning results and the use of MOOCs or internally prepared videos can help with cutting the corporate education costs. Currently, the process of automation is embedded in daily processes, many companies are undergoing the digital transformation, and slowly, the augmented reality and artificial intelligence are being utilized by businesses as well.

As videos are being recorded quite commonly by general public for their private use, it was of the authors´ interest to discover whether Czech companies frequently record their own instructional and educational videos. The research findings of the paper are as follows: the hypothesis claiming that 50% of the researched companies frequently record their own educational videos based on the SPSS binomial test had to be rejected. It is less than that. Actually, it was found that 9% from the research sample and 26% from the responding companies frequently prepare educational videos in-house; 10% from the research sample and 29% from the responding firms shoot their videos occasionally.

In conclusion, it is to say that methods of instruction used by the lecturers as well as the content necessary to be transferred onto employees undergo frequent changes in a reaction to the rapidly changing needs of companies based on the dynamic technological advancement. Future research might focus on revealing the adequacy and identifying effectiveness of video training in companies and satisfaction of employees with this form of education.

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THE PERSONAL LEARNING CLOUD AS INNOVATIVE TOOL IN CORPORATE TRAINING

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Key words: Digital learner, Microcertification, Personal learning cloud, Personalized learning environment, Skill transfer gap.

Abstract: Digital enterprise transformation based on the constant flow of innovations is the driving force of disruptive changes in corporate education, both in terms of content and formats. Based on the research findings, the authors of this paper seek to examine and interpret the dynamics shaping the 21st-century form of on-the-job learning. The objective of this paper is to analyze innovative digital learning platforms and virtual learning programmes and thus offer a base for viable systematic approach in the efforts to meet the companies' needs to accelerate the development of people's capabilities. The emergence of "the personal learning cloud" can address the requirements of corporate practice for customizable learning environments, personalized content and just-in-time delivery of learning materials covering a broad array of skills. On the one hand, the ubiquity of online training materials, including the mobile massive open online courses, and a trend towards embracing microcertifications contribute to a plethora of choices; however, on the other hand, the situation poses a threat to traditional training providers, including universities. The authors would like to initiate a discussion on digital learning trends and the need for educational institutions to reconfigure their offerings towards customized learning programs and mobile learning courses. Simultaneously, a more active role of academia in corporate training and closer collaboration with businesses are to be discussed. A self-completion questionnaire for business representatives provides fresh data on digital learning specifics and currently used practice in the design of corporate training. The Continuous Learning Model and Personal Learning Cloud Characteristics template complement this study. In conclusion, opportunities for future research studies on the examined topic are suggested, mainly in relation to skills transfer gap, effective corporate training design, and learning & development success and its measurement.

Introduction

Achieving a successful digital enterprise transformation and staying competitive in the future is preconditioned by seamless integration of the latest technology. However, creating a competitive advantage is not just about implementing state-of-the-art technologies. Companies need *" [..] to establish a culture of agility, innovation, empowerment, and engagement."* (Uhl & Gollenia 2014) Hand in hand with these challenging tasks, the nature of corporate training is changing in a dramatic way. There is a growing concern that traditional educational programmes no longer offer the learning environment expected by digital learners as well as the right set of knowledge and skills needed to face the unpredictable challenges of tomorrow. Extremely high costs of training hand in hand with the often criticized skill transfer gap contribute to the urgent need to redesign corporate learning environments in a profound way.

On the other side of the coin, there is *the learner* – respectively *the digital learner* – with all his or her expectations and digital lifestyle. In order to teach Millennials effectively, educators have to be aware of the fact that constant access to information, anytime and anywhere, is a natural part of their lives. Unlike their educators, they have never experienced anything else.

Among the historical heritage of quotes on learning, there are three worth mentioning: (1) Winston Churchill: *"I'm always eager to learn, although I don't always enjoy being taught."*; (2) Henry Ford: *"Anyone who stops learning is old; anyone who keeps learning stays young."* and (3) Brian Herbert: *"The capacity to learn is a gift; the ability to learn is a skill; the willingness to learn is a choice."* (Learning! Is

it a gift, a skill, or a choice? 2017) Especially *the willingness to learn* is a key point deserving attention in the design of both university and corporate learning programmes since *motivation to learn* is becoming ever more important.

Another critical point is the overwhelming amount of information. "*We're drowning in information and starving for knowledge.*" said Rutherford D. Rogers (American Librarian). (Rutherford n.d) In order to avoid information overload, there is a very useful 'compass' as a helping hand and graphical tool recommended by OECD. 'The Learning Compass 2030' developed by OECD can be seen as *"an evolving learning framework that sets out an aspirational vision for the future of education. It provides points of orientation towards the future we want: individual and collective well-being."* (OECD 2019) The OECD project's authors explain the idea of 'a learning compass' as follows: *"The metaphor of a learning compass was adopted to emphasise the need for students to learn to navigate by themselves through unfamiliar contexts, and find their direction in a meaningful and responsible way, instead of simply receiving fixed instructions or directions from their teachers."*

PICTURE 1. OECD LEARNING COMPASS 2030

Source: (OECD 2019)

In an attempt to design viable systematic approach helping companies to meet the educational needs of their employees directly linked to digital transformation of enterprises, and offer them a tool to accelerate

the development of people's capabilities, the authors of this paper are going to work predominantly with *the personal learning cloud* as an innovative tool in corporate training and its structure from the viewpoint of high quality educational content sources and methodology. Specific *instructional strategies* as self-directed learning, adaptive learning, collaborative learning and lifelong learning will be highlighted and incorporated into the mix of methods. The data gathered from the qualitative research followed by an analysis and interpretation will provide a stepping stone for further elaboration of the topic.

Under the conditions of current digital transformation of our society, human capital development within the concept of lifelong learning is increasingly becoming a vital factor in the attempt of companies to achieve their challenging goals, stay competitive in the long run, and be actively involved in the process of continuous innovation. Based on the literature review and research findings, the authors of this paper seek to examine and interpret the dynamics behind the changes shaping the 21st-century form of on-the-job learning. Their purpose is to analyse innovative digital learning platforms from the viewpoint of their suitability for corporate education and collect fresh data on the current practice in corporate training within 100 Top Czech companies (see Methods). The findings will offer a base for viable systematic approach to the synthesis of the acquired knowledge, its transferability and certain level of generalization in the form of the authors' recommendation for educators (both in corporation and academia) for the nearest future.

Literature review and theoretical background

The objective of the literature review is to examine and interpret the dynamics behind the changes shaping the 21st-century forms of learning, including on-the-job learning.

Already in 1992, professors Gagné and Wagner in the Preface to their work *Principals of Instructional Design* mentioned the idea that school systems of that time were not meeting the needs (of that time). (Gagné, Briggs, & Wager,1992, xi) They also highlighted the need to place more emphasis on learner analysis, cognitive strategies, motivational strategies, and information presentation strategies. It was their aim to initiate discussion on the use of new technologies and their contribution to the instructional design. (Gagné, Briggs, & Wager, 1992, xi).

In recent years, methods of instruction and instructional strategies have been widely investigated in many studies. Focus on *multimedia* (Mayer 2003) has often been the subject of research. Two approaches to multimedia design, i.e. *a technology-centred approach* and *a learner-centred approach*, are taken into consideration as important aspects of the multimedia design instruction and are precisely described and explained by R.E. Mayer in *The Cambridge Handbook of Multimedia Learning* (Mayer 2014, pp. 13-16). *Multimedia storytelling* (Gitner 2016) and *The gamification of learning and instruction fieldbook: ideas into practice* revealing concepts and elements of incorporating *gamification* into learning (Kapp, Blair, & Mesch 2014) bring the newest insight into the topic. Interesting aspects of learners' motivation in relation to *social media networks* has been brought by the authors of the article *Twitter Use and its Effects on*

Student Perception of Instructor Credibility (DeGroot, Young, & VanSlette 2015) examining an instructor's message content on Twitter profile and its impact on a student's perception of the instructor's credibility. Also, Facebook and YouTube offer us forms and content that can be implemented in educational contexts (discussion forums, video analyses, how-to videos, video animations, information and knowledge exchange). These platforms are highly interactive and they also offer the mode of video streaming. They may increase the degree of student motivation and help to acquire important competences after the completion of the academic course. (Sevil, Navarro, & Bernal-Agustín 2014) Video and other multimedia formats can be used in a creative way and seamlessly incorporated into teaching and learning. Picture 2 below describes *Learner-Generated Digital Media* (LGDM) – an instructional method used for the design of digital media as an assessment tool which is becoming – according to the authors – prevalent in higher education. The added value of this model is the fact that it is quite flexible and can be applied to any digital media type, e.g. a podcast, digital story, animation, video, and blended media. (Reyna & Meier 2018, p. 3)

PICTURE 2. LEARNER-GENERATED DIGITAL MEDIA (LGDM)[1]

Source: (Reyna & Meier 2018, 3)

However, in these studies, attention has been given predominantly to formal learning environment. As for corporate education and learning strategies, researchers generally fail to deal with innovative approaches to employee training and there is a little evidence that they gradually adopt the idea that education and training should be designed in harmony with the needs of digital business transformation. An exception to this rule is the study examining the concept of *individualized educational trajectories* as a

[1] DMP stands for Digital Media Project.

constituent part of the educational systems development and its future prospects published by researchers from Volgograd State Technical University. (Isaev, Aleks, Isaeva, & Kravets 2013) The authors highlight the use of *e-learning technologies* in corporate training which brings significant benefits to companies by reducing the cost of face-to-face training, as well as by ensuring the availability of educational materials from virtually anywhere in the world. In their study, courses are understood as *a structured set of training modules which are selected by students according to their personal preference.* The urgency of the educational process transformation in view of its adaptation to the rapidly changing structure of the labour market is analysed as well. (Isaev, Aleks, Isaeva, & Kravets 2013) Important research findings confirmed that the whole education sector is currently disrupted by digitalization and innovation and negative consequences are felt especially in the area of entrepreneurship education. As a result, popularity of Massive Open Online Courses (MOOCs) and micro-credentials is growing (‘13 Entrepreneurship MOOCs 2018).

Another important research area consists in the thorough examination of *digital learners*, their characteristics, changing roles they play in the educational process, and changing learning habits as well as learning formats' preferences they exhibit. The core learning attributes of digital generations are discussed by Ian Jukes and Ryan L. Schaaf in their work *A brief history of the future of education: learning in the age of disruption.* They depict digital learners as students who prefer receiving information from multiple, hyperlinked digital sources; students who prefer multitasking and like multimedia type of information processing to text processing. Learning that is simultaneously relevant, active, instantly useful, and fun is on the top of their preferences and expectations. (Jukes & Schaaf 2019)

On-the-job training has had a long tradition in the Czech Republic. However, traditional areas of education and training focus (foreign languages, soft skills) should be complemented by a new set of skills reflecting the current needs of businesses. Important findings contributing to the discussion which skills are critical for the future have been published in the *Global Skills Index 2019* (Coursera 2019). In spite of the fact that the Czech Republic ranks high in the Global Skills Index (Business 22nd place; Technology 2nd place; Data Science 6th place) and is considered to be an attractive location for investors (Coursera 2019), the focus on digital skills development is fully justifiable.

Corporate universities and the personal learning cloud

A recent collection of articles *Educating the Next Generation of Leaders*, published by Harvard Business Review (HBR) in March - April 2019 issue (Moldoveanu & Narayandas 2019), is an invaluable contribution to the topic of corporate education based on a very precise analysis of current situation. Being partly transferable also to the world of academia, the insight given by various CLOs or CHROs and the authors' suggestions to implement the personal learning cloud in education and training represent a concept that has the potential to shape and perhaps disrupt the future way of learning and personal development. In

the Czech academic research, certain common features can be found in the work of Pospíšilová, a researcher from The University of Pardubice, Czech Republic, who published a book chapter dealing with a digital learning portfolio *Enhancing Learner Autonomy and Active Learning Using Digital Portfolio* (Pospíšilová 2018) where the author suggests to use e-portfolios for (1) students' assessment; (2) as a tool securing higher employability of graduates, and (3) a tool supporting lifelong learning.

Closely monitoring the area of leadership development, the authors of the above-mentioned HBR study identified three main reasons why immediate actions are necessary: (1) *the gap in motivation* on the side of business leaders; (2) *the gap between the skills built by executive development programmes and those required by firms*, and (3) *the skill transfer gap* – consisting in the fact that what is learned is rarely fully applied. The authors' suggestion is to bridge these three gaps without any delay. (Moldoveanu & Narayandas 2019) Based on their personal experience, the authors of this paper are convinced that the results of this analysis are fully transferable also into the world of tertiary education and also to MBA programmes offered by universities as well as by independent providers. They also share the idea expressed in the HBR study concerning the new situation for universities and other educational institutions, i.e. "*Finally, digitization is leading to disintermediation. Traditionally, universities, business schools, and management consultancies have served as intermediaries linking companies and their employees to educators—academics, consultants, and coaches. Now, however, companies can go online to identify (and often curate) the highest-quality individual teachers, learning experiences, and modules—not just the highest-quality programs. Meanwhile, instructors can act as "free agents" and take up the best-paying or most-satisfying teaching gigs, escaping the routines and wage constraints of their parent organizations.*" (Moldoveanu & Narayandas, 2019, p. 6)

At this moment, it is necessary to highlight the role of technology which is completely changing the landscape of education. Thus, corporate universities and the personal learning cloud - which is to be understood as the **growing flexible mix of online courses, social and interactive platforms and learning tools** - are filling the gaps. Organizations can design their training programmes with the help of a careful selection of their individual components. At the same time, they can customize them in harmony with their needs and students'/employees' learning styles preferences, enjoying high levels of flexibility and accessibility. (Moldoveanu & Narayandas 2019) Massive Open Online Courses operated by providers collaborating with prestigious world-class universities play a significant role in the innovative design of corporate learning as well as in cutting the costs of it.

Seeing the benefits of the innovative approaches to corporate learning and training through the eyes of employees, the personal learning cloud enables personal development journey in an unprecedented way: everybody can learn from the best teachers and the most renowned experts in the world.

Methods and research findings

While designing the research, the method of a self-completion questionnaire for business representatives has been opted for by the authors. The research findings provide fresh data on digital learning specifics and their practical implications for teaching and learning.

A sample of respondents consisted of the best 100 companies based on their turnover in 2018 operating mainly on the territory of the Czech Republic. The database is accessible via Czech Top 100. (100 Nejvýznamnějších - CZECH TOP 100 2019) A self-completion questionnaire was designed using an online application SurveyMonkey – Premium version which enables tracking and evaluation of open-ended questions, too. The questionnaire was handed over to the CLOs and/or CHROs of the companies in questions. The purpose was to get fresh data from thriving and prosperous corporations which take care of human capital development, and, consequently, to get acquainted with their experience and perhaps use it as examples of good practice with the high potential of transferability to small and medium-size companies.

The *data collection* started on 17th May 2019 and was closed on 10th June 2017. The *response rate* reached 35 %.

The *research objective* was to examine and interpret the current practice of companies used in the design of corporate training. Selected data sets, specifically the following three research questions, are part of this study.

In order to keep pace with the dynamic changes on the job market and in companies and organizations, there is a clear need to upskill their workforce without delay since technology is advancing much faster than people can absorb. Before adopting the best strategies, it is necessary to have insight into the real situation in corporate learning and training.

With the aim to achieve the above-mentioned objectives, the authors have formulated the following hypotheses:

H1: In the design of corporate learning and training, Chief Learning Officers always use a mix of various teaching methods and multi-faceted educational resources (lectures, seminars, e-learning courses, mobile courses, mobile MOOCs[2], webinars, educational videos, etc.)

H2: In the design of an employee's educational programme, Chief Learning Officers always take into account learners' personal preferences as for learning styles and content as well as the company's needs.

H3: In the design of learning programmes, the Chief Learning Officer/the company collaborates with universities and representatives of academia.

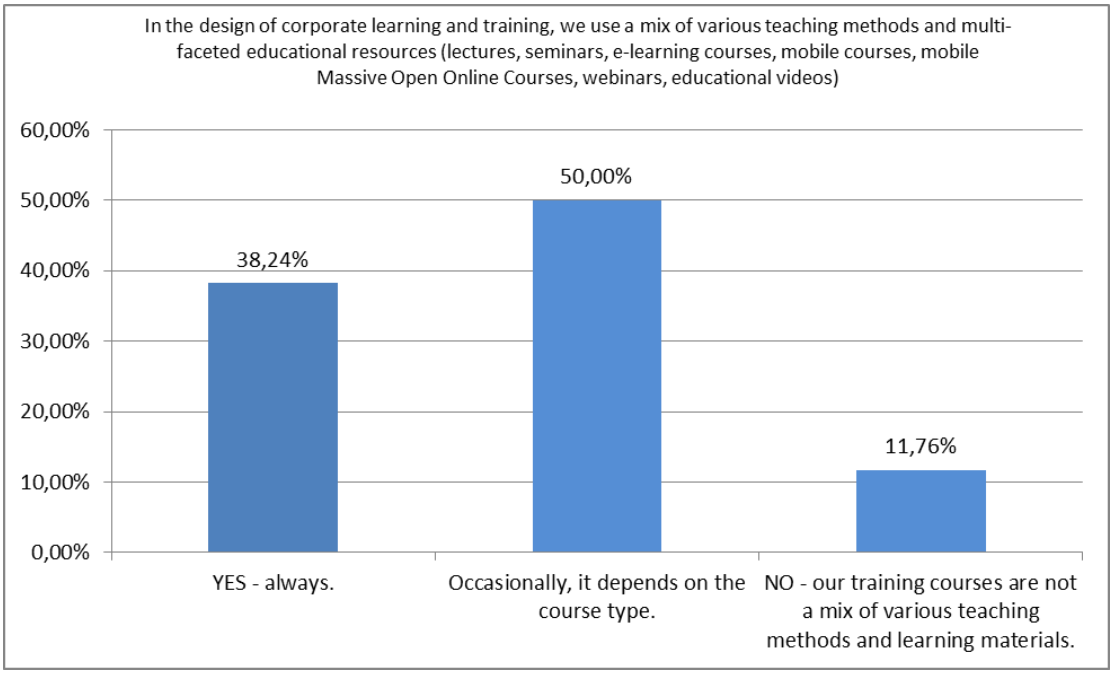
[2] Massive Open Online Courses

Being aware of the pressing need to have fresh data from corporate training practice, the authors carried out a survey focused on the CLOs, or eventually CHROs[3] and their current preferences in corporate training design.

Selected data from this survey and a couple of answers to open-ended questions are worth spotlighting.

Question No. 1 *"In the design of corporate learning and training, we use a mix of various teaching methods and multi-faceted educational resources (lectures, seminars, e-learning course, mobile courses, mobile Massive Open Open Courses, webinars, educational videos)."*

GRAPH 1. SURVEY RESULTS 1



Source: authors' own elaboration

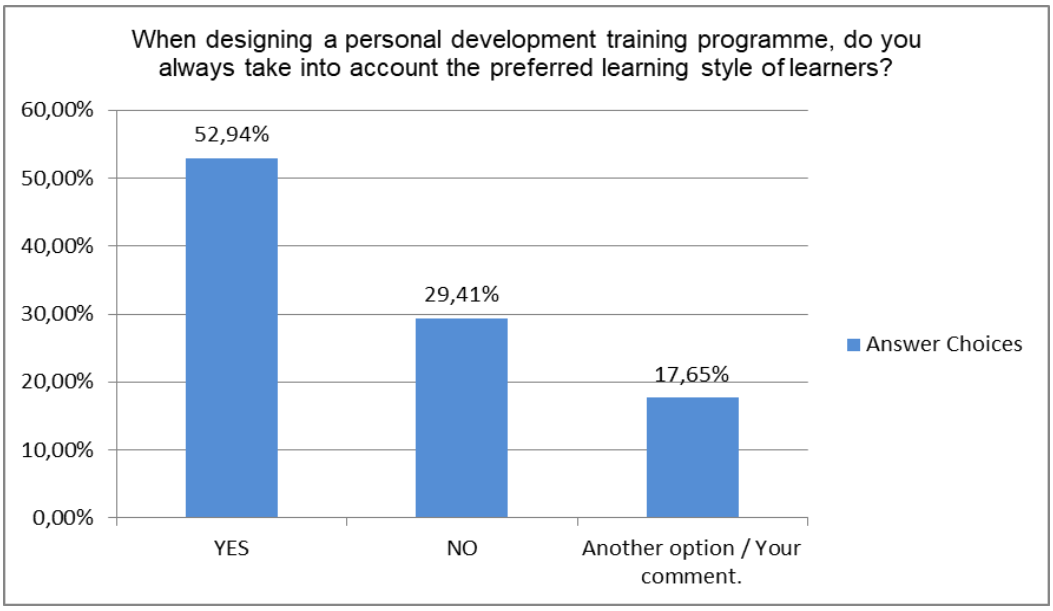
Authors' comment: It is very promissing to notice that the surveyed companies use a mix of various teaching methods and multi-faceted educational resources: almost 40 % of companies always design their corporate training in this way.

Question No. 2a *"When designing a personal development training programme, we always take into account the interests of our company,"* 100 % of respondents unanimously agreed with this statement.

Question No. 2b *"When designing a personal development training programme, do you always take into account the preferred learning style of learners?"*

[3] CLOs = Chief Learning Officers; CHROs = Chief Human Resources Officers

GRAPH 2. SURVEY RESULTS 2



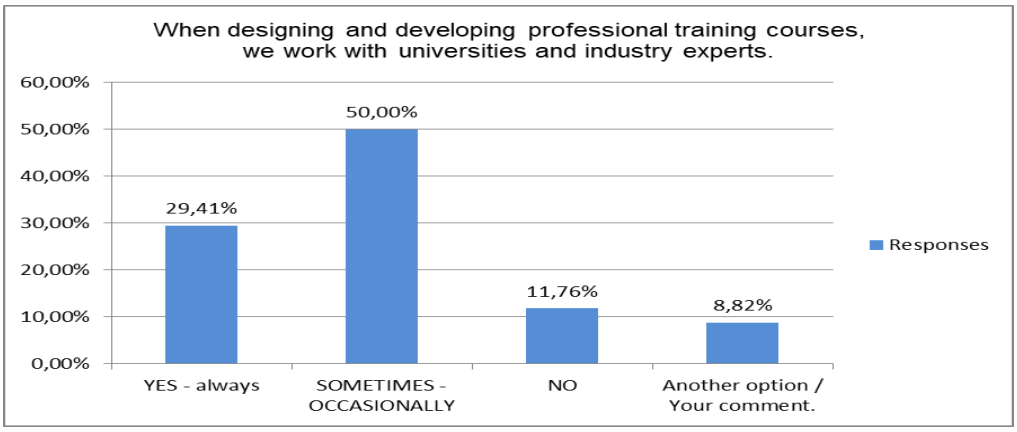
Source: authors' own elaboration

Authors' comment: More than 50 % of respondents always take into account the preferred learning style of employees, which is a positive finding. Simultaneously, there was a plethora of respondents' interesting comments pertaining to this question and reveiling the real atmosphere in companies:

- If we proceed from individual development plans (and training is individualized), then the preferred style of learning / development is taken into account. If the program is designed for a larger group where the approach can be partly more individualized, the approach is based on the experience with development effectiveness, resp. with the use of suitable methods / forms.
- If it is possible.
- Well, only for language learning, otherwise set universally.
- If it is realistic.
- If it is an individual training then yes, if it is the group, then it depends on the trainer's approach; in any case it is a desired outcome.
- Funding is an important aspect, i.e. we offer e-learning also to those who prefer classical training.

Question No. 3 *"When designing and developing professional training courses, we work with universities and industry experts."*

GRAPH 3. SURVEY RESULTS 3



Source: authors' own elaboration

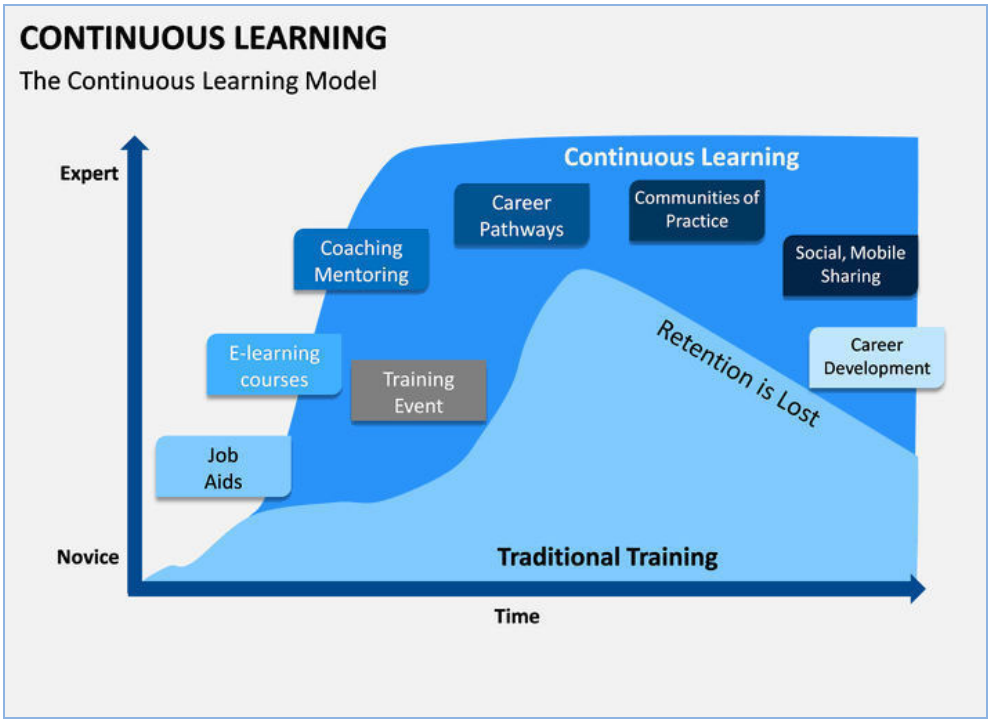
Authors' comment: A mere 29,41% of respondents *always* work with universities and industry experts when desiging and developing professional training courses which is rather disapointing. There were 3 comments pertaining to this question:

- If the question relates to the content of development programs, then certainly yes, because to a large extent we hire experts for this work. In our case, these are mainly medical faculties, IPVZ, law firms, judges, etc.
- No, not with universities, but with professionals who teach or otherwise cooperate with schools.
- We do not cooperate with universities but we try to select experienced industry experts.

By way of illustration, the Continuous Learning Model and a sample of The Personal Learning Cloud template complement this study providing a richer approach and intelligible explanation of the new concept suggested by the authors of this paper.

The Continuous Learning Model graphical representation helps us realize the fundamental difference between traditional training and continuous learning within the frame of adult education, while adult education is to be understood as a subset of lifelong learning.

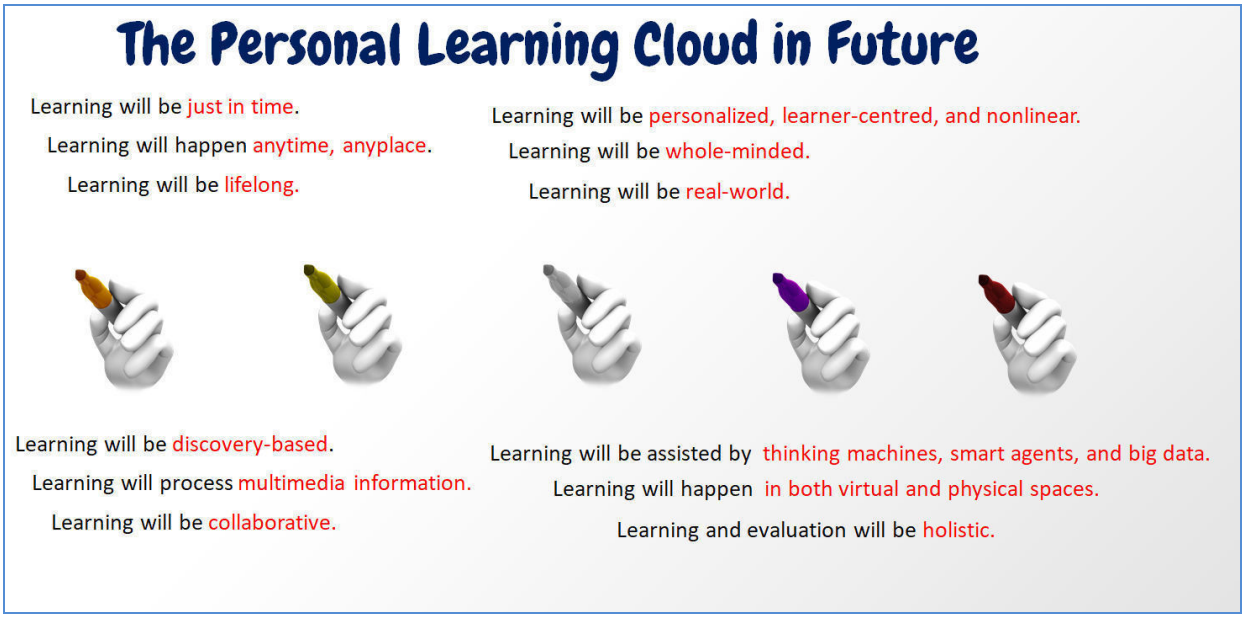
PICTURE 3. THE CONTINUOUS LEARNING MODEL



Source: ('Continuous Learning', n.d.)

The Personal Learning Cloud Characteristics template has been elaborated by the authors based on the predictions about learning in 2038 by Ian Jukes and Ryan L. Schaaf (2019, p. 83) and it is meant to help educators realize the characteristics of future learning environments, platforms and resources.

PICTURE 3. THE PERSONAL LEARNING CLOUD IN FUTURE



Source: authors' own elaboration based on (Jukes & Schaaf, 2019, 83) using a customized visual from Shutterstock.

Conclusion

The purpose of this study was to examine and interpret the dynamics behind the changes shaping the 21st-century form of on-the-job learning. Based on the literature review, the authors analysed innovative digital learning platforms from the viewpoint of their suitability for corporate education and collected fresh data on the current practice in corporate training executed in the 100 Top Czech companies.

The research findings have proved that almost 40 % of the surveyed companies *always* design their corporate training programmes as a mix of various teaching methods and multi-faceted educational resources (lectures, seminars, e-learning course, mobile courses, mobile Massive Open Online Courses, webinars, educational videos etc.) and 50 % of the respondents use the same approach *occasionally*, depending on the course type. Thus, the hypothesis H1 has been tested and can be fully verified. On the top of that, the results can be considered as supporting evidence of these companies' willingness to work with the innovative idea of "the personal learning cloud" since they already now partly apply a similar approach.

Verifying the hypothesis H2, the research has also proved that more than 50 % of respondents always take into account the preferred learning style of employees, despite organizational and / or financial constraints, which is a positive finding. Simultaneously, 100 % of respondents unanimously agreed with the statement that they always take into account their company's interests when designing a personal development training programme.

Unlike the first two, the hypothesis H3 can be verified only partly since a mere 29,41% of respondents *always* work with universities and industry experts when desiging and developing professional

training courses. Though another 50% of respondents admitted occasional co-operation, this finding is still rather disapointing since the open-ended comments to this question clearly deny co-operation with universities. Testifying to the situation in the corporate environment in the Czech Republic, this finding is a fresh confirmation of the above-mentioned HBR study concerning the new situation for universities and other educational institutions. (Moldoveanu & Narayandas, 2019, p. 6)

This study is the first step towards enhancing our understanding of the inevitable and much needed changes in corporate education and training regarding their system of organization, content and context, especially in view of the emergence of Industry 4.0 and digitalization of economies. Also, to the detriment of both sides, the broken links between universities/academia and the corporate world are to be carefully examined and ways to remedy the situation should be suggested and implemented.

The emergence of "the personal learning cloud" can address the requirements of corporate practice for customizable learning environments, personalized content and just-in-time delivery of learning materials covering a broad array of skills. This idea is – at least partly - transferable to the tertiary system of education and should be promoted from the viewpoint of enriching the existing courses by high quality supplementary learning resources. Thus, the digital learner learning preferences will be respected and new generation of students will be more in control of their learning progress and, as a result, even more motivated by an easy access to digital learning materials as part of their own personal learning cloud. On the one hand, the ubiquity of online training materials, including the mobile massive open online courses, and a trend towards embracing microcertifications contribute to a plethora of choices; on the other hand, these trends pose a threat to traditional training providers, including universities.

In conclusion, the authors are convinced that the present findings might suggest several courses of action in order to solve these problems. However, opportunities for future research studies have been clearly revealed, mainly in relation to digital skills transfer gap, effective corporate training design, and learning & development success and its measurement. Also, specific training programmes for CHROs helping them to implement innovative approaches to corporate education are to be designed and made available. Simultaneously, a more active role of academia in corporate training and closer collaboration with businesses are to be discussed and established.

It was the intention of the authors of this study to initiate a discussion on digital learning trends. Last but not least, they would like to invite other researchers interested in this topic to share their ideas and research findings in future systematic collaborative studies. Only then, we will not be drowning in information, and, only then, will not be starving for knowledge.

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CHALLENGES OF TEACHING ENGLISH FOR SPECIFIC PURPOSES TO ADULT STUDENTS

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Key words: adult education, needs analysis, English for Specific Purposes, life-long education

Abstract: Globalisation of the world economy impacts all the aspects of life in Ukraine: public and private sectors, economic, political, social and educational spheres. Acquiring knowledge and developing skills only at university is not enough any more if a person wants to be riding the tide in his/her professional life. Thus, the concept of life-long education is moving to the foreground and the issues of adult education are taking on greater urgency. Under such conditions English, as a necessary means for further education as well as for business and professional communication, is in the focus of attention of governmental bodies of Ukraine and a number of non-governmental organisations. In the framework of one of the British Council projects in Ukraine – 'English for Civil Servants' more than 200 civil servants from a number of governmental bodies and ministries joined a 120-hour English for Specific Purposes course in 2018-2019 academic year. This research paper deals with the issues that arose during that course in terms of identifying learners' needs and catering the content of the course for those needs, developing materials, enhancing intrinsic motivation, managing mixed-ability, mixed-superiority and mixed-authority groups. The research was conducted in three groups: Secretariat of Cabinet of Ministers (11 learners), State Fiscal Service of Ukraine (12 learners) and Ministry of Finance (13 learners). The conclusions about the efficiency of the methods applied were made relying upon the feedback of the learners and the attendance rate of the learners.

Introduction

The modern world is developing so fast that qualifications we got at university are not enough anymore. Skills and knowledge become out-of-date at the very moment we have acquired them. Thus, we have no way out of the situation other than continuing education. Educational market offers a variety of online and face-to-face courses, webinars, seminars, lectures, workshops, tutorials and summer schools to resolve the discrepancy between the existent and required competencies of the employees. British Council Ukraine does not stand apart from the problem of life-long education. One of the projects undertaken by British Council Ukraine is ‚English for Civil Servants. In the framework of this project the civil servants from a number of governmental bodies have the opportunity not only to increase their level of English, but also to master some soft skills necessary for their professional activities. Initially the project was allocated for the period from 2011 till 2015 (Civil servants of Ukraine learn English with British Council). But the demand for the course due to its efficiency exceeded all the expectations, therefore, it was extended till 2019. Thus, in 2018-2019 academic year more than 200 civil servants from a number of governmental bodies and ministries joined a 120-hour English for Specific Purposes course. As the British Council Ukraine cares for all its courses to be 100% productive and efficient, we as British Council ESP trainers and teachers in our turn try to do our best to meet the requirements of the British Council. In order to do this, every time with every new group we need to answer the following questions: what to teach, how to teach, how the way in-service adults learn differs from the way pre-service students learn. And the first thing we should bear in mind is that andragogy is pretty different from pedagogy in terms of motivation, experience and background of learners, the role of the teacher etc. (Knowles, Holton and Swanson 2005, 40). This research is a hands-on experience of tackling these issues, identifying challenges and overcoming difficulties during the 120-hour course in three groups of adult learners.

Methods

This research paper deals with the issues that arose during that course in terms of identifying learners' real needs and catering the content of the course for those needs, developing materials, enhancing intrinsic motivation, managing mixed-ability, mixed-superiority and mixed-authority groups. The research was conducted in three groups: Secretariat of Cabinet of Ministers (11 learners), State Fiscal Service of Ukraine (12 learners) and Ministry of Finance (13 learners). The conclusions about the efficiency of the methods applied were made relying upon the feedback of the learners and the attendance rate of the learners.

Research

So the first issue that arose when I got three groups of civil servants was to identify the content of learning. It was not as easy as it seemed to be. With pre-service student's National ESP curriculum is usually a starting point (Bakaieva et al. 2005). But with in-service learners it is not the curriculum that defines the content, but it is the adult learners who define the curriculum (Knowles, Holton and Swanson 2005, 37). The professional needs of learners should be in the focus of attention of the course. But how to identify them? The ESP gurus consider the needs of analysis as the panacea in this situation, but I would argue that it is not that universal.

Firstly, sometimes the questions are not built appropriately. For example, when we asked the learners, how important it was for them to be able to give presentations in English, to participate in meetings in English or to speak to foreign visitors, almost all the participants of the course circled the option – ‚very important'. But during the course I found out that only a very small number of them really needs these skills in their job: they either do not deal with foreign guests, or do not give presentations, but are a kind of ‚speech-writers' for their bosses. In order to avoid such misinterpretations next time I would rather reformulate such questions into: ‚Are you responsible for dealing with foreign guests at your job?' or ‚Are you expected to deliver the presentations in the framework of your job responsibilities?' and give them the opportunity to range the answers from ‚never' to ‚very frequently'. I consider that such precise ‚yes/no' questions leave less room for misunderstanding and misinterpreting the results. And I believe that if the content of the course is chosen correctly, it will enhance the intrinsic motivation of learners and they will attend every lesson and develop their skills more effectively.

Secondly, even when our learners are aware of what they need, teachers sometimes cannot provide them with this. For instance, learners from the Secretariat of Cabinet of Ministers emphasised in their needs analysis forms that they need legal English. But during oral interviews they complained that their previous teacher had not met their expectations due to two reasons: the teacher was not competent in law and they were studying the legal system of the United Kingdom that is pretty different from Ukrainian one. So, they consider that course as a waste of time, because adult learners value their time and do not want to

spend it on learning something just for fun (Anoshkova). I believe that the situation might have been avoided if the questions in the needs analysis form had been different to identify their language learning gap. This year the course was focused more on developing learners‘ reading and writing skills when they deal with legal documents and drafts of laws. What should be emphasised is the fact that an English for Specific Purposes teacher by default cannot be ‚a Jack of all trades – yesterday s/he taught English to Biology or Mathematics professionals, today – to Economics and Physics students, and tomorrow s/he will deal with lawyers and bankers. Therefore, we should take it for granted that we are not teaching the professional subject of our learners in English, anyway they know it better, we are supposed to teach what we are competent in: English and language skills.

Another difficulty I faced during the course is managing mixed-ability, mixed-superiority and mixed-authority groups. Dealing with a mixed-ability group is a quite common situation in language practice. Despite online testing the applicants for their level and splitting them into groups according to it, in two groups (State Fiscal Service and Ministry of Finance) I had students ranging from A2 to B2, because in first case my group was launched 2 months later than another group in State Fiscal Service and in the situation with the Ministry of Finance my group was the only one in this institution, so we had no choice. Besides the traditional ways of teaching mixed-ability groups as ranging the tasks and pairing strong student with the weaker one, when the first one on the move could give some explanations to the second one, if necessary, I have tried and would recommend teambuilding that helped to create a friendly and supportive atmosphere: some teambuilding games and compiling the code of conduct at the very first lesson, when learners themselves create the rules later required to be followed by every member of the team: not to interrupt, to respect each other, etc. This practice worked well and I have got many positive feedbacks from weaker students, who appreciated the opportunity to speak at their own pace and to be heard by others during the class, moreover, the stronger students did not object to more extensive explanations and treated their weaker colleagues with understanding and support.

More complicated problem turned out to be with working with mixed-superiority and mixed-authority groups. This challenge was absolutely new for me, because before, when I was working with pre-service students, I and the learners themselves understood their equal status. But while working with civil servants I faced the situation when the head of department and his/her subordinate appeared in the same group either several heads were the members of the one group or, out of the blue, one of the top-managers joined the group after two month of the course. At the beginning of the course I experienced such a situation when one of the heads expressed her opinion on one of the topics and nobody from the group dared to voice the opposite opinion, despite judging from their facial expressions and heads they were shaking I saw that they disagreed with her. Or another situation, when the deputy State Secretary of the Cabinet of Ministers joined the group after two months from the beginning of the course, I noticed the tension that

appeared in the group, when those learners who actively participated in group discussions before, now were keeping their mouths closed and were always looking at the deputy State Secretary's reaction. In order to reduce that tension the first thing I did was switching the mode of interaction from plenary discussions to small group discussions and pair work (Cooke, 1994). Then I used more teambuilding activities to make them feel as one supportive team. I also believe that teacher's equal treating them also helped. I equally corrected the errors if necessary and supported both: those in power and their subordinates. The result was terrific, according to the final feedbacks the learners of all the three groups now feel like a family.

100% of feedbacks of the learners were positive, they consider this course to be very beneficial for them, the content met their needs and now they can function more effectively in their professional field. All the respondents want to continue the course in the same team with the same teacher. The attendance rate of the learners was very high. Bearing in mind that they were not assessed during the course and their organisations do not require any certificates of completion from them, I might admit that their motivation was so high that their attendance rates were as follows: in the State Fiscal Service – 5 learners had more than 75%, 5 learners – more than 85%, and 2 learners – more than 95% of attendance, in the Secretariat of the Cabinet of Ministers – 3 learners had more than 75%, 5 learners – more than 85%, and 3 learners – more than 95% of attendance, in the Ministry of Finance – 1 learner had more than 75%, 9 learners – more than 85%, 2 learners – more than 95% and 1 learner had 100% of attendance.

Conclusion

The major findings in terms of the content of the ESP course for adults are as follows: bearing in mind that in case of an ESP course for in-service adults we should build the curriculum around their professional needs we should not only rely upon the needs' analysis, but also tailor every single question in the needs' analysis form to be sure that we are on the same wavelength with the learners in terms of understanding the implied request for information, moreover, we should select the questions appropriately to avoid misinterpretation of the results later, i.e. we need to understand what we want to hear and how these answers can help us to cater the course to the real needs of our learners.

Also while building the curriculum ESP teachers should avoid the temptation to try teaching the subject (Economics, Chemistry, Maths etc.) in English to the professionals in this subject, because the in-service learners are 100% more competent in their professional sphere than an ESP teacher. The language teacher is expected to teach them what s/he is competent in – the language skills. Also the practice showed how important is to research the experience of the previous language course of the group and to gather the feedback from the learners at the beginning of the course, at least one time during the course and at the end of the course.

As to dealing with mixed-ability, mixed-superiority and mixed-authority groups team-building activities worked well, also switching the mode of interaction from whole class work to small group and pair work showed good results, and equal treatment of the teacher to all the group members contributed a lot to building a supportive and friendly atmosphere.

As a result of this research I need to polish needs analysis form: to reconsider some questions for the results to be more informative and beneficial for choosing the appropriate content of the course.

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USING INFORMATION AND COMMUNICATION TECHNOLOGY IN FOREIGN LANGUAGE TEACHING: ADVANTAGES AND DISADVANTAGES

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Key words: information and communication technology (ICT), educational process, foreign language teaching, traditional and modern teaching method.

Abstract: Information and communication technology (ICT) is firmly entrenched within our everyday life and that applies also to foreign language teaching. Personal computing devices and the internet have become powerful prerequisites in the educational process. On the one hand, ICT in foreign language teaching intensifies the learning process. A lesson with interactive activities and live presentations, in which the students can participate, is not only more attractive but also more effective. ICT allows a student's language capability to be developed more fully – at any level. Using computer-based technology, the student can control the learning process, and choose a suitable personal tempo. The student can independently obtain information and practice skills on-line such as pronunciation, and immerse him/herself in the language environment and culture of the relevant country. On the other hand, ICT in foreign language teaching has disadvantages. According to a questionnaire among Ukrainian students, if they are not motivated to study when learning on-line, students can be distracted by other activities such as games, music, etc. The more students use ICT, the more anti-social they become, being limited with the communication with peers. Moreover, constant use of ICT can restrict emotions, feelings and competitiveness. Human interaction remains important and the teacher still plays a pivotal role. The student can learn individually but still needs real-time explanation and communication. Thus, the use of ICT in teaching foreign languages can be most effective when combined with traditional and modern human-based methods.

Introduction

Ukrainian education is in a process of modernisation and reform. Foreign language proficiency and the implementation of European standards in Ukrainian higher education institutions are extremely relevant to this process.

Learning a foreign language is an important factor in the preparation of future, competitive specialists in any field. A foreign language forms the foundation for the professional activities of specialists who will be able to work not only in international companies but in Ukrainian companies which have any international dealings. The modern labour market demands higher knowledge and training in many fields, with continuous professional development being a requirement. A crucial factor in the Ukrainian business landscape is the capability to communicate effectively in native and foreign languages.

Nowadays it is impossible to imagine practical classes in a foreign language without the use of information and communication technology (ICT). ICT is firmly entrenched within our everyday life and that applies also to foreign language teaching. In the age of global information, the traditional textbook – the main teaching tool for many decades – is giving way to electronic and other information and educational resources. The use of ICT is becoming increasingly important as a different approach to learning; motivation and the efficiency of students' independent work are thereby increased.

ICT in education is now an everyday necessity. This raises the question of which approach to foreign language learning is most effective: the traditional, teacher-led class or a computer-based system – or a combination of the two? The organisation of the learning process in a foreign language, using traditional teaching methods and modern information technologies, is a burning issue in higher education institutions,

and one which this paper considers. The analysis in this paper of the advantages and disadvantages of using ICT in foreign language teaching and learning is based on questionnaires to fifty students from the first to fourth-year of the following specialities: "International Relations, Social Communications and Regional Studios", "Philosophy", "Pedagogy and Secondary Education", "Ukrainian Philology" and "Journalism" at Oles Honchar Dnipro National University (Ukraine). The objective was to gather the students' opinion on computer-based versus human-based learning and to identify the prevailing view on which method they considered to be most effective for mastering foreign languages. The pivotal aim of this paper is to analyse and illustrate the advantages and disadvantages of ICT use in foreign language teaching.

Theoretical orientation

Previous researchers have established that there are pluses and minuses in computer-based technology when mastering a foreign language. Polina Zakotnova emphasizes that the implementation of ICT in the learning process speeds up the transfer of knowledge and experience from the teacher to student and from one student to another one (Zakotnova 2012, 85-86). Tatiana Bunakova considers that it is impossible to imagine foreign language classes without using modern information technologies. ICT allows improved effectiveness of classes, a quick response to students' questions and an easier resolution of emerging problems. At the same time, information technologies cannot replace the whole learning process; it is only an additional tool used not instead of but together with traditional methods (Bunakova 2016, 55-60). Blanka Klimova in her analysis "ICT versus traditional approaches to teaching" names fifteen advantages and six disadvantages of ICT implementation in teaching and learning foreign languages (Klimova 2012, 196-200).

Other scholars argue that the use of ICT tools helps students increase interest in the subject and enhance their verbal and cognitive activity, and develop skills for independent and team work. It also helps in the effective formation of all types of speech activity (Timofeeva, Kail 2014, 77-80). Alsu Khakimzianova, Ramziia Gubaydullina and Asiia Iliasova consider the positive and negative sides of e-learning, and remark that among the main drawbacks of ICT learning is the great investment of time, as communication in forums and mail requires more time than live communication in the classroom (Khakimzianova, Gubaydullina and Iliasova 2016, 2-3). A broader perspective has been adopted by May Postholm who is of the opinion that ICT applied in the classroom depends on the teacher and pupils, and the skills and opportunities they have to use (Postholm 2007, 587-599). Rashmi Mohanty identifies the benefits of ICT in education for teachers, students and parents (Mohanty 2011). Crystal Lombardo also distinguishes advantages and disadvantages of technology in education (Lombardo 2019). All of the above share the opinion that modern computing technologies (with their advantages and disadvantages) have become an integral part in the educational process of every higher institution.

Methodological approach

Data was analysed from several groups of university students (years 1-4, 50 students in total) of different specialities from Oles Honchar Dnipro National University. Their level of English was Intermediate to Upper-Intermediate. First of all, after looking at scientific works of both domestic and foreign researchers, some questions were created. I asked the students to answer eight questions about ICT learning and seven questions about learning a foreign language with a teacher. Then it was interesting for me to discover the students' opinion on which method – human-based or computer-based – was more effective for mastering particular essential skills (Reading, Writing, Speaking and Listening) or indeed both methods combined? Each student received three sets of questionnaires (shown below in Table 1, 2, 3). Each questionnaire consisted of a number of multiple-choice questions and the students had to answer in a set format. Then students' answers were set in the tables. Comparative and quantitative questioning to analyse the data was used. In my research, I focused on whether ICT could be advantageous or disadvantageous compared with a human-based approach.

Different ways of obtaining a foreign language

There are many ways of and possibilities for mastering a foreign language: accessible literature, a wide variety of teaching methods and approaches that offer quick results, as well as online programs and websites. However, even such a variety of choice does not protect a student from the difficulties of learning a foreign language. Moreover, the same method is not effective for every student. This is due to the individual psychologies and abilities of students. Introverts and extroverts, serialists and holists learn differently. Some students easily memorise words, others have to use words to retain them. So it is a combination of diverse teaching methods and offerings, including computer technology, which will take account of individual ability, enliven interest and motivate.

The availability of modern technology (computers, laptops, tablets, broadcasting technologies) and the popularity of the internet have created serious prerequisites for the successful integration of information and communication technologies into the educational process (Nuzha and Smirnova 2012, 230). The use of the latest information technology in education and particularly in teaching a foreign language is increasingly important. Researchers have noted that the computerization of the educational process is considered by domestic and foreign methodologists as one of the factors for optimal organisation of training.

Advantages and disadvantages of ICT Use

The use of ICT in teaching and learning a foreign language introduces significant changes for students. For more productive vocabulary memorising, there are computer programs such as LinguaLeo, Words Teacher, ETrainer. A student sees an English word and an associated picture, hears the pronunciation of a word, then pronounces and writes it, doing a number of definite tasks which contribute to better retention.

The Internet has countless websites offering various methods of mastering a foreign language. Language students thus have ample chance to find a program which works for them individually.

Foreign language students can also in this way obtain information independently and are able to practice tasks individually and privately. They can hear the foreign language, practice the pronunciation, discover the culture of the relevant country, and generally immerse themselves into the language environment – virtually visiting the country whose language they are studying. It should be noted that when teaching and learning foreign languages it is important to rely on the regional aspect, since such material expands the students' world outlook and also motivates them to study.

The use of ICT in the teaching of a foreign language increases the motivation, skills and knowledge of students, which in turn improves results. Motivation is a key psychological factor. Aleksey Leontiev considered that "mastering a foreign language is focused not only on activity and communication, i.e. to the interlocutor, and not only to the image of the world, i.e. on consciousness, but also on the student's personality" (Leontiev 1999, 226). ICT intensifies the learning process itself, making the classes more interesting, richer in activities and generally more effective. There is also the useful consequence of improved attendance at classes! ICT can create fertile ground for the development of capability. Nevertheless there are still shortcomings.

Unfortunately, the reality in Ukraine is that not all universities can afford full provision and use of ICT for the teaching of foreign languages. Whilst it has been said that "only if there is a competent choice of computer technologies will the educational process be truly innovative", working with ICT sets new demands on teachers (Nuzha and Smirnova 2012, 234). Some teachers lack capability and experience in ICT and the use of applications such as Power Point for presentations, Picture Manager for editing graphics and Moodle Platform for course management. Furthermore, if the students are not motivated to study and concentrate when learning on-line, they can be distracted by other things. In attempting to mastering a foreign language only on-line, the students lose the benefit of personal contact and suffer from limited communication with their peers. Moreover, constant use of ICT can restrict their emotions, feelings and competitiveness, transforming them into anti-social objects.

Results

The survey was based on a quantitative method of questioning. Fifty students from Oles Honchar Dnipro National University (Ukraine) took part. There were also heated discussions among students over the choice between ICT-based learning and human-based teaching.

The questions in Table 1 "Students opinion on ICT learning of foreign language" looked at the attitude towards learning English with the computers, e-resources, etc. It was revealed that most students expressed a positive attitude to this method of English language training. They were definitely sure that ICT learning

improves language skills, helps when studying and is more effective than learning with a teacher. Nevertheless only 18 students out of 50 considered that ICT learning gives more a profound understanding of the subject. There were some students who expressed dissatisfaction with an ICT learning process. The quantitative result is given below.

TABLE 1. STUDENTS' OPINION ON ICT LEARNING OF FOREIGN LANGUAGE

	Questions	Agree	Disagree
1	ICT learning improves language skills	49	1
2	ICT learning is more effective than learning with a teacher	48	2
3	ICT learning is more comfortable than learning with a teacher	24	26
4	ICT learning gives more profound understanding of the subject	18	32
5	ICT learning helps when studying	50	0
6	ICT learning increases motivation when obtaining foreign language	27	23
7	ICT learning allows comprehending new material better	31	19
8	ICT learning advances social exclusion	27	23

Source: survey of 50 students at Oles Honchar Dnipro National University, 2019.

The answers to the questions in Table 2 "Students opinion on human-based learning of foreign language" showed that all the students questioned believe that the involvement of a teacher improves their language skills and that human-based learning is as effective as ICT-based learning. Most students were of the opinion that a teacher gives a more profound understanding of the subject than ICT. Furthermore, human-based teaching was considered to be more efficient. The result in numbers is as follows:

TABLE 2. STUDENTS' OPINION ON HUMAN-BASED LEARNING OF FOREIGN LANGUAGE

	Questions	Agree	Disagree
1	Teacher improves language skills	50	0
2	Human-based learning is more effective than ICT learning	41	9
3	Human-based learning is more comfortable than ICT learning	21	29
4	Teacher gives more profound understanding of the subject	42	8
5	Teacher helps when studying	45	5
6	Teacher increases motivation when obtaining foreign language	38	12
7	Teacher allows better comprehension of new material	43	7

Source: survey of 50 students at Oles Honchar Dnipro National University, 2019.

From the answers to the questionnaire in Table 3 "Computer-based learning versus human-based learning of foreign language when obtaining the four essential skills" the following was elicited:

Speaking. Speaking skills were considered by 76% to be developed better with the help of a teacher. Only 10% of students wanted to develop Speaking skills using ICT.

Listening. Also 76% of students believed ICT helped more with Listening skills and only 24% thought they could develop Listening skills better with a teacher.

Reading. Almost half of those surveyed (36%) indicated that they can improve reading skills with a teacher and 30% considered enchanting Reading using computer-based method.

Writing. The same percentage (36% compared with Reading) of participants reported that they could improve their Writing skills with the help of human-based method. And a minority of those who responded to this question felt they could boost Writing skills using computer-based method.

Combination. A merging of teacher-led and ICT learning could best develop Writing skills (60%); Reading (52%) and Speaking (48%). Only 42% of students thought this combination would advance their Listening skills.

TABLE 3. COMPUTER-BASED LEARNING VERSUS HUMAN-BASED LEARNING OF FOREIGN LANGUAGE WHEN OBTAINING FOUR ESSENTIAL SKILLS

	Questions	Reading	Writing	Speaking	Listening
1	Human-based method is more effective in learning	18 /50 (36%)	18 / 50 (36%)	38 / 50 (76%)	12 / 50 (24%)
2	Computer-based method is more effective in learning	15 / 50 (30%)	10 / 50 (20%)	5 / 50 (10%)	38 / 50 (76%)
3	A combination of human-based and computer-based method is more effective in learning	26 / 50 (52%)	30 / 50 (60%)	24/ 50 (48%)	21 / 50 (42%)

Source: survey of 50 students at Oles Honchar Dnipro National University, 2019.

Conclusion

Our survey allowed us to identify the advantages and disadvantages of learning and teaching a foreign language using ICT. We assessed the students' attitude to using ICT and compared the human-led and ICT-led methods. The results of the questionnaire (Tables 1, 2, 3) show that each method has its advantages and disadvantages; innovative technologies do indeed advance the learning process but can be most efficient when used in combination with the human-based method. The student can learn individually but still needs real-time explanation and communication. Thus, the use of ICT in teaching foreign languages can be most effective when combined with traditional and modern human-based methods.

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TEACHING ENGLISH TO PRE-SERVICE TRANSLATORS: ON THE WAY TO BLENDED LEARNING

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Key words: blended learning, teaching English, information and communication technology tools, pre-service translators, activities.

Abstract: The rapid development of the information society and the increasing level of students' literacy in information technology brings requirements as for reconsidering the teaching methods in the tertiary education system. As the question of productivity in language education is crucial it demands flexibility in choosing approaches to designing the teaching and learning process. Recent research on the problem reveals great potential of blended learning in teaching English to university students majoring in translation studies. As a combination of face-to-face and computer assisted learning within a course this approach is aimed to make up a complete training programme in the context of pre-service translators preparation.

Blended learning has proved to provide the efficiency in both academic courses and extracurricular forms within linguistic education. With the respect to the roles of the participants in the teaching and learning process through blends the approach under investigation can minimise cost while maximising instructional value.

Having designed specially organised activities the author of the article suggests the ways of utilising suitable information and communication technology tools and learning platforms at different stages of the course in English for pre-service translators. The impact of these activities on the students' autonomy development and their academic performance is described in relation to the process of forming the professional competence of intercultural mediators. The challenges of utilising blended learning in the preparation of students majoring in translation studies are reviewed. The students' attitude to this way of acquiring the language and the level of their motivation towards the linguistic competence improvement are also outlined.

Introduction

The reformation of the higher education in Ukraine according to the world educational standards brings challenges to both academic teachers and students involved in preparation of future translators and interpreters. Among the general world educational tendencies that reflect the globalisation process a student-centred approach is essential in the context of developing the professional competence of intercultural mediators (Zgaga 2014). As the new generation of learners called 'digital natives' are the ones who consider information communication tools (ICTs) an indispensable part of daily work and leisure, they feel comfortable with technology and find it an integral part of the learning process. Contemporary learners in higher education are utilising more technological tools than before in-class and out-of-it. (McCubbin 2016). Therefore, the academic language courses have to solve the contradiction between the need to support the students' motivation in acquiring the professional competences on the one hand and the necessity to develop their autonomy, self-organisation and responsibility via new technologies on the other. This has led to an attempt to find practical suggestions for the successful integration of ICTs into the English course for students majoring in translation studies. Aiming at combining elements which use ICTs with more traditional face-to-face learning within a course blended leaning (BL) suggests the most appropriate form of language tuition utilising up to 45% of online and technically supported activities.

The aim of the article

The paper aims at outlining the ways of using suitable ICTs and online sources, defining their functions at different stages of teaching and learning process and pointing out the challenges in developing the professional competence of students majoring in translation studies via BL.

Methods

The suggested ways of utilisation of ICTs in teaching English to pre-service translators and interpreters are based on observation of recent publications on the problem of BL, describing the results of the practical use of educational online resources, tools and platforms, the results of completing a training course on Methods of teaching languages via ICTs held in Kyiv National Linguistic University (Ukraine) and practical experience in selecting and compilation of additional online tools with the existing face-to-face course to extend the later and develop its efficiency.

Analysis of recent research and publications

Nowadays more and more academic teachers and researches recognise a rise in the use of computers and mobile gadgets by students which is steadily developing. This has resulted in a number of works that introduce computer assisted language learning to higher education in particular. A number of publications are dedicated to BL as a specially organised process of direct and indirect interaction between the participants of the educational process through ICTs (Chernysh 2019; Danysko and Semenovska 2018). There are papers reporting on the experience of utilising the technology of BL in such aspects of the language learning process and course varieties as language practice (Fabrychna and Shevelko 2019), assessment (Hundorov 2019, O'Hare and Bo 2013), teaching academic writing (Sulisworo, Rahayu and Akhsan 2016), teaching listening comprehension in English (Martynenko 2016, West 2018), teaching business English (Ingham 2013) and teaching translation (Shevelko 2013). Among the tools multimedia presentations (Klymenko, Zakordonets and Shymkiv 2017), Facebook (Sulisworo, Rahayu and Akhsan 2016; Fabrychna and Shevelko 2019), digital educational videos (McCubbin 201 Maglione and Tibout 2017), a viki (Ingham 2013), online audiotexts (Martynenko 2016), Google Docs and Google Drive (Fabrychna and Shevelko 2019) are represented.

The main part

The next step of this research is to study why a good blend is important for developing a language course. BL commonly refers to any combination of face-to-face teaching with computer technology (online and offline activities/materials). Designed in a balanced way a language course with a blend helps to improve learning effectiveness, reduces travel expenses and consequently allows to obtain learning objectives quicker. The influence on students' soft skills by means of developing their autonomy and motivation is also observed. According to Claire Whittaker (Whittaker 2013) the right blend is highly important as it can also affect the student's retention in the course so we find a need for careful consideration of the following points characterising a course under development:

1) the proportion between in-class language tuition and e-learning;

2) the modes of delivering information through technology;

3) the stages of the course for pre-service translators where technology can be used efficiently;

4) the selected ICTs and objectives they help to achieve.

Therefore, the first question we had to solve was how the course length, the timetable and the syllabus would define the amount of e-learning performed by the students. In comparison with other computer assisted teaching technologies (web-enhanced, hybrid and fully online ones) the blended English course considers a significant part of activities that involve e-learning reaching the amount of 45% (Whittaker 2013). Within the work on development of the translator's competence our English language course considers both an in-class and extra-curricular form of teaching and learning as their combination proves to provide students with linguistic competence growth. The level of students' autonomy will vary in different activities of all stages in both forms of learning – from the teacher's close monitoring which is generally introduced as live e-learning to students' self-monitoring, often realised in self-paced learning (Whittaker 2013).

The second characteristic of the blended course is the selection of modes that may range from in-class sessions to short instructions that result in independent online work of students. Among other effective modes of interaction between student and student, student and instructor, student and content, student and ICT interface are webbased group activities and personal online mentoring support throughout fulfilment of a particular assignment by students.

Within the course for pre-service translators e-learning can be used in both the curricular and the extracurricular parts. To efficiently support and extend face-to-face lessons the stages of implementing technology should be carefully arranged. The following table represents the way e-tools are integrated into the English language course for pre-service translators pointing out the stages, the students' activities and the objectives achieved with the selected ICTs (see Table 1).

TABLE 1. THE SELECTION OF ICTS AT DIFFERENT STAGES OF THE ENGLISH COURSE FOR PRE-SERVICE TRANSLATORS VIA BLENDED LEARNING

Learning stage	ICTs involved	Students' activity	Objective
The curricular part of the English language course			
• Introducing new vocabulary • Extending / Summarising topical vocabulary	Online mind map maker	• Studying an online mind map • Creating an online mind map	• to introduce a new topic • to summarise a learnt topic
Reading/listening practice	External online resources (YouTube, podcasts, educational sites for English learners etc.)	reading, listening, watching in order to develop the key communication skills	to read / listen / watch the record and perform the tasks
Vocabulary / Grammar/ Phonetics revision	• grammar / vocabulary bots in online messengers (Facebook, Viber, Telegram) • Online puzzle / crossword / wordsearch makers • Online learning platforms	• doing online grammar practice • creating online puzzles, crosswords or wordsearch grids	to drill vocabulary units, grammar structures or/and phonetic patterns via online exercises
Course projects	• Google Drive • Messengers (Viber)	• sending and sharing the projects; • choosing winners of the competition	• to upload the assignment on the suggested topic; • to vote for the best project in the group
Research work	MOOCs (Coursera, Future Learning)	following an external online course	• to get extra information on the suggested topic; • to summarise a module of an external course and report on it
The extracurricular part of the English language course (the Speaking Club)			
Preparation stage	• Google Form • external online resources (YouTube, podcasts, educational sites for English learners etc.)	• filling in an online questionnaire • reading, listening, watching in order to get ready with key vocabulary and grammar	• to vote for issues of interest to be discussed at the Club meetings • to read / listen / watch the record and perform the tasks
• Preparation stage • Managing stage	Google Sheets	filling in a form	to register for participation in a Club meeting; to see the topic, the speaker, the number of participants at the following meeting
• Preparation stage • Monitoring stage	Facebook page	• reading announcements • writing commentaries	• to get informed of the time and venue of the meeting and the topics to be discussed; • to leave feedback on the attended meeting

Source: Own

The majority of learners revealed a positive attitude to doing specially organised computer assisted activities in both the invariant and extracurricular forms of the academic course, which was shown in the results of a short survey conducted among the students of 5 academic groups (64 respondents). According to the survey, 89% of them were engaged in e-learning during an academic semester and 67% of respondents consider it a good opportunity to practise English outside the class for longer periods of time. We also tried to identify the factors that motivated students to proceed in their language studies. More than a half of them (56%) point out getting more practice and thus gaining self-confidence, 52% of respondents emphasize the opportunities to do cooperative learning and use technology they are familiar with as part of the course, 44% report on independence to practise and the opportunity to practise privately to later show themselves. This indicates that the blended English course for pre-service translators is regarded as useful, supporting, flexible and motivating for students.

Despite the benefits mentioned above the process of the course design and participation in it evolves some challenges. We defined the problems as they appeared in the blended course and divided them into groups according to whom they concern – students, teachers or both (see Table 2).

TABLE 2. CHALLENGES RELATED TO E-LEARNING IN A BLENDED COURSE

Challenges students face	**Challenges teachers face**
• Impossibility of getting an immediate response during distant e-learning; • problems in self-organisation; • A possible delay in updating online content.	• Low levels of some teachers' literacy in information technology; • an increase in the teachers' workload; • course design challenges.
• Internet connection problems.	

Source: Own

In the search of a perfect blend we suggest that a successful course and the tools involved in it largely depend on the context. And an effective design of a blended course can derive through following the notion of flexibility where practice, evaluation and reflection are the basic components.

Conclusions

In the article we reflected upon the way a face-to-face language course supported with additional online materials can become a course based on the principles of BL. Both advantages and challenges of using ICTs are outlined. The general benefits of designing a blended course in English for pre-service translators are the possibility to enhance the efficiency of teaching and learning and a flexible approach to learning by means of delivering some training and assessment online. Besides, it revealed notable effects on students' academic autonomy development, their academic outcomes, language acquisition and motivation. Considering the challenges, we would appreciate a further research on solutions to time management, design, technological literacy and other problems relating to the issues of computer assisted language learning so that all participants of the teaching and learning process can experience all the effectiveness of the blending approach.

We also accept a possibility to adopt the developed types of learning activities to suit other teaching and learning contexts, e.g. in designing English for Academic Purposes, General English or Teacher Training courses.

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IMPROVING LEARNERS' PRAGMATIC COMPETENCE IN GERMAN AS A FOREIGN LANGUAGE: INTRODUCING UNIQUE FEATURES OF DISCOURSE IN SOCIAL NETWORKS

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Abstract: Many applied linguistic studies have been carried out in the area of social media. Among other issues, they point out the advantages of using these online communication tools (e.g. Twitter, Facebook, Instagram) in foreign language teaching. The media support students' motivation; they allow communication outside of the class etc. However, they can also serve as a valuable source of authentic language use. Discourse observed in social media communication (Twitter, Facebook, Instagram) bears unique linguistic features different from those in other discourse communities. The study, building e.g. on a study of the language of advertising in social media, uses Speech Act Theory to analyse and describes these characteristics. It identifies specific lexical and syntactic features, and pragmatic language use typical to social media and online communication in German and compares these to print texts. Consequently, it argues for the use of social media in German as a foreign language classes where it can serve as a source of authentic and meaningful language use. It claims learners of German as a foreign language need to be introduced to online discourse and its features in order to become competent users of the language in the 21st century. It further argues that exposing students to the language of authentic online communication, rather than artificially created texts, enriches traditional ways of foreign language teaching and provides learners with valuable language learning experiences.

Introduction and background

In the last few years, social media have become a natural part of life for a large section of society and in the lives of young people they now occupy almost a central role. The high number of users of these communicative media is evident in the latest statistics on social network users. These figures from April 2019 record 2.3 billion active Facebook users, 1.9 billion for YouTube, 1.6 billion for WhatsApp, 1.3 for Facebook Messenger, 1.1 billion for WeChat and one billion for Instagram. [1] Altogether the statistics include 20 different social networks, of which the most commonly used are cited here; however, there is also a perceptible increase in the number of those using other social media outlets. A 2017 study, for example, which focuses on the use of social networks by young people in the USA, states quite clearly: "In 2014, 89.42% (weighted n, 1126/1298) of young adults reported regular use of at least one social media site. This increased to 97.5% (weighted n, 965/989) of young adults in 2016" (Villanti et al. 2017, 1).

In addition to such positive effects as connectivity, the possibility of rapid worldwide communication and so on, this trend also has negative consequences. For instance, some studies have shown a correlation between using social networks and psychological problems: "[...] technology-based social comparison and feedback-seeking were associated with depressive symptoms" (Nesi, Prinstein 2015, 1427). However, it is not merely a matter of specific diagnoses; social media also have an identifiable effect on social interaction generally. Although these media are referred to as "social", they do not always increase one's number of contacts or the quality of interpersonal communication: "Young adults with high SMU (social media use –

[1] https://www.statista.com/topics/1164/social-networks/ and https://www.statista.com/statistics/272014/ global-social-networks-ranked-by-number-of-users/

author's note) seem to feel more socially isolated than their counterparts with lower SMU" (Primack et al. 2017).

Social networks are also a means for propagating negative and often dangerous topics such as self-harm – viz. Moreno (2016) who describes the use of ambiguous hashtags when addressing the issue of self-harm. Another example is the issue of hate speech on social networks (Chetty, Alathur 2018). There are in fact numerous papers dealing with such topics.

Negative phenomena associated with social media is a topic of interest also for the mainstream media, one example being an interview with neurologist Martin Jan Stránský[2] , who states quite bluntly that "[u]se of social networks is directly linked to an increase in anxiety, depression and a decrease in personal satisfaction and health [...]".

Yet for all the negative aspects associated with social media, including some not described here, it must be acknowledged that in this day and age these are the standard channels of communication (viz. afore-mentioned data). Given that the language of social media contains its own quite specific features, yet at the same time is a form of language used daily, it represents a thematic area which should be included in foreign language teaching. Therefore, the primary focus of this paper is specific features of the German language in selected social media, using Speech Act Theory as the basis for linguistic analysis. The author will suggest why, notwithstanding all the negative features of the language used in social media, it is still of benefit to include this aspect of language in German lessons and work with social networks in an appropriate way in foreign language teaching generally.

Methods and analyzed corpus

In order to provide the most accurate data possible when proposing the benefits of using social media in German language teaching, as well as to describe as many different levels of language as possible, the author offers not only the results of her own research (*primary research* based on corpus analysis) but also a summary of previously published papers (*secondary research*). The aim is to characterize specific features of social media language as a whole, then with particular reference to Facebook, Twitter and Instagram.

Since social networks, both collectively and individually, cannot be perceived as a communicative channel containing one single uniform language with identical symbols and features, a variety of examples are presented from selected accounts and different time periods. As a typical example, an analysis (*primary research*) is provided of communication via Twitter and the Facebook page of the German firm Kaufland, using texts which appeared during a 50-day period bridging 2018 and 2019 (specifically from 4th

[2] https://www.irozhlas.cz/zivotni-styl/spolecnost/neurolog-stransky-mozek-rozhovor-facebook-twitter-socialni-site-dopamin-lajk_1904210700_och

December 2018 to 22nd January 2019). These posts were analyzed using Speech Act Theory (see below and Huang 2017, 199-216) and the results compared with texts of advertisements that had appeared in print. Altogether the corpus consists of 56 texts from Facebook and 43 from Twitter, containing a total of 274 speech acts (136 Facebook and 138 Twitter).

An example of Instagram posts is a discussion linked to four photographs representing the most-liked post to appear on 10th May 2019 under #tagtraeumer. This hashtag was selected as being typical of the kind of communication school pupils and teenage students might encounter when working with Instagram. Tagträumer is an Austrian pop group which is popular with this particular age group. In addition to posts by the group itself, the analysis also incorporated 68 subsequent reactions which appeared below the news item.

The analysis looks at the visual aspect of language as well as other factors (e.g. grammatical level, syntactic structure). The main focus, however, is on the use of speech acts, which reflect the pragmatic level of language. Speech Act Theory is one of the basic roots of pragmatic linguistics and, despite having undergone various modifications in its fifty-year tradition, the basic parameters have remained unchanged. As its starting point, this research takes the traditional definition of speech acts: "The speech act or acts performed in the utterance of a sentence are in general a function of the meaning of the sentence" (Searle 1969, 18). The identified speech acts are also described following Searle's classification, which distinguishes between the following basic illocutionary speech acts: *assertives/representatives* (statements), *directives* (e.g. questions or requests), *commissives* (e.g. promises, offers), *expressives* (e.g. thanking, congratulating), *declarations* (e.g. christening, firing) (Huang 2017, 201).

For a simplified general description of the speech acts under analysis, Speech Act Theory is extended by macro-speech acts: "Such a speech act performed by a sequence of speech acts will be called a global speech-act or *macro-speech act*" (van Dijk 1992, 238). This follows Voltrová (2019), who examines the issue of macro-speech acts used for communication on social networks by the German company Kaufland.

Selected specific features of German on social networks

The following description of specific features of German on social networks should not be regarded as all-embracing: as mentioned previously, communication on social networks is highly heterogeneous; hence the results presented in this paper should also be viewed as partial.

The secondary research

For a description of the language used on Twitter, the conclusions of Moraldo (2012) are relevant in offering a detailed, multi-layered description from various perspectives of German as used on this communicative platform. Although recent years have certainly witnessed developments in this area (e.g. the increasing use of emojis), thanks to the specific nature of the brevity of its posts, the basic features of

linguistic expression on Twitter (especially in the area of syntax) have not changed significantly. Moreno notes simplified syntactic structures (particularly the omission of articles, subject, auxiliary verbs), lexical reduction and use of "Jugendsprache", or "teenage language". An example of lexical reduction is the use of English acronyms (*lol*, *omg* …), which, however, can also be found on other online platforms or even in the spoken language of young people. Elements of "Jugendsprache" are likewise typical of other online platforms – see the use of Umgangssprache, namely colloquial language, and dialect or frequent use of participles, also described by Moraldo. The above-mentioned features likewise appear regularly in the current author's corpus of Instagram texts.

The primary research

The results of research into Kaufland's online advertising (Voltrová 2018 and 2019) shows the fundamental role played in this type of communication by visual elements and these are clearly identifiable also in online texts and texts on social networks whose purpose is other than advertising (see below). In this context it is interesting to note the considerably more common use of emojis on Facebook (on average 1.9 emojis per single post) to that on Twitter (0.2/1). By comparison the difference in frequency of pictures accompanying posts is negligible: 1.2/1 on Facebook and 1.1/1 on Twitter. On the basis of this data, the strong role of visual elements in the type of communication under analysis may be taken as given. This also applies in cases where these elements often have a quite distinctive character of their own and are not referred to directly in the text (this is true of 48% of the texts on Facebook and 91% of those on Twitter).

Comparing the structure of macro-speech acts in the Kaufland Facebook and Twitter corpus with that used in printed advertisements (Simon, Dejica-Cartis 2015 a, b), it is evident that – even if in both cases the field is advertising – the macro-speech acts identified in the printed advertisements were insufficient to cover all cases of the social network groups. For reasons of interactive communication on social networks, two new groups were identified, containing appellations and expression of emotions.

The analysis of Instagram language is based on posts attached to four photographs offered by Instagram on 10.5.2019 as the most-liked item under #tagtraeumer, linked to the Austrian pop group Tagträumer. The analysis incorporates a total of 68 responses from fans of the group which appeared under the photographs. The content consisted mostly of enthusiastic reactions to either forthcoming concerts or ones that had already taken place.

Instagram by its very nature is focused on visual material since its primary purpose is the sharing of photos. With this in mind, one might expect the posts attached to shared photos to be about those very photos. However, this particular sample contained not a single reference directly linking the photograph with the text (e.g. a more detailed description) and only on three occasions was the photograph mentioned in a more general sense.

The high occurrence of emojis (on average 1.6 per single contribution), and especially in some cases groups of them (up to six or seven in one contribution), combined with the purely peripheral use of emoticons or hashtags (a mere three emoticons and five hashtags in the entire sample) represents a certain unifying feature of the data, one that may be regarded as having a very similar form. This is also true of the subject matter of the texts and corresponding speech acts. The most frequent occurrences in the corpus are of assertives (47) and expressives (18). At the level of macro-speech acts, the most common features are information (25) and expressing emotions (20). This representation of individual groups within the sample is also quite specific in comparison with the language discussed in textbooks of German.

For the purposes of our argument, namely the use of social media in German language teaching, it is also important to note that, in addition to the pragmatic level discussed above, the Instagram sample included only 45 utterances containing a main verb. Thus, this sample also shows significantly reduced syntactical constructions of the type described above (Moraldo 2012), which might represent a fundamental barrier to comprehension for pupils and students of German. Of the analyzed texts, 36% contain what would be considered a mistake according to codified norms (either at orthographical or, for example, morphological level). A typical example in this respect would be the post *Wer gerne dabei gewesen*, where the correct form would be *Ich wäre gern dabei gewesen*. Since the word *wer* means *who* and, moreover, here again the subject is omitted, this could lead to an incorrect decoding of the message by students. The analyzed corpus also contains examples of repetition of letters, which Moraldo refers to simply as "Mehrfach-Iterierung", or "multiple repetition" – e.g. *wirr* (instead of "wir") or *sooooooooo cool.* Some high frequency constructions display features which students are taught are quite unacceptable in German – for example a missing subject, as in *War gestern in J. mit dabei* (cf. English *Was there in J. yesterday*).

In conclusion, it may be stated that both the author's corpus and other studies cited here describe quite specific features of the German language on social networks and these are present at all linguistic levels (especially syntax, lexicology and pragmatics).

Why use social networks in teaching German as a foreign language?

Modern media generally, including the Internet or social networks, may serve in teaching (not only languages) as an excellent means of motivation. This, however, is not the only argument in favour of their inclusion in the educational process. As regards the teaching of foreign languages, it is in general highly appropriate to use authentic texts because it is precisely these that school students will encounter when working with a foreign language. Just as it is important for a variety of reasons to work with literary texts (for how and why, see e.g. Mehnert et al. 2016), it is also recommended students be familiarised with other forms of authentic communication (television, news, advertisements, social media).

Further positive effects of working with these new forms of communication in teaching have already been described in several studies. These include, for example, the surprisingly positive effect regular work with tweets has on pronunciation (Mompean, Fouz-González 2016); Ekahitanond (2018) describes the positive effects of using Facebook as a learning tool; Naghdipour (2017, 130) states: "[U]nder some conditions, Facebook could function as a learning environment to revamp students' interest and facilitate their engagement in collaborative language learning activities."

In addition to the arguments presented in published studies, there is one further point already hinted at above relating to field-specific features of the language used. Differences in syntax (viz. the example of condensed constructions above), morphology, lexicology or pragmatics can cause problems to learners of German, particularly in their perception of a text on a social platform. As mentioned previously, however, such language, for all its specific features, is a completely natural means of communication amongst young people: "Internet takes up a large part of the time in adolescents' lives, especially as a means of communications, being WhatsApp and social networks the most commonly used apps" (Reolid-Martínez 2016, 6). Therefore, if we want pupils and students of both German and foreign languages generally to be motivated and work with material which, for them, is natural, it is necessary not only to explain the specific features of social media language but also work with them directly in that same environment. Furthermore, social networks offer easy contact with native speakers from a similar age group, which may form a basis for personal contact in the future. Working with real-life social networks is certainly more effective and beneficial than using adopted texts of a similar type to the sample texts in the Deutch.com 1 textbook.

Conclusion

This paper describes some selected specific features of the German language used on social networks. The primary focus is a characterization of language at the pragmatic level and a description of the language used on selected Facebook pages, Twitter and Instagram. As the studies cited show, it is certainly possible to speak here of quite specific differences between the "traditional" written form of a language and this modern linguistic hybrid. At the same time, this paper also shows it is not possible in the context of social media to speak of "one single uniform language". The means of communication and linguistic strategies employed differ significantly according to network, site or user. Focusing on a description of speech acts and their categorization – using, for example, van Dijk's macro-speech acts (van Dijk 1992), it is quite evident that the social network pages analysed here contain specific features not only in terms of syntax and lexis but also in the area of pragmatics. This applies particularly in the case of speech acts connected with interaction (viz. the Kaufland Facebook page) and the high number of expressions in the Instagram texts. Overall it is certainly important to emphasize the role of visual elements in communication, for

example in the texts on Instagram or Facebook; in the case of Twitter the amount is less (see results above).

In recent years, social networks have become one of the basic pillars of communication around the world (in April 2019 Facebook was the most widely used with 2.3 billion users, YouTube had 1.9 billion; other data and their source appears above). Given the need in language teaching to prepare school pupils and students for authentic communicative situations, working with social networks should form a completely natural part of teaching both German and other foreign languages. Appropriate work with social media, including a discussion of the risks and negative aspects of this means of communication) is an excellent means of motivating students because it represents an authentic form of contemporary language used in everyday communication. If pupils and students have not been introduced in a natural manner to the specifics of this way of communicating in the foreign language they are learning, their lack of competence in this area may result in their exclusion from common and authentic communication of the 21st century.

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ESL FOR B+: MODERN LANGUAGE LEARNING TOOLS AND EXPERIENCES IN TEACHING SPEAKING

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Key words: ESL, speaking skills, education, language learning tools, applications

Abstract: Globalisation and technological development have opened new horizons for learning and teaching English as a second language. Meanwhile students clearly highlight that speaking is their key problem in real-life interaction caused by various factors, starting from syllabus requirements to lack of motivation or physiological features. Thus, nowadays there arises an issue of fast and efficient speaking skills acquisition that must be tackled accordingly.

This paper focuses on the research of modern language learning tools and their practical use both for classroom-based speaking practice and self-studies for L2 learners of B+ levels. The results of the research show how conventional communicative activities, such as role-plays, pyramid discussions, simulations, brainstorming, story completion, etc., when complemented by activities related to the use of technology tools contribute to progress in speaking. Audio books, cartoon episodes, short videos may serve a platform for speaking activities in the classroom whereas online chat rooms, network groups and student learning communities provide maximum opportunities for students to dive into the real world of communication, helping them learn speaking patterns. Additionally, mobile applications offering vocabulary study sets with numerous tasks facilitate the pre-speaking stage. The challenge also lies in having intelligible pronunciation and accuracy of the language, which can be gained and enhanced via mobile applications that help drill isolated sounds, phrases and sentences. Additional benefits include enhanced listening skills and the ability to get more comfortable with face-to-face communication.

Introduction

Nowadays, rapid development of information technology has contributed a great deal into enhancement of the language learning process. Both teachers and students find it increasingly important to apply technology-assisted language learning tools and experiences. In recent years, there has been an increasing number of studies that address the employment of web-based tools and modern apps in language classrooms (Darsih, Suherdi and Safina 2019; Hamad, Metwally and Alfaruque 2019; Knihová 2017; Kubálek and Kubálková 2017; Petkova and Pavlova 2017; Sun and Yang 2015, and many others). The advent of the Internet opens more opportunities not only to stay connected with each other and informed about news but also to share and acquire knowledge. It is clear from these observations that information and knowledge are both seen as basic and conditional assumptions of education, but thinking and learning, along with education, are also influenced by technology that we use (Fabrychna 2017; Gálik 2017; Hronová 2017; Nomass 2013; Syzenko 2017). Thus, language educators and learners of English as a second language (ESL) constantly search useful technology tools to help facilitate their teaching and learning process (Diachkova 2017; Didenko 2017; Pospisilova 2017; Rigo 2017, 2018; Sankaravelayuthan 2019). Meanwhile the issue is burdened not only by the desire to know more or learn the language faster. Students clearly highlight that spelling and grammar skills are the easiest to drill whereas speaking is considered their key problem in real-life interaction. It may be caused by various factors, such as psychological stress triggered by lack of motivation or/and confidence, low self-esteem or physiological features. In addition, syllabus requirements in schools and universities are strict in term of timeframes and topicality to allow extra time for details or difficult points. Thus, nowadays there arises an issue of fast and efficient speaking skills acquisition that must be tackled accordingly.

Methods

To conduct the research it was necessary to browse the Internet and Google Play store and select the relevant up-to-date free applications and effective speaking practices, use them at the lessons to check their efficiency and thus group them in accordance with their rationale, practical and user-friendly points, etc. The criteria applied to apps included 1) a variety of interesting ESL activities focused on teaching/learning speaking, 2) a possibility to speak with real people or be recorded, 3) compatibility both with PCs and mobile phones, 4) a complementary focus on learning personalised vocabulary and listening, 5) popularity.

The total number of applications tested in the review was 37. 17 of them were selected by the students as the ones to work with. The minimum number of apps used by every student amounted to 10.

The criteria applied to classroom and out-of-class activities that benefit to speaking skills were the following: 1) task-based teaching/learning, 2) opportunities for meaning-focused language use, 3) free use of any extra patterns to express the issues in the process of achieving the task or goal, 4) maximum engagement of learners' interest.

The most efficient and result-oriented activities and applications were chosen to be used and investigated in combinations or sets depending on the topic, phase, students' level of English.

The targeted groups were university students of 2 and 4 years of studies and totally counted 75 persons. The total number of conducted classes in the targeted groups amounts 260. Each student answered 10 general questions before, during and after the research to assess and compare the emotional feedback and psychological issues and had 9 interim topical and 4 final language tests to assess the results in speaking. All the language tests were part of the university curriculum. The questionnaires focused on the psychometric issues of confidence, success, language problems, fears, time, behavior patterns and preferences of ESL learners.

Results

The results of the research show how a combination of conventional communicative activities, modernised to practice in class and complemented by activities related to the use of technology tools contribute to progress in speaking with students of B+ levels. All the activities were grouped up to the place of usage: **classroom speaking activities**, **preparative out-of-class speaking activities** and **consolidating out-of-class speaking activities**. This classification emerged due to the fact that teaching and learning speaking is basically done in class but modern technologies nowadays can offer new horizons to students and assist them in practicing speaking out of the classroom. Each group presents its own characteristics, thus it entails different recommendations to follow.

First, I selected the top 10 classroom activities that benefit to speaking skills:

Brainstorming – is an activity aimed at generating many random ideas in small groups within a specified time-period. Besides, the given activity prepares to real-life situations and enriches imagination.

Debates – is a simple form of game to practice both speaking and team-building. In this game two groups of students are given the list of topics for debates preliminary prepared by the teacher. When presented a point to discuss, one group's task is to agree with the idea, and another group disagrees.

Guess the Emotion – is a competitive game targeting students' feelings and emotions. Participants are divided into two teams and show or pantomime an emotion (e.g., embarrassment, fear, love, anger, devotion, etc.), prepared by a teacher as cards and the competitor team is to guess the emotion. To encourage the students, the teacher may award points for each correct and fast guess.

Just Listen – is an activity that encourages participants to speak how they feel about a subject. Students are encouraged to recap on what the partner has said on the subject. Additionally, this activity also strengthens listening skills and an ability to memorize and summarize the information.

Open-Ended Questions – is an activity that is meant to inspire hot discussions. The indicated type of questions requires an extended response and shows multiple ways to answer the same question. Students are thus challenged to demonstrate their speaking skills and personal views. For instance, special questions usually evoke more desire to speak out and take part in discussions.

Picture Telling – is an exercise that will unveil your students' talents to put their ideas into words. Depending on a topic, a variety of pictures will let the students describe what they see processing visual cues in story form. This activity may be a magic wand during pre-training stages of learning topics and when spotting random speaking practices.

Role Playing – is an activity to expand students' empathy and perspective talking. Acting out roles they drill the targeted vocabulary and repeat previously corrected information while learning to cooperate in pairs. For example, making students act as police officers or parents in various real-life scenarios pushes them to think responsibly.

Situations Sample / Simulation – is an activity to practice assertive communication when students are given various scenarios or situations to act/simulate in different styles (e.g., aggressive, assertive, persuasive, passive). This experience may show them real-life communication patterns to be used on purpose out of the classroom.

Story Completion / Popcorn Storytelling – is a fun snowball game played in a group. After a starting sentence is given, the next participant adds his own sentence based on the previous answer to create a complete story. Students are welcome to demonstrate their listening and speaking skills and heavily use imagination.

The Enigmatic Self **–** is a game to promote self-awareness. Students are encouraged to find something mysterious about themselves and their partner (e.g., three things that no one else knows). This activity can be highly connective as students will discover uniqueness of each other or common topics to further communication and train them to speak on the spot.

The second group represents preparative out-of-class speaking activities, which are recommended to start as homework to be resumed as classroom communication activities.

The top 5 effective activities of this kind are:

Listening to Audio Books – can serve both for improvement of speaking and listening. Modern world offers many interactive books for free. As my experience shows, it is more fruitful to work with books a level lower not to overload students with extra new words but to focus on the ways how to describe a storyline using multiple ways in terms of grammar and vocabulary. Writing down a script at home gives a student a chance to listen to each complicated part the needed number of times and thus memorize it correctly. In class, students may role-play the story or retell its plot and comment on certain issues.

Reading / Listening to Dialogues – is an exercise to be done as homework and then summarised and role-played in class to practice speaking skills and indirect speech patterns.

Watching Cartoon Episodes – is an effective way to apply visual aids to get the plot. Writing scripts at home and role-playing in class may significantly improve speaking skills. Acting out animals, birds, flowers or objects students will enhance their imagination, which is the key to fast reaction in communication. This activity engages descriptive language and storytelling heavily.

Watching Short Topical Videos – may serve a platform for speaking activities in the classroom, such as video-based discussions or retelling. TED talks, bloggers' chats are interesting and they inspire students to stay up-to-date and motivate them to learn English.

Group Presentation / Team Debate Project – is a collaboration activity that will prepare students to work in a team. Such team-building exercises also help students sharpen their oral and written communication skills and develop understanding how to work under pressure, debate their opinions, work together towards a common goal and meet deadlines.

As a piece of advice, it is necessary to point out that the abovementioned activities are both fun and educating, that can be highly appreciated by students, as they feel tired of repeating the same style exercises day by day. Besides, new emotions and good results will inspire them to act out next time and lose fear to communicate freely in the real life. A teacher is welcome to tailor the indicated activities further to suit specific key learning concepts or audience.

One more important issue to tackle here is mistakes in communication. Some methods of their correction may seem embarrassing to students. Therefore, it is highly recommended to discuss and agree on the method to be used not to hurt or humiliate students.

Recommendations for successful speaking practice are also connected with behavioural styles applied in a classroom. Teachers are welcome to pay close attention to what other participants say, teach them to respect opponents and be brave to speak out.

Third, I selected the top 10 applications that focus on improvement of speaking skills and can be used out-of-classroom:

Busuu (https://www.busuu.com/) is a language app recommended for learning English at any level. Through this community, learners can connect with native speakers and get instant feedback on their speaking and writing exercises. Its lessons comprise reading, writing, speaking, spelling sections. Students can practice real-life English with natives on their own.

EnglishTalk (https://www.englishtalkapp.com/) is an app tailored to master conversation skills in English. It offers a user to find a random speaking partner to practice talking to real people in live audio chatrooms.

FluentU (https://www.fluentu.com/) is an app to learn native-sounding English, as it provides real-world English videos from different spheres like movie, music, speeches transformed into lessons. Videos have interactive subtitles with instant definitions and pronunciation as soon as you tap a word in it. Any video can be paused for the learner to imitate the pronunciation of the word or phrase. Users may check their progress by doing quizzes and exercises.

Memrise (https://www.memrise.com/) is a language platform, which uses flashcards as memory aids and offers user-generated content in offline and online modes. Memrise also offers courses to learn grammar, vocabulary and speaking in an innovative way.

Quizlet (https://quizlet.com/) is a mobile and web-based study application that allows students to study information via learning tools and games. As a memorization tool, Quizlet lets registered users create sets of terms and definitions customized for their own needs. These sets of terms can then be studied under several study modes: flashcards, gravity, match, speller, write, long-term learning, test, live. This app shows fruitful results when used to memorize new vocabulary as homework to be later used at the lesson as it includes pronunciation back up and thus students do not need to be shadowed. Speaking about hands-on experiences, “live” mode offers users with their teacher to break up into teams and compete to win.

SpeakingPal (https://www.speakingpal.com/) is an app to practice speaking in dialogues focused on real-life situations. Users can record other users talking to them over video and see the automatic

subtitles and responses while they speak. Moreover, instant evaluation of a user's speaking ability shows the level of speaking and points out mistakes.

Speaklar (https://www.speaklar.com/) is an app for live speaking practice with a random partner based on your level via an audio call. Users are welcome to text each other and send audio clips for listening practice. Verified English speakers and a possibility to stay incognito are its features to any taste.

Supiki (https://www.supiki.com/) is an app you can chat with on a suggested topic without having to speak to strangers. A user is listened to and asked follow-up questions based on the user's answers. Animated videos created to help the user feel the "reality" are a great fun and engage in spontaneous, realistic conversations.

TalkEnglish (https://www.talkenglish.com/) is an app with interactive topical lessons to improve English conversation skills. Follow-up quizzes help make sure you actually understood what you learned. Listening exercises and recorded progress show the comprehension level and progress.

VOA Learning English (https://learningenglish.voanews.com/) is an app basically designed for listening practice, though it is also considered effective in practicing natural English speech. The app provides stories, lessons and news in a slow tempo for non-native speakers to feel comfortable and understand everything. The speed of the audio can be adjusted to listen carefully and imitate to master correct pronunciation.

We should note that speaking must be practiced in pairs or in groups. Therefore, there is one important issue about these apps – they all help find an interlocutor or act as an interlocutor. Moreover, they are equipped with sets of exercises to correct mistakes and learn the necessary vocabulary, which considerably facilitates the learning process. Besides, each app is good for drilling isolated sounds, phrases and sentences on their own, which motivates learners to gain intelligible pronunciation and accuracy of the language. Additional benefits include enhanced listening skills and the ability to get more comfortable in face-to-face communication.

The following example set can illustrate how various activities can be combined to develop speaking skills. For instance, the topic "Vegetables" may engage the application Quizlet to drill the relevant vocabulary list without the teacher's assistance. To get ready for the first lesson, the students are welcome to listen to correct pronunciation of the words and memorise them using Flashcards, Speller, Write and Test study modes. Match and Gravity can help drill the vocabulary and practice fast reaction. At the lesson, the teacher may encourage the students offering them Picture Telling activity. Pictures of vegetables can be used to practice laconic definitions and eloquent phrases for descriptions. Additionally, the students can have several Peppa Pig cartoon topical episodes (Shopping, Lunch, Picnic) as their homework. Writing scripts at home and acting out roles in class will help practice both

topical and general vocabulary. As a weekend task, the students may opt for discussing the topic with real vegetarians. To gain double benefit, Qiuzlet can be useful in learning the new vocabulary connected to tastes and flavours while Speaklar or EnglishTalk apps are good to find random users for a good conversation. Finally, the students may be required to prepare a group presentation on vegetables and their health benefits. Prior to it, some topical blogger talks can be recommended to get ideas and speaking patterns.

Speaking about the group results, measured with the help of interim and final tests and questionnaires, it is necessary to report improvement of not only speaking but also listening skills. The questionnaire used at the pre- and post-research phases showed the increase in 1.5 points. The level of speaking skills was medium to high with the average ratio of 7.2 out of 10 initially and 8.9 out of 10 finally. The students were asked questions about their own level of language skills and their classmates to see psychological and emotional benefits. They also reported higher confidence level and satisfaction from and with their results.

As an additional benefit, many students were inspired by their speaking skills and acquaintances that they asked to advise them on pronunciation apps to improve their accent. This idea may be considered in detail and developed into another research.

Conclusion

Language learning has become generally available and free for everyone with a desire to learn. L2 learners can practice their English skills with minimal time constraints in any place they find comfortable for doing it. With the accessibility of technology tools, both teachers and students need to focus on developing speaking skills more than ever. These skills allow people to open the world and to show themselves to it. The more speaking practice students get in and out of class, the faster they adapt to new accents and speaking patterns. Excellent speaking skills make them feel confident and competitive in new surroundings. They are eager to learn more, to develop faster, to speak better. In addition, seeing the algorithm of practicing English, students learn how to properly use applications and online platforms to develop their skills on their own and be able to control this process effectively.

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CASE OF ALBANIA: MEASUREMENT AND ASSESSMENT AS MAIN COMPONENTS IN THE CURRICULUM OF FOREIGN LANGUAGES

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Key words: measurement, assessment, curriculum, foreign languages

Abstract: Measurement and assessment, as important components of the curriculum of foreign languages, are the main objectives of this paper. This research is carried out with the appropriate qualitative research method in applying the technique of focus groups. Regarding the design of the focus group card, it was decided to divide the questions into two main blocks where the first block contains two groups of questions and the second block a group of questions responding to research questions. The first block consists of two groups of questions and mainly aims to gather information about the criteria used for assessing language competences and the difficulties encountered. The second block consists of three questions, which aim to gather information on the difficulties encountered in assessing students and how much the foreign language teachers support CEFR to the assessment. It was possible to collect, analyze and draw conclusions that led to specific answers for the research questions for an optimal approach towards the target and the study design.

Teachers of lower secondary education system (250 teachers of foreign languages, no other subjects), teaching in the 6th to the 9th grade were the target group of this study. Responses obtained from focus groups held in district schools of Tirana, Elbasan and Durrës in Albania, allowed the researcher to have already a clear picture of the concrete situation for the chapter of measurement and assessment process in the curriculum of foreign languages.

The place, which the measurement and assessment have in the curriculum of foreign languages of lower secondary education, is already clear thanks to the scientific analysis performed for each research question.

In conclusion, it can be argued that the findings of this study may help to improve the assessment component, offering a concrete contribution to the educational practice settled in our educational system starting from foreign languages curriculum improvement.

Introduction

One of the most important curriculum components that will ensure success in education is precisely the moment of assessing the progress of the students' preparation and the performance of education in general. In this sense, the underlining of the term "measurement", when we talk about assessment, is presented as a turning point to success.

It seems clearly that understanding the differences among measurement, assessment (of students' achievement), overall evaluation and testing are very important for the knowledge base of professional teachers and effective teaching. These terms closely related to each other have been presented for years as an obstacle not only to experienced teachers but also to the teachers to be or it may also happen that they use these terms to replace one another.

Burhan (2009) argues that overall evaluation seems to have broader coverage. He also defines that the overall evaluation as the process of obtaining information and its use to form judgments that are used for decision making. This process is composed of five phases which are:

Preparatory phase

Data collection

The reasoning on the data

Making decisions

Reporting

As Burhan (2009) points out, students' achievement assessment does not include decision-making and reporting. It focuses mainly on collecting data and adding value on something. This means that students' achievement assessment seems to cover phases 1, 2 and 3 of the overall evaluation process. Meanwhile, testing has a narrower scope, as it is precisely one of the techniques for data collection or results. It can be used accompanied with other techniques such as observation and interviews. Testing is not about making judgments.

Moreover, Kizlik (2010) clarifies some differences among measurement, student achievement assessment and overall evaluation. He emphasizes that measurement refers to the process of determining the attributes or dimensions of any physical object. It seems to be an exception in the use of the term "measurement" in determining a person's IQ (intelligence coefficient). The phrase that is usually used is "This test measures the IQ". In addition, it is applied in measuring things such as attitudes or preferences. However, when we measure, we usually use a standard instrument to determine how large, long, heavy, voluminous, hot, cold, fast something is. Standard instruments refer to instruments such as: scales, thermometers etc. We measure to have information about how useful or have not been the transmission of knowledge so far, the authenticity of the benefit depends largely on the accuracy of the instruments we use, as well as our ability to use them.

Student's assessment is very different from measurement and has uses that suggest very different goals. It is a process by which information is collected about any known objective or purpose. Overall evaluation is a broad term that also includes testing. A test is a special form of evaluation. Tests are evaluations made in special circumstances in order that they can be easily administered. In other words, all tests are learning evaluation but not all evaluations are tests. We test students at the end of a lesson or chapter. The evaluation either implicit or clear is related to several goals or objectives for which it is projected. A test or evaluation provides information about the objectives or goals set. This implies that we test or assess students to determine either an objective or purpose is achieved or not. Student's assessment is quite open, which implies that achievements exist at an acceptable level or not. Skills are demonstrable. Understanding assessment is much more difficult and complex. Skills can be practiced while understanding cannot. We can assess a person's knowledge in different ways, but we always have to overcome a step, a conclusion that we draw about what a person does and tells about what s/he knows.

Meanwhile, the overall evaluation is probably a bit more complex and less understandable from the above-mentioned terms. When we assess, what we do is engage in a process that was previously designed to provide information that will help us make a judgment about a particular situation. In general, each

evaluation process requires information about the situation in question. A situation is an umbrella term that takes into account ideas such as goals, aims, standards, procedures and so on. When we evaluate, we say that the process will provide information about the merits, suitability, kindness, validity, legality, etc. of something for which a reliable measurement or rating has been made. So, we measure the distance, we assess student's achievement and evaluate results in terms of a set of criteria. These three terms are closely related with each other, but it is useful to think about them not as separate from one another but as ideas and processes related to one another.

Methodology

According to Matthews and Ross (2010, 235) "Basically, the focus group is a method for collecting qualitative data, which is an adaptation of the interview technique. The difference between them lies in the fact that the interview is not face to face but it's an interview within a group". Furthermore, the researcher met the standards for this paper by consulting Connor-Linton & Amoroso (2014) who states that this method served in particular to understand how much foreign language teachers do adhere CEFR to assess the students and difficulties these teachers have to face up in the assessment process.

Research Questions

Regarding to the design of the focus group card, it was decided to divide the questions into two main blocks, taking into consideration the Curriculum for lower secondary education (English Language grade 9) prepared by the Institute of Curriculum and and Trainings (2008) in Albania. The first block contains two groups of questions and the second block a group of questions responding to research questions.

The first block consists of two groups of questions and mainly aims to gather information about the criteria used for assessing language competences and the difficulties encountered.

Group I

What are the criteria you use for assessing language competencies?

What are the difficulties you encounter in assessing language competencies?

What are the causes of these difficulties?

How do you select the assessment criteria?

How and how much do students know the assessment criteria?

Group II

What are the difficulties you face up in order to use practically theoretical guidelines of the curriculum for students' assessment?

Which language competences are the most difficult to be assessed? Why?

How can you overcome the difficulties you encounter?

The second block consists of three questions, which aim to gather information on the difficulties encountered in assessing students and how much the foreign language teachers support CEFR to the assessment.

How well do you know CEFR in general and students' evaluation chapter in particular?

What difficulties do you encounter in implementing CEFR while assessing students?

How can these difficulties be overcome?

Participants

For the purpose of this study, 3 focus groups were held with foreign language teachers in Tirana, Durrës and Elbasan who teach in secondary schools, during the school year 2016-2017, with the following topics:

The criteria used by teachers to assess language competencies.

Difficulties encountered by teachers in assessing students.

The first focus group was done with 7 English and Italian teachers, teaching in two schools in Elbasan district, Albania. Eight of them were contacted beforehand, but one of them could not be present. This focus group was held in the teachers' room and the climate during conversation with the teachers was very friendly. As they expressed themselves, they felt quite free in expressing their own opinions.

The second focus group was organized with English and German teachers, teaching in three schools of Tirana district, Albania. A total of 9 teachers participated, 7 of them teaching in the city and 2 in the village. This focus group was held in one of the buildings of the Faculty of Foreign Languages, after being agreed in advance with the participants in it.

Regarding the third focus group, it was organized with English language teachers in the district of Durrës, Albania. Altogether, 5 teachers attended. The latter focus group was organized in one of the auditoriums of Aleksandër Moisiu University, after being agreed with the participating teachers themselves.

Procedure

In the three focus groups, were taken notes during the conversations and were recorded as well, an aspect that had been previously agreed with each of the teachers. Also at the beginning of each focus group, participants were re-affirmed their anonymity both during the discussions and during the data analysis process. Focus group participants did not respond in a certain order, but for each question asked

by the researcher, it was taken care that everyone expressed his/her own opinion. All questions had place for discussion. The arguments of the participants regarding the criteria and methods of assessment in foreign language were quite diverse. There was no hesitation on the participants' side and the discussion in all three focus groups continued naturally. The duration of the focus groups was different, ranging from 30 to 35 minutes. All three of these focus groups were organized during the first semester of the academic year 2016 - 2017.

Results

Research question - What are the difficulties encountered by foreign language teachers in the process of using new assessment criteria?

What are the criteria you use for assessing language competencies?

What are the difficulties you encounter in assessing language competencies?

What are the causes of these difficulties?

How do you select the assessment criteria?

How and how much do students know the assessment criteria?

From the detailed analysis of focus groups with foreign language teachers emerges that the largest and the most significant part of the participants, about 75% of them (among which 10 teachers who teach in the 6^{th} grade, 11 of them who teach from 7^{th} -9^{th} grade, among them 5 men and 16 women from the districts being part of the research , Tirana, Elbasan and Durres) not only show that they lack a profound and detailed knowledge of the distinction among language competence, competences in general and skills but this creates a problem in the application of new assessment criteria.

"We do not have criteria for assessing competencies, we have some general criteria regarding the four skills."

"As far as I know, there are seven competences that are related to the environment, life skills, etc. So when they get the final mark, we consider it as involved. "

"I personally assess the language skills, that is, the 4 skills, the others should be assessed by teachers of other subjects."

Being able not knowing the distinction between competences and skills, a number of difficulties comes across, as 82% of the participants say all of this happens not only by the fact that the competence-based curriculum is an innovation of recent years but also to the failure in applying a suitable and tailored training with concrete needs of the competency based assessment during a lesson, during a didactic unity

or the full cycle of the skills and competences that each student must obtain for passing from one level to another.

"A lot of difficulties we may face up as the competences are the something new for the last few years."

"We have difficulties in assessing competencies separately and separating them from the skills."

"We are struggling to determine exactly which are competences that need to be assessed in each classroom."

"We've got used to handwriting examinations, especially when we find them readily available in the teacher's book or on the internet."

From the detailed analysis made to each focus group questions, it is clearly seen that a considerable percentage, 92% of them have sufficient knowledge of the skills and assessment criteria for four language skills such as: listening, reading, writing and speaking but have difficulty in determining the exact limit of "error" and determining its "weight", so the evaluation table that has already more than twenty-five years being used in the world. It is noticed that for most part about 70%, it is little known and for 93% of them is little applied.

"They have not clarified what is the exact error limit and where it is seen during the assessment."

"We have heard about the evaluation table, but we do not know how to do it well."

"We have got few trainings concerning students' assessment".

A significant percentage of teachers who participated in the focus groups, 87% has sufficient knowledge for the use of tests, knowledge control, and assessment through them. A small number of teachers, respectively 20% assess even when students try to learn.

"On the basis of students' level, we see how skilled s/he is to read, speak, write and understand".

"I also appreciate even the efforts a student makes, that is, the achievements".

"I pay much more attention to the assessment of written tasks and tests at the end of each chapter".

Regarding to the evaluation criteria, they are vague, unclear, not based in initial criteria where subjectivism still remains the determining factor. This fact is also confirmed by 88% of the teachers surveyed in focus groups.

There are good efforts, confirmed by 66% of the teachers, for a greater transparency of few criteria used in the assessment as well as improved teacher communication with the student regarding to the journey of the evaluation process.

"I explain to the students since the beginning of the school year that how many grades each answer has; that how many grades are minus for spelling mistakes or how many grades the activity in the classroom has".

"I tell them the test scores and they have the right to be clarified why they have got that grade".

"We define from the beginning the score that each test section has".

In order to have a more complete picture and detailed analysis of our research question that *What are the difficulties faced by foreign language teachers in the process of using new evaluation criteria?*. questions were sub-grouped on the basis of proximity to themes and the second group of questions was proposed as follows:

What are the difficulties you face up in order to use practically theoretical guidelines of the curriculum for students' assessment?

Which language competences are the most difficult to be assessed? Why?

How can you overcome the difficulties you encounter?

From the responses analyzed carefully to this second set of questions, it comes out that the biggest disadvantage and the greatest difficulty teachers encounter is not having in their hands the proper curricula, but only plan-programs. Consequently, they underline that there is an inflation of not defined terminology in terms of the program, plan-program or recently syllabus that does not help them in clarifying ideas and less in their concrete training to switch to an individual programming of their work, directly from the curriculum, which would force them to recognize it in the real level of their classes in order to evaluate in this way and program individual work on level-bases.

It also emerges clearly from the analysis of the focus group's responses that little or nothing has been provided to offer either theoretical material or practical training for the acquisition of new teaching models and especially the new evaluation criteria.

"For us, the curriculum has remained an abstract word because when we want to deepen and understand it better wherever we are looking for we come across the syllabus and not the curriculum".

"We recognize some new terms of assessment and some of the new criteria, but that in everyday life they confuse us much more then help".

"The training offered to us rarely and very little has the element of assessment in it".

"The only theoretical material that is being offered is a handbook of Institute of Education Development which, to tell the truth, many things remain only theoretical".

From the analysis of the second group of questions emerges that one of the major difficulties encountered by teachers in the assessment process is the "mental clutter" that is caused when the term "competence" is used either it is spoken for language competencies (i.e. skills) or curriculum on competences bases. So, what results from the responses of the teachers in the focus groups, they have little or almost not clear the assessment criteria, almost 98% of them, when it comes to curriculum competences such as (communication and expression competence, competence of thinking, competence of learning to learn, competence for life, entrepreneurship and environment, personal competence, civic competence and digital competence).

"The competence of thinking that we almost do not wonder how to assess or the competence of learning to learn that comes to us completely revealed".

"The digital competence we are facing very often recently is equally difficult to measure realistically, even if we fill up with a score of 10 students making projects in their computers".

"We have difficulty in assessing oral answers or assignments done by using the internet as well as the so-called projects or group works".

Therefore, the only opportunity that teachers really assess as effective is the ongoing process of concrete trainings, that is, the application of new assessment models, organization of open classes when colleagues and school directorate participates and experiences exchange which would lead in a better understanding of the terminology and practice of assessment in our schools. More concretely, 100% of the teachers participating in the focus groups highlighted this necessity by saying that:

"We need to organize open classes".

"During the trainings, we should be provided examples of how to recognize competences and assess them".

"We have to be given a ready-made chart of how to split the mark X from the mark Y".

"We need to do trainings on how to assess the student's independent thinking".

Given to the fact that a good part, mostly significant part of the curriculum changes, especially of those changes that the foreign language curriculum has undergone in the last twenty years, is dictated by the necessity of decentralization, i.e. teacher's academic freedom, expressed and sanctioned in the so-called directives of the Council of Europe and more specifically in the European Common Reference Framework for Languages. The second research question aims to lead us into a detailed and clear analysis of the current situation in applying assessment principles expressed at CEFR. This research question has also

been structured in groupings of questions to help accurate articulation by our teachers and our process of analysis.

Research question: How do the foreign language teachers adhere CEFR to the student assessment?

How well do you know CEFR in general and students' evaluation chapter in particular?

What difficulties do you encounter in implementing CEFR while assessing students?

How can these difficulties be overcome?

From the analysis we see that teachers have enough knowledge of the Portfolio, especially in that part of it when it comes to the levels, so 90% of the teachers are clear how to define the levels in CEFR and what are the achievements on level-basis. Some of them, 28%, also apply level of control at the beginning and at the end of the process. However, this recognition results to be truncated as it does not extend to the recognition and application of assessment criteria based on skills and competencies expressed through the level.

The "laziness" of the teachers in the reasoning and determination of the levels provided in the Portfolio derives from the fact that these levels are predetermined by the ready-made syllabus designed by the Curricula Institute and are not the result of the personal research that teachers would perform if the transition from the curriculum to the program/syllabus would be a process carried out by the teachers themselves and as a result the determination of the didactic work to achieve the skills and competences at the level basis and the determination of the evaluation criteria would be the result of their individual work and the realization of the needs and skills of the student. At the same time, the other problem that arises from the same unfinished process of academic freedom of the teacher is the problem related to the definition of different levels within the same level, i.e. within the same class and the details of the evaluation chart for each student.

It was found that 100% of the teachers responded to this group of questions regarding knowledge about portfolio that this one is extremely valuable in the assistance it provides in determining levels, in assessing skills (skills for each level) but not at all useful when it comes to assess student's competences, precisely in his/her assessment of the competence based curriculum.

In the final analysis of the focus group responses results that teachers are unclear in the students' assessment for "generativist" competences, competencies that the language portfolio predicts in the final analysis.

"I believe I know well the level I have been assigned to attend in my class respectively A2 beginning and ending of the year".

"We do not have to know everything about CEFR, I feel comfortable to know what level my students are".

"I do a preliminary test whenever the school starts in order to define students' level and put deadlines to myself for the work I have to do with my students in order that they can reach the required level".

"We are provided student's level by the program at which CEFR talks about it so in this sense it is easier for us to orient ourselves".

"It seems like that in fact, even within the level determined that comes to us, the students have different levels in the group".

"As far as we have understood, this handbook deals with skills assessment and does not offer any assistance in assessing competencies".

With regard to the last question of this grouping, but in the ranking of importance it's among the first as it attests the teachers' vision on the future of improving the current model of assessment. It has to be said that besides euphoria, 86% of them think that the difficulties also exist as a result of continuous changes in the system without allowing the crystallization of a process, in order to have the possibility of a final analysis of the progress and achievement. 100% of the teachers emphasize that only a well-thought, well-organized and focused training on assessment not only for language competencies but also for competencies in general would ensure success as well as facilitate and improve significantly the teacher's communication relationship with student:

"Our work would be easier if they explained how to translate skills in competencies so that we could properly assess students".

"Our difficulties are endless, I do not know where to get started because we are asked for new things every year; without properly mastering skills assessment, we are asked assessment of competencies. We've become confused".

"In addition to the test package, it would also be helpful if we had a package with other activities assessment in the classroom, activities that aim at the communication and expression competence that is closer to the skills we assess".

Conclusions

This section aims to provide a brief summary of the conclusions based on the findings of the study. The issues addressed in this study are related to the measurement and assessment component in the foreign language curriculum. Based on this fact, the findings of this study arise from the findings of the research questions.

In general, for lower secondary education teachers in Tirana, Elbasan and Durrës we can say that 28.4% of them are familiar with CEFR and know it as a source of various readings such as books, articles, Internet etc. Consequently, it turns out that 64.8% of the teachers often apply CEFR criteria.

Based on teachers' self-reports, about 69.2% of them know the language skills as they have done enough training but the influence of competencies for a large number of teachers has been below the average level in the students' assessment.

Referring to data from focus groups, 75% of the teachers not only show that they deeply lack detailed knowledge of the distinction between language competencies, competences in general and skills but this also creates a problem in applying new assessment criteria.

As far as assessment criteria are concerned, they are vague, unclear, not based in genuine criteria where subjectivism still remains the determining element. This fact is also confirmed by 88% of the teachers surveyed in focus groups.

In the framework of the focus group analysis, it turns out that the greatest difficulty that teachers have stays in the lack of genuine curricula in their hands and the plan-programs as well. Consequently, there is a not-defined inflation terminology with regard to the terms: program, curriculum or recently syllabus that does not help them in clarifying ideas and less in their concrete training to switch to programming of an individual work, directly from the curriculum, which would force them to recognize themselves the real level of their students in order to assess individual work on level basis.

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ENHANCING 'SOFT SKILLS' IN THE ENGLISH FOR SPECIFIC PURPOSES COURSE WHEN RECORDING A VIDEO

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Key words: English for Specific Purposes, soft skills, peer feedback, collaborative learning, self-reflection

Abstract: It is known that the aim of any English for Specific Purposes course is to prepare students to function effectively in their professional environment, which makes the development of 'soft skills' inalienable. Recent findings of the leading researchers have highlighted interpersonal and higher-order cognitive skills among the crucial ones for a successful career.

This study was undertaken at Zaporizhzhia National Technical University (Ukraine) within the Socializing in Academic and Professional Environments Module of the English for Specific Purposes course. With the focus on enhancing their 'soft skills', the 1st-year students of technical specialisms were given the tasks to record a video presentation of the university they were studying at and of their native city. The criteria for peer feedback were agreed on, and the ways of giving it were analyzed with the students in terms of their being constructive, positive, and having the ultimate aim to inspire and lead to further progress.

The data on the efficiency of the task was collected via students' feedback and teacher's observation. Challenges of such a work were outlined for both the students and the teacher (e.g. students' unwillingness to collaborate, their preference to individual mode of performing the task, the necessity for the teacher to moderate the feedback process). The study revealed that the practice of peer feedback enabled students to see the benefits of their collaboration (e.g. self-expression, peer support, interpersonal connections, and exchange of experience) and find appropriate solutions to the issues that arose. This way peer feedback enables to make the English for Specific Purposes, as well as any other, classroom a safe place for collaborative learning with each participant contributing to the shared pool of knowledge and expertise.

Introduction

Education and skills have been acknowledged to be 'a core strategic asset for growth' of the European Union (Rethinking education 2012, 2). Skills, such as critical thinking, team work, problem solving and creativity, digital or language skills are acknowledged 'essential prerequisites for personal and professional fulfilment' (Decision 2018).

The analysis carried out in Ukraine (Carpio, Kupets, Muller and Olefir 2017, xviii) reveals a finding that is in line with the evidence from around the world – the workers need a mix of advanced cognitive, socioemotional, and technical skills. Even though the Ukrainians are admitted to have high levels of basic cognitive skills, it is stated that the higher education and the training system does not produce enough skills relevant for today's labour market.

However, it should be noted that the system of higher education in Ukraine has been undergoing radical transformations with the aim of better meeting the requirements of the stakeholders and making university graduates more competitive in the global setting where not only technical excellence is required, but also the abilities to solve problems, to communicate with international partners, to manage their time efficiently, and contribute to the team work are to be demonstrated.

Since a Language for Specific Purposes course puts the needs of the students into the foreground, integrating soft skills into it is of paramount significance to ensure better career prospects for our students.

A substantial positive impact on teaching English for Specific Purposes (ESP) at Ukrainian universities has been made by the English for Universities Project that was run by the British Council Ukraine in 2015-2018 (see the impact study by S. Borg (Borg 2018)). Initially, the baseline study emphasized "a pressing

need for a more modern and flexible syllabus for English at university level, taking into account a focus on English as a means of international communication, the academic and professional needs of undergraduate and graduate students and … standards in the CEF.“ (Bolitho and West 2017, 82). Hence, teaching soft skills has become one of priorities, but it is yet to be further instilled into the syllabus.

The necessity and possibilities for implementing soft skills training methods as an integral part of a Language for Specific Purposes course has been highlighted by various scholars both abroad and in Ukraine (Urs and Catelly 2010; Tevdovska 2015; Lavrysh 2016; Kic-Drgas 2018; Hradilová 2018). However, the research on fostering soft skills in ESP classes is still scarce. The variety of approaches to soft skills and their classification complicates the discussion of the relevant teaching methods. Conducting soft skill-oriented tasks for a Language for Specific Purposes class is an issue as appropriate methodology and instruments have not been worked out yet (Kic-Drgas 2018). Thus, further development of the strategies and tools for enhancing soft skills in Language for Specific Purposes classes, ESP in particular, is to be carried out.

Literature review

Soft skills have been prioritized in numerous researches, but there is still a multitude of terms to name them: core skills, skills for employability / employability skills (see Brewer 2013, 41-45), transferable skills for life-long learning (Davies 2009, 564), etc.

When speaking about soft skills, we rely on the understanding of their nature as of ‘qualities that do not depend on the acquired knowledge and that are harder to quantify due to being related to one’s emotional intelligence and personality traits’ (Calanca et al. 2019, 1).

There is a wide range of soft skills such as adaptability, open-mindedness, problem solving, decision making, communication skills, self-learning and knowledge discovery, empathy and team work, motivation, attitude and a spirit of enquiry, knowledge of interacting with transnational cultures, business etiquette, expected and acceptable behaviour in new geographies (Urs and Catelly 2010, 42), leadership, management, negotiation (EP 2017), etc.

As for the skills that employers in Ukraine value most, they are consistent across sectors and occupations (Carpio et al. 2017, 5). The top five skills are job-specific technical skills, professional behaviour, problem solving, ability to work independently, and teamwork.

In the professional sphere of Information Technology, Internet, and Telecommunications in Ukraine (Carpio et al. 2017, 133), in addition to education, experience, computer skills, and foreign language skills, the job requirements include such cognitive skills as communication (including presentation), learning, time management, and thinking skills; and the following socioemotional skills: responsibility, teamwork, self-management, goal orientation, attention to detail, and stress management.

Interestingly, the skill of giving constructive feedback, as well as team building and leadership, is listed (Calanca et al. 2019, 10) among the skills with the highest salary award in the UK, which proves the value attributed to this skill by the employers.

It should be emphasized that soft skills are interconnected. For example, as Smith K. (Smith 1995) points out, to develop teamwork skills, students must have and use the leadership, decision-making, trust-building, communication, and conflict-management skills. In its turn, the effect of peer feedback interventions on learning is considered (Sridharan and Boud 2019, 894) 'a crucial determinant of the success or failure of collaborative group work'.

In this study we focus on teamwork as one of the top skills listed by the employers not only in Ukraine, but worldwide. This skill encompasses peer feedback, critical thinking, problem-solving, communication, etc. Within the scope of this paper, we will consider mainly peer feedback and self-reflection.

Feedback literacy, 'the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies', is one of the core capabilities for the workplace and lifelong learning. Four inter-related features constitute a framework underpinning students' feedback literacy: appreciating feedback, making judgments, managing affect, and taking action (Carless and Boud 2018, 1315-1323).

If feedback processes have the potential to facilitate students to better self-assess, develop and showcase a range of soft skills, enhance student engagement and autonomy, foster students taking responsibility for their learning, and develop self-assessment aspects of self-regulated learning, peer feedback, "a communication process through which learners enter into dialogues related to performance and standards" (see Sridharan and Boud 2019, 896), is not less powerful.

Providing comments to peers is seen as often more beneficial than receiving them because it triggers 'powerful mental processes', involving critical thinking, the active interpretation and application of assessment criteria, reflection (Nicol, Thomson and Breslin 2014, 112). Moreover, through these processes peer review supports collaborative interaction (Carless and Boud 2018, 1320). Therefore, providing students with the opportunities to practice peer feedback is essential for the development of other soft skills such as critical thinking, creativity, reflection, and collaboration, in the first place.

Among the benefits of peer feedback, D. Nicol (2010, 509) lists the following: teachers realize what students value most in feedback, students see examples of good/bad works and act as assessors, which is important for developing their ability to evaluate their own work.

The positive effects of giving peer feedback for the students also include the development of critical thinking, communication, self-reflection and collaboration skills. At the same time, via peer feedback,

students help a teacher to set new goals and improve the teaching methods, identify if the teaching practice is good.

The inalienable features of efficient feedback are as follows: understandable, selective, specific, timely, contextualized, non-judgmental, balanced, forward-looking, transferable, personal (Nicol 2010, 512-513), goal directed (Shute 2008, 157). The forward-looking, constructive nature of feedback was brought to prominence in the concept of 'feedforward' (Goldsmith 2015), which helps people to 'envision and focus on a positive future'.

For efficient feedback the tone and atmosphere matter a lot. The researchers note that if a trusting atmosphere is established, learners are more likely to develop the confidence and faith to reveal what they do not fully understand (Carless and Boud 2018, 1318). This seems relevant for peer feedback as well. Students will be eager to collaborate and exchange their opinions if they feel safe.

The vitality of being able to give feedback for the future career growth is reflected in the learning objectives for Professional English stated in the Global Scale of English (see GSE 2018, 13-53). The document profiles a learner's proficiency across four skills: reading, writing, speaking, and listening and showcases that, in various professional settings, the learner should be able to understand feedback, ask for and give it in both written and spoken form.

The challenges of peer feedback should also be taken into account. The problems of 'social loafing' and 'free-riding' (See Davies 2009, 567) may arise. The teacher should make the benefits of peer feedback clear: if students realize them, they will eagerly use this tool for their self-development. The teacher should also facilitate the process of peer feedback so that students were not inhibited by their groupmates.

Despite being acknowledged as important, the implications of student feedback literacy for teaching and course design have not been sufficiently considered either abroad (Careless and Boud 2018, 1315), or in Ukraine. It seems reasonable that 'a productive feedback ethos' (Careless and Boud 2018, 1322) is to be established in the first-year of study so that students could experience the value of feedback and appreciate its benefits from the onset.

The purpose of the study was to evaluate the efficiency of a video recording task for the development and further improvement of soft skills (critical thinking, teamwork / collaboration, leadership, problem-solving, creativity) in the ESP course. The task was designed to provide the opportunity to foster peer feedback which develops students' soft skills such as critical thinking, their ability to reflect both on their peers' and their own performance. The requirement to comment and evaluate their peer's output made it necessary to exercise empathy, tolerance, and creativity when some improvement was to be recommended.

The ESP syllabus at Zaporizhzhia National Technical University contains 4 modules: Socializing in Academic and Professional Environments, Searching for and Processing Information, Presenting Information, Application Procedure. The tasks under consideration were set within the Socializing module so as to enable students to tell their English-speaking colleagues about Zaporizhzhia National Technical University and the city of Zaporizhzhia. Students were to record 2 videos: one was about the university, the other one about the city.

Two groups of first-year students were involved, 16 people overall. One group comprised the students of the Faculty of Radio Engineering and Telecommunications (Group 1); the other one consisted of the students who study at the Faculty of Computer Sciences and IT (Group 2). The average level of English language proficiency was B1 in Group 1 and B2 in Group 2. In each group there were 2 subgroups. The students had the freedom of choice who to work with. The tasks were performed collaboratively over the period of 2 weeks each.

After watching the video of the other group, the students were invited to give their group feedback by filling in an online table. In order to improve the quality of the peer feedback and ensure its being positive, efficient, actionable, some scaffolding was provided beforehand. For that purpose, the extensive list of recommendations on giving feedback (Shute 2008, 177-181) was taken into account. It was emphasized that the feedback was to be constructive; praise and criticism had to be balanced, and suggestions for improvement were to be given.

Before the first video recording task, the students brainstormed the criteria for a good video. They were finalized into a set of criteria in an online form. It also served as a check-list for the students, a guideline that helped them to approach the recording and the peer feedback.

The rubrics for peer feedback were as follows:

1. Content.
    - 1.1. Good scenario.
    - 1.2. Pithiness (Informative video).
    - 1.3. Relevant information, real facts.
    - 1.4. Range of vocabulary, phrasal verbs.
    - 1.5. Cohesive (no “blank” moments).
2. Presentation.
    - 2.1. Dubbing (correct pronunciation, clear / understandable speech). Correct use of English (grammar and vocabulary).

- 2.2. Choice of video shots (eye appeal, quality and variety of background pictures, varied locations, picture of the university).
- 2.3. Quality of pictures / video shots (clear, stable).
- 2.4. Quality of sound.
- 2.5. Background music.
- 2.6. Video effects (optional).

3. General impression (interesting, tedious, creative, etc.).
4. Time limit (2-3 min).
5. Points (max 100).
6. Other comments (optional).

The table for peer feedback also included the total score for the task completion so that students could further exercise their critical thinking, and analyse the correspondence of the work presented to the established criteria.

On submitting the 2nd video, the students were asked to fill in an online questionnaire whose aim was to enable students to reflect on the lessons learnt and identify some area for their self-development. It contained the following open-ended questions:

- What was the most important thing that you learnt while working on the task?
- How was this work different from the work on the first video about Zaporizhzhia National Technical University?
- What was the most challenging thing for you when working on this task?
- What was your contribution to the task?
- How did you benefit from the work on this task?
- What skills did you develop / improve while performing the task?
- What would you do differently if you were given a task to record another video?

Results

Upon the analysis of the students' answers, the findings were as follows.

When giving peer feedback by filling in a document online, the students were rather moderate in their comments: e.g. "relevant information", "good range of vocabulary", "quality of content is good" [sic]. There were a few cases of criticism: "poor pronunciation and incomprehensible speech throughout the video", 'low variety of background pictures and locations", "weak effects", "an interesting idea of the video but the video itself is quite tedious" [sic]. However, there were some attempts to soften the

negativity: “sometimes pronunciation was unclear, but in general it’s ok”, “sound was good in general, sometimes a bit loud” [sic]. Some comments were highly positive: “a variety of phrasal verbs”, “excellent scenario”, “video effects are excellent” [sic].

In order to make the peer feedback actionable, in the class, the students were invited to provide some recommendations to their groupmates so that they could improve the quality of the video in case they had to record another one. This practice turned out to be helpful as the learners felt the necessity of being tolerant and tactful. By using appropriate functional language, the students formulated their recommendations, and it was acknowledged to be useful for avoiding criticism and becoming partners in collaborative learning.

Out of the things learnt while performing the tasks, the majority of the students in Group 1 considered shooting and editing the video to be the most important. They also mentioned working in a team, improving their English skills, and finding out more facts about the sights in Zaporizhzhia.

For Group 2 the aspects related to teamwork turned out to be of more significance. It became evident for them that the team should distribute the work more efficiently to meet the deadline, listen to the leader and involve all team members into the process. The technical skills developed while fulfilling the task were also noted as useful.

When asked to compare their experience of recording two videos, the students in both groups admitted that the second video was easier to produce, and it was of better quality, more professional as they had already got some experience. The possibility to choose the sights was marked by the learners as enhancing their motivation.

As for the challenges, Group 1 pointed out the task being time-consuming, while the students in Group 2 found it difficult to meet the deadline, gather people together and make them work, produce a high-quality shooting as proper equipment was required.

Reflecting on their personal contribution to the task, the students mainly spoke about the technical process, with only one person in each group saying that they gathered the people and organized the group.

According to the students’ questionnaires, the perceived benefits of performing the task were as follows. For Group 1, they were improved English language skills, in particular better expressing their thoughts in English, enhanced skills of working with the video editor, and getting invaluable [sic] teamwork experience. Positive emotions and having good time were on the list, as well. Group 2 benefited by not only improving their English language and video shooting skills, but also by learning more about the sights, and the history of the city. One student expressed the hope that the work could positively influence the mark.

Among the skills developed or improved while performing the task, Group 1 named prevalently language skills (speaking, pronunciation, writing scenarios, making the text laconic and, at the same time, informative), adding teamwork, communication, organizational and video recording skills. On the contrary, Group 2 rated video recording skills the highest, which were followed by improved creativity, coordination with the team and formulating their ideas in English.

When asked what they would do differently if they were given a task to record another video, Group 2 was unanimous that better equipment would be used. Group 1 had a range of suggestions from asking for more time to do the task, including less information into the video, adding more special effects to make the video spectacular, improving their pronunciation to providing more help to their collaborators.

While students were working in the classroom, it was evident that for the completion of the first task there were more people unwilling to work in a team giving preference to the individual mode of performance. Students admitted that they were not used to collaboration. But the situation changed, which was evidently due to the perceived benefits of teamwork, peer support, established interpersonal connections, and exchange of experience. The necessity for the teacher to moderate the feedback process was topical, though some progress in making feedback more constructive with mitigated criticism when discussing the second video was noticed.

Judging by the students' feedback on the video recording tasks, their experience was mainly positive and seen as beneficial in terms of their personal development, self-expression and improved life-related skills.

Conclusion

Enhancing students' soft skills via a video recording task in the English for Specific Purposes course was efficient as the students' feedback and teacher's observation revealed. The students fostered their critical thinking, teamwork, leadership, problem-solving, and creativity.

Despite the challenges, such as students' unwillingness to collaborate, their preference to individual mode of performing the task, the necessity for the teacher to moderate the feedback process, the benefits outweighed because the learners exchanged their experience and practiced their skills of self-expression, providing peer support, and establishing interpersonal connections.

As for the lessons learnt, it might be more beneficial for the quality and effect of peer feedback on the video to develop more elaborate, detailed criteria for it. Students should be encouraged to focus on feedback being constructive, goal-oriented, actionable, they should be ready to suggest some solution to a problem. For that purpose, appropriate functional language for giving recommendations should be practised.

Peer feedback on the recorded videos proved to be a powerful tool that ensures the development of the growth mindset, increases students' performance and engagement. This practice empowers students, instills enthusiasm for learning, helps them to improve and progress. Peer feedback enables to make the English for Specific Purposes a safe place for collaborative learning and create a shared pool of knowledge and expertise which all of the learners can contribute to.

Thus, the task of video recording is helpful for the development of students' soft skills and can be suggested for integration into the English for Specific Purposes syllabus. The practice of giving and receiving feedback should be fostered, and feedback literacy should be implemented in the educational process with teacher acting as a facilitator and a coach. In this way students will become the agents of their own change and will be better capable of self-development and life-long learning.

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TESTING ENGINEERING STUDENTS' KNOWLEDGE ACQUIRED IN A BUSINESS ENGLISH COURSE SUPPORTED BY LMS MOODLE

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Abstract: The purpose of business English courses for the students who have just reached the Upper-Intermediate level of language proficiency (B2, CEFR) is to provide them with the language and concepts of business and economics found in books, journals, newspapers, magazines, and on websites; to develop their comprehension of business and economics texts; to develop their listening skills in the fields of business and economics; and to provide them with opportunities to express concepts both verbally and in writing, by reformulating them in their own words while summarizing, analyzing, criticizing, and discussing ideas. In the past, the University students used a business English course book that covered twenty-eight units from the areas of management, production, marketing, finance, and macroeconomics. Nowadays, they use a business English course book that presents twelve units based on topics of great interest to anyone involved in international business. This course book was developed in association with the Financial Times and it includes a large number of authentic texts with informal business vocabulary. The research findings (cf. Hrdličková 2015) show that idiomatic expressions with strong and low collocation affinity of both components cause difficulties for students in reading comprehension. On the other hand, the following research findings (cf. Hrdličková 2018) prove that students show interest in learning idioms. The paper is part of the Project KEGA "Idioms in Business Communication" carried out at the Faculty of Applied Languages of the University of Economics in Bratislava. The control groups of students were enrolled on a traditional business English course. The experimental groups of students were signed up for the same course but it was supported by an e-course in LMS Moodle. The paper aims to compare the students' results achieved in common departmental standardized testing and statistically evaluate them. In addition, the paper gives a qualitative analysis of five standardized tests.

Introduction

The Department of English Language of the Faculty of Applied Languages offers two/three courses in business English for the students who studied English as a first foreign language at primary and secondary schools. The courses are entitled "Business English for Advanced Students I, II, and III". Within the period of two/three semesters, no matter what level they reached (B1, B2, or C1, CEFR), undergraduates of the Faculty of National Economy, the Faculty of Commerce, the Faculty of Economic Informatics, the Faculty of Business Management, and the Faculty of International Relations use *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011). Depending on the type of the faculty, they have to study eight/twelve units, namely: Communication, International marketing, Building relations, Success, Job satisfaction, Risk, Management styles, Team building, Raising finance, Customer service, Crisis management, and Mergers and acquisitions. During the first semester, undergraduates deal with Units 1 – 4, during the second semester Units 5 – 8 and during the last semester Units 9 – 12. At the end of each semester, all undergraduates have to take written examinations by means of common departmental standardized testing where they have to demonstrate the acquired knowledge and skills.

The paper is part of the Project KEGA entitled "Idioms in Business Communication". It is carried out at the Department of English Language and so far 395 undergraduates have participated in it. In the winter

semester of 2017/18, five experimental and five control groups of students from different faculties were included in it. Apart from using a compulsory course book, experimental groups of students used a self-help book *Ideational Idioms in Business English Communication* (Hrdličková 2016). In accordance with the aims of the project, this book was used in order to develop reading literacy in a foreign language and to improve communication. From seminar to seminar, students had to acquire business idioms (Hrdličková 2017) and at the end of the semester, they were tested on them. Surprisingly, the research results revealed that both groups of students had quite a good command of general idiomatic vocabulary as well as they showed an interest in acquiring business idioms (Hrdličková 2018).

It can be stated, from our previous experience, that a majority of undergraduates have difficulty in passing written examinations. The paper tries to identify the cause of their problems. First, the paper looks at the structure and content of both books in order to see what undergraduates study and how they are prepared for written examinations. Since assessing students' progress (Donna 2000) is very important, the paper describes major approaches to assessment. The research compares the students' results achieved in standardized tests, therefore, the paper also considers frequently used test items (Donna 2000; Šikolová and Mikuláš 2016). The paper also shows how a business English seminar was made more attractive for experimental groups of students. As one of the test items in standardized tests was focused on writing, experimental groups of students were given the possibility to improve their writing skills via an e-course in LMS Moodle. On the basis of ensuring better conditions for experimental groups of students, their systematic and alternative approach towards learning and the lecturers' feedback, the following hypothesis was put forward: "The experimental group of students will show better results in common departmental standardized testing."

The main aim of the paper is to compare the students' results achieved in standardized tests and statistically evaluate them. In addition, the paper considers the quality of five standardized tests. As the scope of our research interest comprises lexicology, the rationale for the qualitative analysis is to find out what vocabulary was included in standardized tests.

Market Leader Business English Course Book

Market Leader is a multi-level business English course for businesspeople and students of business English that has been developed in association with the *Financial Times*. The third edition of the Upper-Intermediate level features updated content and a significantly enhanced range of authentic resource material. According to the authors (Cotton, Falvey and Kent 2011), if the person is in business, the course will greatly improve his/her ability to communicate in English in a wide range of business situations. If the person is a student of business, the course will develop the communication skills he/she needs to succeed in business and will enlarge his/her knowledge of the business world. Everybody studying this course will

become more fluent and confident in using the language of business and should increase their career prospects.

As mentioned above, *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011) presents twelve units. The particular sections of each unit are arranged as follows: Starting up, Vocabulary, Listening, Reading, Language review, Skills, and Useful language. A Case study section occurs after each unit while a Working across cultures section and a Revision section occur after every three units.

In the first two sections, businesspeople and students are offered a variety of activities in which they discuss the topics of the units and exchange ideas about them. They learn important new words and phrases which they can use when they carry out the tasks in the units. They can also find some definitions.

Language review sections focus on common problem areas at an Upper-Intermediate level so that students can become more accurate in their use of language. Each unit contains a Language review box which provides a review of key grammar items. Also, students have the opportunity to consolidate vocabulary and grammar in *Market Leader Business English Practice File* (Rogers 2011).

In the reading section, students read authentic articles on a variety of topics from the *Financial Times* and other newspapers and books on business. They develop their reading skills and learn essential business vocabulary. In the listening section, students hear authentic interviews with business people and a variety of scripted recordings. They develop listening skills such as listening for information and note-taking.

The Skills sections are focused on developing students' essential business communication skills, such as making presentations, networking, negotiating, cold-calling, and dealing with communication breakdowns. Each Skills section contains a Useful language box, which provides students with the language they need to carry out the realistic business tasks in the course book.

The Case studies are linked to the business topics of each unit. They are based on realistic business problems or situations and allow students use the language and communication skills they have developed while working through the unit. They give them the opportunity to practice their speaking skills in realistic business situations. Each Case study ends with a writing task (Cotton, Falvey and Kent 2011).

Working across cultures sections focus on different aspects of international communication. They help to raise students' awareness of potential problems or misunderstandings that may arise when doing business with people from different cultures.

Finally, Revision units are based on the material covered in the preceding three course book units.

Ideational Idioms in Business English Communication

The self-help book *Ideational Idioms in Business English Communication* (Hrdličková 2016) for the Independent user (B2) – the Proficient user (C2) can be used with *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011) as it deals with the same topics. Each unit consists of three sections:

short introductory texts explaining some basic terms, texts from online or book sources demonstrating the current use of idioms in business English contexts, and the examples of current British, American and Australian idioms extracted from four business English course books.

As the qualitative analysis of the research focuses on business vocabulary, it is also necessary to look at the terms and definitions included in the introductory texts of the first four chapters of this book. Chapter 1 Communication explains why communication is vital for organizations and what functions it fulfils. It is divided into three subchapters that present the following terms together with their definitions: a) The communication process – participant, message, encoding, decoding, channel, feedback, and context, b) Forms of communication – intrapersonal communication, interpersonal communication, group communication, public communication, and mass communication, and c) Communication in business settings – upward business communication, horizontal communication, downward communication, and communication to outside stakeholders.

Chapter 2 International marketing describes why companies and nations engage in international trade. It includes two subchapters that provide the definitions of the following terms: a) The global environment – domestic market, international market, global organization, multinational, and transnational company, and b) Expanding internationally – importing, exporting, licencing agreement, franchise agreement, international contract manufacturing or outsourcing, strategic alliance, venture, foreign direct investment (FDI), foreign subsidiary, and multinational corporation (MNC).

Chapter 3 Building relationships distinguishes between personal relationships and social relationships. It consists of two subchapters with the definitions of the following terms: a) Business-to-business relationships – professional networking, and b) Companies and company governance – stake, Stakeholder Theory, annual report, and social audit.

Finally, Chapter 4 Success provides the definition of success, and it is divided into four subchapters: a) Successful people – entrepreneur, chief executive officers (CEO), top manager, executive, manager, specialist, and employee, b) Successful products – product, good, service, customer, c) Successful companies – good company, competitive advantage, management, market leadership, customer-relationship management, d) Successful countries – economy, education, training, human expertise, trade secret, and innovation (Hrdličková 2016).

Assessing undergraduates' progress in business English seminars

Needless to say, education and training is important to anyone to be successful in life. It is essential to ensure that undergraduates are making progress on a business English course and to show this progress in quantifiable and comprehensible terms to them. In Donna's view (2000), formal or less formal assessment procedures can be used. She discusses four approaches that seem appropriate for the business English

context: a) periodic achievement tests – a testing approach which makes assessment of speaking (also writing) a real possibility, provided classes are small; b) portfolio assessment – which involves looking at samples of students' writings; c) end-of-course tests – a more traditional approach to assessment on courses; and d) external examinations – specially-written and recognised business English exams.

In agreement with Donna (2000), a very effective way of tracking students' progress and students' achievements on an ongoing basis is to arrange periodic achievement tests which use carefully developed marking criteria. These tests are popular with students and useful in class for various reasons. For example, two of them are: students get feedback (mid-course) on their achievements and on progress made, as well as they are able to monitor their own progress throughout a course and plan their self-study accordingly. In the past, the undergraduates of the University of Economics in Bratislava used to take periodic achievement tests, but it was abolished by the management of the Department of English Language.

As regards portfolio assessment, if courses focus mostly on writing skills, assessment can be based on a portfolio of each student's work. In order to use this type of assessment the teacher will simply need to issue each student with a folder at the beginning of the course and explain that it is their responsibility to fill it with samples of their work. The teacher will need to specify what type of samples he/she needs to see and how many of each type. For a course which aims to develop a broad range of business writing skills the teacher might, for instance, specify that he/she needs to see the following: emails – of any kind and length, but clipped to any previous correspondence; memos – one a memo with a request, one a response to another memo and one a mini-report requested by a manager; one three-page report (Donna 2000). The teacher tells students that they can submit these items to him/her at any time for assessment. The teacher gives students feedback on each piece of work. The teacher should allow students to resubmit any item if they wish. The only rule is that everything must have been submitted by a certain deadline.

End-of-course tests are the traditional method for assessing students' progress on courses. Well-written formal end-of-course tests have certain advantages, e.g. they can test students' level of performance at a given date, they are usually easy to administer and can sometimes even be administered by non-experts, and they can act as gatekeeper on courses, determining whether or not students can proceed to higher levels and whether or not students are awarded certificates (Donna 2000).

On the other hand, badly-written tests not only waste time, they might also give wrong impressions about what students can and cannot do which could in turn unjustly influence their career prospects. The teacher should make sure any test he/she uses is valid and does not simply test a student's ability to take tests. Weir (1993) states that language tests need to meet three general principles that underlie all good test design: they need to be valid, reliable, and practical.

Before the teacher starts writing end-of-course tests, he/she has to consider the following points: a) his/her main aim is to test what has been covered in the course, b) as well as using a written format, the teacher can also use oral interviews or role-play, c) including many different types of test items may result in a fairer test because the performance of individual students will depend less on whether or not they are good at a particular type of test item, d) all marks should be ideally add up to 100 and marks for different sections should be carefully weighted so as to reflect the importance of each language area tested and the time required to complete that part of the test, e) the test should include information on marking criteria and time allowed for each task for the students' own reference, f) the test can include some optional extra reading for those students who finish early, g) the test can include some end-of-course objective-setting – either for the next level in the teacher's Business English programme or for his/her students' future informal study, h) the test can also include a space for the student to write a comment to the teacher about the test, about his/her progress, or about the course in general; this will make the testing process more interactive (Donna 2000).

As for the test items, the teacher can use a mix of subjective and objective test items. Objective test items have one or more predetermined answers, which are not open to discussion. Subjective test items involve open-ended questions or tasks which could have many 'correct' answers. Marking objective test items is obviously easier, faster and more reliable in the sense that marks are less variable if several teachers are marking the same test. Subjective test items, although more difficult and time-consuming to mark, usually involve more realistic tasks so are perhaps more worthwhile. Specific test items, both objective and subjective, can be: a) multiple matching, b) multiple word gapfill, c) multiple sentence gapfill, d) clueless gapfill, e) multiple choice, f) mini-listening, g) extended listening, h) extended reading, i) guided writing, j) learner feedback, and k) spotlight role-play (Donna 2000).

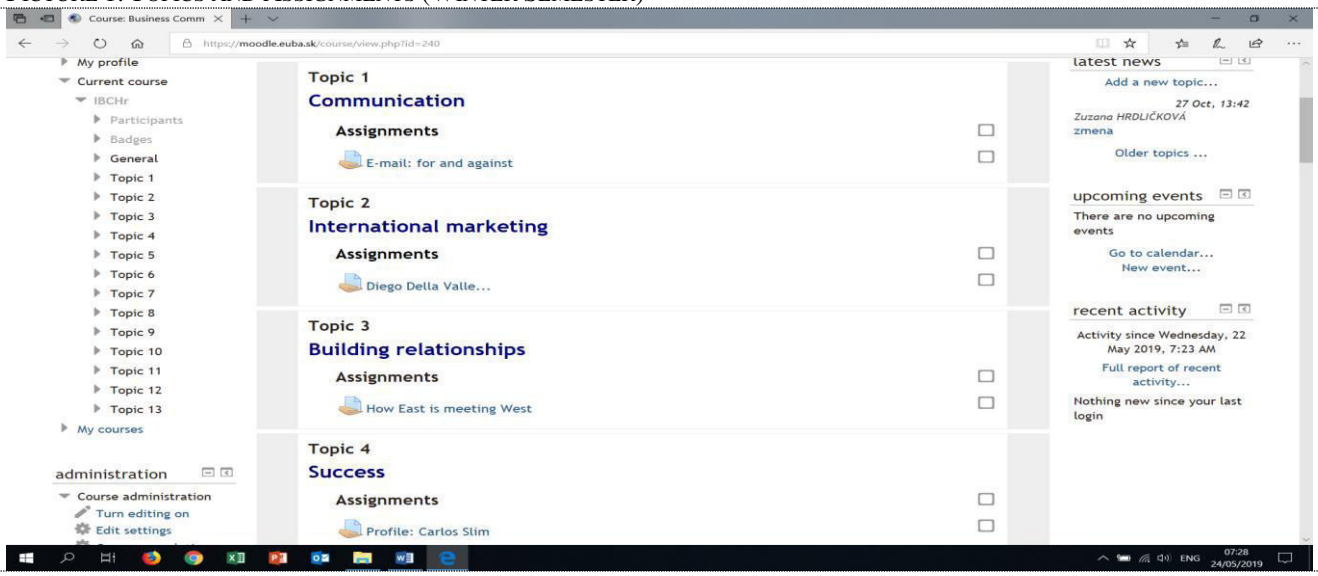
According to Šikolová and Mikuláš (2016), the most frequently recommended test items are: a) tasks with a brief answer (answers to questions verifying understanding, filling the gaps), b) dichotomous tasks (true, false) and trichotomous tasks (true, false, not stated), c) answer selection tasks (multiple choice, ideally with one correct answer and three distractors), d) matching tasks, e) tasks with an extensive answer with an unstructured nature (longer answers to questions), f) tasks with an extensive answer with a defined structure (e.g. an essay), g) tasks with an extensive answer with a structure given by a convention (e.g. a formal letter). They also discuss other test items, for instance, the summary of a read text – this test item meets the needs of real life, but it is relatively difficult to ensure its reliable assessment. The summary should include key information from the text in an acceptable form (text organization, grammatical and lexical accuracy). On the other hand, according to them, the following test items are not recommended: a) complete translations of sentences and coherent texts, b) tasks of organizing (ordering items), and c) dictation.

Nimritta (2016) states that Learning Management System (LMS) Moodle (Modular Object-Oriented Dynamic Learning Environment) is an intuitive and supportive environment for the independent nature of learning in higher education. In her view, there is no population more technologically skilful than post-secondary students.

LMS Moodle is the University's Virtual Learning Environment (VLE). It is a web platform designed specifically to support the delivery of teaching and learning materials and activities. The VLE enables learning resources and activities to be collected into one online location offering users constant anywhere and anytime access. LMS Moodle provides a number of interactive activities including forums, quizzes, surveys, chat and peer-to-peer activities. Users have the opportunity to share resources, work and learn together. The University is currently running version 2.6.4 of Moodle but in cooperation with PragoData Consulting, s.r.o. it plans to run a newer version that will bring a host of improvements.

According to Su (2006, in: Suppasetseree and Nutprhapha 2010), Moodle is a free online Course Management System (CMS) that is particularly good for language teaching. It contains many useful and friendly tools for creating and operating different types of courses. On the basis of our experience at Masaryk University in the Czech Republic we can state that online learning platforms like LMS Moodle are ideal for university students. Again, in accordance with the aims of the project KEGA, LMS Moodle was implemented into the teaching process. In order to help future engineers improve their foreign language skills within business English seminars, an e-course "Business Communication" was designed. Nowadays, it enables students to have access to teaching and learning resources, self-test exercises and assessments, online learning activities, assignment submissions. Picture 1 shows the first four topics of an e-course together with four written assignments.

PICTURE 1. TOPICS AND ASSIGNMENTS (WINTER SEMESTER)



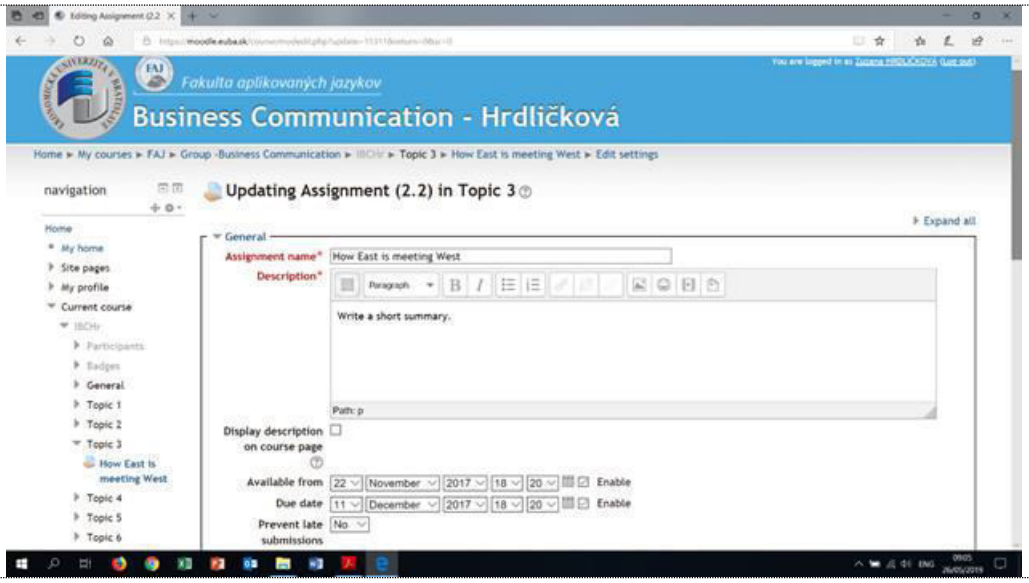
Source: Own

In the winter semester of 2017/18 LMS Moodle was used for improving students' writing skills. According to Sebínová (2011), feedback is closely connected with education and it is hard to imagine the teaching and learning process without it. LMS Moodle contains multiple feedback options, e.g. an inquiry (a poll), a questionnaire, assessments given to assignments, a multi-user assessment, and the like. The module Assignment is one of the most commonly used tools in LCMS Moodle. In other words, an assignment means setting a task. It is mainly used in tasks that require a more comprehensive response. Students send a completed task back to Moodle and the teacher evaluates the student's homework according to predetermined rules and may also allow corrective submissions. The assessment must meet the requirements of an individual approach to the student while guaranteeing the anonymity of each student. Chourishi, Buttan, Chaurasia, and Soni (2011) discuss the importance of assessments in any learning scenario. In agreement with Sebínová (2011), they describe the activity Assignment as an important tool for assessing students and guiding them during their studies.

Different additional conditions can be chosen when creating an entry: a deadline for the submission of assignments, the form of submission according to the chosen type of assignments, and the possibility of re-sending the assignments (Picture 2). Apart from these conditions, Nedeva (2005) and Chourishi, Buttan, Chaurasia, and Soni (2011) discuss grading and after resubmitting the assignments regrading them.

Evaluation can either be numerical (percentages, marks, points) or verbal. A combined assessment is appropriate. The teacher evaluates the role of the numerical value from the scale created and comments in writing on the strengths and errors in the task. In the case of a request for revision or completion of the work, it is indicated in written evaluation.

PICTURE 2. SETTING THE MODULE



Source: Own

Since one of the test items in standardized tests is focused on writing, experimental groups of students were asked to write four summaries of the first four reading texts presented in *Market Leader Business*

English Course Book (Table 1). The assignment activity provided a space into which students submitted their work for the teachers to grade and give immediate feedback on.

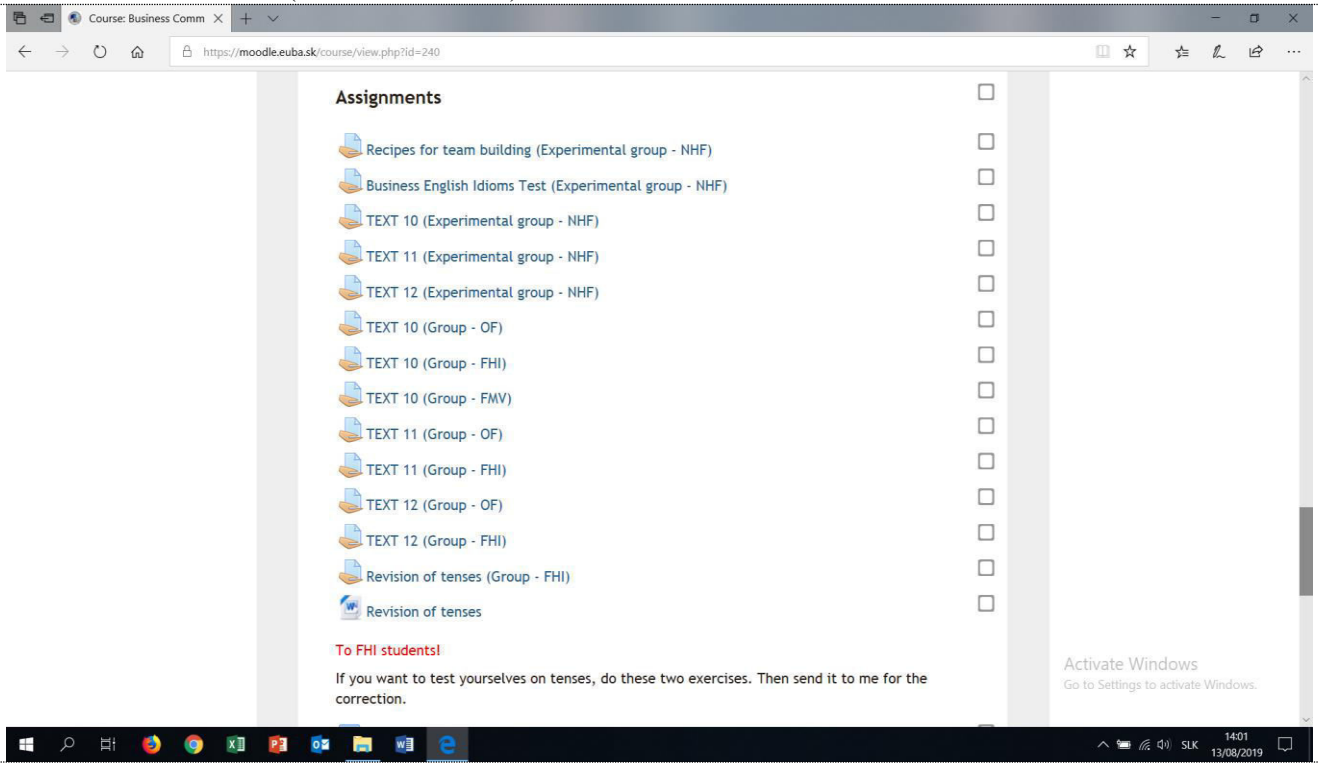
In addition to improving writing skills, the activity Assignment was also used in the summer semester of 2017/18 for improving reading skills and grammar. As can be seen in Picture 3, a greater number of students were required to read 12 texts in English-language newspapers and magazines, look for idiomatic expressions in them and submit their work into LMS Moodle.

TABLE 1. A STUDENT'S PORTFOLIO OF WRITTEN ASSIGNMENTS IN MOODLE (WITH MISTAKES)

Name of assignment	**Summary of the text**
E-mail: for and against Submitted: Thursday, 23 November 2017, 5:11 PM	This article is about e-mail in business. The truth is that business is generally best done face to face, but nowadays too many of us hide behind silent communications. Moreover e-mail can be a terrible distruction, but it is also marvellously economical tool.
Diego Della Valle … Submitted: Thursday, 23 November 2017, 5:12 PM	This article is about Italian atmosphere in fashion. Some Italian companies are more focused on the sphere of celebrities, but very important are companies which maintain the company on traditions and put quality before quantity. It is key to success and different between fashion and luxury company.
How East is meeting West Submitted: Friday, 24 November 2017, 9:20 AM	This article talks about guanxi. It means "connections" and the key to everything, especially for foreign investors. It is important have friends in different countries and meet people from different cities and have worldwide connections.
Profile: Carlos Slim Submitted: Sunday, 3 December 2017, 9:34 PM	This article describes Carlos Slim. Carlos Slim is either the world´s richest or second-richest man, with a fortune estimated to be in excess of $67bn. In spite of his obvious wealth, he remains frugal. He has comitted to spend $10 bn to fight marginalisation and poverty by investing in health, education and employment.

Source: Own

PICTURE 3. ASSIGNMENTS (SUMMER SEMESTER)



Source: Own

Research – material, methods and hypotheses

The research aims to show the results of a written examination of two groups of students participating in the Project KEGA. During the winter semester of 2017/18, 144 first-year students attended a course entitled "Business English for Advanced Students I". Apart from using a compulsory course book to deal with the first four units of *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011), the experimental group of students had to acquire idiomatic expressions from *Ideational Idioms in Business English Communication* (Hrdličková 2016). However, the control group of students was also recommended to study these expressions as both groups were tested on them at the end of the semester. Surprisingly, the research findings revealed a positive approach towards acquiring idioms in both groups (Hrdličková 2018).

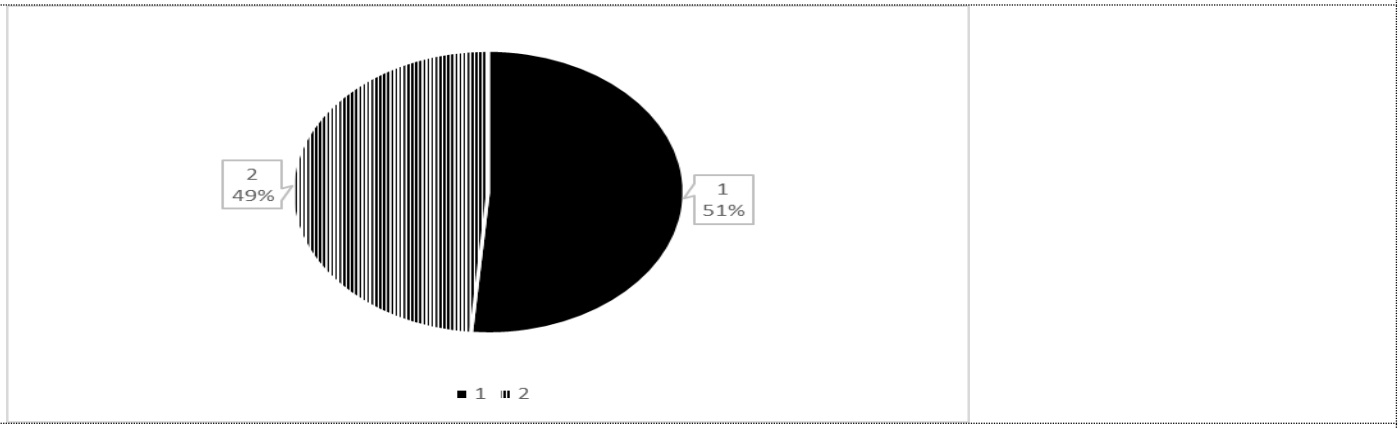
In December 2017 and January 2018, both groups of students had to participate in common compulsory departmental standardized testing, no matter what course book they used. The research compares the results of students attending a traditional business English course and students enrolled on a course supported by an e-course in LMS Moodle. With the use of technology, the experimental group of students was expected to improve their language skills. Therefore, the following hypothesis was put forward: "The experimental group of students will show better results in common departmental standardized testing." The results of standardized testing will be compared and statistically evaluated. In the research, the method of "Statistical Hypotheses Testing" – T test (parametric test) – will be applied in order to test the significance of the difference between the sample means. Research hypotheses H_1 and H_0 will also be tested.

Passing exams successfully would not be possible without grammar and vocabulary. Therefore, the main aim of a qualitative analysis is to find out what grammar and vocabulary was included in standardized tests.

Results and discussion – testing hypotheses

Table 2 presents the numbers of students who participated in the research, or the investigated sample of respondents (participants). Graphic representation of the numbers of students can be seen in Chart 1.

CHART 1. GRAPHIC REPRESENTATION OF THE NUMBERS OF STUDENTS



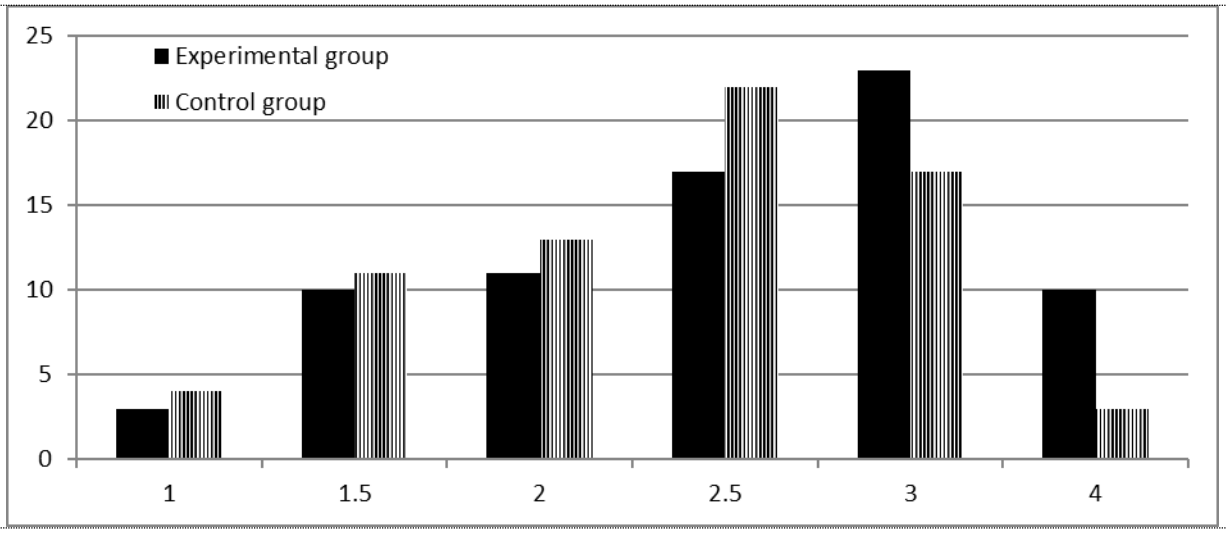
Source: Own

TABLE 2. NUMBERS OF STUDENTS		
Number of students	Experimental group	Control group
	74	70
Source: Own		

On the basis of the distribution of the achieved evaluation (Table 3) as well as the graphic representation of the grades (Chart 2), it is possible to assume a fundamental difference in the level of the achieved results, or the knowledge among the students of the experimental group and the control group.

TABLE 3. GRADES ACHIEVED BY THE STUDENTS						
Evaluation	A (1)	B (1-)	C (2)	D (2-)	E (3)	FX (4)
Number of students – Experimental group	3	10	11	17	23	10
Number of students – Control group	4	11	13	22	17	3
Source: Own						

CHART 2. GRAPHIC REPRESENTATION OF GRADES



Source: Own

In order to analyze the achieved results or to compare the level of students' knowledge the statistical method "Statistical Hypotheses Testing" was used. A parametric test aimed at testing the significance of the difference between the sample means, the so-called T-test, was used.

The "Independent Two-sample T-test" was used to compare the results of the experimental group and the control group.

Hypothesis H_1: There is a notable difference between the achieved results, or the level of knowledge of the experimental group and the level of knowledge of the control group.

Null hypothesis H_0: The difference between the knowledge of the students of the experimental group and the knowledge of the students of the control group is random.

The result: At the significance level of 5% ($\alpha = 0.05$), the null hypothesis H_0 is rejected, because the probability $p = 0.019$ (i.e. $p < \alpha$), it means that the difference can be considered as notable (significant).

The statistical characteristics calculated from the achieved grades, which were used in the test, are shown in Table 4.

TABLE 4. QUANTITATIVE CHARACTERISTICS

Statistical characteristics	Experimental group	Control group
Sample size	74	70
Median	2.58	2.35
Sparsity	0.658	0.474
Standard deviation	0.811	0.688

Source: Own

Results and discussion – a qualitative analysis of standardized tests

From the structure of a standardized test (Table 5) it can be seen that the first test item requires students to define five expressions. In our view, apart from providing the definitions of words or expressions this type of test item is very useful to test students' knowledge of grammar. The second test item is a matching task. The third test item is connected with the second test item as it requires students to use the expressions from Column A in context, and if necessary they have to make some changes. The fourth test item focuses on present, past and future tenses. Students are asked to use a correct tense in the sentences. The fifth test item is extended reading which tests students' reading skills more extensively. Authentic texts are extracted from webpages, newspapers, business books, magazines or journals. There is a list of questions for which the students need to write dichotomous answers. Finally, the last test item is writing; it provides students with a text in Slovak and they are required to write a short summary of the text in English.

TABLE 5. STRUCTURE OF A STANDARDIZED TEST

Test item	Instruction	Total
I.	EXPLAIN THESE EXPRESSIONS.	(Total – 10 points)
II.	MATCH A WORD/WORDS FROM COLUMN A WITH THEIR DEFINITIONS FROM COLUMN B.	(Total – 10 points)
III.	COMPLETE THE GAPS IN THE SENTENCES WITH A WORD/WORDS FROM THE ABOVE IN COLUMN A.	(Total – 10 points)
IV.	PUT EACH VERB IN BRACKETS INTO A SUITABLE TENSE.	(Total – 10 points)
V.	READ THE TEXT AND DECIDE IF THE FOLLOWING STATEMENTS ARE TRUE OR FALSE.	(Total – 10 points)
VI.	WRITE DOWN A SUMMARY OF THE MAIN POINTS OF THE TEXT IN 50 WORDS.	(Total – 10 points)

Source: Department of English Language, 2017/18

As our research interest covers lexicology, terminology and phraseology, the following qualitative analysis will be focused only on the first two test items of five standardized tests. Also, some example sentences will be given to see whether and how often the tested words and expressions are used in the first four units of *Market Leader Business English Course Book* (ML) (Cotton, Falvey and Kent 2011).

As it can be seen in Table 6, the first test item focuses on providing the definitions of five expressions. In one out of the five tests the expressions were, for instance: emerging economy, annual report, employer, product launch, and intranet. The Glossary section of *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011) provides some definitions, but not of the above mentioned. It only

provides the definitions of the words 'emerging' (adj) and 'launch' (n, v). What is more, the expressions 'emerging economy' and 'intranet' do not occur in the course book at all. When searching for the occurrence of the adjective 'emerging' in the course book, the following expressions can be found: 'emerging markets' (U2) and 'emerging networks' (U4).

TABLE 6. TEST ITEM 1	
I. EXPLAIN THESE EXPRESSIONS. (TOTAL – 10 POINTS)	
1 emerging economy	
2 annual report	
3 employer	
4 product launch	
5 intranet	
Source: Department of English Language, 2017/18	

*Businesspeople – local and foreign – are tapping into **emerging** networks that revolve around shared work experiences or taking business classes together*. (ML, U4, p. 25)

*Certainly in the **emerging** markets – for example, China – we could make a lot of money if we promoted it as a mass-market fragrance, at an affordable price*. (ML, U2, p. 154, Listening)

In *Oxford Business English Dictionary for Learners of English* (Parkinson and Noble 2005) the verb 'emerge' and the noun 'emergence' are listed as less important words. They occur in the expressions such as 'emerging markets' and 'the emergence of new technologies/evidence'.

The term 'annual report' occurs only once in the course book. What is more, it occurs in Unit 8.

*Preparing the **annual report** is a big job, but we're getting no input from her at all*. (ML, U8, p. 161 Listening)

When searching for the occurrence of the adjective 'annual' in the course book, the following expressions can be found: 'annual party/parties' (U3), 'annual China Entrepreneurs Forum' (U3), 'annual planning conference' (Working across cultures 1), and 'annual sales' (U4).

*Why does Ogilvy Public Relations Worldwide hold **annual** parties for previous employees?* (ML, U3, p. 24)

*It is currently holding its **annual** planning conference in Mauritius*. (ML, Working across cultures 1, p. 30)

*The period led to the formation of one of the key parts of Slim's empire – Grupo Carso, which today has **annual sales** of $8.5bn year and owns retail outlets such as Sanborns and Sears, as well as a wide range of manufacturing businesses*. (ML, U4, p. 39)

According to *Oxford Business English Dictionary for Learners of English* (Parkinson and Noble 2005), the adjective 'annual' is an important adjective to learn. On the one hand, the term 'annual report' is a less

important term from the area of accounting. On the other hand, the dictionary introduces collocations such as 'an annual conference', 'annual sales' and many others.

As the dictionary shows, the term 'employer' is an important term to learn.

*Because we know in talking to **employers** worldwide that they want marketing professionals that have the capabilities and skills required of today's demanding global business environment*. (ML, U2, p. 17)

As mentioned above, the Glossary section provides the definition of the word 'launch' (n, v). The dictionary introduces this important word as well as the collocation 'to launch a product'. However, the term 'product launch' is a less important term from the area of marketing.

*Mm, um, **product launches**, um, we always have something coming out, um, ah, at the beginning of the year, so, um, that'd be a great, um, session to have*. (ML, U2, p. 154, Listening)

*The success of our new **product launch** was jeopardised by an unimaginative advertising campaign*. (ML, U3, p. 23)

According to Table 7, the second test item is multiple matching. In Donna's view (2000), it is a good warm-up item which helps most students to relax because it only requires a receptive knowledge of English. Here, the students are required to match ten words with their definitions, e.g. forecast, frugal, land, consortium, stakeholder, flair, bond, intermediary, out-of-house, and estimate.

TABLE 7. TEST ITEM 2

II. MATCH A WORD/WORDS FROM COLUMN A WITH THEIR DEFINITIONS FROM COLUMN B. (TOTAL – 10 POINTS)	
A	**B**
1 intermediary	A a statement about what will happen in the future, based on information that is available now
2 estimate	B an agreement by a government or an organization to pay back the money an investor has lent plus a fixed amount of interest on a particular date; a document containing this agreement
3 out-of-house	C a person or organization that tries to help two other people or groups to agree with each other
4 frugal	D an organization of several businesses or banks joining together as a group for a shared purpose
5 bond	E using only as much money or food as is necessary
6 land	F natural ability to do something well
7 forecast	G a party that has an interest in an enterprise or project; a person who has invested money into something, or who has some important connection with it, and therefore is affected by its success or failure
8 stakeholder	H work is not done within a company by the company's staff; people who work at their own home or for another company, rather than in the company building
9 flair	I to succeed in getting a job, piece of work, etc., especially one that is seen as very valuable
10 consortium	J a judgement that oy make without having the exact details or figures about the size, amount, cost, etc. of something

Source: Department of English Language, 2017/18

The Glossary section of *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011) does not include the definitions of the following: forecast, frugal (adj), land (v), stakeholder, and estimate (v). What is more, the words 'consortium', 'flair', 'intermediary', and 'out-of-house' do not occur in the course book at all. When searching for the rest of the words, these expressions can be found:

*The sales **forecasts** are very good*. (ML, UNIT A, p. 33)

It's not surprising that Georgy Volkov didn't want to give Melissa five-year sales ***forecast*** *for the products they were supplying because there are so many permissions and certificates you need in Russia before you can set up a joint-venture deal*. (ML, Working across cultures 1, p. 156, Listening)

The word 'forecast' is an important noun or verb to learn. *Oxford Business English Dictionary for Learners of English* (Parkinson and Noble 2005) introduces collocations such as 'sales forecast', 'to give a forecast', and others.

The adjective 'frugal' occurs only twice in the same unit. According to *Oxford Business English Dictionary for Learners of English* (Parkinson and Noble 2005), it is a less important word to learn.

In spite of his obvious wealth, he remains ***frugal*** *in his tastes, and is often seen wearing a plastic-effect wristwatch which doubles as a calculator*. (ML, U4, p. 39)

As regards the expression 'land a job' in the third sentence of the third test item (Table 8), no such a collocation can be found in Units 1 – 4, the only expression 'land a deal' was found.

TABLE 8. TEST ITEM 3	
III. COMPLETE THE GAPS IN THE SENTENCES WITH A WORD/WORDS FORM THE ABOVE IN COLUMN A. MAKE THE APPROPRIATE CHANGES IF NECESSARY. (TOTAL – 10 POINTS)	
1	It is difficult to give an accurate …….. of sales.
2	He was very …….. and would often use a tea bag three or four times over.
3	She …….. a top job at Microsoft.
4	The company has been rescued by a …….. of banks.
5	The scheme encourages workers to become …….. in their own companies.
6	Being a good salesman requires skills, …….. and a good knowledge of your product.
7	The company are to issue …….. backed by its revenue from travel insurance.
8	The company acts as an …….. between buyers and growers.
9	Less than 4% of our products are now made …….. .
10	Can you give me a rough …….. of the time involved?
Source: Department of English Language, 2017/18	

Loosely translated, guanxi means 'connections' and it is the key to everything; securing a business license, ***landing*** *a distribution deal, even finding that special colonial villa in Shanghai*. (ML, U3, p. 25)

As regards the word 'stakeholder', it occurs only once in the course book in U11.

And then thirdly, ah, and finally there's rebuilding, so if this, has been a major crisis that the organisation's had to deal with, how does it rebuild its reputation externally, how does it, ah, restore the confidence of its customers, of other ***stakeholders*** *and indeed internally of its, of its employees?* (ML, U11, p. 165, Listening)

Aged 11, he invested in government saving ***bonds****, keeping a detailed ledger to track all of his purchases*. (ML, U4, p. 39)

Regarding 'estimate' used as a noun, it cannot be found in Units 1 – 4.

Carlos Slim is either the world's richest or second-richest man, with a fortune ***estimated*** *to be in excess of $67bn*. (ML, U4, p. 39)

In the third test item, the students are asked to complete the sentences with a word or expressions from the second test item in Column A. They are also expected to make changes if necessary, e.g. land – landed, stakeholder – stakeholders, bond – bonds, and estimate – estimated.

The analysis further continues with providing the definitions of the expressions such as: buying spree, staff, competitive advantage, adapt, license, entrepreneur, sweatshop, customer service centre, CEO, target market, in-house, demonstrate, press release, trademark, breakdown, alliance, sweatshop labour, facility, expand, and subsidiary.

The expressions from the second test item were: business acumen, engage, exploit, attribute, royalty, retail outlet, evolve, flair, work force, merger, knock-down, venture capital, supplier, joint venture, launch, homogenous, accusation, trust, far-flung, stockbroker, supply, establish, former, turnaround, networking, nouveau riche, market niche, order, fee, and shareholder.

In conclusion, some of the expressions occur many times in the course book, e.g. staff, supplier, market, marketing, and the like. However, the expressions such as frugal, far-flung, buying spree or others occur only once or twice, or there are also word that do not occur in the course book at all, e.g. evolve, flair, homogenous, accusation, trademark, etc.

Conclusion

Communication, International marketing, Building relationships, and Success are the first four units of *Market Leader Business English Course Book* (Cotton, Falvey and Kent 2011). This paper discussed the results of standardized tests of the experimental group and the control group of students. Altogether, 144 students were tested. The hypothesis "The experimental group of students will show better results in common departmental standardized testing." was rejected. The research proved that the experimental group of students did not show better results in standardized tests. One of the main reasons was the fact that the experimental group of students acquired more important and more frequently used business vocabulary. As the names of the units suggest, we supposed the students would be tested on business terms closely connected with these topics. Also, the above analyzed standardized tests were not created for them by the lecturers who taught them during the winter semester. The second main reason was the fact that the experimental group of students was composed of mixed classes – students with B1 and B2 levels. Breeze (2007) also deals with the problem of mixed level groups. The third main reason was the fact that in the experimental group of students there were also classes that did not receive good evaluation in the entry idiomatic test. Finally, a discipline can be taken into consideration.

As for the test results, immediate measures were taken (Picture 3) and more e-learning tasks were added to the course. This is just a small sample of assignments and a good example of how students can be trained at universities.

Regarding the qualitative analysis of the tested vocabulary in five standardized tests, more attention should be paid to the selection of business vocabulary and terms. Therefore, it is highly recommended to test more useful business vocabulary and more important business terms from the areas of management, marketing, human resources, production, etc. It is also recommended to include collocations, e.g. sales staff, marketing staff, communications(s) devices/technology, internal communication, and the like.

LMS Moodle – an open source web-based platform that provides a virtual learning environment – is constantly used in business English seminars as the project KEGA is still carried out at the University. However, it is also strongly recommended to use it in the teaching process as it serves as a learning management system by providing equivalent virtual access to classes, class content, tests, homework, grades, assessments, education tools and access to numerous external academic resources. It can also serve as a social space where the users are able to interact via threaded discussions or chat.

Acknowledgement

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ATTITUDES TOWARDS THE INTERNET AND TECHNOLOGY AND THE USE OF E-LEARNING TOOLS FOR LEARNING FOREIGN LANGUAGES

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Key words: e-learning, attitudes towards the Internet, foreign languages

Abstract:
The article aims to present a research on the subject of mutual relations between attitudes towards the Internet and technology and the use of a tool that allows learning languages using e-learning methods. Due to the nature of the complexity of learning a foreign language, more and more people are choosing to study on many platforms. In addition to the classic classes in language schools, there is a wide range of courses and on-line training at various levels of difficulty. This offer is also adjusted to the user's age, degree of involvement or limited thematically. A lot of mnemotechnic are used here as well as impacts on many senses and involving users through prizes.
People who use these courses, however, have certain beliefs and attitudes towards both technology and the Internet itself. This research is to check what attitudes and beliefs support the teaching process, and as they can be an obstacle in the acquisition of knowledge. The study will use the scale of Internet Use Expectancies and the scale of problematic use of the Internet. The research group will include people aged 18-30, millennials generation. Due to the fact that they are the first generation that was born in times of constant contact with technology, they constitute the largest percentage of people using e-learning methods to learn languages.
The conducted analyzes have shown that people using e-learning methods have a positive image of expectations towards the Internet and show less connections with Problematic Internet Use. In addition, gender differences as well as in the range of the chosen foreign language have been demonstrated.

Introduction

The aim of the article is to show the interrelations between problematic use of the Internet, expectations of the Internet and the use of various forms of language learning. This topic is particularly important due to the growing percentage of mixed learning methods, which in addition to traditional activities are based on the possibility of the Internet and programs (Chen and Shu 2014, 57-75). As many researchers have pointed out, this topic is common in many countries, due to the ease of access and the ability to use such teaching methods at almost any time (Sun 2009, 88-103). The choice and limitation of only to learn foreign languages is to check this particular group of users (Azar and Nasiri 2014, 1836-1843). Due to the fact that the ability to speak in many foreign languages increasingly an advantage on the labor market, young people make the effort to learn more and more foreign languages (Ushida 2005, 49-78). Especially in international corporations, the ability to use English or other languages, in addition to the mother tongue at level B2 or higher, is increasingly a basic requirement for standing for a given position.

The research group consisted of people between 18 and 30 years of age, which mean a group of people who are Y generation, or Millennials generation. These are people born in the Internet age, for whom using a computer and using technology is natural. This is the first generation of digital natives. Young people on the market are also struggling with growing demands and competition, which is why language learning is an important factor for them to reach their dream career (de Larreta-Azelain 2013, 127-139).

Regardless of external factors, the choice of teaching methods also has beliefs that people have towards the Internet. As research shows, we develop certain specific expectations about the Internet and regardless

of the way of use, these beliefs and expectations accompany us when using and using this medium (Viberg and Grönlund 2013, 169-180).

Methods

To examine the problems presented, the following questionnaires were used. Internet Use Expectancies Scale consists of two subscales (Brand, Laier and Young 2014, 1256). The first is positive reinforcement, while the second is avoidance expectancies. The scale consists of 8 questions, 4 for each of the subscales. Answers are marked on a 6-point scale from completely disagree to completely agree. The second scale used is the scale of generalized problematic use of the Internet 2 (Caplan 2010, 1089-1097). It consists of 15 questions from which you can calculate 4 subscales. The first is the preference for on-line social contacts, then mood regulation, negative consequences, insufficient self-regulation, which is divided into cognitive absorption and compulsive use of the Internet. 119 people aged 18-30 were examined, and in the survey they also indicated the age, gender, type of teaching and the language they are learning. For further analysis, the following research questions were posed:

1. Will there be gender differences in the preferred teaching method?

H1. Women will use stationary activities more often than men.

As can be seen from the available statistics for stationary classes, the majority of women have a higher percentage of women than men (Banditvilai 2016, 220-229).

2. Will there be differences between the genders in the area of Problematic Internet Use?

H2. Women will show higher scores in mood regulation than men.

H3. Men will show higher results in negative outcomes subcategories than women.

H4. Men will show higher scores in the compulsive Internet use subscale than women.

Based on the conducted research (Caplan and High 2006, 265-271), there are gender differences in individual subscales of the problematic use of the Internet. As the research results show, women score higher on the mood regulation scale, while men on the negative outcomes and compulsive internet use scales. It is worth noting that there were no differences between the sexes in the overall scale of this questionnaire.

3. Will there be differences between the sexes in terms of expectations for the Internet?

H5. Men will have higher scores on avoidance expectancies than women.

H6. Women will have higher positive reinforcement results than men.

Based on the analysis of the literature, a more frequent search for positive reinforcements by women on the Internet is indicated, while in men more frequent use of the Internet as a method to avoid or offset the problems of the outside world. This dependence does not occur on teenagers and children (Hsu 2013, 197-

213).

4. Will there be differences between learning English and learning other languages in the field of the chosen method?

H7. English learners will use classroom learning more often than learners of other languages.

Based on the analysis of offers addressed to people who want to learn a foreign language, English is the dominant language in full-time courses, both in terms of group size and level of advancement (Stracke 2007, 57-78).

5. Will people choosing mobile learning and online learning have higher positive expectations for the Internet than people choosing traditional teaching methods?

H8. People choosing mobile learning and online learning will have higher positive expectations towards the Internet than people choosing traditional teaching methods.

Positive expectations towards the Internet may be the choice of this method of learning a foreign language. On the other hand, having avoiding tendencies may result in reverse actions (Akbari, Soodeh and Simons 2012). There may also be a feedback relationship where people using online programs to teach a foreign language receive positive reinforcement that builds a positive image of the Internet in these people (Kormos, Kidler and Cziser 2011, 495-516).

6. Will attitudes towards the Internet be related to the problematic use of the Internet?

H9. The positive reinforcement attitude will not be related to the problematic use of the Internet.

H10. The avoidance expectancies attitude will be related to the problematic use of the Internet.

Regardless of the advantages, the Internet also has some drawbacks (Chen 2013, 20-36). There are many problems and difficulties that are associated with excessive or inappropriate use of the Internet. Checking which attitude is more connected with the Internet may allow to determine what actions may strengthen and which to reduce the occurrence of problematic use of the Internet (Rahimi and Yadolahhi 2011, 167-174)

Results

The study was conducted on a group of 119 people. The mean age was 22 and the median 21. In order to determine the normality of the distribution, the Shapiro-Wilk test was carried out, which showed that the variables do not have a normal distribution. Which means that non-parametric tests will be used in later analyzes. 65 women and 54 men participated in the study. 77 people were learning languages using mobile learning, 70 using classroom learning, 78 using online learning, 51 people used both mobile and online learning, 36 people used all three methods. 81 people were taught English, 16 people of French, 11 German, 5 people of Italian, 4 people of Spanish, 1 Danish and 1 Swedish language.

H1. Women will use stationary activities more often than men.

In order to check the first hypothesis, Mann-Whitney U test was used, which showed statistically significant differences between men and women in the use of classroom leraning. Statistics Z = 4,001 for p <0.001. Based on the chart, women were more likely to use classroom learning than men.

H2. Women will show higher scores in mood regulation than men.

H3. Men will show higher results in negative outcomes subcategories than women.

H4. Men will show higher scores in the compulsive Internet use subscale than women.

In order to test hypotheses 2,3 and 4, we used the Mann-Whitney U test, which showed statistically significant differences between women and men for hypotheses 2 and 3. For hypothesis 2, the value of Z = 3,17 for p <0.001, which means statistically significant differences between men and women in the scope of subscales mood regulation. Based on the chart, women obtained a higher median (12) than men (8), and differences in the minimum and maximum values were also shown. For women, they were 5-21, for men 3-19. The results of statistical analyses for hypothesis 3 showed that men achieve higher results in the negative outcomes subscale than women (Z = 2.48 p <0.01). Based on the chart, men obtained a higher median (7) than women (6), they also had a higher range of 25-75%, which was 5-11 for men, and 3-8 for females. Based on statistical analyses made for hypothesis 4, there were no statistically significant differences between men and women.

H5. Men will have higher scores on avoidance than women.

H6. Women will have higher positive reinforcement results than men.

To test the above hypotheses, the Mann-Whitney U test was used. The obtained results indicate the lack of differences between men and women both on the positive reinforcement scale and on the avoidance expectancies scale (Jarawa 2014, 33-44).

H7. English learners will use classroom learning more often than learners of other languages.

In order to verify the hypothesis, the Mann-Whitney U test was used which showed statistically significant differences between the group of people learning English and a group of learners of other languages in the use of classroom learning. Value Z = 5.31 for p <0.001, which means that people learning English more often used this method of teaching than other people.

H8. People choosing mobile learning and online learning will have higher positive expectations towards the Internet than people choosing traditional teaching methods.

In order to verify the above hypothesis, the Mann-Whitney U test was carried out, separately for three methods of learning. The obtained results indicated significant differences in the level of positive reinforcement for people using or not online learning. Z value = 3.67 for p <0.01. Based on the chart, the

median for people using online learning was higher and amounted to 14, and for those who did not use this method, 12. The people using online learning also obtained higher results for positive reinforcement in the range of 25-75% of responses. and they amounted to 12-17, and for those who did not use this method 11-13. Other teaching methods did not show statistically significant differences for positive expectations of the Internet.

H9. The positive reinforcement attitude will not be related to the problematic use of the Internet.

H10. The avoidance expectancies attitude will be related to the problematic use of the Internet.

In order to check the above hypotheses, the analysis of Spearman's correlation was used, i.e. a non-parametric test for measuring correlation. For positive reinforcement, one positive correlation was obtained with the mood regulation subscale, which was rho = 0.23 for $p < 0.05$. For the attitude avoided expectancies, all subscales and total sum showed statistically significant correlations. For the total sum it was rho = 0.56, $p < 0.05$, for mood regulation rho = 0.50, $p < 0.05$, for compulsive Internet use rho = 0.35, $p < 0.05$, for cognitive preoccupation rho = 0.32, $p < 0.05$, for negative outcomes rho = 0,26, $p < 0.05$.

Conclusion

The analyses carried out indicate significant statistical differences, which may be one of the internal psycho-social factors shaping the choice of learning methods. The obtained results indicate gender differences, which may be caused by many factors. Differences in the choice of classroom learning more often by women can be shaped by the type of advertising or the orientation of a given school. The elements of problematic use of the Internet affect everyone, both women and men, but it seems important to point out that the demonstrated gender differences may support different uses and beliefs towards the Internet. The problem on the general scale seems homogeneous, while on the basis of the analysis of the subscales one can notice some differences that may be related to the choice of a foreign language learning method. Another aspect is the phenomenon of greater availability and universality of English language learning opportunities than other languages. People who expect positive reinforcements from the Internet and do not use it as avoidance behaviours more often used the online learning method. In addition, positive expectations of the Internet point to almost negligible correlations than just avoiding trends with Problematic Internet Avoidance. This indicates a certain interdependence of positive emotions that can play a role in protecting in a proper, not excessive use of the Internet. The possibility of mixing foreign language teaching methods allows to adapt the pace and diversity to the requirements of learners, regardless of external factors, such as the degree of accessibility of a given school, materials, product or other issues, internal beliefs and opinions may also be a significant contributor to preferences of specific teaching methods.

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Development of competencies

NEW TECHNOLOGIES IN EDUCATION OF PEDAGOGICAL STAFF IN THE FIELD OF ELEMENTARY ART EDUCATION		IVANA SHÁNILOVÁ, MILAN DEMJANENKO Jan Amos Komensky University Prague, Czech Republic

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Key words: Microcomputer, Pedagogical staff, Software, educational program, Elementary art education.

Abstract: The paper focuses on a specific area of further professional education, on pedagogical education of staff at elementary art schools. The authors present partial results of the evaluation of educational programs in the area of modern technologies, specifically software for comprehensive art schools agenda management focused on classification and work with microcomputer in education.

Introduction

Further education of educational staff is becoming an increasingly important issue of educational policy in many aspects and an important characteristic is its institutional character, ie the ideal environment is a functioning institutionalised structure in which further education of educational staff would be performed. It can then be defined as *"institutionalised, conceived and managed education at various levels of groups of teaching staff in practice, aimed at development of education and development of the school as an educational institution"* (Kohnová 2004, 70–71). Průcha defines further education of this target group in Pedagogická encyklopedie (2009, 413) *"in a broader sense as a lifelong development of professional competences following the preparatory education, to all activities which, in relation to the achieved qualification of the teacher, serves to maintain and improve their professional skills and educational activities in which teachers engage to broaden and maximise their knowledge, skills and professional attitudes"*.

The system of further education of pedagogical staff is a basic prerequisite for the long-term sustainable development of pedagogical professions, both in terms of professional development of teachers and in terms of meeting the needs of the different target groups concerned by this education. Of course, also in terms of economic sustainability and high efficiency of the whole system. The optimal state of further education of pedagogical staff is characterised by finding a flexible balance in finding ways to meet the needs of individual target groups, equality of access to this education for all users, high efficiency of the system as a whole, guaranteed quality of supply, outputs and standardisation of basic parameters.

Education staff of elementary art schools in the Czech Republic are defined by the Act on Education Staff, which regulates conditions for the performance of activities of education staff, their further education and career system. It applies to the teaching staff of schools and educational establishments registered in the Register of Schools and Educational Institutions and to those working in social care institutions. The Act on Education Staff defines the prerequisites for the performance of the activity of a pedagogical staff member, the prerequisites for the performance of the function of the school headmaster and the achievement of professional qualifications. It regulates the obligation of teachers to continue their education in order to renew, strengthen and complete their qualifications. Pursuant to Section 2 of the Act

in force, the pedagogical staff member is a teacher, tutor, special educator, psychologist, leisure time educator, teacher assistant, coach, head teacher. Education staff, including school headsmasters and deputy headmasters, are preschool, elementary school, elementary art school, high school, special education centre, pedagogical-psychological counselling centre, vocational high school, vocational school, leisure facility, recovery educational institutions, educational institutions for further education of pedagogical staff, social care facilities, sports schools and sports classes of secondary vocational schools.

The implementing regulation to the above-mentioned Act is the Decree on Further Education of Education Staff, which defines its types and conditions for the placement of teachers and other categories of education staff into career levels. This regulation defines the types of further education of pedagogical staff. Being a good pedagogical staff member means, among other things, grasping the requirement of lifelong learning, mastering skills that change dramatically throughout their profession. Pedagogical professionals promote theories, values, cultural patterns, attitudes and traditions. They bear the responsibility for upbringing and education of children and youth towards society in the sense that they bring them into social life. They have a significant share in shaping pupils and their individual careers.

Before we move on to performance of education in this area, we consider it necessary to classify the connection of ICT with art in elementary art schools. Kalhous et al (2002) lists three areas in the basic classification. First Tutorials, which include subject training programs, simulation programs, didactic games (programs designed as a fun game for educational purposes), and electronic textbooks and encyclopaedias. Second area is Computer as a work tool, which includes text editors (programs enabling text writing, database systems (a database-containing program, that is a group of information organised according to certain criteria to allow different manipulation with this information), spreadsheets (designed to perform calculations within a user-defined spreadsheet), graphical editors (programs that allow you to create and edit images on the editor), and CAD systems (Computer-aided Design means the ability to model two- and three-dimensional models). The third area consists of Programs for obtaining information from computer networks, ie, multimedia supporting the development of multimedia classrooms, which enable the provision of information from various media such as newspapers, books, magazines, television, videos, telephones and computer networks including all services such as e-mail, www or news.

New technology in elementary art schools

For the purpose of this paper, the authors focused on new technologies in the education of pedagogical staff of elementary art schools. At present, the National Institute for Further Education, which is a contributory organisation directly managed by the Ministry of Education, Youth and Sports of the Czech Republic. It provides complex nationwide tasks in the area of further education of pedagogical staff resulting from the Government Resolution of the Czech Republic, education legislation and securing the tasks of the European Social Fund and provides advice to schools and school facilities, it informs about

new trends and practices in education throughout the Czech Republic. In the area of education of pedagogical workers of elementary art schools, the main objective is to provide education deepening their qualifications. Furthermore, the choice of topics, specific contents and forms of individual educational programs, based on the Ministry's strategic documents, reports of the Czech School Inspectorate of the Ministry of Education, the conceptual and analytical activities of this institute reflecting the education provided and the practice of the target group. In terms of content and structure, these educational programs are linked to the successfully verified system of education of teachers of elementary art schools.

There are three pillars. The first is the implementation of one-day training programs, seminars, ICT courses and multi-day management courses. The second pillar deals with cyclical educational programs, namely a four-part educational program in the amount of 24 lessons for trainee teachers, a four-part educational program in the amount of 24 lessons for experienced teachers and a four-part educational program in the amount of 24 lessons for wider management. The third pillar is focused on the so-called. nationwide educational programs, which are several day long and carried out according to the assignment, for teachers of the subject Organ music lesson, for teachers of fine arts and for teachers of specific study fields of music (music theory, ensemble and orchestral play, bagpipes, cymbalo music lessons and others).

Educational programs may be as follows:

- educational program Organ music lessons;
- nationwide meeting of teachers of literary and dramatic disciplines at elementary art schools;
- nationwide meeting of teachers of music at elementary art schools;
- national meeting of teachers of fine art at elementary art schools;
- information seminars on the Electronic Organisation of Art School competitions;
- how to evaluate a dance work;
- a new textbook on music theory;
- playing wind instruments;
- national roundtable conference Support of elementary art schools.

The entire educational area of elementary art education responds to the need to support the education of teachers and managers of elementary and secondary art schools in connection with the ongoing curricular reform, the need to create a separate structure of educational programs, the need to ensure sustainability of ESF projects which the aforementioned institute carried out recently. The unbalanced or non-existent offer of educational programs for teachers and managers of elementary and secondary art schools and insufficient methodological assistance in addressing the curriculum reform process at elementary and secondary art schools.

Education robotic programs have become popular in most developed countries and are becoming increasingly popular in developing countries. Robotics is used to teach problem solving, programming, design, physics, mathematics and even music and art and is available to students at all levels of their education (Miller, Nourbakhsh 2016). According to Eguchi the evolution of skills for the successful implementation of Education 4.0 is of significant contemporary interest to both researchers and practitioners. One of the most researched topics in Education 4.0 is the use of robotics in education. Experts highly encourage the use of robotics in classrooms to convey the most important 21st century skills to children.

As mentioned above, the authors focused on the two current implemented programs in which they participated and thus had the opportunity to talk to both the target group of education and the lecturers.

Within the framework of the first program called Classification - software for comprehensive management of the agenda of elementary art schools, there is a possibility to keep records of pupils and education staff in electronic form. Participants were presented with the Classification software, which facilitates classroom documentation, scheduling, school reports, matching of tuition fees and loan instalments, and more. The main points of the seminar were: Introduction of SW Classification, SW installation, login to the program, description of the main SW window, transition to other program modules. The areas of study became fields, departments, fields of study, subjects, teachers, pupils, applications, catalogs, timetables, class books, concerts and performances, prescribed tuition fees, instruments records, prescribed loan instalments, settled payments - HOMEBANKING technology. The software accepts the requirements for keeping the school documentation in relation to the requirements of the Framework Educational Plan for Elementary Art Education. By completing the educational program, education staff of these schools will acquire new skills in keeping the school documentation and classroom documentation in the electronic way not only headmasters, but also teachers and school administrative staff. The school headmaster gets an overview of all information about the school (school register, timetables, school fees and statistics). Participants of the program will get acquainted with the possibility of easy and quick announcement and printing of school reports, convenient compilation and editing of timetables, comfortable management of class books using PC, mobile phone, tablet. School administrators are presented with the possibility of effectively keeping records of tuition and loan instalments, printing various overviews and bank statements.

The second program called *Playing with Microcomputer I.* is based on the need to acquaint and provide pedagogical staff or lecturers with the teaching of programming, robotics and microcomputers both in after school activities and during school lessons. During the training program, participants were acquainted with programming of microcomputer Micro:bit and its use in the development of talent. At the beginning of the

seminar, the students were acquainted with the principles of block programming, its advantages and disadvantages and with the procedures of working with pupils in the classroom. The aim was to enable the participants to use the acquired knowledge when programming their own animations, inscriptions and programs using a microcomputer in the work with gifted pupils. The lecturers also worked with examples of other possibilities of extension for use in education and all participants were offered the possibility of continuation within the next course. The methods used were lecture, practical demonstration, programming of own programs, programming of microcomputers and practical examples. Table 1 lists the specific educational goals (based on Bloom's taxonomy of goals).

TABLE 1. EDUCATIONAL OBJECTIVES – PLAYING WITH COMPUTER I.

Rev. Bloom, 2001	**Cognitive process dimension**					
Knowledge dimension	**1. To remember**	**2. To understand**	**3. To apply**	**4. To analyse**	**5. To evaluate**	**6. To create**
A. Knowledge of the facts (factual knowledge)						
B. Conceptual knowledge		C1				C4
C. Procedural knowledge			C2			C3 C4
D. Metacognitive knowledge						

Source: revised Bloom's taxonomy of educational objectives, Anderson, Krathwohl, 2001
Note:
C1 – Seminar participants will be acquainted with purpose of programming of microcomputers for youth and gifted pupils.
C2 – Seminar participants will be acquainted with programming software and methodology of programming of microcomputers.
C3 – Participants thanks to the information acquired will create own programs in the above mentioned software and will practically explore the application on a given microcomputer.
C4 – Participants thanks to experience acquired will design education system of programming of microcomputers in their lesson.

Source:Own

Follow-up educational program *Playing with a microcomputer II*. extends the knowledge of microcomputer programming from the first educational program and is based on at least passive programming ability. During this educational program, pedagogical staff were acquainted with the advanced programming of Micro:bit and how to use it for their work with gifted pupils. Instructors presented previews of possibilities of extensions and applications in education in detail. With this knowledge, participants were able to program robots controlled by Micro: bit. By completing the seminar, participants will be fully qualified to use the microcomputer both for programming and for controlling robots in education. Table 2 shows specific educational objectives again based on Bloom's taxonomy of objectives.

TABLE 2. EDUCATIONAL OBJECTIVES – PLAYING WITH COMPUTER II.						
Rev. Bloom, 2001	**Cognitive process dimension**					
Knowledge dimension	**1. To remember**	**2. To understand**	**3. To apply**	**4. To analyse**	**5. To evaluate**	**6. To create**
A. Knowledge of the facts (factual knowledge)						
B. Conceptual knowledge		C1				C4
C. Procedural knowledge			C2			C3 C4
D. Metacognitive knowledge						

Source: revised Bloom's taxonomy of educational objectives, Anderson, Krathwohl, 2001
Note:
C1 – Seminar participants will be acquainted with purpose of programming of microcomputers for youth, gifted pupils.
C2 – Seminar participants will be acquainted with procedures of using of extension for Micro:bit and procedures of robot programming.
C3 – Participants thanks to the information acquired will create own programs cooperating with extension and robots for Micro:bit.
C4 – Participants thanks to experience acquired will design education system of advanced programming of microcomputers in cooperation with the robots in their lesson.

Source: Own

A lecturer stated during an interview, that *"electronic keyboard instruments, such as keyboards, synthesisers, digital pianos, and workstations, are used in art (not only in elementary art schools) as completely separate instruments that encompass wide spectrum of usage. For example, a particular musical instrument, an instrument in an orchestra, an instrument that can replace any acoustic instrument, not just a keyboard instrument. In elementary art schools, besides the solo use as a separate instrument, we can also use it as a substitute for missing, expensive instruments, such as a temple organ, harp, or old historical instruments. Sound samples from good instruments are hard to distinguish from acoustic instruments, in many aspects they outperform some acoustic instruments (no tuning is required, etc.).*

Workstations so called working stations provide much greater use of technology. A keyboard may replace the whole orchestra, recording studio, directly with the instrument we can record with singing together music and then save the result in MP3 or WAV format. Schools can save considerable money for renting a recording studio. Furthermore, these instruments can accompany live dance or theatre performances, in the field of fine art they can link images with music (videoclip, etc.).

In addition to the points mentioned in the introduction, I would point out one, absolutely perfect assistant for the a keyboard player - a tablet that allows a sound engineer to control the sound of the entire concert using wireless technology without having to connect the instruments with an incredible amount of cables. In addition, he/she can store the specific space he/she sounds and recall the data whenever needed. In the area of tutorials and other software, I would mention especially music and notation software and programs Cubase, Audacity, Sibelius, Muse Score, XG Works, Dorico, Sonar and similar. Notation programs save us - musicians - a lot of time and notation paper music, because we can instantly play, review, and edit any music notation that we create using notation software. Generally, the use of ICT in

pedagogical and artistic practice saves us time, allows us to gain insight into the field (thanks to the Internet) and allows us to share our cultural experiences through websites and social networks and thereby motivate our pupils."

Methodology

In terms of methodology, the method of non-standardised interview was used, which is based on direct interviewing, ie on verbal communication of the researcher with the respondent or with more respondents. It is characteristic for the interview that it is a pre-arranged, structured procedure, based on a set of thoughtful questions. It was a structured interview for feedback research. The questions formed a chain of content related questions in order to find out the feedback from the addressed experts on the need and time relevance of programs, their use in schools and their satisfaction. The aim of the research was to acquire relevant knowledge and opinions of respondents on given educational programs. A total of 2 interviews were conducted with the headmaster of a primary school and a lecturer, who actively cooperates with the Institute in these areas within these programs. After the interviews were completed, the responses were sorted and categorised.

The participants of all the above mentioned seminars were very satisfied. The headmaster of the Elementary Art School in Ústí nad Labem stated that *"the Classification system helps teachers of elementary schools. The system uses three platforms (classic computer program, web interface and mobile phone application), which are interconnected. Although the original basis for the Classification system was a database for the registration of elementary school pupils, it has gradually become an indispensable and powerful aid in teaching. Of course, the database works with all the data as required by law, but it also allows the teacher to follow the artistic development of each pupil. It contains information about his performance at competitions, concerts, performances and exhibitions. From the history of class books the whole track of the course of education is available at a mouse click. It is possible to redefine the school educational program including the required outcomes. The system monitors whether the pupil fulfils all prescribed items in the required hourly allocation. Of course, data may be exported to the EOS database without unnecessary rewriting. These are probably the key characteristics in a school teacher pupil relationship. But the system also allows communication. Not only among teachers, but also between school and subsequently teachers and parents. Classification also makes life easier for parents by using the booking system to register lessons at the beginning of the school year or by sending an excuse notes from the Classification mobile app directly. They have an overview of planned performances, pupil's results, tasks for the next lesson or payments. Both the teacher and the parent are relieved of excessive bureaucratic burdens and can devote themselves to the most important thing - their children."*

Another method used was a questionnaire to evaluate the training program for participants. The questionnaire contained a total of four questions - evaluation of the lecturer, whether the lecturer was an

expert from their perspective, whether he/she used active teaching methods, brings knowledge for practice and provides space for active participation of participants in the program. In the second question, respondents evaluated the content and organisation of the programs. In the third, whether there is sufficient hourly allocation. Finally, in the fourth, they had the opportunity to make comments or recommendations.

The programs were carried out in September 2019 (11 respondents) and in November 2019 (32 respondents). A total of 43 respondents from elementary art schools in Prague and Central Czech Republic participated in the feedback questionnaire.

From the point of view of participants, there is overall satisfaction with these educational programs, participants are interested in continuing these programs, appreciate the expertise of lecturers, value the interconnection of theory and practice, and at the same time express satisfaction with methodological materials, receive many messages on ICT materials and application from lecturers.

Conclusion

In conclusion it may be stated, that it is necessary to support elementary art schools and their pedagogical staff in the area of modern technology. The demands placed on schools and teachers are more demanding and complex. It is known that the education of pedagogical staff is a never-ending process in which there is still room for improvement. Quality education is an important factor that can positively influence the prestige of this occupation. In the future, it will be important to participate in the creation and provision of suitable conditions for the activities of elementary art schools, both in the field of modernisation of equipment and teaching methods (including the use and subsequent implementation of modern digital technologies in education) as well as in the area of support of development of competencies of pedagogical staff of elementary art schools. It is necessary to support education and development of pedagogical staff through compact educational programs in the field of information technology and to contribute to improving the quality of work of pedagogical staff in education and upbringing, especially through mutual exchanges of experience between teachers from different art schools and good practice examples. This will also deepen the cooperation of these workers and practitioners within individual artistic fields and improve the quality of teaching.

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A NEW EDUCATIONAL PROGRAM OF DIGITAL COMPETENCES DEVELOPMENT FOR TEACHERS

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Key words: digital competences, digital technologies, a new educational program, research.

Abstract: The aim of the paper is to point out to a new educational program, which is subjected to a research within the implemented project TAČR (Technological Agency of the Czech Republic) for the support of applied social and humanitarian research, experimental development and innovation of ETA at CTU MIAS, Masaryk Institute of Advanced Studies, Czech Technical University in Prague. The methodology of the paper is based on an analysis of the current situation in the teaching of vocational subjects at Czech secondary schools and research in this field. More specifically, the paper deals with the application of digital technologies to the educational process, digital competences of teachers, work with didactic technique and new technologies. The new educational program is aimed for developing the digital competences of general education teachers in secondary vocational schools. The program is also intended to show that digital technologies can be used not only for entertainment, relaxation, and communication, but represent also a significant tool in education, demonstrating the possibilities and limits of digital technologies in today's school, and highlighting their importance as support and supplement to modern interactive teaching.

Introduction

The dynamic transformation of society is reflected in the demands for changes to the education system, in which teachers must prepare pupils even for professions, that currently do not exist. This fact is also reflected by the European Commission (Carretero, Vuorikari, and Punie 2017), which issued recommendations for member countries on how to define teachers´ necessary digital competences. These recommendations built on previously developed Digital Competence Framework for Citizens (Redecker et al. 2018) and on a definition of a digitally functioning educational organization (DigComp 2.0 2016). In the information society, which is based on knowledge economy and where ideas and knowledge become commodities, a tumultuous development of digital technologies, that affect most of human life spheres, takes place. Especially serious impact is reflected in the new possibilities of industry, which is called Industry 4.0. A new generation of digitally literate workers must be trained for the needs of this industry. Very important role is played by teachers who must prove sufficient digital competences. Increasing attention focused on the competences required by the information society leads individual schools and the entire education system to introduce necessary changes within their curriculum. The aim of the current education is to develop digital literacy and computer science thinking of pupils, to improve their competence to work with digital technologies, and to introduce new learning methods.

Educational program

The new educational program is based on the European Digital Competence Framework of Educators, which is divided into five core areas (Redecker et al. 2018): information literacy, data literacy, communication and collaboration, digital content creation, security and problem solving. The concept of creating the educational program for teachers of social sciences aims to build and develop the digital competences of teachers so that they can prepare pupils for life in the 21st century, the world of digital technology, which is a natural micro-environment for emerging generations that use it naturally for own

entertainment and communication (School Education Gateway 2017, 2018). These means of digital technologies also fundamentally interfere in the field of forming and personal (self) development, i.e. generally in education and (self) education. While respecting the fundamental links between the digital competences of the European framework, we assume that the curriculum is modular in three levels of competence, including a defined standard that ensures an adequate quality of the educational process. The individual modules relate to the selected topics: professional competences of teachers, pedagogical competences of teachers and support of pupils' (students') digital competences (Vuorikari et. al. 2016). As already stated, the curriculum is based on the European Framework of Digital Competence for Teachers. Based on the analysis of this European framework (Redecker et al., 2018), it was decided that the curriculum would be modular in three levels of difficulty.

The educational program will be adapted based on research - research on digital competences of secondary vocational school teachers, that is currently carried out at the Masaryk Institute of Advanced Studies, Czech Technical University in Prague (CTU), as part of a research grant from the Czech Technology Agency (project number TL01000192 - Developing digital competence of teachers of social sciences and secondary vocational schools). The objective of the project is based on the development and experimental verification of the proposed educational program of digital competences of neglected professional group of teachers of social sciences in secondary vocational education. Innovativeness lies in transforming the results into a system of further teacher education and in supporting regional action planning in education. It may be reflected in the national curriculum in the reforms of school education systems, especially of models of approaches to the acquisition and further development of teachers' digital competences.

Analysis of educational programs

Before the research (research on digital competencies of secondary vocational school teachers) was analysed the content of the educational programs DVPP (educational programs for further education of pedagogical staffs), respectively sub-subjects of accredited degree programs to train digital competence teachers with an emphasis on the target group of vocational subjects' teachers, general subjects' teachers.

When analysing the content of DVPP courses and analysing partial subjects of accredited study programs, we are based on the total number of university educators according to the Ministry of Education, Youth and Sports and the high school portal. The DVPP course database on the Ministry of Education website was used for the analysis. All educational institutions focused on the target group of teachers of vocational subjects, teachers of general subjects were analysed. More specifically, the ICT specification field (digital technology or the name of the educational institution is referred to as computing and

informatics) with a total of 231 DVPP courses, which is the focus on digital technologies and digital competences.

The most common topics of the courses are: programming in Java, work with interactive whiteboard, creation of web pages, creation of spatial geometry in PC, creative informatics, Moodle and its use in school environment, ICT coordinator, processing of text and graphic information, computer-aided teaching, technical elaboration of digital video for teachers, presentation of teaching in MS PowerPoint, basics of creating e-learning courses, creation of distance learning supports for LMS Moodle, e-learning in school practice.

From the total number of 231 courses for our needs for the creation of the educational program, we proceeded to analyse this selected specialized topic of the courses: didactic use of ICT, use of free and open source licenses in education, basics of mass mailing, use of tablet for school education, use of multimedia technology in teaching, information technologies in teaching, use of computer in teaching, communication social networks, e-learning in teacher's work, multimedia in teacher's work, interactive whiteboard in teaching, audio-visual equipment in teaching, work with interactive whiteboard, social networks in teaching, video and multimedia in teaching, sound and music in teaching, modern internet technologies creation and use of presentations, creation and processing of multimedia, didactics of information technologies, open source and free software, processing of text and graphic information, multimedia for education, introduction to distance education, computer-aided teaching, multimedia in education, methodology of e-learning courses internet security, cloud work, teamwork in electronic documents, Moodle for teachers - creating tests in Moodle, Moodle and its use in school environment, basics of e-learning courses creation, creation of distance learning supports for LMS Moodle, modern correspondence for practice, information technologies, software systems, computer in education, educational programs, school information systems, creation of teaching materials, freeware for teachers, e-learning in school practice.

Furthermore, we proceeded to the analysis of individual subjects in the study programs of accredited study programs. We were based on the total number of university-educated teachers according to the Ministry of Education, Youth and Sports and the high school portal. Selected subjects from these universities for analysis: Information literacy, Modern didactic technology, Development of didactic competences of teacher, Pedagogical and didactic technology, Information and communication technologies, Modern didactic technologies in education, Didactic technology, Information and communication technologies in vocational education, LMS systems in education, Computer in education, Internet in education, Information technologies in education, Education in information society, Digital technologies, Computer technologies, Technical support of education.

The vast majority of vocational training institutions are not focused on digital competences, digital technologies, cloud services, new technologies, mobile technology and m-learning in their curriculum (more specifically subjects). Computer literacy teaching, personal computer service, working with common office applications, the Internet, and e-mail are prevailed. From other findings, we can conclude that Moodle teaching and didactic techniques are more widely represented. The situation is much better for DVPP courses. Courses focusing on e-learning, LMS Moodle, e-learning courses, computer use in teaching, multimedia in education, interactive whiteboards and work with graphic programs are prevailed. To a lesser extent, the focus on working in the cloud, teaching programs, using the tablet in teaching, information technologies in teaching, social networks in teaching, and modern internet technologies.

We have come to the conclusion that many of these institutions do not focus on new technologies in their teaching as a support for the educational process currently used in everyday life and in educational reality as well.

Designing educational program

Another activity was the creation of a draft educational program for the development of digital competences of teachers of general subjects in secondary vocational schools. A proposal for an educational program for the development of digital competences of teachers of general subjects of secondary vocational schools has been prepared. The teacher education development curriculum proposal includes the following topics (Svoboda 2019):

- Introduction, LMS Moodle
- Interactive technologies and innovative teaching resources in teaching
- Digital competences and digital technologies
- Cloud services in a school environment
- School and digital technology security
- Digital technologies in teaching and school management
- E-learning, m-learning and mobile devices
- M-technologies in teaching
- Practical multimedia demonstrations of mobile devices (their use and animation)
- Selected digital technologies for teachers
- Selected digital technologies for head teachers
- Modelling scenarios of activities using digital technologies

This proposal was preceded by a study of professional literature (see all references), active participation in international scientific conferences, workshops and research team publishing activities. The subject of discussions was the expert opinions of innovative social science educators and practitioners on teaching that is supported by digital technologies. The knowledge gained from these active participations was used to construct the educational program (Svoboda 2017, 2019).

Another activity was the initiation of the creation of didactic materials according to the three-phase model of the E-U-R learning process. The concept of key competencies in RVP secondary vocational education has been studied, focusing on the competence to use information and communication technologies and to work with information. The team is currently working on extending and completing these didactic materials, which are tailored to the results of the research and educational program topics.

The curriculum is aimed at developing the digital competences of general education teachers in secondary vocational schools. They point out digital competences, work with didactic technologies and new technologies. More specifically, the application of digital technologies to the pedagogical process. Digital literacy is no longer perceived as a purely professional component of technical education, becoming a general educational component, thus not solely a requirement for vocational subjects´ teachers (Kuzminska et al. 2017). Similarly, social science teachers need to be equipped with the appropriate digital competencies to ensure that they can cope with the challenging roles of the teacher to help develop and master the key competences and competences of the pupils in order to compete in the future labour market.

The curriculum is based on the main thrust that technology can be helpful in preparing teachers for lessons, assisting in didactic transformation / interpretation and modernization of educational content (National Centre for Education Statistics 2013), enriching collaboration, communication and integration of social partners, including important feedback elements that are critical self-identification resp. differentiation of the position of schools with regard to regional competence with emphasis on the management of the educational process and control of its quality. The training program will not focus solely on technical implementation. It will be didactically integrated into the corresponding "life situations" in the context of teaching / learning in selected social science subjects.

Based on the results of the research, the themes for creating modules in the educational program are modified. At the same time, central attention is currently being paid to the design and pilot validation of the modular program for the development of digital competences of social science teachers in secondary vocational education. The modular program will focus not only on teachers' ability to work with digital technologies, but also on recognizing their learning potential in classroom management, methods and forms that support student collaboration, creative thinking development and individual learning strategies, and learning motivation. It will be important for teachers who take part in the modular digital competence

program.

Conclusion

Innovative methods and forms of teaching are important means that put emphasis on the use of information and communication technologies and elements of practice learning. Actually, we should rather speak about a society of intensive knowledge processes instead of a knowledge society (Lorenzova, Svoboda, 2018). Indeed, everything that can be observed is a huge and unprecedented dynamic of processes connected with the knowledge. Permanent innovation becomes a necessary condition for the survival of a firm on the market, the lifelong learning is an unavoidable prerequisite of employment, the continual recombination of a huge quantity of findings produces new and new knowledge. It corresponds all to Education 4.0.

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DIGITAL COMPETENCE: FROM SELF-EVALUATION TO ANALYSIS OF STUDENTS' LEARNING BEHAVIOUR

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Key words: learning behaviour; digital competence; DigComp 2.1; online course; open online course; e-learning; blended learning

Abstract: Digital competencies are in not only the European, but overall in a global context, the strong theme that has essentially the exponential growth in the analysis of publications in Scopus. We conducted a study will be based on two courses taught at the Faculty of Arts - are consistently based on the framework DigComp, allowing direct comparison study of behaviour no results from tests of the reference framework. One course was a form of blended learning, the other purely online, both have identical online support (it was open Web-based courses). Total research sample is 146 people, primarily from the philosophical faculty. Students in both courses studied online, wrote a final test and conducted their self-evaluation within the DigComp 2.1 reference model. At the same time, they also commented on how they imagine a digitally competent citizen and ranked a domain of competence according to their importance.

Our empirical study wants to focus on the following research questions: 1) How do the students themselves assess the digital competence? 2) Is there a correlation between their evaluation and test results? 3) Is there a relationship between how they are evaluated and what is their movement on the course pages? 4) What topics are interested in on the site? Reflected somehow in the other measurable parameters? 5) How do students introduce a "digitally competent person"?

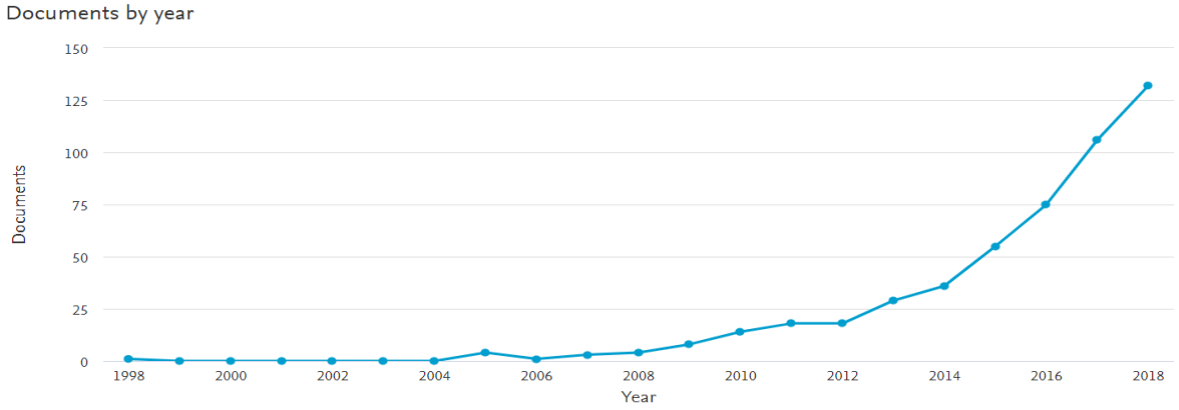
For answers to these research questions we will use relatively diverse source tools - e-learning support in the information system of the University, Google Analytics and Smartlook surrendered files in e-learning with a final questionnaire.

Introduction

Digital competences have been a subject of research and academic interest for quite a long time, and since 2008 it is possible to see their broader publication response also in databases and journals. In SCOPUS, the topic of digital competence is almost exponential. Almost always there is a consensus that digital competences are something that every person needs to work in a modern, mechanized or computerised society. It is not, therefore, a focus on ICT professionals that could be overlooked in part of the population, but indeed one of the central competency "clusters", whose timeliness is more than evident.

I will present a necessary theoretical and empirical studies on which I will rely on my research. First, it is required to offer a basic definition of what is "digital competence" and how I am researched and codified.

PICTURE 1. NUMBER OF DOCUMENTS INDEXED IN SCOPUS (1998-2018). KEYWORD "DIGITAL COMPETENCE".



Source: Own, Scopus

Li and Ranieri (2010) focused on the digital competences of students in China. The study aimed to show whether there is a direct link between digital natives, as a specific sociological indication of the current school generation and their digital competence; So it makes sense that digital competence somehow explicates, or whether they are something that everyone has naturally. On a sample of over three hundred schoolchildren from one province, they showed that digital natives and digital literacy are not closely related. Other researches, such as those associated with the group around Perez-Escoda (2016), also went in a similar direction.

Calvani et al. (2008) offered a (abundantly referenced) study that compared different approaches to the construction of digital competence models or focused on their ideas. Technical, cognitive and ethical optics viewed digital competences. This difference served as a basis for modelling competence frameworks, which the authors did for the example of high school. The authors also emphasised the four value bases that should be considered when reflecting on digital competences, namely reducing the difference between knowledge and skills, emphasising complex thinking, transdisciplinarity and synthetic thinking and sensitivity to the socio-cultural framework.

Martin (2005) defined digital literacy as "the awareness, attitude, and ability of an individual to use digital tools to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, create new knowledge, and communicate with others in the context of particular life situations" and to create a positive social situation and was able to reflect on the process. " a similar approach has also Gilster (1997), who first coined the term digital literacy.

Cartelli (2009) based on similar positions as Calvani et al. (2008) and emphasised the educational implications of the changes the digital environment brings. Important issues are that have nontrivial solutions to a wider proved interdisciplinary thinking or problems open. Like Calvani, Carteli also accentuated the presence of an ethical dimension of digital competence. But adequately understood it ethical - both authors were not primarily a philosophical reflection, but of responsibility in the use of technology, both to himself and also to the environment.

In our case study, I will follow the most famous digital competence model, namely DigComp 2.1: The Digital Competence Framework for Citizens (Carretero at al. 2017), which was commissioned by the European Commission. They stressed the cognitive, social and complexity component. They postulated a total of 21 competencies that are divided into five dimensions - information and data literacy, communication and collaboration, digital object creation, security and problem-solving. The model emphasises the need for a citizen to have digital competencies if they are to actively and responsibly exercise his citizenship. It thus reflects a long-term European discourse linking technology and citizenship no later than Nora and Minc (1980; Zlatuška 1998).

Methodology

As far as the research concept of reflection is concerned, the research concept I studied was also based on research by Tigelaar (2004) and his collaborators, who created a competency model for higher education. Their approach was to identify the frameworks or standards that worked in the area under investigation. From them, a new model was created, which was subsequently worked with the Delphi method. Seventy-four experts were approached, 85% of whom eventually cooperated. Methodological frameworks attraction is anchored in the local environment (authors primarily borrowed models from the Dutch area). The researchers received a model to comment on, and the authors repeatedly worked with their feedback. For example, an interesting study related to DigComp by Janssen and Stoyan (2012) continued in the Delphi method.

On the other hand, Wiek (2011) and his colleagues pointed out the problems that may be associated with the empirical approach to developing the competence framework. The fact that there is a social consensus (obtained, for example, by research or meta-studies) does not necessarily imply compliance with theoretical assumptions or consistency at the level of competence. Now the notion of competence, he appeared to be extremely problematic, because his understanding is so vague that associate it with empirical studies is always uncertain.

For us, a critical approach was also the team of authors around Bok (2011), who, with the help of a theoretical exposition, carried out focus groups with veterinary students to determine the students' bounded competence framework. From the theoretical and field-intensively discussed and grasped conception (the competences of veterinarians are therefore not distant or unknown to the students) they reached the student's view of the competency profile (not the knowledge one). In the second phase of the research, the model was analysed using a panel of experts (again, the Delphi method is used here) to evaluate the relevance and importance of each competency to the veterinary profession profile. I had a different research approach, namely that I collected the data from the questionnaires individually. I have also followed up with Plessis and Van Niekerk (2014), who are ranking competencies according to their importance) (they use practitioners to do this) as an essential tool for creating a competency model.

Participant description

In our case study, I worked with two research samples. The first were students of bachelor's degree in Information and Library Studies at the Faculty of Arts, Masaryk University, who studied compulsory subject VIKBA14 Digital Competence, which is included in the third semester of the recommended study plan. There are several represents (4) and one student from another field. In total, there were 52 of them, 41 of whom filled the test. The course was organized in the form of blended learning (Garrison & Kanuka 2004, Garrison & Vaughan, 2008), where a lecture was held once a week outside the online study, which deepened or supplemented specific topics from DigComp, mostly in the form of selected issues. The lectures proceeded as they were with the individual DigComp dimensions.

The second sample was the students of the new KPI33 course The new Digital Competence Development Course was purely e-learning and open to all university students as an optional subject. A total of 94 students participated in the course, 60 of which were from the Faculty of Arts, 11 from the Faculty of Science, 7 from the Faculty of Economics and Administration, 2 from the Faculty of Education, 6 from the Faculty of Informatics and four from the Faculty of Law and the Faculty of Social Sciences. Of these, 41 were undergraduate students, 44 undergraduate students. The specific thing was that 37 students are information science students, so a substantial part of them went through some form of instruction in VIKBA14. The course itself was new to all students and the sample was fully disjunctive. 67 students completed the test.

The total sample I were working on was therefore 108 students at the end of the course (i.e. those who submitted tasks, passed the test and could be registered) and over (we are not able to tell how many students have written off in the first two weeks of the semester) 146 students at the beginning. The online environment was familiar to both study groups, and I are not able to effectively distinguish users in it.

So I have the following data sources in total:

- 111 final questionnaires with information on a digitally competent citizen.
- 110 self-evaluation assessments completed.
- 151 completed tests (KPI33 students had up to three test passes)
- Data from Google Analytics
- Data from Smartlook

Data collection and processing

We have already repeatedly described the research tools in some of our previous articles, so in particular, in the first two, I will attempt some brevity. I will gradually go through web analytics tools, testing and self-evaluation tools, and a questionnaire. In this section, I combine the tool description directly with the description of data collection and processing.

Google Analytics

Google Analytics is among the most widely used tool for web analytics. It allows you to track both basic page parameters, such as visit time, many visitors, or source, as well as some more advanced information, such as their interests, age, gender, or the devices they use, or the places they connect. However, Google Analytics tool is not flawless, today represents by far the most widely used tool whose data are subject to reporting in marketing. (Clifton 2012, Liu, & Burns 2018).

However, the application I use has an educational dimension. I want to monitor how the data characteristics outlined are related to how students respond in a test, evaluate themselves, and so on. That is, how data that is relatively easy to access and measurable can serve to design online courses

effectively, and how to learn from their learning behaviour. (Luo et al. 2015, Romanowski & Konak, 2016) I have deployed Google Analytics on the site for the entire course of the course and will follow the period from December 16th, 2018, to January 31st 2019. The period from the beginning of the semester to the enrollment of grades. Google Analytics did not allow us to distinguish between students and course KPI33 and VIKBA14, so the study group here will form one category.

In total, 976 users were involved in this way (it is a user who is not connected to cookies - that is, access from various devices, or anonymous mode, etc. - thus the actual number of users would probably be significantly lower). The average time per visit per page was about 14 minutes (non-abandoned visits), which are 6.3 pages viewed.

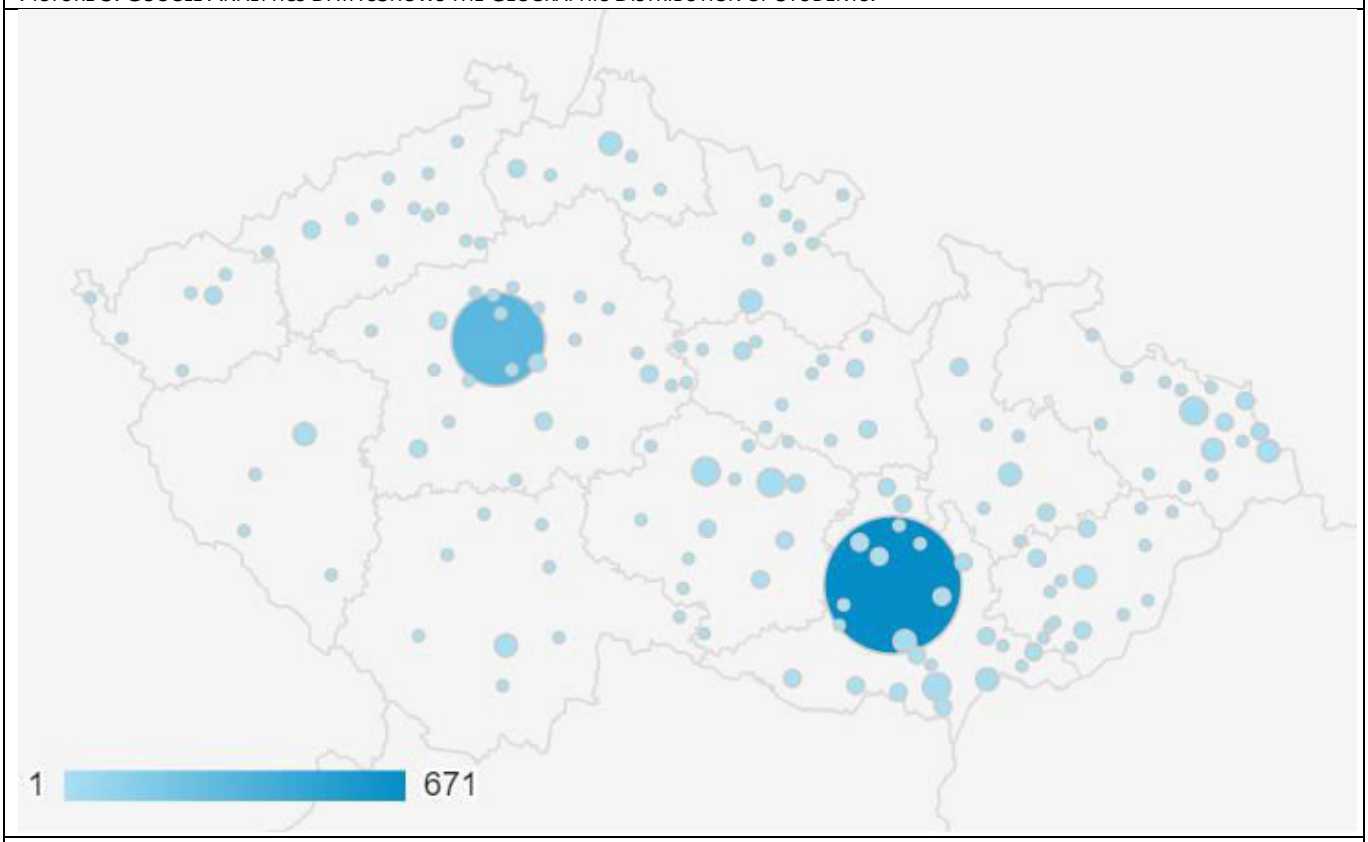
This tool also allows you to analyze the average time spent on one page, which was the crucial first metric that was interesting for us and which I could use for our analysis. From the data I have available, I could say that the most common interests of students (27% of them analyzed) are movie reviews, online video, dictionaries and encyclopedias, favorite music and literature. Only less than 5% of users have English as their primary language on the computer.

Each page in Google Analytics matched one competency (this way I had a course built), eventually a competency domain page or tools.

PICTURE 2. DATA FROM GOOGLE ANALYTICS ILLUSTRATE NONLINEAR LEARNING.

Source: Own

PICTURE 3. GOOGLE ANALYTICS DATA SSHOWS THE GEOGRAPHIC DISTRIBUTION OF STUDENTS.



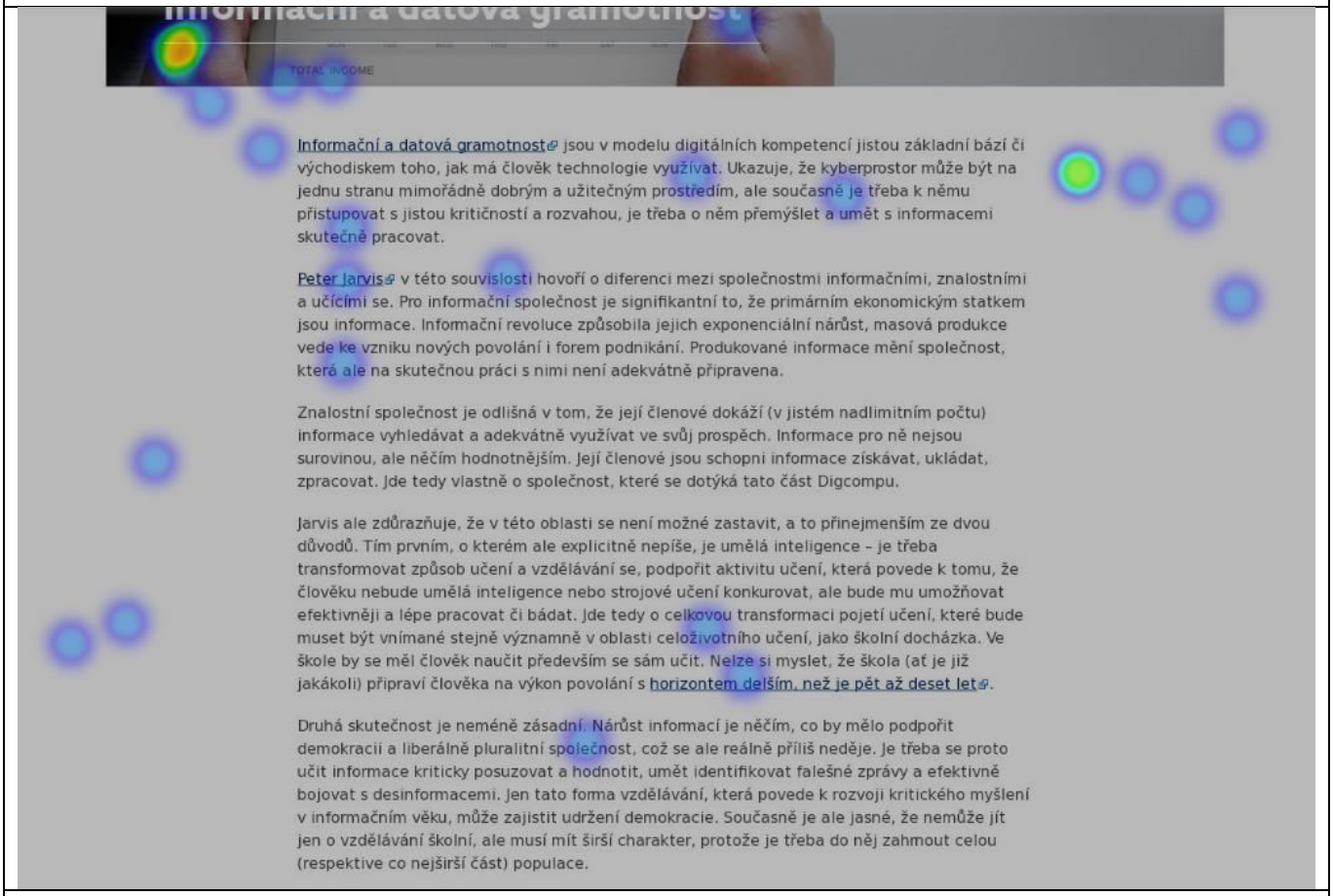
Source: Own

Smartlook

Smartlook is a tool that allows you to create heatmaps, analyze cursor movement over a page, or track clicks. It is an application similar to the more famous Hotjar (or Mouseflow, Luckyorange, etc.). I used this tool in our study in two ways - to analyze the number of clicks on the page (considering only the part between the header and the footer). Secondly, I analyze points of interest from the cursor heatmap on selected pages.

The app has been integrated through Tag Manager from Google. It shows some errors when a video or picture is placed on the page in that the movement and clicks in that section are not recorded accurately. In addition to the above features, it allowed you to track "actions" of students on the site or record their entire movement on the site (again as well as Google Analytics with cookies) or track how many per cents of users finish the page.

PICTURE 3. SMARTMAP HEATMAP SHOWS CLICKS ON ONE SELECTED PAGE.



Source: Own

Final questionnaires

The final questionnaire (with the option of submitting on December 16th 2018, to January 31st 2019) was compulsory for students of both courses, but unlike Smartlook or Google Analytics, I can distinguish (and also do) student responses in both courses. The students answered a few questions, interesting to us is: "How do you imagine a digitally competent person?". Answers were submitted in DOCX or PDF to a folder under the student name. I then obtained answers to this part of the questionnaire from all the documents, transferred it to one file and analysed it further. Our goal was to identify emerging topics concerning DigComp, so there was no need for unique coding. Thanks to the fact that the students answered after the course, their answers were quite strongly unified in the conceptual sense. In the KPI33 course, a total of 68 people submitted the questionnaire so that 68 testimonials of approximately 500 characters, including spaces, were analysed. In the case of VIKBA14-43, the same range of statements.

The self-evaluation questionnaire

The self-evaluation questionnaire was carried out in the Information System of Masaryk University as a test (available on 16 December 2018 until 31 January 2019). Students had to answer all 21 questions to finish the course. Individual items are a translation of competencies in DigComp, and the student could easily compare their content with unique texts. It is interesting that it does not work with

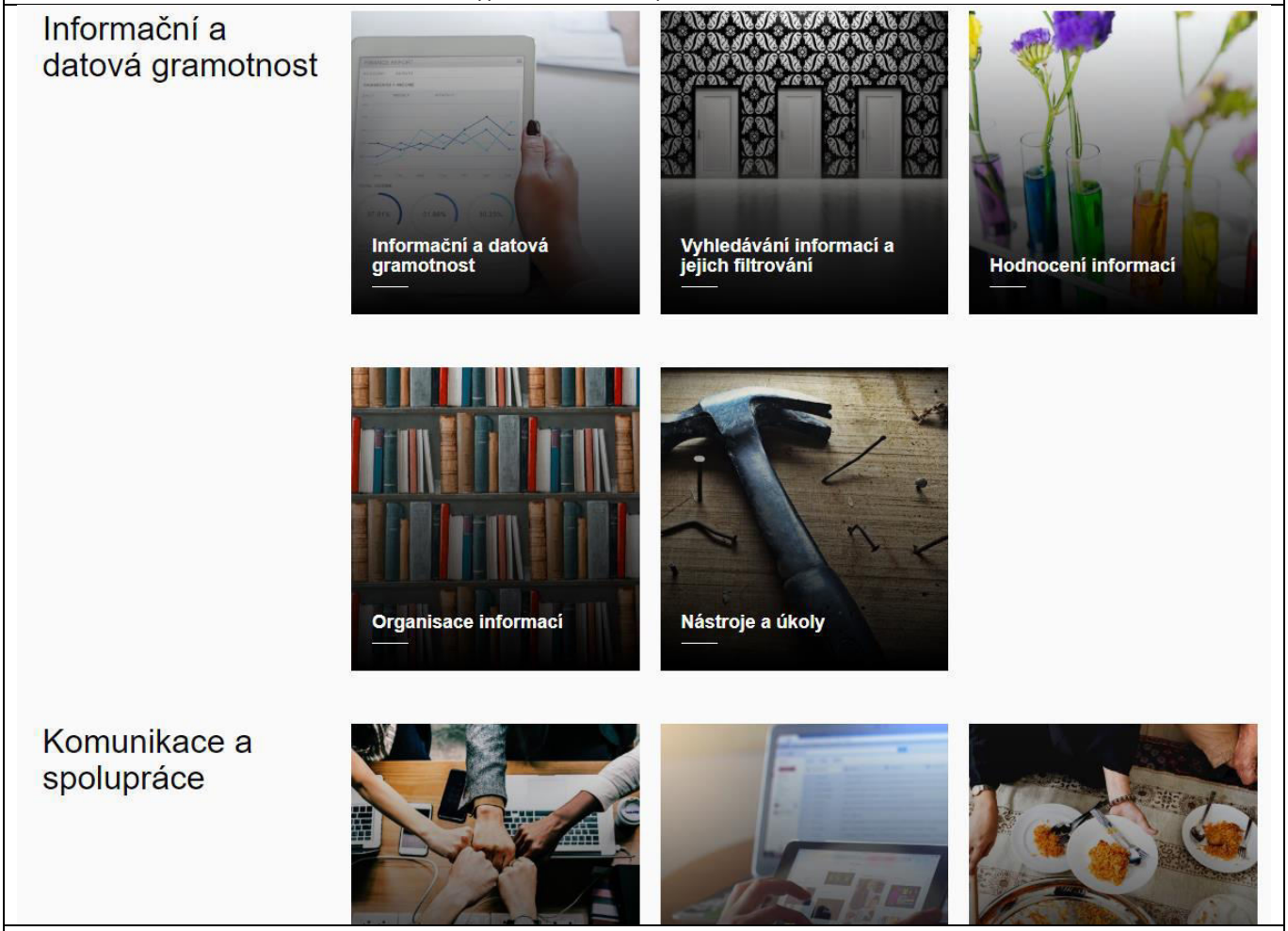
a regular Likert scale, but offers a relatively accurate description of what a given level of competence means in the range of grades 1 to 8.

Descriptions of each stage are different for each competency (given by the DigComp framework), although they follow a common difficulty pattern. For the self-evaluation test, I set the scale as nine-grade, with the one-step option still having a variant with no competence (rated as 0).

We could associate data with specific users (students), but this is not important or appropriate for ethical and methodological reasons. I have exported student responses from the information system. I then calculated the average of each competency in the following way: I multiplied the level of competence by the frequency of responses, and from these data, I created a sum divided by the number of responses.

We assume the linearity of the scale when processing the data, but this is strongly approximate. There are breaks in the range, where two competence levels are always closer than others and form specific clusters. However, I did not consider this in the data processing. I analyzed the result both by individual competencies and domains. The obtained data also allow us to compare the students of VIKBA14 (41 responses) and KPI33 (69 responses) among themselves.

PICTURE 3. COURSE DESIGN AVAILABLE FROM: HTTPS://KISK.PHIL.MUNI.CZ/DIGICOMP



Source: Own, https://kisk.phil.muni.cz/digicomp

Knowledge test

The knowledge test (available December 16th 2018 to January 31st 2019) was also implemented as authorised and authenticated in the information system (IS) of the university. Students of both courses had the same set of questions. The test was for a limited time, and each student answered a collection of 42 items that were randomly selected and sorted. However, it has always been the case that two questions have tested each competence. VIKBA14 students (41 tests passed) had one test, KPI33 students (67 students - 104 tests submitted) up to three if they did not reach the minimum score of 23 points.

The test questions contained four possible answers, of which only one was correct. For the answered question, the student obtained one point in case of correct answer, in the case of incorrect or unanswered answer he gained points 0. By the fact that the test did not have the character of a standardized calibrated test, it is not possible to deduce from it the absolute level of competence but allows us rather more general characteristics. To reduce the inaccuracy of the instrument (to limit the influence of individual or inappropriate questions), I proceeded as follows in the data processing.

For each question, I have determined its correctness (what percentage of students responded to it correctly). In the second step, I assigned the individual domains of competence to the questions and computed the average. Thus, the resulting number is the average correctness of the answers across questions. The minimum is sixteen, and a maximum of twenty-nine averaged questions. The obtained data also allow us to compare students VIKBA14 and KPI33 with each other.

Results

Some of the results below have already been presented in other journal outputs. However, I would like to offer here a comprehensive view of the phenomenon of reflection of digital competencies by students of the Faculty of Arts of Masaryk University.

The first research question was **how do students evaluate themselves as part of their digital competencies?** Students answered questions in the self-evaluation questionnaire as the levels are described in DigComp. The answers did not affect the final evaluation of the course, and the scale was supplemented by 0 - I do not have the given competency.

For course KPI33 published the following results:

TABLE 1. COMPETENCE OF STUDENTS KPI33 BY 7 (AND 0) LEVELS AND AVERAGE ON EACH COMPETENCE.										
Competence / level	0	1	2	3	4	5	6	7	8	Averg.
Browsing, searching and filtering data, information and digital content	0	1	6	9	17	8	19	4	0	4,5
Evaluating data, information and digital content	0	1	3	6	21	10	17	5	1	4,8
Managing data, information and digital content	0	1	8	1	21	12	17	3	1	4,6
Interacting through digital technologies	0	1	5	8	17	6	21	4	2	4,7
Sharing through digital technologies	0	1	5	11	12	7	23	5	0	4,7
Engaging in citizenship through digital technologies	3	2	12	25	6	2	11	3	0	3,5
Collaborating through digital technologies	0	1	2	9	13	7	23	7	2	5,0
Netiquette	1	0	7	16	15	8	13	4	0	4,2
Managing digital identity	1	1	8	11	26	3	10	4	0	4,0
Developing digital content	1	3	5	10	12	7	19	6	1	4,5
Integrating and re-elaborating digital content	3	4	10	7	21	3	14	1	1	3,8
Copyright and licences	0	5	13	15	20	2	6	3	0	3,5
Programming	14	19	9	4	6	3	4	3	2	2,3
Protecting devices	0	7	10	17	15	7	7	1	0	3,5
Protecting personal data and privacy	1	8	7	18	12	2	12	3	1	3,7
Protecting health and well-being	1	2	16	10	19	7	7	2	0	3,6
Protecting the environment	3	4	7	14	19	5	10	2	0	3,7
Solving technical problems	2	9	8	18	9	5	9	4	0	3,5
Identifying needs and technological responses	1	4	16	14	14	3	9	3	0	3,5
Creatively using digital technologies	0	6	18	16	7	7	6	4	0	3,4
Identifying digital competence gaps	1	9	11	16	17	5	5	0	0	3,2
Source: Own										

For course VIKBA14 published the following results:

TABLE 2. COMPETENCE OF STUDENTS VIKBA14 BY 7 (AND 0) LEVELS AND AVERAGE ON EACH COMPETENCE.										
Competence / level	0	1	2	3	4	5	6	7	8	Averg.
Browsing, searching and filtering data, information and digital content	0	1	1	8	16	5	10	0	0	4.3
Evaluating data, information and digital content	0	1	2	8	13	8	6	3	0	4.3
Managing data, information and digital content	0	0	4	8	13	4	9	3	0	4.4
Interacting through digital technologies	0	1	3	8	12	8	7	2	0	4.3
Sharing through digital technologies	1	0	6	11	6	10	3	4	0	4.0
Engaging in citizenship through digital technologies	1	3	9	9	11	3	3	1	1	3.4
Collaborating through digital technologies	0	1	4	4	16	6	7	2	1	4.4
Netiquette	0	0	4	9	13	8	4	3	0	4.2
Managing digital identity	0	3	3	8	13	6	5	3	0	4.0
Developing digital content	0	1	4	11	10	5	5	5	0	4.2
Integrating and re-elaborating digital content	0	0	12	10	11	3	3	2	0	3.5
Copyright and licences	0	2	7	9	16	2	4	1	0	3.6
Programming	4	12	10	5	1	0	5	3	1	2.7
Protecting devices	0	3	10	8	8	3	7	2	0	3.7
Protecting personal data and privacy	1	1	7	12	7	3	7	3	0	3.8
Protecting health and well-being	2	3	6	8	15	3	5	0	0	3.5
Protecting the environment	0	1	9	7	16	6	2	0	0	3.6
Solving technical problems	0	7	11	9	5	3	2	3	1	3.2
Identifying needs and technological responses	0	4	7	13	5	2	9	1	0	3.6
Creatively using digital technologies	1	2	9	10	9	4	3	3	0	3.5

Identifying digital competence gaps	0	4	9	5	11	5	5	2	0	3.7
Source: Own										

The average student self-evaluation competence of 3.9 for the KPI33 course and the VIKBA14 course is the same as the average competency, i.e. 3.8, but interestingly, with less variance than the first course.

In the case of average self-esteem for the domain of competencies, it is possible to say that the most energetic students feel in the area of information, and data literacy (which also corresponds to their study focus) at 4.5, followed by communication and cooperation with 4.2 and three more domains have an average score of 3.4-3.6. In this context, it is interesting that students do not evaluate themselves in the area of working with information, as their study is (and using compulsory courses) in most of them searching, organising and evaluating information. In both courses, the worst programming in which 0 answers are strongly represented, but it is exciting to note that levels 7 and 8 are mostly the same as all other competencies.

As shown in the table below, it is fascinating that the overall self-esteem in domains differs by about one point only (for VIKBA14 by 0.8 in KPI33 by 1.2) although most students should be professionals in the first domain, thus reaching a score above 6.

The second research question is whether and how does this assessment relate to the test results? Here, too, the answer may be rather straightforward. I proceeded by sorting the dimensions into dimensions by DigComp and entering the information in the following table. In the table, you can see data from the average self-assessment and the accuracy of the test responses, added together for both groups.

TABLE 3. SELF-ASSESSMENT DATA.				
Competence areas	Correctness [%]	Self-evaluationVIKBA14	Self-evaluation KPI33	Self-evaluation avrg.
Information and data literacy	65.9	4.3	4.6	4.5
Communication and collaboration	64.5	4.1	4.4	4.2
Digital content creation	72.6	3.5	3.5	3.5
Safety	72.8	3.6	3.6	3.6
Problem solving	66.6	3.5	3.4	3.4
Source: Own				

As shown in the table, our experiment did not lead to any correlation between self-assessment and the correctness of the answers in the test. The possible individual links are completely random at the level of five elements. The question is whether the results reflect a non-invalid test, or something else. Even about the previous table and our students 'knowledge, it can be reasonably argued that the absence of dependency is primarily due to the students' inability to assess appropriately - by failing to fit appropriately in the competence framework, they make the second question undecided. An evident disproportion, for example, in the creation of digital content is also apparent in the fact that students created practical tasks that tested, among other things, this competence and most of them managed it safely, so it should reach values of 5-6 points.

The third question is whether there is a relationship between how they are evaluated and what is their movement on the course pages? For this purpose, I have compiled the following table that monitors self-assessment, proper test, and essential web characteristics.

TABLE 4. WEB ANALYTICS, SELF-ASSESSMENT AND STUDY RESULTS.

Competence areas	Correctness [%]	Self-evaluation avrg.	Time spent with domain [s]	Domain interaction	Time spent on the page [s]	Interaction visit
Information and data literacy	65.9	4.5	931	2 747	186.2	3.1
Communication and collaboration	64.5	4.2	1 466	1 782	183.3	3.5
Digital content creation	72.6	3.5	1 171	1 975	195.2	4.0
Safety	72.8	3.6	1 280	1 313	213.3	2.8
Problem solving	66.6	3.4	1 248	638.0	208	1.4

Source: Own

From the table, it is possible to read some exciting correlation relations (we consider only those higher than 0.5 concerning the number of elements). There is a -0.60 correlation between the correct answers in the test questions and the self-assessment, which can be interpreted as not being able to evaluate students adequately. I believe that the little ability of self-assessment and self-regulation can also rely on the inability to seek their educational challenges. This behaviour also corresponds to our previous conclusions.

In terms of self-learning behaviour and web analytics, the -0.7 correlation is satisfying, which is between self-assessment and total time spent on the page. In other words - the stronger the students in the area, the less time they spend on the page, their content can be expected to be easier for them to adopt. Conversely, the positive correlation between time spent on the page and the correct answer is didactically valuable and is relatively strong (0.6,). It may be interpreted to mean that the time spent studying a given dimension has a positive effect on the test result, which mostly corresponds to its construction. Further correlations were not traced or were statistically insignificant. The result is, of course, influenced by the fact that (and how) students cannot self-evaluate.

What topics are interested in on the site? Are they reflected in other measurable parameters? Students are among the task of ranking competence domains from the most important to the least important. In the final questionnaire, I received answers from 41 students of KPI33 course and 40 students of VIKBA41. I subsequently scored the answers (the most important answer is 5 points least important one), as in some previous cases I work with a linear scale, which may not be linear in the perception of students. This fact was also reflected in some of the answers I couldn't include in the table. The relevant students' responses are included in the tables.

For course VIKBA14 published the following results:

TABLE 5. SORTING DOMAINS OF IMPORTANCE BY IMPORTANCE. STUDENTS VIKBA14.						
VIKBA14	Max.	2	3	4	Min.	Score
Information and data literacy	19	9	9	0	1	159
Communication and collaboration	3	2	8	19	7	92
Digital content creation	0	6	2	8	23	69
Safety	16	15	5	3	0	161
Problem solving	1	7	15	9	7	103
Source: Own						

For course KPI33 published the following results:

TABLE 6. SORTING DOMAINS OF IMPORTANCE BY IMPORTANCE. STUDENTS KPI33.						
VIKBA33	Max.	2	3	4	Min.	Score
Information and data literacy	22	12	5	1	0	110
Communication and collaboration	3	4	7	17	9	15
Digital content creation	0	3	4	11	22	0
Safety	14	12	8	4	2	70
Problem solving	1	9	16	7	7	5
Source: Own						

We then standardized and merged the data:

TABLE 7. SORTING DOMAINS OF IMPORTANCE BY IMPORTANCE. STANDARDIZED SCORE.			
Complex	VIKBA14	KPI33	Important score
Information and data literacy	4.0	4.3	4.1
Communication and collaboration	2.3	2.3	2.3
Digital content creation	1.7	1.7	1.7
Safety	4.0	3.7	3.9
Problem solving	2.6	2.7	2.6
Source: Own			

The data show that Information and Data Literacy (VIKBA14 4.0 and KPI33 4.3, which is even the highest point profit of all) and safety (VIKBA14 4.0 KPI33 3.7) and vice versa are the most important domains for students. The score equally creates digital content. Interestingly, the data show a high degree of correspondence between the Communication and Cooperation Competency Course, Problem Solving and Digital Content Creation and Problem Solving, but they are partially divergent in the two most important.

Correlations offer insight into the possible links between the variables being monitored. Values of 0.43 reached the relationship between self-esteem and perceived domain importance, while a negative correlation of mean significance can be seen between perceived usefulness and time spent studying the domain (-0.48). There is only a weak correlation of 0.25 between site interaction and perceived importance. Interestingly, there is no correlation relationship at all between the correctness of the response and the perceived usefulness (-0.10).

The last fifth research question is how do students introduce students of the philosophical faculty of a digitally competent person? For this question, I used questionnaires (as in the previous point), and the content I studied was not quantitative but qualitative. I tried to follow specific topics or aspects that emerged among students. Methodologically, I relied on content analysis (framework analysis) of their testimony. By having a Digcomp course, students can also say that they are based on it. I have written

answers from all students of about 500-1000 characters, including spaces, which I have analyzed analytically through open coding. I do not provide specific statements here due to the limited space of the article.

Again in this section, I will not distinguish the testimonies of the two groups because they overlap to a great extent. Students are most self-assessing in the area of information and digital literacy. This fact will also be reflected in their approach to the subject in that they consider the work with information to be a basis for all digital competence. Only a person who can find, critically evaluate and process information can seek additional competencies. It is, therefore, a particular input and unmistakable digital competence module.

On the contrary, in line with self-esteem, it is possible to say that there is a contradiction of programming, which was perceived to have been referred to as either a "basic level" or as something mostly unnecessary. In the context of Czech curriculum reform (Barták et al. 2019), however, I may soon see a new break in this area, because programming is supposed to be something that will be taught at primary schools.

What students perceive very strongly is the emphasis on critical thinking in the broadest sense. Critical thinking, which is not part of DigComp, has been frequently mentioned and emphasized by students as something necessary for life, both in the context of information literacy and, for example, in assessing the impact of technology on human life. (Samson 2018, Van den Hoven et all. 2015)

It is also often bridging to the next "meta-competence", which is the ability to solve problems. The students do not perceive this as a dimension (as DigComp does), but as a specific competence that is general but without internal division. A competent digital person can solve problems through technology. It is also related to this; students emphasize the openness of the competency framework and the need to learn. This framed openness is a fascinating view of the competency framework. At the same time, however, students reflect on the framework not as a flat, composed of partial competencies, but as a hierarchical one.

Discussion

Our study deals with a comprehensive study of the learning environment phenomenon in the structure and complexity of a combination of research methods that have not yet been an analogy in published texts. I am aware of the fact that much of the research data is related to a relatively limited number of domains, which is the first limit of all calculated correlations, and that the knowledge test performed is not entirely standardized. Nevertheless, I would like to argue that our review study will show some exciting features of how philosophical students understand digital competencies and how strong they are, as well as how the learning in the online environment, or the movement of students in it, works.

There is a -0.6 correlation between the correct answers in the test questions and the self-assessment, which can be interpreted as not being able to evaluate students adequately. I believe that the little ability of self-assessment and self-regulation can also rely on the inability to seek their educational challenges. The fact that students are not able to evaluate is, on the one hand, a fact that is quite obvious from our research and probably quite well corresponds to how students are taught in Czech education at all levels, i.e. virtually nothing. Failure to adequately evaluate then enters other dimensions of their lives. After all, perhaps this is the reason why the ability to learn appears quite often in the description of a digitally competent citizen.

What is interesting is that I have not identified any link between the perceived need for a specific competence and how students interacted with the content. This fact could be interpreted in such a way that the students do not care about the educational content and do not develop it, but this would be contrary to how I can perceive the acquired data in the context of our other courses. Instead, it seems that students do not project their preference for learning in the environment. But there is one more factor - the number of visits decreases during the course (i.e. the number of students), so the first two topics will be slightly overestimated, and the last issue will be diminished due to a collision with the credit week. These errors are of a systematic nature and cannot be easily removed from the research sample.

As regards the research of students' competences, it can be said that the topic of Digital Content Creation is relatively low in the description of a digitally literate citizen, is significantly weakest in terms of importance analysis. At the same time, it is part of its programming competence, which is the worst in terms of the entire competency package and is also widely discussed by students. Students seem to perceive defensive, that is, security (both in free answers and in terms of importance analysis) as a more central theme than the ability to transform the environment. Perhaps here, too, there is a certain education for passivity, which may have an impact on students' low self-esteem or their significant underestimation.

The central theme for students is working with information (information literacy), which they perceive as the first among competencies, which to some extent also corresponds to DigComp, which does not speak of it as competence but as literacy. A new category is the problem solving which, in our judgment (from the analysis of responses) in the ranking of importance, has dramatically damaged the unclear internal structure and illogicality of its construction, not the insignificance of problem-solving competence.

What is surprising is the relatively strong discrepancy between the competencies that students possess and those they perceive as useful. The substantial drop in Communication and Cooperation and Digital Content Creation can be attributed to the fact that students have above-average results (both in knowledge and in self-esteem). It seems that part of the competencies acquired outside formal

education are not perceived as significantly as what they learn during the formal education process. The vast majority of both courses are students in the field of Information Studies and Librarianship, and Information Work and Information Security are among the critical topics of education.

In terms of self-learning behaviour and web analytics, the -0.70 correlation is exciting, which is between self-assessment and total time spent on the page. In other words - the stronger the students in the area, the less time they spend on the page, their content can be expected to be easier for them to adopt. Conversely, the positive correlation between time spent on the page and the correct answer is didactically valuable and is relatively strong (0.6). It may be interpreted to mean that the time spent studying a given dimension has a positive effect on the test result, which mostly corresponds to its construction. Values of 0.43 achieve a relationship between self-esteem and perceived domain importance, while a negative correlation of mean significance can be seen between perceived usefulness and time spent studying the domain (-0.48). There is only a weak correlation of 0.25 between site interaction and perceived importance. It can, therefore, be expected that there is a specific link between perceived usefulness and interactions, albeit not strong.

To make the found correlations more useful and educational, students will need to develop their self-esteem, which I see as a methodological limit to our entire research. It is clear from the free statements about a digitally literate citizen that the framework quite strongly guides DigComp students in their thinking about the issue, which is also the reason to believe that they work with texts in a large scale not only for form but as with educational instrument.

Conclusion

Our empirical case study has analyzed several phenomena that have not yet been adequately mapped in such a structure. If I am to identify other future directions of research at this point, they could be divided into two courses:

1. Research on the environment in which online education takes place, where an even more full field of research tools is available, or tools with a higher degree of standardized. The second option is to educate students in the field of self-evaluation, which would allow us to reveal further correlations in more detail.
2. The research of competencies themselves can be realized relatively quickly, either by enlarging the sample or by other research tools that have recently begun to emerge.

We believe that the turn of research and educational attention towards the environment in which education is taking place is one of the critical paradigmatic shifts in pedagogy, which I should be able to respond adequately. If authors such as Floridi (2013, 2014), Lakoff (1987), Johnson (2008) are true, it will be necessary to put the environment at the center of research interest. I believe that I will no longer be primarily focused on pedagogical competence or specific curriculum content within the research and preparatory mainstream, but just the ability to create an environment in which practical

and profound learning will take place. At the same time, I believe that our case study will be a contribution to the methodology for exploring this environment, which will increasingly be unable to distinguish between online and offline, between digital and physical. Learning happens in their unified field.

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Robots

PROMOTING ROBOTICS IN EDUCATION: TOWARDS A SYSTEMIC INTEGRATION OF DIGITAL INNOVATIONS IN THE SCHOOL CURRICULUM (MOLDOVA INITIATIVES)

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Key words: Robotics in Education, Educational Robotics, Learning Approaches.

Abstract: This study overviews the conceptual, empirical and learning frameworks of robotics as a meaningful educational resource and presents the latest Moldovan initiatives regarding the use of robotics in school. Nowadays, robotics is seen as a cross-curriculum activity focused mainly on STEM subjects contributing to form the basis of technology scientific perspectives. Teaching and learning robotics involves developing hands-on skills, increasing problem-solving creativity, and promoting digital innovations. Though robotics skills and knowledge are connected to computer science education, robots could be applied across any subject domain. Many worldwide governments and educational institutions are already doing concrete steps in this area, and most of the educational practices are related to the implementation of diverse robotic kits. In Moldova, the supplying of schools with robotic kits started in the context of Roboclub program that was launched in March 2014 by the financial support of the United States Agency for International Development in partnership with the Ministry of Education, Research and Culture of Moldova and the National Association of ICT Companies. Today, the number of national schools provided with robotics is still growing due to the national pilot-program "Clasa viitorului – Future Classroom Lab" launched in December 2017. However, during the last years, the use of robotics in schools has raised theoretical and methodological issues that are necessary to understand the potential of robotics as effective supplements for learning, and how to integrate it into curriculum. In this context, this work examines features of educational technology connected to the field of applying robotics in education, based on literature review, and introduces a critical analysis of the actual situation of robotics in Moldovan schools. In addition, this study identifies that the suggestions of the existing researches in robotics education are appropriate for a constructivist approach, informal education, collaborative learning, creative and problem-based learning. Relying on these findings the study suggests the implementation of robotics in Moldovan schools needs to be carefully designed in accordance with proper learning frameworks, scientific approaches and national curriculum requirements. The basic results of the presented analyses ensure that implementing robotics in education needs competences and innovative capacity in order to deal with technological advances and educational issues.

Introduction

To study the basic features of robotics in education and promote a clear understanding of this field are the main foci of the article. Several important subjects of Educational Robotics are presented following the guidance of pedagogical criteria, which include the area of learning activity and the implementation of robotics in teaching in Moldova schools. The overview of this field shows that robotics, as a new trend in educational technology, is being used as a multidisciplinary applied science that proposes to design and develop the technical insight and algorithmic thinking of the students in STEM (Science, Technology, Engineering, Math) education. The article presents an analytical overview of the pedagogical issues of the robotics in education, revealing also the shortage of national analyses in this field.

One of the central dilemmas of practising robotics in education, in my opinion, is not to understand how a robotic kit can be constructed passing some technical provocations, but how robotics could be effective at increasing cognitive and learning outcomes. The rising popularity of applying educational robotics in national schools shows not only the positive interaction of learners vs. the robotic kits, as well as the awareness of teachers that robotics can be amazingly valuable teaching device. In this context, the key research questions have been identified as follow: What is the paradigm of robotics in education? What are the learning approaches that sustain the educational model of robotics? How does the robotics provide STEM education? What are the potential characteristics of robotics in Moldova educational setting?

The results are of interest to teachers and stakeholders of educational institutions who aim to understand the implications of robotics in education. To achieve this intention, a structured review of studies with the qualitative suggestion of pedagogical principles of robotics was conducted and the newest Moldovan initiatives regarding the use of robotics in schools were examined.

Robotics in education

Today, teaching robotics in school becomes an integral part of the curriculum. Robotic kits are common tools in schools, and implementation of robotics in education is usually connected with the age group of the students (especially at the primary and secondary levels). In EU schools robotics is promoted mainly as hands-on learning experiences and STEM Education through European Schoolnet projects (Durando 2017). Robotics is typically associated with coding, computer programming, and computational thinking. According to European Schoolnet (2015), coding is a part of the national curricula of 16 countries of European member states.

Robotics and computer programming may encourage learning 21st-century skills: critical thinking, problem-solving, communication, collaboration, and ICT-literacy. From the point of view of teaching and learning, activities covered by Educational Robotics are described as best practices of creativity, collaboration, differentiation, team engagement, critical thinking, sustaining attitudes to STEM, and solving real problems.

Despite the diverse investigations of this topic in literature, there is not a definite understanding of the terms *robotics in education* vs. *Educational Robotics* (ER). The literature review resulted in converging ideas of the usage of these two concepts, that's why these terms could be managed as interchangeable. Misirli & Komis (2014) state that Educational Robotics refers to the teaching practice during which the students use the robots to construct knowledge with the help of or for the robots themselves. Lynch (2017) stipulates Educational Robotics "as a field that implies students, coding, designing, developing and operating robots, thereby facilitating the development of their understanding and application of various subjects". Angel-Fernandez & Vincze (2018) in their research present a first attempt to develop a concrete definition of ER, and the following statement was suggested: "Educational Robotics is a field of study that aims to improve learning experience of people through the creation, implementation, improvement and validation of pedagogical activities, tools (e.g. guidelines and templates) and technologies, where robots play an active role and pedagogical methods inform each decision". Eguchi (2014) points out more specifically that Educational Robotics is an effective learning tool for project-based learning where STEM, coding, computer thinking and engineering skills are all integrated into one project. In many cases, ER is mentioned as an element used in education to develop new skills, and, within this context, it can be understood as an educational approach, which uses programmable tools to enhance the learning process.

The implications of robotics to teach curriculum subjects are treated as an important aspect of education; this is seen as a frame of a complex learning environment. The studies about robotics in education were conducted over the years in different countries according to reviewed literature. The adoption of robotics in education is both integrated-curricular and extracurricular. Those activities that are an element of the school curriculum and take place in a formal dimension of the discipline syllabus are seen mostly as lessons learned with the help of robotics. According to Alimisis (2012) "robotics in education has emerged as an interdisciplinary, project-based learning activity drawing mostly on Maths, Science and Technology. [...] The use of robotics in education is aimed to enable students to control the behaviour of a tangible model by means of a virtual environment".

To diminish the misunderstanding of the terms described here, it is necessary to introduce the role of robotics in education. So, Miller, Nourbakhsh & Siegwart (2008) give three roles for robots in the educational setting:

1. the robot *as a programming project* – the robotic system is seen as an element to be programmed in order to create a concrete physical manifestation of computer programming;
2. the robot *as a learning focus* – it means the creation and use of a physical robot as a goal in and of itself by stimulating general interest in science, technology, and engineering;
3. the robot *as a learning collaborator* – in this case, students are not designing robots, but rather conducting inquiry during which a high-functioning robot can serve as an all-season companion.

Mubin et al. (2013) define three main categories of the role of a robot during the learning activity: a *tool*, a *peer* or a *tutor*.

Innorobo Community (2016) with the reference to ICAP (Innovation Conception et Accompagnement pour la Pedagogie) specifies four roles for robotics in education:

1. Robots *as educational subjects* that serve as basic algorithms by programming objects and actions.
2. Robots *as learning support tools* that offer implementation of more realistic simulations, for instance, in medical and healthcare education.
3. *Telepresence robots* that enable sick children to "virtually" attend classroom sessions at school by taking control of a teleoperated robot.
4. *Robots that assist education* professionals in their daily tasks via a "collaborative, complementary robot-human" approach. For instance, robots can account for the presence or absence of students, welcome them into the classroom by name, etc.

In my opinion, the most relevant strategy of using robotics as a special education technology in schools is presented by Ospennikova, Ershovb & Iljin (2015) that established the next roles for robotics: (i) *an object of study*; (ii) *a tool of cognition*; (iii) and a *means of teaching, development and training of students*.

Robotics, as an object of study or a learning tool, is studied on the base of a curriculum discipline in school that means students would be building, creating and programming robots in accordance with teaching units. The robotics curriculum and its educational standards are usually established in accordance with national requirements. The Moldova Curriculum of the optional discipline Robotics (2015) has been designed in such a way that students can choose to study Robotics at any level or cycle of education, without having studied it at the previous one. It includes the following context structured in four main modules: (I) *Introduction in robotics* (historical evolution of robotics and cybernetics, the role of robotics in modern environment, types of robots, mission and future of robotics, laws of robotics, human-robot relation); (II) *How a robot is built* (functional scheme of the robot, physical structure of the robot, structures of resistance, locomotive systems, execution elements, power sources, sensors, command units); (III) *Managing robotics* (robot work environments, robot control systems, robot control methods, robot control) for primary education. At the next levels children can repeat the first 3 modules, but also starting the last module (IV) *Coding of robotics* (developmental routines for robots, notions of graphical programming, programming of linear algorithms, branching algorithms, repetitive algorithms) for second level classes or *Elaboration and programming of the algorithm of managing robotic models* for lyceum classes. These four modules are correlated to understand the scientific background of robotic systems, functioning, and algorithms of its work.

Robotics as a tool of cognition is practised by students in order to learn a variety of concepts across mathematics, engineering, science, and computer technology subjects (STEM). Scientific knowledge of robotics is used in carrying out various experiments. Ospennikova et al. (2015) specify the following areas: robotic experiment (astronautics, microcosm studies, archaeology, underwater exploration, and others), modelling of robots and their systems (modelling the process to provide a variety of features and functions of robot such as sense of touch, sense of sight, hearing sense).

The educational ideas of introducing robotics in education are connected to the potential of providing a unique learning experience of developing the engineering thinking and technical skills of students, increasing their interest in engineering professions, electronics, and computer science areas.

Pedagogical and educational functions

One of the main matters of this work is putting the emphasis on pedagogical principles coming from the implementation of robotics in education. Well-designed curricula, aligned to learning theories, proper educational context, pedagogical methods and professional competences of teachers in leading educational innovations, including robotics, will contribute to improving the learning experience of students.

Literature review reveals that the use of Educational Robotics in teaching contributes to the development and improvement of the cognitive acquisitions of children (Alimisis 2012; Eguchi 2014; Ospennikova et al. 2015; Rouhiainen 2019). The positive outcomes of the practical abilities of students are

associated with their active behaviour and in effective cooperation in solving specific technical problems. Developing project-based learning with coding, engineering, mathematics, and science stimulates students to think in depth about designing, constructing, programming and modelling robots. Students not only discover how the technology works, but ER also ensures a meaningful and interesting learning setting due to its hands-on character, and the possibility of working in teams.

The educational function of robotics is also essential in the development of the personal qualities taking responsibility, improving the communication and interpersonal skills, ability to work in a team sharing experiences, the implementation of group school projects preponderantly interdisciplinary, promoting own initiative and independent learning, as well as developing the technical creativity, imagination, and critical thinking.

The successful introduction of robotics in school is not just a matter of access to new technologies and technology itself, the real significant issue from the educational perspective is the educational theory and the curriculum guiding the use of robotics in an instructional context. Alimisis (2012) specifies that the robotics is just another tool, and it is the educational theory that defines the learning outcome coming from robotic applications. However, the potential of using robotics interdisciplinary in order to make learning activities relevant, are usually not found in the regular curriculum, in this context, Rouhiainen (2019) suggests four basic guidelines when planning to use robots in the classroom: (a) have a clear learning objective that the robotics is implied; (b) use the robots to help with repetitive tasks, which can often be boring and time-consuming for humans, thus teachers can focus more of their time and attention on educating their students; (c) make sure children don't become too attached to the robot, because the robot is there to help children with learning, rather than as a friend or social companion; (d) follow ethical guidelines, because the role of ethics is becoming increasingly important.

The interdisciplinary of learning activities represents a distinct function of robotics courses. There are many fields of application of robots in STEM disciplines and particularly in physics, likewise in social disciplines, geography, history, literature, music, and art. Lantz (2009) says STEM education is larger than just an interdisciplinary paradigm. It is transdisciplinary in fact and suggests a „multi-faceted" combination of fields, as well as new spheres of understanding that ensure the integration of disciplines. This idea is also sustained by other authors (Goh & Ali 2014; Lynch 2017) and by the aspect that new robotics innovations tend to be performed around these four disciplines. It is crucial that teachers promote the relevance of using robotics to STEM subjects and not only in their classrooms, and determine how to adapt curriculum and identify correlations with national standards.

Learning Approaches

The potential of robotics as effective add-ons to learning is analysed through educational technology to facilitate learning and improve the educational performance of students. Qualitative review of the literature

identified that most of the existing researches use problem-based learning, constructivist and constructionist frameworks to design and implement robotics curricula and to explain schoolchildren's engagement in robotics education. Altin & Pedaste (2013) evaluated different approaches used to teach with robots, namely: discovery learning, collaborative learning, problem solving, project-based learning, competition-based learning, and compulsory learning.

The most significant approach that influences robotics education is constructivism. The cornerstone of the constructivist theory lies in J. Piaget's theory of cognitive development, which establishes learning as a result of mental construction by the learner. The cognitive development involves two essential processes: assimilation and accommodation, as insights of knowledge built over time. The theory of Piaget, still topical today, highlights the role of mental structures, ways of organising, combining, transforming, and assimilation of information. Constructivist approach involves building a learning environment, changing perspectives, preparing materials for different learning channels, creating social situations in which children learn from each other (Flueraș 2010).

The cognitive constructivism is also declared in J. Bruner's theory based on information processing (discovery learning method), according to which learning is an active process in which students build new ideas or concepts based on current and past knowledge. (Ghiolmez 2014) "Discovery learning" inspires students to ask questions and to deduct general principles from practical examples or experiences. In the literature, discovery learning is described as a method of Inquiry-Based Instruction that encourages learners to search for new information and to find facts and correlations. Pappas (2014) specifies that the techniques used in discovery learning can differ, but the goal is always the same, and that it is the learners to reach the end result on their own. Discovery learning could be organised in combination with collaborative learning to involve all students who are attempting to have a shared educational experience. In a collaborative learning context, students are capable to learn from each other and share experiences that may benefit the entire class. Collaborative learning theory, as stated by Pappas (2014b), suggests that students who are trained in a group context and cooperate in order to achieve common goals are more successful, while those who work autonomously are more likely to exhibit competitive behaviours.

Constructionist approach as an extension of constructivism is a strategy for education that changes the method of learning by focusing on building products or artefacts, hence stimulating the process of „learning by doing". Artefacts are tools by which children learn. A constructivist learning activity promotes a problem to be solved, in this case, students manage their own actions to produce a personally meaningful artefact without any intervention from the teacher (Frăsineanu 2007).

Designing and programming robots represent a process in which students learn and discover how the technology works, further applying their skills and knowledge in particular situations or meaningful school

projects. Students interact with robotic bricks/elements and the coding environment, thereby acquire knowledge of the features supported by such objects and events. In this way, students build their personal ideas and reality and define their learning background.

Problem-solving and analytic methods use procedures typically practised in robotics, programming, computer science, engineering, mathematics, and other disciplines. The problem-solving approach identifies robotics education as a part of STEM education. To plan STEM learning activities based on problem-solving skills, the selection of a topic within the curriculum to use educational robotics is a very relevant measure.

Robotics and STEM activities are also planned successfully in a dynamic project-based learning approach. Project-based learning is built upon real tasks that have brought challenges for students to solve. (Goodman 2010) This encourages interdisciplinary perspectives of robotics and enables students to perform diverse roles in creating robot models. Project-based activities generally focus on student-centred inquiry and group learning that benefit from building skills such as critical thinking, communication, and collaboration.

Based on the mentioned above conceptualization, studies of the learning approaches that facilitate the success of implementing innovative technologies and robotics in school indicate that educational utilization of active, collaborative, inquiring, problem-based, and constructivist approaches provide an ascending engagement and an inherent learning process.

Moldova initiatives

Educational Robotics has been implemented in the world education system for about two decades according to the literature review. The activity of Moldova schools and centres in robotics has significantly increased only in the last 5 years, starting with Roboclub program launched in March 2014 with the financial support of the United States Agency for International Development (USAID) in partnership with the Ministry of Education, Research and Culture of Moldova and the National Association of ICT Companies.

Starting with the 2015 year, Robotics (‘Robotica’) was introduced as an optional discipline in the school curriculum. The optional Robotics discipline is proposed to schoolchildren at the primary level (3rd-4th grades), at the second level (7th-9th grades), and at any high school level classes (Curriculum of the optional discipline Robotics, Ministry of Education, Culture and Research of the Republic of Moldova 2015). In conformity with the discipline matrix, each educational level contains 34 hours/per year. (ibid.) Moreover, the schoolchildren from different grades and education cycles can create mixed groups to study the Robotics discipline. In such cases, the study materials, tasks, and learning activities are individually set for each age group, and the integration of teaching activities is achieved by developing teams of students

within joint projects. The activities in combined groups are provided as extra-curricular learning activities. In the case of mixed groups, students of primary grades could make activities of the development of fine motor skills, spatial attention, precision, and imagination, students of second level grades - additionally, activities of the development of technical creativity and algorithmic thinking, and students from Lyceum - activities of the designing robot models, elaboration and implementation of robot driving algorithms. (News diez.md 2015) In the situation when the student chooses the Robotic Modules consecutively at several cycles, the modular-concentric organization of the Robotic Curriculum permits extrapolation, deepening, developing, systematization, and generalization of robotics acquisitions from one cycle to another across all discipline units. (Curriculum of the optional discipline Robotics 2015)

On the authority of national curriculum of the optional discipline Robotics (2015), considerable educational benefits and the formative value of the discipline consists in:

- developing of fine motor skills and abilities, attention, precision, spatial imagination;
- developing inventiveness, creativity and technical thinking;
- developing construction, algorithmization, programming and efficient use of cyber-systems;
- developing practical skills for using robot-driven programs;
- enhancing efficient interactions between man and cyber-systems;
- increasing motivation to study real disciplines;
- guiding students towards performance in achieving the desired goals;
- developing teamwork capabilities.

Thus, Educational Robotics becomes a basic element of children education and penetrates the content of the school curriculum. The appropriate decisions have already been taken by Moldova authorities at the state level. Hence, the objectives of schoolchildren learning in the field of computer science and robotics are to perform a variety of technical projects. Studying robotics at primary and secondary levels seems to give a good impact on the way children choose their interests, develop new skills, orient for their future professions. For this reason, many national schools buy themselves educational robotics kits or participate in different projects to gain these types of equipment.

Many national schools implement extracurricular training in robotics, which takes place after school hours at the school itself under the supervision of teachers or instructors in order to prepare schoolchildren for robotics competitions. These non-formal activities are mostly connected with Lego League Competitions. In Moldova, the competition *First Lego League Moldova* takes place annually, where hundreds of children, teachers, coaches, and other people gather. This year, at the First Lego League Moldova 2019 semi-final edition, a record number of 62 robotics teams has taken part, composed of

children aged between 9 and 16 and guided by 80 instructors and coaches. The Moldovan competition is organised by the National Association of Technology Companies, with the support of USAID and the Government of Sweden. (News stiri.md 2019) These competitions are very attractive for children, and the "action" itself introduces some fun and motivation, which resulted in game-based learning and inspired the children to make improvements of the design of their robots to do them more competitive.

At present, the number of Moldova schools equipped with robotics kits is continuously increasing. The main actions in this field are guided by the national pilot-project "Clasa viitorului – Future Classroom Lab" and other projects. Based on the European Schoolnet model of Brussels, the Future Class Lab project aims to transform the education system of Moldova by integrating innovative digital technologies, robotics, and STEM subjects in teaching. (News www.orange.md 2017) However, the introduction of robotics in schools has raised issues necessary to understand how ER could be effective for learning to promote the transdisciplinary integration of STEM disciplines in the curriculum. In this scope, at the initiative of the Moldova Government and with the support of the strategic partners as the Moldova Competitiveness Project financed by USAID, the Government of Sweden, UKAid and Orange Moldova Foundation, the National Centre of Digital Innovation in Education was open in April 2019, which is going to train teachers to apply new digital technologies in school. Also, the Moldova Competitiveness Project 2015-2020 and the Government of Sweden are developing educational programs for children and youth, including Roboclub and FIRST Lego League, Coder Dojo, GirlsGoIT, etc. to teach children in essential skills for a career in technology. (ibid.) These initiatives facilitate the improvement of digital skills absolutely necessary for the technological era, and prepare young people for the competitive market and 21st-century careers. National and international projects are a necessary part of how changes can be implemented in schools, establishing implementation capacity to allow innovations to be used effectively and more widely.

The Moldova experience of practicing robotics in education has been organized also within robotics and IT centres. It is necessary to mention the following national centres (Odobescu 2018):

- *Junior STEP IT Academy Moldova* provides IT studies for children aged 7-14. The children acquire both theoretical knowledge and practical skills of modelling and programming robots, create gadgets using Arduino, use graphics applications, develop websites, animated characters, presentations, etc.
- The Educational Centre for Teenagers *Tekwill Academy Kids* specialized in IT is offering courses in Engineering and Robotics field, namely: Milo (robotics for children of 7-9 years), LEGO Mindstorms EV3 (9-12 years), Arduino (13-16 years), Drone race (14-17 years).

- The centre *Creative Robotics* offers students who attend robotics courses, LEGO Mindstorms Education EV3 sets of robotics. During the course, participants learn basic coding, mechanics, electronics and robotics. (Youth Development for Innovation Foundation 2018)
- The centre *RoboCode Moldova* expects beginners and children already trained in IT (8-15 years). The course includes programming of robots, creation, and programming of mobile applications, C ++ programming for Arduino, 3D printing, games creation, Internet of things (IoT), smart home systems, autonomous robots, etc.
- *ImpacT Academies & Camps* teaches children to use several gadgets like: KANO, 3D PENS, Little Bits, Dash and Dot robots, Google Cardboard, Makey Makey, and Robot Turtles.
- At *the Lego Club*, children aged between 4 and 14, learn technical science with LEGO EDUCATION educational sets. Through their activities, organized in the form of games, children study robotics, IT, engineering, physics, mechanics, and architecture. Children assimilate also design skills, fine motor skills, teamwork, communication, analytical thinking, and programming.
- *Roboclub Artico* develops skills in the interactive programming of Lego's robot sets. The program contains instructions for assembling robots from Lego Mindstorms EV3 sets, then studying the programming language of these robots through the EV3 education software.

However, robotics classes are mainly carried out in the form of limited extra-curricular activities in national schools – 34 hours per year as mentioned above. The limitation of robotics as an optional discipline does not match the increasing change of modern technical environment due to the vast expansion of robotics in human life. Robots have already become an indispensable part of many areas of the industry, science, social service, and human life. That is why the new generation of students requires the development of innovative IT-competency determined by the robotic technical environment. Once we consider the significant impact that robotics will have on the workforce and society, it is then necessary to identify how we develop our students for this transformation. Graduates of schools should be prepared for this environment. In connection to this, the researchers Ospennikova, Ershovb & Iljin (2015) propose to set innovative and complex educational objectives like: (1) updating the content of polytechnic education of students, taking into account robotics technology innovation; (2) training of future consumers of robotic environment services; (3) training of future robotic systems manufacturers (research engineers, design engineers, planning engineers). To be successful, the teachers will teach applying active-participatory training methods like robot educational games, robot exploration of simulated environments, the documentation of researches, and the presentation of elaborated projects.

The educational system of the Republic of Moldova needs strategies and ideas that would improve the interest of students in studying science, technology, engineering, mathematics, physics, and computer

science disciplines. Robotics discipline, by its applicative character, is designed to stimulate creativity and motivation of schoolchildren. In this regard, robotics is one of the concepts that extend knowledge in science, technology, and mathematics, combining transdisciplinary and interdisciplinary skills. (Curriculum of the optional discipline Robotics 2015)

Conclusion

Based on the literature analysis, it could be concluded that the use of Educational Robotics has a large potential to offer learning experiences to students, supporting STEM programs and playing mainly the role of a learning cognitive tool and an object of study. Within STEM activities, students gain from the possibility to learn about robotics, mathematics, science, technology, and engineering in motivating learning conditions. The teaching methods of robotics courses are based on the constructivist approaches that define learning as the building of knowledge. It is important to provide more research in Moldova to better understand the benefits of Educational Robotic and new technologies in connection with STEM education.

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INTRODUCING PROGRAMMING AND ROBOTICS TO KIDS IN A PUBLIC LIBRARY IN DEVELOPING COUNTRY - CASE STUDY FROM DOBOJ PUBLIC LIBRARY

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Keywords: programming, robotics, learning, public library, education.

Abstract: Libraries are known for providing their services to knowledge and information seeking population. In order to attract the younger population to use library services, librarians must offer creative and interesting activities on a daily basis. This case study presents the project that was a part of INELI (International Network of Emerging Library Innovators) Balkans project and proposed programming and robotics workshop to be held at the public library. The aim of the project was to introduce the programming and robotics to kids ages 10+ in a fun and easy to understand way. The expected benefits of this workshop were divided into benefits for kids, society and for the library itself. Kids were given a chance to obtain useful skills while playing, hoping that obtained skills could eventually determine their future profession. The project objectives were to engage kids in creative activities in library, introduce programming and robotics to kids in a creative and fun way, promote the library as an "open" space, promote educational values, teach students how to collaborate and share knowledge while competing at the same time and help young people develop professional skills and careers.

Eventually, the implementation of this project went through the third party. In our case, it was Centre for Management, Development and Planning - MDP Initiatives (MDPi) from Doboj. Taking into account the specific needs and challenges of contemporary Bosnian society, MDPi identified activities that would improve public library services. MDPi team provided expertise, built management capacities and practices, fostered partnerships and networks on a local and regional level. In the end, after overcoming some minor and major obstacles, the main objectives of the project were met. In order to change kid's perception about programming and robotics, to change kid's perception about libraries, to make a stronger bond with community members (kids and their parents) and to promote the library as a learning space, libraries must be ready to accept, carry out and implement such projects with the help and resources from various organizations including governmental, non-governmental or commercial organizations.

Introduction

Public libraries are organizations that provide services to patrons of all ages and different backgrounds. As such, libraries must create and perfect services that meet the expectations of those they intend to serve (Harnon et al. 2015). In recent years, the advancement in technology created positive changes in libraries in developed as well as in developing countries. Libraries in developed countries provide smart technologies (Wójcik, 2016; Min, 2012), 3D printers (Moorefield-Lang 2014), high-speed internet, music studios, robotic equipment and other technologies to their patrons on a daily basis. The use of STEM (science, technology, engineering and mathematics) approach to learning and development is accepted in libraries around the globe. STEM researchers have found that the knowledge and skills that students acquire outside of school - at home, in afterschool programs, and as part of various informal learning experiences widen that opportunity gap between children in poverty and those from more affluent homes (Lopez, Jacobson, Caspe, & Hanebutt 2019). There were projects that encouraged and supported the use of science and technology in public libraries such as Global Libraries (GL), Electronic Information for Libraries (EIFL) etc. Following the above-mentioned trends, Doboj public Library and its IT department decided in 2014 to find a way to secure and implement STEM technologies and to provide a learning opportunity for those kids interested in acquiring new computer and programming skills. Since there are three Faculties in Doboj that educate students in the field of internet technologies (IT) there is a great chance that those kids would stay in Doboj and become students at one of those faculties. Also, there are

two private programming companies that are in constant need of new and skillful programmers so the library could use the fact that kids who attended STEM workshops at the Libary and later became students, as a tool for promotional and marketing purposes. The idea was to use the Lego robots since the brand attracts a lot of attention and the Library is always in a real need for publicity. Unfortunately, there were no extra resources available for this purpose within the Library, even in the long-term planning, so the idea was to secure the resources either by applying for a grant or by participating in the international project. In the end, the resources were secured through INELI Balkans project which was implemented by the Greek organization "Future library" (FL). The aim of this paper is to present the challenges that small public libraries are dealing with when implementing such projects and possible solutions that could be applied to solve the inevitable issues that libraries are facing in this specific field.

Project proposal

Methods – Public libraries in developing countries are faced with many challenges when it comes to implementing innovative services and advanced technologies in the library surrounding. The main problem that public libraries face is how to secure funding for such projects. The first step towards implementing new services in Doboj public library was to perform extensive research regarding the use of STEM technologies in neighboring countries, mainly Serbia, Croatia and Montenegro. While researching the implementation of STEM technologies in Serbia it was discovered that the public library in the city of Ćuprija successfully implemented the Lego robotics programming project through EIFL funded project and they were interested and willing to share their experiences and resources with us. The arrangements were made for them to have a two-day workshop at the Doboj public Library. The two-day workshop took place in March 2015. The event was well attended and attracted media coverage on a national level. The feedback from kids and their parents was positive so the decision was made to start actively searching for possible ways of securing funds for the Lego robotics project throughout that year. Eventually, we discovered the INELI Balkans project and applied to participate in it. INELI-Balkans was a three-year Future Library project (November 2014 – November 2017) supported by the Bill & Melinda Gates Foundation. The aim of the project INELI-Balkans was to lay the foundations for a sustainable network of Balkan libraries, library partners and communities that will encourage knowledge-sharing, collaboration, skills and library service development.[1] The goal of this project was to introduce the innovative trends in Libraries to the 35 participants from eleven Balkan countries (Albania, Bosnia & Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Greece, Kosovo, Montenegro, Romania, Serbia and Slovenia) and to educate them on how to become innovative leaders and how to implement those trends in public libraries in their

[1] Ineli Balkans Needs Analysis Report. Available at: https://www.futurelibrary.gr/wp-content/uploads/2015/05/INELIBalkans_NeedsAnalysisReport_final_version.pdf , (accessed 13th May 2019).

counties. At the end of the first year, after extensive online training program in leadership development and innovative library trends, the five innovators were given funds to implement their project proposals. The project proposal that represented Doboj public library had the title “Creative IT corner for kids” and was among five awarded project proposals.

This was the first domestic or international project of any kind implemented by Doboj public Library in the last 20 years so there were many unknowns and potential setbacks ahead. The target groups were school children (age 10-14) and high school students (15-18). Since they all have to choose appropriate professional orientation in the near future, which could affect their entire life, it is important that they become familiarized with the IT field at an early age. The primary school curriculums did not provide enough information about the IT profession and covered only basic computer literacy courses (sometimes presented in an inadequate way and outdated technology). High school students (that were interviewed) complained that the programming courses in their curriculum were not interesting or are hard to understand. Many of them were not able to learn programming techniques presented in a traditional way, and as a result, some had low marks and eventually lost interest. Those already proficient with programming needed participation in real projects in order to develop professional skills. The official library records indicated that the number of members in the kid’s department ages 6-15 was at 631 which presented the huge potential in recruiting the workshop participants.

Case study – Doboj public Library

The initial beginning of the project titled “Creative IT corner for kids” was planned for January 2017. The first setback occurred even before we could get the project money transferred from FL due to library’s inability to obtain Mayor’s confirmation that amount donated by Future Library (FL) would be used exclusively by Doboj public Library for the sole purpose of implementing the above-mentioned project. The issue occurred because Doboj public Library does not have its own bank account thus all the transactions go through the Municipality’s main bank account. The request was sent to the Mayor’s office in December 2017 but the Library never received any official response from them. The Library was in contact by phone with the Mayor’s office stuff but even after three weeks of waiting, the library could not get an official answer to our request. Eventually, the library was given an authorization by FL to implement our project through the third party which in our case was organization MDP Initiatives from Doboj. MDPi provides expertise, builds management capacities and practices in municipalities and civil society organizations, stimulates and implements development initiatives, fosters partnerships and networks on a local and regional level. Thanks to their help and support we were able to implement the initial phase of the proposed project with ease since all the financial transactions were prepared and executed by MDPi.

When it comes to the Lego programming workshops held at the library the goal was to have a group of 4 kids working on one Lego robotics kit and the total number of participants at one workshop cycle was expected to be 1. The total number of workshops initially planned was 5 but due to the late start, it was later changed to 4. The intended outcomes of the Project "Creative IT corner for kids" were:

- To change kid's perception about programming;
- To change kid's perception about libraries;
- To make a stronger bond with community members (kids and their parents);
- To promote the library as a learning space and
- To attract more visits to the library.

The second setback became apparent when we faced a problem with equipment procurement. Initially, MDPi submitted the request for procurement of Lego equipment to the only authorized Lego dealer in Bosnia and Herzegovina. Initially, they had three Lego Mindstorms sets and appropriate accessories in stock. The dealer had just one Lego Expansion set in stock but, in meantime, it has been put on hold for some other institution so we had to wait for 7 days before they decided whether they will buy it or not. Eventually, they gave up so we received one Lego expansion set as planned. Also, due to slight changes in the prices of Lego and other computer equipment in the meantime, we requested from FL to approve the purchase of additional Lego Expansion. It was concluded that Lego Expansion set would generate much more interest and provide much more additional opportunities for students due to the fact that they will be able to assemble and program 6 more additional Lego robots and much more.

The Facebook page @kreativniITkutak and dedicated web site were created and went live. Promotional methods used to reach the audience:

- Conventional media (newspapers, TV);
- Social media ("Doboj public Library", "Kreativni IT kutak za djecu" and "INELI Balkans" Facebook pages);
- Project's web site, Library web site;
- Promotional workshops.

We did receive messages and inquiries for workshops mostly through our FB page.

Results

The original project proposal anticipated a total of five workshops to be held, one each month. Since the start of the project was delayed from January to April 2017, and since actual money transfer took place in May 2017 the implementation of the project started in Jun 2017. Because of this late start, the total number

of workshops to be held was changed to 4. However, it did not impact the number of kids attending the workshops but rather it shortened the number of planned workshops. Since we had just 4 months to complete the Project and in order to have all 4 workshops organized we decided to have two extra one-day workshops in October.

After the promotional workshop we realized that 4 students per one Lego set, as initially planned, was not functioning very well since some students did most of the assembling and some did very little so we decided to have no more than two students per one Lego set in the future (for regular workshops) totaling six students per one workshop, which proved to be more effective. After the second workshop, which was held in Jun 2017, we organized the first workshop for kids in a rural school, as per the project proposal.

In order to reach the intended number of kids that would participate in the Project, the decision was made to organize additional workshops for younger kids (age 5 -10). Also, additional workshops were held for two institutions that are taking care of kids without parental care. One workshop was held in August and the second workshop was held in September. Also, the visits to rural areas raised the total number of participants to about 82.

CHART 1. TOTAL NUMBER OF PARTICIPANTS

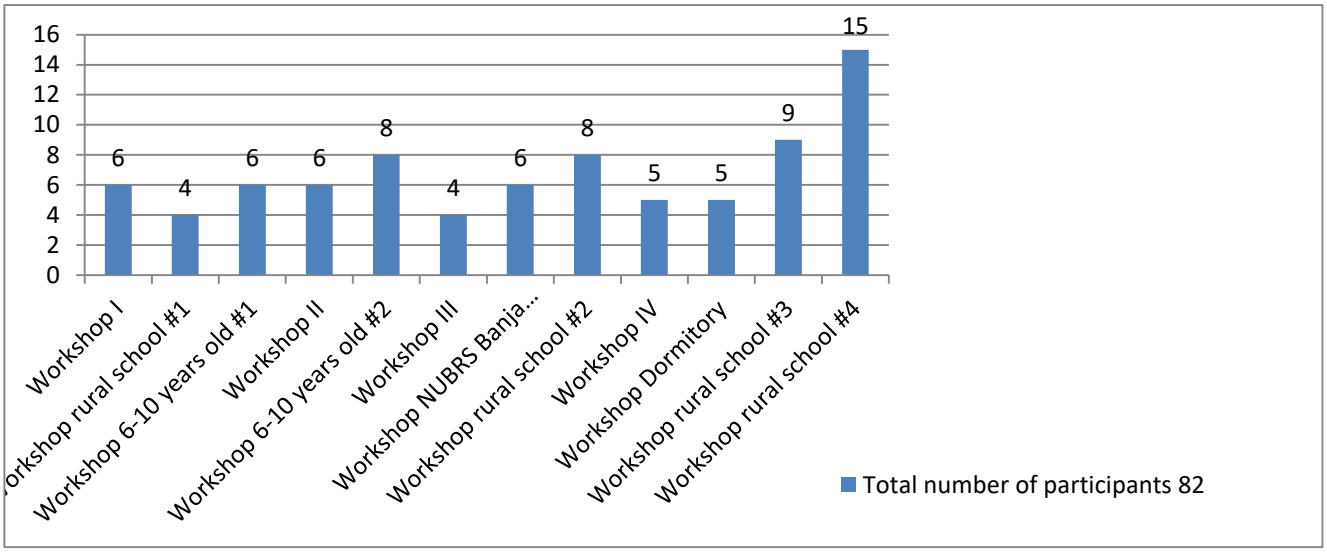

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CHART 2. TOTAL NUMBER OF PARTICIPANTS BY GENDER/ PER WORKSHOP

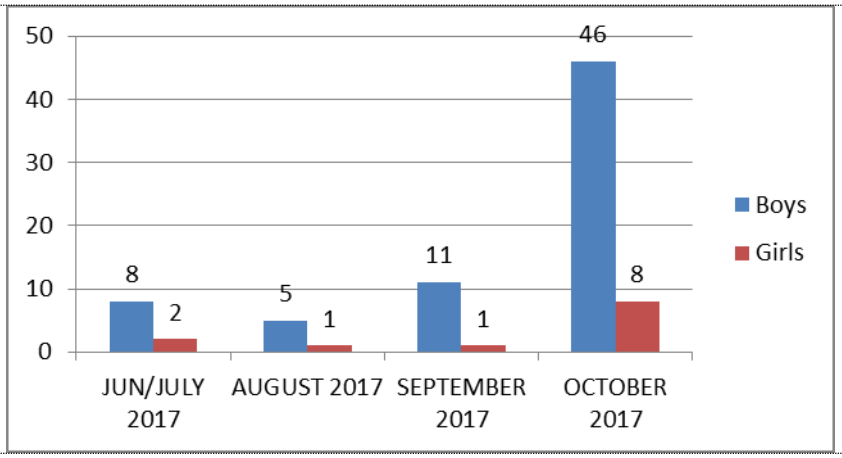

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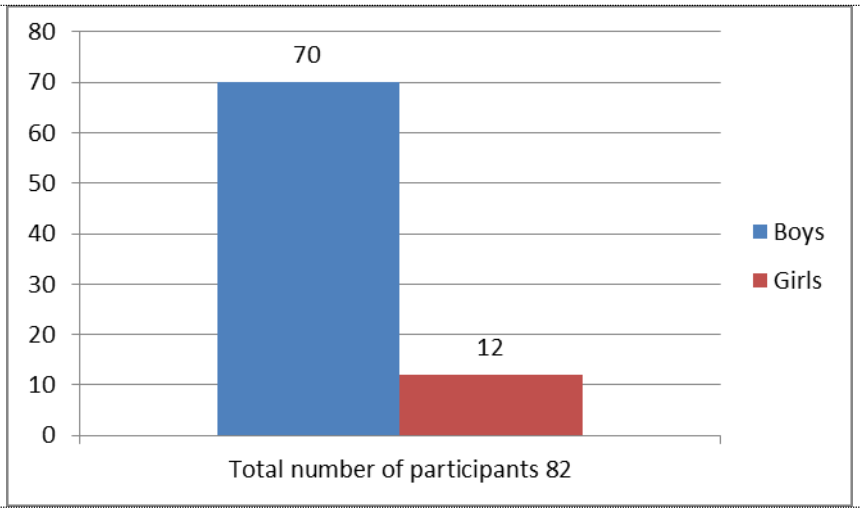
CHART 3. TOTAL NUMBER OF PARTICIPANTS BY GENDER



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One of the partners in this Project was local Dental clinic and as a part of the project, we proposed that they teach kids on the importance of dental hygiene and disease prevention, which presents constant problems to kids at this age. The presentation on the "Importance of oral hygiene" was given by a dentist from this dental clinic. The presentation was held at the Doboj public Library and demonstrated how kids should brush their teeth correctly. Also, Dental clinic donated one Lego Expansion set as planned by project proposal and also gave away 25 teeth brushes to kids that attended the presentation.

Afterwards, the certificates for successful completion of the Lego programming course were awarded to participants. Out of 32 invited participants, 25 participants showed up (other participants were either in school or could not make it on time but they all received their certificates and promotional materials afterwards).

The attendance was optimal. Out of 22 kids that participated in 4 workshops that were held on a monthly basis just one participant was not able to attend all 4 workshops due to sickness (missed two

workshops). All other participants attended all the workshops and successfully completed the Lego programming course.

The attendance was tracked by writing down the names of participants and by taking photos of each workshop.

Conclusion

Kids did not perceive the library as a learning space in the past due to many factors (lack of space, unfriendly or inadequate environment, lack of IT equipment etc.) but that is definitely changing now.

As already explained above, the number of participants was limited to 6 per one workshop in order for each participant to have more hands-on experience, which was one of the aims of this project in the first place. There were more participants in the rural schools but it was mainly organized for the promotional purposes so that kids who do not have a chance to visit the library on a regular base be introduced to Lego workshops. They all were invited to visit the library in the future and to participate in the Lego programming workshops.

During the four-month period, kids showed real interest in working with Lego robots but one thing that stands out is that kids just don't have the habit of visiting the library on their own.

One of the positive things is the number of kids that showed up for the certificate award ceremony which was a good indicator that this could become service that would attract more kids to the library on a regular base. Most parents said that kids were thrilled and that they would like to continue to participate in the future workshops.

Driven by this, we are working towards developing competition events were kids could show their knowledge and potential. Kids definitely felt more and more comfortable with programming as time went on. They were very engaged during the workshop and mostly talked about programming and Lego robots. They wanted to assemble different robots and they wanted new challenges every time they came to the library. At first, they thought of it as a game but all of them acknowledged at some point that it is quite challenging but interesting.

The project had some impact when it comes to changing kids' perception of libraries. The best confirmations for this are words of twelve years old participant who made the following statement during one workshop: "This is so interesting! I forgot I'm in the library!" Others just could not comprehend that they are having such fun in the library.

At the same time, the implementation of new technologies and concepts into the library surrounding presented quite a challenge for librarians especially for those in developing countries. Successful project

implementation required additional activities, such as finding best practice models, training and toolkits which were needed to integrate this type of thinking and behaviour into the everyday operation.

Subsequently, to overcome all possible obstacles the commitment from both management and librarians was required in order to successfully adopt and implement new technologies and principles (Newby et al., 2014; Nguyen, 2009). Finally, public libraries in developing countries need to step up their effort to improve library services and relationships with patrons to keep up with the trends and standards currently present in libraries in developed countries. Further, it is important that library management accepts the responsibility for securing the successful implementation of any project by providing a supportive and positive attitude towards the use of the new technologies within the library.

Public libraries in developing countries must build partnerships in order to provide STEM resources and programming to the youngest members in their community. The future research will focus on giving a high priority to the introduction of Makerspaces and Media labs and other creative facilities in the library that will help patrons gain knowledge, improve skills and quality of life in general. Librarians should accept project implementation as "one step at the time" process, where incremental changes would eventually lead to a significant changeover in the everyday workflow in libraries (Stokić et al. 2018).

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Virtual and mixed reality

PRE-SERVICE TEACHER TRAINING IN THE VIRTUAL CLASSROOM: PILOT STUDY

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Key words: virtual reality, higher education, pre-service teachers, teacher training, curriculum, didactics

Abstract: The pilot study will be presented in a virtual classroom environment. Virtual classroom is an application based on the Unity 3D engine. The user puts on 3D glasses, and finds himself/herself in a virtual primary school model where several pupils can sit on the seats to interact with. There is also a virtual whiteboard in the classroom, where the user can write notes, as well as a map with a pointer. The application is used during the teaching of didactics for pre-service geography teachers, where expansion to other disciplines is expected. In the pilot study, there were 10 students of the 1st year of Geography Teaching, whose task was to present a short explanation in a virtual classroom, focused on selected critical points of the geography curriculum. Before starting the VR training course, the students completed a questionnaire, focusing on their experience with real teaching and VR. The pilot study was conducted in three successive stages. First, the students tried working in a virtual classroom (presented themselves and a geographic theme), provided basic feedback, and were given a virtual session at lower secondary school level. In their next class, they presented a pre-prepared theme in a virtual classroom, received feedback from teachers and other students who evaluated their performance according to a single evaluation form, and reflected on the work in Virtual Classroom. During the last stage of the project work, the students taught the same topic again, and tried to give a better performance, reflecting comments from the previous level. After completing the process, the students completed another questionnaire to determine their responses to the application of VR in teacher training.
It is clear from the results of the pilot study that the presentation of individual students in a virtual classroom is a good way to open both subject and didactic topics in teaching didactics. It turned out that pre-service teachers very often focus their training and self-learning on the professional (disciplinary) accuracy of the presented curriculum, and are less concerned with the didactic aspects of the topics taught - how to explain and motivate pupils to learn, etc. The ability to explain the problematic areas of the curriculum can be systematically developed in a virtual classroom, as well as the two-stage approach used, seem to be the appropriate methodological basis. When comparing the first and second performances in a virtual classroom, it is clear that students are getting better, so this pedagogical work simulator can be successfully used as one of the possibilities of pedagogical training, in conjunction with their own school practice. At the same time, we came to the conclusion that some students suffer from cyber sickness while working in a virtual classroom, and cannot fully concentrate. However, it is also beneficial for these students to be able to participate in the role of reflective evaluator and colleague for didactics lessons, using a virtual classroom.

Introduction

Virtual Classroom is an application to support the education of future teachers, created in the Unity development environment. The project originated at the University of West Bohemia in co-operation with the Faculty of Education and the Faculty of Mechanical Engineering, and in connection with the project Risk Environment Simulator, a virtual environment used in the treatment of alcohol addicts, as well as other projects using virtual reality in education, e.g. Digital Factory (Hořejší et al. 2016).

The use of a virtual teacher training environment was described by Andreasen and Haciomeroglu in 2009 (Andreasen and Haciomeroglu 2009). According to them, realistic aspects of the virtual environment can improve the training of future teachers. In addition, the inclusion of a virtual environment, along with other tools in preparing future teachers, can provide future teachers with more experience, which they can then use to cope with situations that occur in schools (Andreasen and Haciomeroglu 2009). Simulated environments, according to several authors, provide a safe place for

practical training and, in addition, future teachers receive quick feedback (Dieker et al. 2014a; McPherson et al., 2011; Scheeler, McKinnon, & Stout; 2012). Dawson and Lignugaris/Kraft (2017) also point out that teachers who have taught in a virtual environment evaluate virtual pupils and the environment as realistic, and evaluate their experience as acceptable and valuable, with regard to their professional experience. Straub et al. (2014) describe, in relation to mathematics teachers, that training in a virtual environment can increase the frequency of higher order questions that teachers ask students during their lessons, as well as support specific feedback they provide. Hayes et al. (2013) also describe that experience gained in a virtual environment can be successfully transferred to the physical class.

The TeachLivE project was a major source of inspiration for creating our virtual classroom solution. It began as early as in 2005, when Professors Dieker and Hynes of the College of Education and Human Performance at the University of Central Florida asked themselves: "Could teachers improve their performance - like soldiers or pilots - through simulation?" (Ferrante 2017). Their mixed-reality class simulator is now successfully used at over 80 universities across the US to prepare pre-service and in-service teachers.

The application of our virtual classroom solution was carried out in a study group of 10 students of the first year of the Master's degree study of geography teaching, within the subject Didactics of Geography. The aim of the presented research was to find out the relationship of geography students to the use of virtual reality in teaching, and to verify the suitability of the chosen procedure.

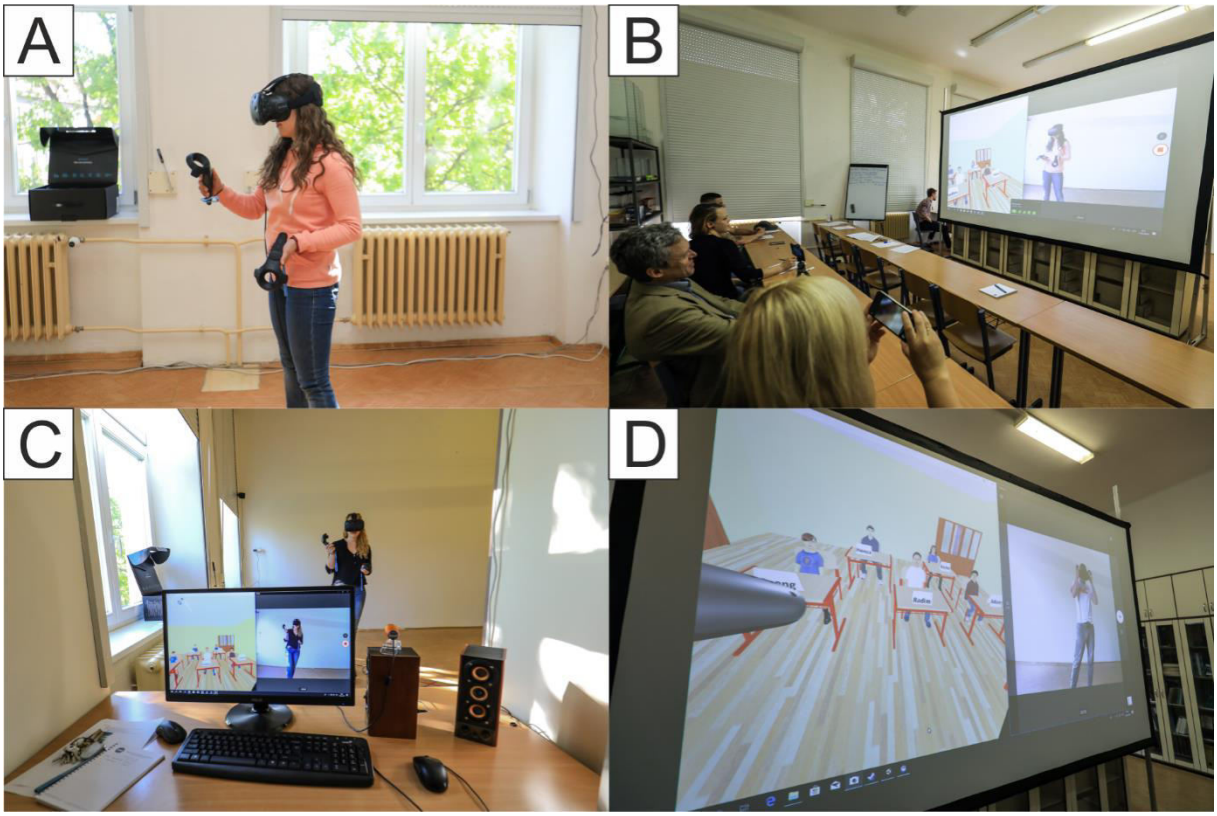
Methodology

Technical description of the pilot study

The pilot study was carried out in a classic classroom, which was divided into two parts. In the first part, a large enough space was created for the safe movement of the student in a virtual environment (see Fig. 1A), which was monitored by webcam during the study. The camera monitored the student's movements to monitor his / her non-verbal expressions, and the spoken word was very audible in both parts of the class. In the second part of the classroom, there was a session for the other study participants and a large projection facility showing the image from the monitoring webcam, as well as the virtual class image (Fig. 1B), seen by the student in the virtual environment. This ensured that the observers could assess both the participant's speech in the virtual classroom, and their real movements. The same image was seen on the monitor by a didactic, who controlled the virtual class (see Fig. 1C).

In a virtual classroom environment, the user puts on a headset and finds himself in a virtual model of a primary school class, where several pupils sit at desks to interact (Fig. 1D). There is also a virtual whiteboard, on which the user can write notes, along with a map and a pointer.

FIGURE 1. DEMONSTRATIONS OF THE ENVIRONMENT IN WHICH THE PILOT STUDY WAS CONDUCTED. A) SPACE FOR SAFE MOVEMENT IN A VIRTUAL ENVIRONMENT. B) SPACE FOR OTHER STUDY PARTICIPANTS, WITH A VIEW OF THE PROJECTION EQUIPMENT. C) A VIEW FROM THE DIDACTIC WHO CONTROLLED THE VIRTUAL CLASSROOM. D) A VIEW OF THE VIRTUAL CLASS.



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Description of the pilot study

The pilot study itself was divided into 3 stages (similar to Haynes et al., 2013 and Dawson and Lignugaris 2017). The aim of the first stage was to acquaint the participants of the pilot study with the concept of the project, and to obtain initial feedback from them on the virtual classroom environment. Participants were described in detail the study plan and the reasons for integrating virtual reality into the education of future teachers, and the objective of the project was explicitly stated several times. Furthermore, each participant tried the immersion of virtual reality, and in a virtual classroom environment, tried to quickly introduce a selected geographical theme. After each performance, feedback was recorded on the board by the didactic, which was discussed in more detail, so that as many student comments as possible could be incorporated into the virtual classroom environment before the second stage of the pilot study. In the second stage, participants in the virtual classroom already presented the prepared topics. Specifically, it was a five-minute didactic explanation of the assigned critical point of the geographical curriculum (see Pluháčková et al. 2019). The whole teaching process was recorded, so that the participants could look back on themselves and other colleagues and evaluate their or their output, similarly as in the 3A methodology (Slavík et al., 2014). Each output was detailed and didactically analyzed and evaluated. Both process didactics and other participants were

involved in both processes. The analysis of the output was primarily led by a didactic from the relevant discipline, and the evaluation was carried out by other participants on the basis of a pre-defined form, which was divided into three areas: I discipline didactic and didactic area, II verbal communication, and III non-verbal communication. The evaluation included the qualities of a quality teacher included in the proposal of the Teacher's Professional Framework (Tomková et al. 2012). Individual aspects were scored on a scale of 1 to 5, 1 being the best and 5 the worst. At the end of the second phase, feedback from the participants on the virtual class environment was once again recorded. The third stage of the pilot study was the same as the second stage. The participants presented an explanation of the same critical point, but with already incorporated comments, which had appeared in the second phase. The whole process was again recorded and thoroughly analyzed and evaluated. Even at this stage, participants provided feedback on the virtual class environment.

After completing the three stages of the pilot study, participants completed a final questionnaire, in order to gain their views and attitudes to the virtual class project itself. The anonymous questionnaire was based on closed and open questions, in order to obtain as much qualitative data as possible. The closed questions used a four-digit Likert scale, which is a scale of the respondent's agreement or disagreement with a particular assertion or statement (Likert 1932). Respondents were allowed to choose one of four options for agreement or disagreement with individual statements (*completely agree, rather agree, rather disagree and completely disagree*). The results of the questionnaire were evaluated in the end, both by qualitative description and basic quantitative analysis.

A total of 10 students, (6 women and 4 men) aged 23 to 25, participated in the pilot study. All of them at that time being students of the first year of the follow-up Master's programme in Geography Teaching. For their age, the respondents had relatively rich experience in teaching. Most of them were already employed in primary or secondary schools at the time of the pilot study. Until then, their experience with virtual reality had been very basic. Only two participants used virtual reality routinely, the rest of them never had used virtual reality (except for classes supported by Google Expeditions). All of the participants have signed their permission to provide personal data, and to enable recording and photography, or use these records to popularize research.

The aim of this pilot study was not to give general conclusions, but above all, to test the functionality of the created new tool, Virtual Classroom, on a small sample of participants. Therefore, we do not consider all the results to be generally valid, but they are very important for further direction of the future development of the virtual classroom, and the suitable setting of the use of the virtual classroom in the education of didactics.

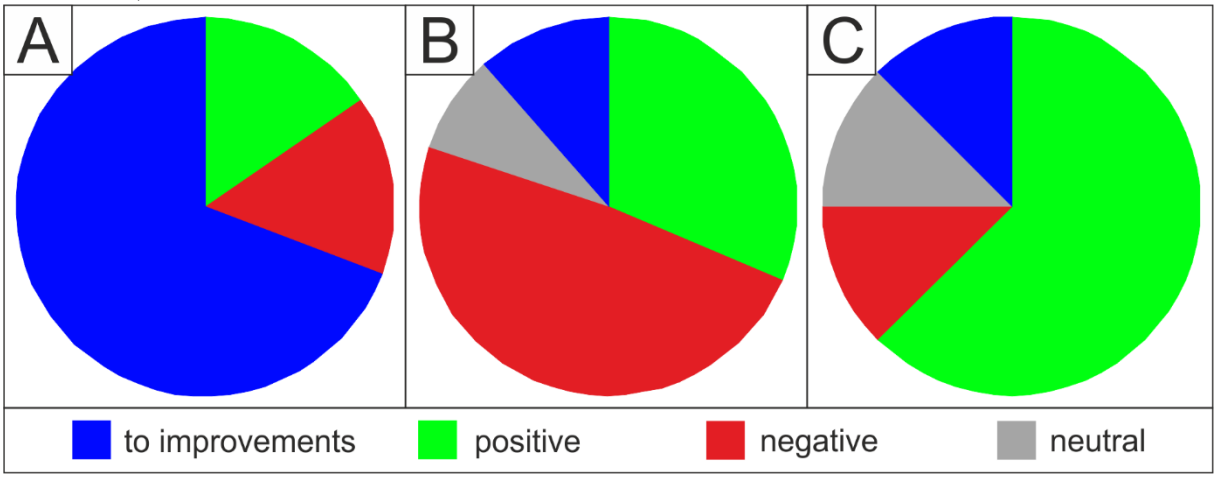
Results

Feedback from students

Suggestions for improving the virtual classroom environment, as well as the subjective feelings that the virtual classmate evoked in the participants, were recorded in the feedback received from the students. Overall, the feedback after the first stage of the pilot study largely contained suggestions for improving the environment (see Fig. 2A). The participants most often mentioned the necessary adjustment of class size, as shown in a statement from one of them: “The pupils are too far away”. Based on the feedback received after the first stage of the pilot study, several changes have been made to the virtual classroom environment to make the environment more natural and comfortable for participants. A map and a pointer have been added, the ability to write on the board has been improved, and the total area of the class has been reduced. The total number of pupils was also reduced to 5. An important change was the addition of name tags for virtual pupils, in order to ensure greater interaction between the pupils and the teacher. This modified virtual class entered the next stages of the pilot study.

During the study, subjective feelings changed markedly (see Fig. 2). As shown in Fig. 2B, negative reactions (red bars) predominated at the beginning (after the second stage of the pilot study). These can be exemplified by statements such as: “I feel uncomfortable.”, “I find it uncomfortable.” or “The virtual classroom certainly cannot replace interaction between pupils and the teacher.” However, during the pilot study, there was an increase in positive comments (increasing the green section of the graph) to a point where positive responses to the virtual classroom environment clearly prevailed (Fig. 2C). We can substantiate the statements of participants: “Better, I feel more confident.”, “I felt better.” or “I felt at home.”

FIGURE. 2. RECORDED RESPONSES TO THE VIRTUAL CLASS ENVIRONMENT AFTER A) FIRST, B) SECOND, C) THIRD STAGE OF THE PILOT STUDY. EACH COLOUR CORRESPONDS TO A DIFFERENT REACTIONS OF RESPONDENTS. NOTE, THE INCREASE OF THE GREEN SECTORS, WHICH REPRESENT THE AMOUNT OF POSITIVE REACTIONS.



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Evaluation and analysis of didactic outputs

During the second stage of the pilot study, it was found that some people, specifically two, were doing poorly in using virtual reality. They had headaches, did not maintain concentration, and felt sick.

These problems are described by the professional community as cyber sickness (LaViola 2000). These participants were forced to terminate their output and continued the pilot study only as evaluators.

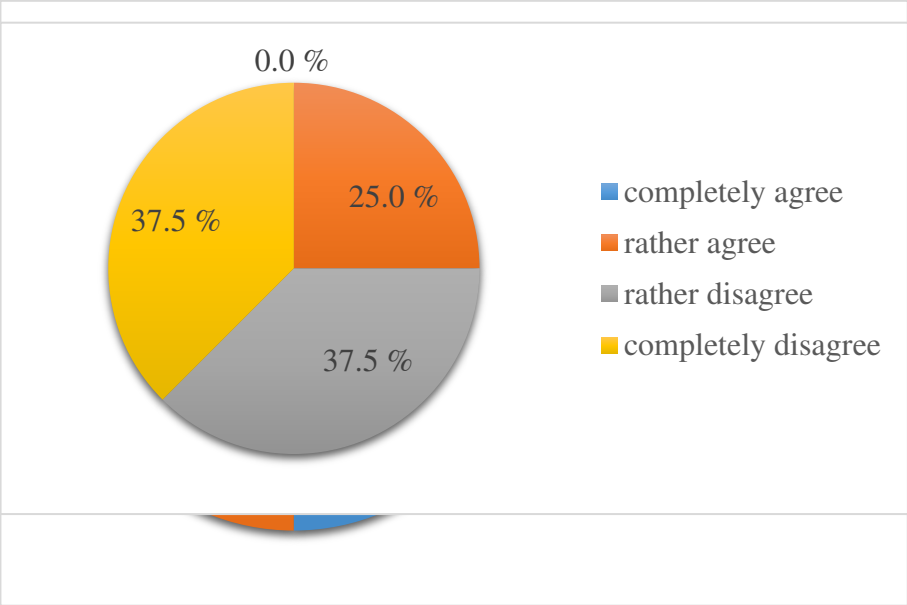
The evaluation of each output after the second and third stages shows that the participants as a whole have improved between stages. Improvement occurred in all three monitored parts of the evaluation (see methodology), with the greatest improvement being recorded in the didactic discipline and didactic fields. Among the specific aspects, there was the most notable improvement in the adequacy of the curriculum. After evaluating in the second stage of the pilot study, the participants seemed to realize that they were too complicated to explain the substance, and in the third stage better adapted the curriculum to pupils in the sixth grade. In addition, the participants improved their readiness to interact with pupils, clarity, and the use of appropriate and proportionate gestures. The smallest improvement, among the aspects that could be improved, was noted in the activation of virtual pupils.

Within the evaluation of each output, the pilot study was very often recorded in the group, "opened" didactically, or subject-intensive topics. These included, for example, the classical pupil's misconception of "colliding lithospheric plates together" (Francek 2013), or the question of motivation in the subject of pedology. There were also problems with missing pupil predispositions (Pluháčková et al. 2019), or problems of orientation on a map without a grid. Every problematic topic was always discussed in detail by the didactic, and a solution was suggested.

Closing (final) questionnaire

The final questionnaire contained a total of 10 statements, which were also linked to open questions. Given the scope of this paper, only two statements were selected to present the views of the pilot study participants, namely Statement No. 12 and Statement No. 18 (Figs. 3 and 4). Looking at the comments of the participants (Tables 1 and 2) on these two statements, we find that individual attitudes to the virtual class project are quite contradictory.

FIGURE 3. SHOWING PARTICIPANTS' COMMENTS ON STATEMENT 12: "IT IS MORE MEANINGFUL FOR ME TO EXPERIENCE TEACHING IN THE VIRTUAL CLASSROOM THAN TO SIT AND LEARN ABOUT TEACHING."



Source: Own

TAB. 1. FEEDBACK ON STATEMENT 12: "IT IS MORE MEANINGFUL FOR ME TO EXPERIENCE TEACHING IN THE VIRTUAL CLASSROOM THAN TO SIT AND LEARN ABOUT TEACHING."

Feedback #1	If there was no practice in schools, then this would be better than nothing. But I would definitely not replace classic experience with VR.
Feedback #2	Real people are real people - nothing can replace them. In the normal classroom, you have 20-30 pupils. I'm glad I could try VR, it is a nice change, but it certainly will not replace real experience.
Feedback #3	We should learn about how to teach, and to do this is a good addition to the virtual classroom.

Source: Own

FIGURE. 4 VIEW PARTICIPANTS' STATEMENTS ON STATEMENT 18: THIS VIRTUAL TRAINER IS TOTALLY UNNECESSARY. I DON'T SEE THE SENSE OF IT

Source: Own

TABLE 2. FEEDBACK ON STATEMENT 18: "THIS VIRTUAL TRAINER IS TOTALLY UNNECESSARY. I DON'T SEE THE SENSE OF IT."

Feedback #1	I think this trainer makes sense, especially in showing the mistakes of the teacher, and the teacher can see for himself.
Feedback #2	It is possible to practice various things on it - summoning pupils, noticing more activity of pupils, where I look around the class as I perform in front of class
Feedback #3	I don't know what it is for. It really differs from the real world / reality. Nowhere will you teach only 5 min, but 45 min, and I cannot imagine teaching in VR for 45 min.
Feedback #4	I would mark it useless at the moment if it was to replace the real class (experience). However, as an alternative way of improving communication, it is good, and I think it has its use.

Source: Own

Discussion

This pilot study examined the possibility of using virtual reality in the preparation of future teachers. The participants taught one of the critical points of the geographic curriculum of the sixth year, when the main teaching method was the method of interpretation or explanation (according to Maňák 1995).

However, scholarly literature and modern trends see monologic methods as obsolete, outdated and, in comparison with other, modern methods, less activating (Kalhous et al. 2002 or Skalková 2007). However, in spite of the above, it is necessary to add that as free-standing, these methods have advantages, and moreover, they often accompany many other methods (Skalková 2007). This is one of the reasons why their training in the preparation of future teachers still has its place (Petty 2008). Moreover, the existing environment does not have to be used "only" for the training of monological methods (according to Maňák 1995). In a suitable concept, students can be prepared for oral examinations, or they can train activation methods, such as discussion methods.

The results of the pilot study suggest that the created virtual trainer could be a useful complement to the training of future teachers, similar to Andreasen and Haciomeroglu (2009). Similar to Dieker et al. (2017), we noticed a positive change in the performance of teachers, and in the subjective perception of the virtual environment, depending on the amount of time or the number of outputs that participants spent in the virtual environment.

It should be noted that participants in virtual reality training may suffer from so-called cyber sickness, which is manifested by unpleasant vertigo. In the pilot study, 2 participants (20%) were affected by this. According to scientific literature, 20-80% of the population suffers from this (Rebenitsch and Owen, 2016). Unfortunately, nothing can be done about these instances (LaViola, 2000), so participants with symptoms immediately ended their VR participation. However, participation in the individual stages of the pilot study remains beneficial for these students. Participants can improve their assessment, discuss issues, or hear "open" problematic didactic or subject topics.

Conclusion and future work

Our results show that the presentation of individual students in a virtual classroom is one of the possible ways to open both subject and didactic topics in didactics teaching. The preparation of future teachers is often focused primarily on the professional (discipline) correctness of the curriculum presented, and less on the reflection of didactic aspects of the topics being taught - how to explain the curriculum to pupils, and how to motivate them to learn, and so on. The ability to explain the problematic areas of the curriculum can be systematically developed in the virtual classroom, and the use of a two-step approach seems to be an appropriate methodological basis. When comparing the first and second appearances in the virtual classroom, it is possible to observe what improvements have been made by the students. Given the results of the pilot study, this educational simulator will be further developed, tested, and used in teaching at the University of West Bohemia as a supplement to pedagogical training, in conjunction with its own teaching practice in schools, and in micro-teaching.

At the moment, we are planning to expand the environment to include other types of classes, such as specialized classrooms, university classrooms, and lecture halls. In parallel, different sets of virtual

pupils of different ages. Furthermore, the addition of virtual aids that are specific to different disciplines, so that it is possible to use the virtual classroom in the preparation of teachers of all qualifications. Another important part will be the possibility of external inputs, so teachers will be able, for example, to prepare their own presentations, which they will be able to control in a virtual classroom, on a virtual projector. We also plan to supplement the possibilities and actions that can be performed with virtual students, respectively, how to control them.

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MIXED REALITY IN THE UKRAINIAN HIGHER EDUCATION INSTITUTIONS: CONFLICTOLOGICAL COMPETENCE OF TEACHERS AND STUDENTS

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Key words: higher education, mixed reality, educational technologies, pedagogical conflict management

Abstract: Actual ideas about the problem of mixed reality in Ukrainian higher educational institutions where conflicts appear have been analyzed in the article. The conflicts are mostly caused by destructive communication, its lack and imperfection, misunderstandings between students and teachers in Virtual, Augmented, and Mixed Reality in Education. They need prevention, which involves the use of educational technologies in the discipline "Conflict Management in Higher Education". Particular emphasis has been put on the content, classification of the latest educational technologies and their impact on students during the study of this discipline. It has been ranged and found that the high quality of the acquisition of knowledge, skills, and impact on students is caused by interactive (32%) educational technologies that are combined with information and communication ones (24%), which are almost equally complemented by personality-oriented (15%) and the technology of educational projects (16%) and other modern technologies (13%). They were applied and combined with coaching (29%), mediation (25%), moderation (16%), facilitation (12%), mentoring (10%), foresight (6%), hosting (2%) (data are rounded to round numbers and given according to the criterion of the frequency of students' selection according to their estimation of productivity, prospects of application, resources of these technologies). Special attention is paid to the essence, principles, dynamics, advantages and disadvantages of these interactive innovative educational technologies. They are used to form the conflictological competence of students of the magistracy of specialty 073 "Management". The research was conducted at the Faculty of Psychology at Taras Shevchenko National University of Kyiv during 2016-2019. The sample of the study was 83 students aged from 20 to 34 years. Recommendations on the application of innovative educational technologies in teaching the discipline "Conflict Management in Higher Education" have been developed.

Introduction

Nowadays the society and the state need citizens who are capable of perceptions of universal values, preservation and enrichment of national capacities. The branch of higher education is one of the most important factors in achieving this goal because it prepares generations to reproduce cultural values. Teaching students the principles of freedom and, at the same time, responsibility for their choice, makes it possible to educate a free person who not only owns the art of making decisions, but also assumes responsibility for them, may be a truly conscious citizen, a competitive specialist, a mobile professional who needs a European labour market.

In modern Ukraine, processes of higher education development are actively taking place, which are connected with implementation of achievements and avoidance of disadvantages in Virtual, Augmented, and Mixed Reality. The latter is understood by us as the unification, combination, modeling of different environments, their harmonious combination into a single unit for the successful development of a student and an educator.

Mixed Reality is a perspective potential of future education, its flexible adaptation and assimilation in accordance with the rapid evolution of the world information society whose inquiries and challenges are realized in such a reality. One of its problems has become conflict, which is due to insufficient poor-quality

simplified communication. It is characterized by psychological, linguistic (or philological), socio-cultural and organizational barriers in the interaction of participants in the educational process in higher education.

In particular, Virtual and Augmented Reality do not give possibilities for the manifestations of emotional intelligence of the individual, which is interpreted in the unity of its structural components (cognitive, affective and behavioral). Emotional intelligence is based on the management of the emotional sphere, its reflection and understanding (Goleman 2018).

A high level of emotional intelligence provides a successful activity of the personality:

- the ability to adequately express emotions;
- understand the emotions and motives of other people's behavior;
- to act effectively in the system of interpersonal relations;
- be able to orient in social situations;
- correctly identify personality traits and emotional states of other people;
- choose the appropriate ways to communicate with them;
- realize all this in the process of interaction (Lyusyn 2004).

The notion of the progress of a modern student as a competitive subject of future professional activity is connected with the ability to interact with the professional society, to manage emotional sphere and, accordingly, relations with the participants of common activity. A high level of emotional intelligence is extremely important in stressful situations, in which conflict becomes a necessary component of making responsible decisions (Koshechko 2018 39-40).

The low level of emotional intelligence in Virtual and Augmented Reality provokes a high level of conflict behavior. Because emotions and feelings serve as indicators that need to be used to prevent pedagogical conflicts, saving time, mental health and other personal resources and improving the quality of education in higher education. For this, it is desirable to combine virtuality (50%) and reality (50%) in equal proportions, which will ensure the success of educational activity.

So, misunderstandings between students and teachers in Virtual, Augmented, and Mixed Reality in Education cause pedagogical conflicts that require prevention. This is a multifaceted long-term process of continuous forecasting and prevention, prevention of destructive emotions, actions, behavior in the educational and cognitive activity of the personality in educational institutions.

Prevention of pedagogical conflicts is a system of well thought out, well-considered, cautious preventive actions that relieve emotional stress (Koshechko 2018 37). The main purpose of this process is to create such conditions for the activity and interaction of students, teachers, administrations, which would minimize the probability of the emergence or destructive development of contradictions between them. To prevent pedagogical conflicts it is possible to use different resources. Among them the most effective is the use of educational technologies.

Now reforming and modernizing higher education, strengthening and increasing its significance in shaping a successful responsible young generation are topical tasks on the path to innovative, European development of Ukrainian society. Reforming education requires an integrated approach to solving many issues (Beseda, Rohlikova, Batko 2017). One of these is the creation of conditions for the transformation of the educational environment, which aims to meet the growing needs of the society to the quality of higher education of youth, which is possible due to the use of *educational technologies*. They represent the algorithms of action with procedural orientation, the priority of personal relationships, an individual approach, non-rigid democratic governance and a bright humanistic orientation of content.

In particular, the pedagogical activity of a modern teacher include developing, disseminating and applying *the latest educational technologies*, which involves updating the content, methods, teaching techniques and reconstructing the personal settings of the teacher (Maiier, Ustymenko 2018). The purpose of their use is to increase the productivity of the educational process of higher education. The degree of technology effectiveness depends on the expenses they need to be implemented, the length of using *modern educational technologies*, and their benefits. These technologies serve to improve and enhance the quality of the educational process in its institutions through organizational forms of management.

Modernization of higher education in Ukraine is carried out in accordance with the principles of democratization, autonomy, high level of scientific support and the *implementing innovations*, which have become an extremely necessary requirement of the modern world, a guarantee of future success. It is known that innovations allow us to respond more flexibly to the demands of time and market, so we can talk about the process of replacing the old things with new ones, which naturally cause social contradictions, conflicts that require constructive management. After all, the functional conflict should be under control, which will ensure the optimal use of its resources (Vashchenko, Klyap 2013, 177-180).

The innovative processes in education mean the processes of appearing, development and penetration of innovations into the wide pedagogical practice, because *the innovation* is not only the creation and implementing of innovations, but also such changes that are decisive, accompanied by changes in the thinking and activity of the personality.

Thus, the *educational innovative technology* is a multi-faceted algorithm for the co-work of the educator and students in planning, organizing and conducting a real learning process with the help of the most modern ways and means of educational activity. The implementation of such technology is possible due to the condition of comfort, positive psychological climate, partnership relations for all subjects of educational activity in higher education. The choice of the educational innovative technology is always a choice of strategy, priorities, system of interaction, teaching tactics and behavior style, the functioning of a teacher with students (Koshechko 2018, 32).

The actual problem of improving the quality of vocational education and *innovative technologies* for its improvement leads to active searches and researches by modern scholars. In higher education there are processes of updating its content, methods and technologies, which become crucial in the teaching students, studying humanitarian disciplines (Prepotenska, Angelova 2018) which also include the academic discipline "Conflict Management in Higher Education" that is based on the nature, causes, dynamics of pedagogical conflicts and knowledge, skills on how to anticipate, prevent and overcome in the educational process of higher education.

In this discipline, special attention is paid to students gaining positive experience and following theoretical and methodological recommendations for successful prevention and effective constructive resolution of *pedagogical conflicts* that appear in the interaction of participants of the educational process (students, educators, administration) due to the existence of certain contradictions, contradictions in value orientations, views, mutual expectations, intolerance in communication, destructive acts, as well as inadequate conflictological culture in formation of which special emphasis is placed on educational innovative technologies.

Related Works and Problem Statement. The analysis of scientific literature on the problem of conflicts allows to state that such scientists as Antsupov (2000), Vashchenko (2013), Zhavoronkova (2011), Klyap (2013), Piren (2003), Shipilov (2000) and others mainly focused on some aspects of the dynamics of conflicts in higher education. Dziuba (2009), Karamushka (2009), Kurochkina (2013), Turkot (2011), Shakhmatova (2013) and others paid attention to the prevention of conflict situations in the activities of institutions of higher education.

Nowadays, the problems of development and implementation of innovative educational technologies are studied by Dichkivskaya, Duka, Krivoruchko, Podlasy, Slastenin, Shapkin and others, the actual ideas of whom were considered and summed up by Koshechko in her article "Innovative Technologies for Teaching Students in Pedagogical Conflict" (2018, 32).

In the context of teaching, some of the most recent studies on the application of educational technologies in higher education are highlighted in the works of Angelova (2018), Beseda, Rohlikova, Bat'ko (2017), Maiier (2018), O. Ustymenko (2018), Postoiuk (2018), Prepotenska (2018) and others.

The objective of the article is to analyze and characterize the mixed reality of higher education in Ukraine in the context of the conflictual competence of educators and students with an emphasis on the use of educational technologies in the discipline "Conflict Management in Higher Education". To achieve the objective, the following goals have been achieved:

- content, classification of the latest educational technologies and their influence on students have been revealed;

- the essence, principles, specifics, dynamics, resources of coaching, mediation, moderation, facilitation, mentoring, foresight, and ghosting as innovative educational technologies have been highlighted;

- recommendations for gradual mastering the discipline "Conflict Management in Higher Education" have been formulated.

Methods

To achieve the objective, the following research methods have been used:

1) theoretical methods: • studying, theoretical analysis of psychological and pedagogical, scientific and methodological literature to clarify the essence and specifics of the main concepts of research; • comparison, systematization and modeling of information to determine the content, peculiarities, characteristics, dynamics of influence on students of educational modern technologies, their resource capabilities in shaping the conflictual competence of students of master's degree in the field of study "Conflict management in high education"; • generalization of research statements;

2) empirical methods: • testing (test "Personality predisposition to conflict behavior by K. Thomas"); • a written survey ("Methodology for the diagnosis of communicative social competence" and a questionnaire "Pedagogical conflict by the eyes of students: prevention and management", "The latest educational technologies in higher education", "Modern technologies of management of higher education institutions "); • quantitative and qualitative data processing methods.

Results

The research was conducted at the Faculty of Psychology at Taras Shevchenko National University of Kyiv. The sample of the study during 3 years, was 83 students aged 20 to 34 years, who studied on the specialty 073 "Management", the educational program "Administration of the institution of higher education", full-time and part-time study (groups of 7 to 15 people) The research was carried out during 2016-2019, each year 5 identical stages of research have been done.

I. *The first stage is called preparatory*. During it, there was an analysis of a large volume of literature on issues related to the use of educational technologies, the comparison of technologies of management of institutions of higher education, the identification of effective methods, conflict management techniques in higher education. Also at this stage there was a selection of methods for studying the above mentioned problem.

II. *The second stage, creative* was characterized by the analysis of scientific and methodological literature, which was connected with the questionnaire survey of students-future managers, its specificity, that reflects the level of professional competence, the use in practice of educational innovative technologies and effective technologies for conflict management in higher education. On this basis, questionnaires were developed using the google forms program: "Pedagogical conflict through student's

eyes: prevention and management", "The latest educational technologies in Higher Education", "Modern Technologies for the Management of Higher Education Institutions" (Duka, Koshechko 2018). Its specificity was taking into account the personal and professional qualities of future managers with the use of modern management technologies at the institution of higher education.

III. *At the third diagnostic stage*, at the beginning of the study the discipline *"Conflict Management in Higher Education",* the test "Personality predisposition to the conflict behavior by K. Thomas" was conducted, a written questionnaire "Methodology of diagnosis of communicative social competence" and questionnaires "Pedagogical conflict by the eyes of students: prevention and management", "The latest educational technologies in higher education", "Modern technologies of management of institutions of higher education". During this stage the high level of occupancy of future managers has been defined. Therefore, e-mail proposals for testing and questionnaires with the use of google forms were sent to the respondents. To some of the respondents, a personal paper version of the questionnaires was used in which the future manager could anonymously respond.

IV. *At the fourth analytical stage*, the processing of test results, written survey, questionnaires, analysis and synthesis, processing of results were carried out. There was a question about visual, graphic illustration and reflection of these achievements presented in the article below. At the same time, during the 1 st semester of the master's degree, from 01.09 to 10.12 of each academic year (2016-2019), students were provided with comprehensive system work in the format of educational training with the aim of mastering the program of the academic discipline "Conflict Management in a Higher Education".

V. *The fifth final stage* was characterized by repeated testing, questionnaires, processing and analysis of their results. As well as consideration and generalization of the recommendations proposed by the students on the implementation of educational innovative technologies in the practice of conflict management in higher education. On this basis, recommendations for the acquisition of innovative educational technologies from the academic discipline "Conflict Management in Higher Education" were formed. The summarizing of the possibilities of further research on the implementation of innovative technologies for the management of higher education institutions in Ukraine has been done.

Discussions

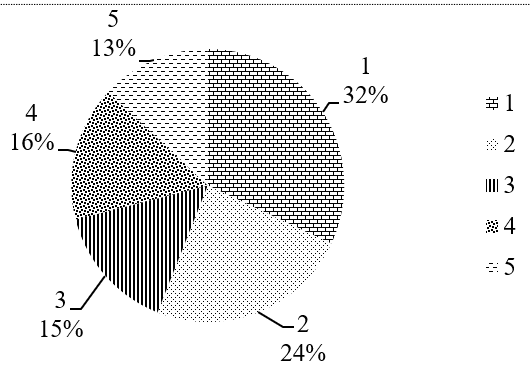
TABLE 1. EDUCATIONAL TECHNOLOGIES ON THE DISCIPLINE "CONFLICT MANAGEMENT IN HIGHER EDUCATION "

I. Traditional:	**II. The latest:**	
	modern:	**innovative:**
• explanatory and illustrative • reproductive • gaming • developing • problematic • differential •motivation, stimulation	• interactive •informational- communicative • learning projects • personality-oriented • remote •integrated developmental	• mentoring • facilitation • moderation • mediation • coaching • foresight • ghosting

Source: own

The research focuses on the content, classification of the latest educational technologies and their impact on students during the study of this discipline. It has been found that the high quality of the acquisition of knowledge, skills, and impact on students is caused by interactive (1 - 32%) educational technologies, which are combined with information and communication ones (2 - 24%), which are almost equally complemented by personality- focused (3 - 15%) and the technology of educational projects (4 - 16%) and other modern technologies (5 - 13%). These data are rounded up to the whole and presented in accordance with the criterion of the frequency of student selection according to their performance evaluation, application perspectives , resources of these technologies in Chart 1.

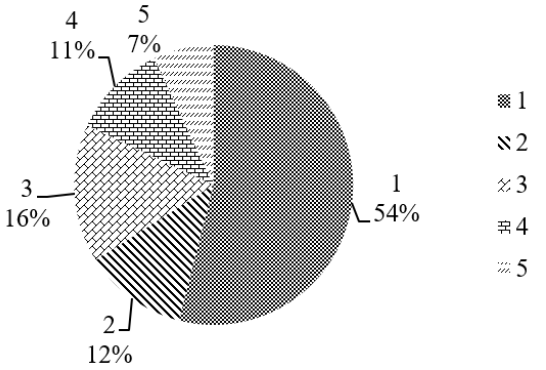
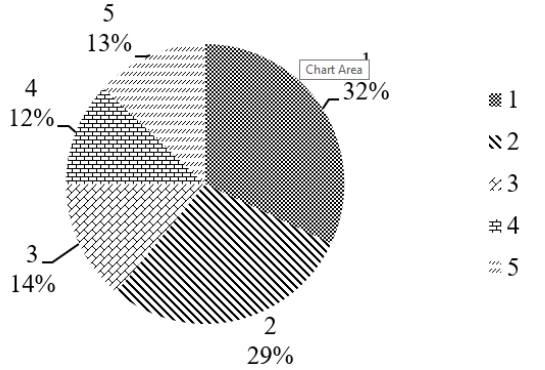
CHART 1. THE MOST OPTIMAL PERCENTAGE OF MODERN EDUCATIONAL TECHNOLOGIES IN LEARNING THE " CONFLICT MANAGEMENT IN HIGHER EDUCATION" ACCORDING TO STUDENTS'CHOICE



Source: Own

In interactive technologies, methods and techniques of cooperative, collective-group training, situational modeling and discussion of different issues become dominant. The multimedia, electronic resources, video and photography, social networks, use of projectors, etc. are more effective in the educational process among information and communication technologies.

Student questionnaires ("Pedagogical conflict by the eyes of students: prevention and management", "The latest educational technologies in higher education", "Modern technologies of management of higher education institutions") at the beginning of the study of the discipline "Conflict management in higher education" showed student's low conflict competence, which correlated with the testing "Personality predisposition to conflict behavior by K. Thomas" and "Methodology for the diagnosis of communicative social competence" and previous studies of the authors of the article (Koshechko, Postoiuk 2018), see Charts 2-3.

Chart 2. Correlation of Styles of Conlict Behavior of Students at the Beginnning of the Discipline" Conflict Management in Higher Education" (3rd Diagnostic Stage)	Chart 3. Correlation of Styles of Conlict Behavior of Students after Training Mastering of the Discipline" Conflict Management in Higher EducatioN" (5th Final Diagnostic Stage).
	
Source: Own	Source: Own

It is evident from the tables that the competing style (1) has decreased from 54% to 32%. The compromising style (2) has increased from 12% to 29%. The style of avoiding (3) is almost unchanged as well as accommodating one (4). Colaborating style (5) has increased from 7% to 13%.

Also, due to the survey, it has been found out that the majority of respondents (66%) did not have information about innovative educational technologies (coaching, mediation, moderation, facilitation, mentoring, foresight, ghosting). Some (29%) knew about some of them. Only 5% of the respondents were aware. Therefore, to correct this situation and increase the level of conflict competence of students, special attention was paid to the essence, principles, dynamics, advantages and disadvantages of innovative educational technologies. An important aspect of students' professional training is not only the acquisition of the relevant knowledge, but also the development of specific skills, which are possible in the context of training activities, which is essential for learning the discipline "Conflict Management in Higher Education".

To our opinion it is important to consider innovative educational technologies in the context of managing pedagogical conflicts. *Coaching* is interpreted as a technology that increases the effectiveness of learning and development of another individual, his or her "training." It is an art of relationships that helps individuals achieve exceptional results in their lives, careers, or in public affairs. At the heart of the coach-approach in education is the teacher's ability to formulate important powerful questions that will help determine the needs and aspirations of students, stimulate thinking, and make them discover their potential. With the help of coaching, students expand the field of knowledge, increase the efficiency and quality of their lives. Coaching is the interaction between the teacher and the students, when the teacher effectively organizes the process of finding the best answers to student’s questions, helps them develop, consolidate new skills and achieve high results in learning the discipline "Conflict Management in the High Education" (Koshechko 2018, 33).

Equally important in the management of pedagogical conflicts is the *mediation* technology, which has long been used in the educational activities of higher education. This is a popular conflict resolution technology with a third, independent, and uninterested part. Mediation is a process of communication between people, in which the third person is neutral, free from negative emotions, helps to find effective ways of overcoming the problem and resolving the conflict, contributing to the development of a voluntary agreement between the conflicting parties. So, one of the most effective technologies in mastering the discipline "Conflict Management in Higher Education" is mediation.

Moderation is a special kind of group work, training technology, which helps to optimize the ideas, thoughts, views and visions of participants; search and acceptance of a common decision in conditions of conflict interaction, limited information and lack of time. The moderation tool is visualization.

Facilitation is a professional organization of the process of group work, which maximizes the potential of all members of the group. This is the space in which the collective intelligence is activated, breakthrough solutions are discovered, conflicts are resolved. The moderator creates conditions, follows the movement of the discussion, needs, the request of the group, which determines the purpose itself, and the facilitator leads to the goal.

Mentoring is a complex interactive process between a teacher and a student who has a lower level of knowledge and experience. The result of this collaboration is the student's educational, career and personal growth.

Foresight is a technology that helps to shape the "desired future" of a person or organization in a competitive environment by managing the benefits, resources of interdisciplinary cooperation, and its potential.

Ghosting is technology of "disappearing" from social contacts, ignoring them in order to avoid conflicts, negative emotions, overloading unnecessary, "superfluous" information and preserving their own resources: time, personal integrity, and appropriate self-esteem.

Summarizing all the above mentioned, we come to the conclusion that each innovative technology has a characteristic motivational-stimulating "cliché-installation" (Koshechko, 2018, p. 35).

Coaching: "I WANT – I CAN! – I BELIEVE! – I DO! – I HAVE THE RESULT!"

Mediation: "WE GET THE RESULT TOGETHER!"

Moderation: "I WILL HELP – I WILL CREATE NECESSARY CONDITIONS AND YOUWILL FIND THE METHOD "

Facilitation: "I WILL HELP YOU – I KNOW THE GOAL!"

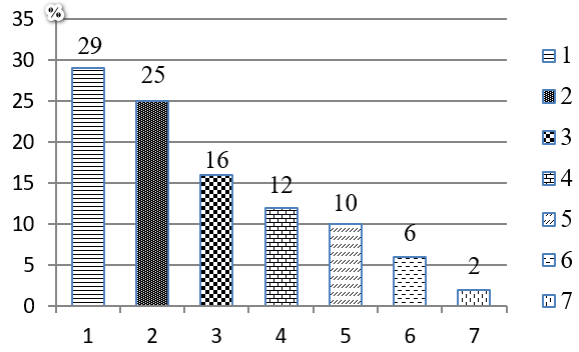
Mentoring: "DO AS I DO!", "IF YOU DO NOT KNOW WE WIIL TEACH YOU!" "MY EXPERIENCE SAYS ..."

Foresight: "I GET THE RESULT STEP BY STEP!"

Ghosting: "I DISAPPEAR AND CARE OF MYSELF!"

So, at the end of the semester, after mastering the discipline "Conflict Management in Higher Education" in the format of educational training, the situation with the acquisition of innovative educational technologies has improved significantly, because students not only knew (97%) about these technologies, but demonstrated appropriate skills (68%) to overcome pedagogical conflicts. These high quantitative indicators were confirmed by qualitative ones, which were manifested in the ability of students to adequately assess the performance, perspectives, resources, significance of coaching (1 - 29%), mediation (2 - 25%), moderation (3 - 16%), facilitation (4 - 12%), mentoring (5-10%), foresight (6 - 6%), ghosting (7 - 2%) (data were rounded up to the whole and given according to the student choice criteria). The results of the survey are presented in Chart 4.

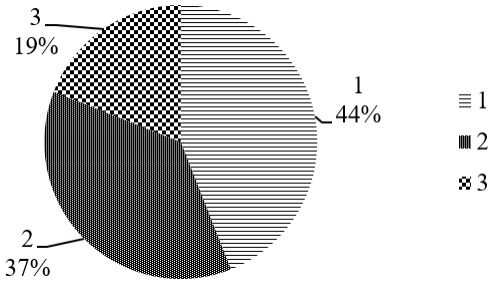
CHART 4. SIGNIFICANCE OF INNOVATIVE EDUCATIONAL TECHNOLOGIES IN LEARNING " THE DISCIPLINE" CONFLICT MANAGEMENT IN HIGHER EDUCATION"



Source: Own

It is worth noting that all respondents, without exception, wish to participate in various trainings for mastering other modern educational technologies and technologies of management of institutions of higher education. That is, the future managers take care of their self-education and self-development, because, according to students, their professional success depends on personal qualities (1-44%), modern technologies (2 - 37%), experience (3 - 19%). In the end we got the results which are shown in Chart 5.

CHART 5. FACTORS OF PROFESSIONAL SUCCESS OF THE FUTURE MANAGER



Source: Own

The recommendations for the step-by-step learning of innovative educational technologies from the academic discipline "Conflict Management in Higher Education" have been formed:

- mastering theoretical and methodological knowledge;
- formation of skills and competences of communication;
- correction of behavioral complexes necessary for use in practical situations;
- development of competence in the ability of self-knowledge and awareness of the options of the actions of others;
- development of skills in the system of interpersonal relations;
- development of reflection and congruence, empathy and tolerance;
- formation of skills, necessary for effective activities connected with the prevention and successful resolution of pedagogical conflicts in higher education;
- achievement of constructive relations constructed on the basis of collaboration.
- To successfully build higher education institutions, it is necessity to rely on the following components:
- individual student abilities;
- the ability of teachers to effectively implement modern educational technologies;
- didactic orientation towards the development of a positively motivated attitude of students towards new things;
- tests of assessment of the results of the activity;
- use of educational training resources;
- development of creativity of students and teachers;
- analysis and generalization of pedagogical conflicts management.

Conclusions

Summarizing the above mentioned, we conclude that the problem we considered is relevant and requires further deep study. Innovations do not appear spontaneously, they are the result of systematic scientific researches, analysis, studying and generalization of advanced foreign and domestic pedagogical experience. The training of specialists in higher education proves that the significant skill acquired by a student during studying is the skill, from a professional point of view, to perceive any visual, verbal information, to realize, make decisions, assess possible consequences, conflicts, and determine the optimal ways of implementing a solution.

Misunderstandings, disputes and differences between the interests of students and educators in Virtual, Augmented, and Mixed Reality in Education cause pedagogical conflicts that require time-saving prevention, mental health, and other personal resources and improve the quality of education. For this purpose, it is desirable to combine in an equal ratio virtuality and reality, which will ensure the success of educational activity. Prevention of pedagogical conflicts is possible due to the use of various resources. Among them the most effective is the use of educational technology in the form of training.

In the modern higher education of Ukraine, it is desirable to favor innovative technologies: coaching, mediation, moderation, facilitation, mentoring, foresight, which are specifically determinative and provide a high level of getting knowledge, acquisition of high-quality skills by students and have a promising potential for Mixed Reality in Education, particularly, via realization of the objective and goals of the discipline "Conflict Management in Higher Education".

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APPLICATION OF AUGMENTED REALITY FOR THE TRAINING OF GEOLOGIST STUDENTS

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Key words: Augmented Reality, Multilanguage application, Geology, Learning technologies

Abstract: The article deals with the problem of teaching foreign geology students whose native language is different from the language of learning. The basis of creating a software product capable of creating visual objects in augmented reality based on existing geological samples are considered, as well as translating their main characteristics into the native language of the student being taught. The technological preconditions for creating an application are reviewed, a review of augmented reality platforms has been carried out, an analysis of mobile devices capable of performing such an application has been carried out, and methodological foundations for creating a geological application have been outlined. In this context, in this article, we first illustrate the current needs for teaching and studying geology for students whose native language is different from the language of learning, and then we discuss the development of an multilanguage AR application for teaching geology.

Introduction

Augmented reality is an environment that in real time complements the physical world, as we see it, with digital data by using any devices - tablets, smartphones or others, and the software part. Augmented reality (augmented reality, AR) should be distinguished from virtual (virtual reality, VR) and mixed reality (MR). In augmented reality, virtual objects are projected on the real environment. Virtual reality is a world created by technical means, transmitted to a person through (for the present) the sense organs. Mixed or hybrid reality combines both apt ways. That is, virtual reality creates its own world, where a person can immerse, and augmented reality adds virtual elements to the real world. It turns out that VR interacts only with users, and AR interacts with the outside whole world (Silva, Oliveira, Giraldi 2003).

The problem of adaptation of foreign students to the learning environment in Ukrainian university represents itself as one of the actual problems which must be solved by the authorities and educators of the university. There is a problem of the adaptation of foreign students to the learning process in the Ukrainian university; it is accompanied by the development of stress and negative feelings against the background of a large study load, which, as a rule, does not meet the expectations of foreign students.

Learning vocabulary causes the greatest difficulties, the main ones being the following:

a. large amount of vocabulary language;

b. complexity of each lexical unit;

c. differences in the meaning of the words of the Ukrainian (Russian) and the students' native language (Verbitskaya 2013).

Among students at the National Technical University "Dnipro Polytechnic", quality control surveys were conducted in which there was a question about the native language. Processing of the polls showed that for students studying in English at the National Technical University "Dnipro Polytechnic" (Table 1), their native language is not English. Teaching such students often had problems concerning with insufficient vocabulary, as well as with the quality of understanding of new topics and concepts. As a result, students with English language learning showed the results of final tests 10-15 % worse than students studying in their native language (Ukrainian). At the same time, interaction with the help of materials printed in the students' native language (for example, French or Arabic), facilitated the understanding of the material.

TABLE 1. LANGUAGES PROFICIENCY LEVEL AND MARKS PROFICIENCY LEVEL OF GEOLOGY

	Native language	English	Russian	Ukrainian
Language skills	9	6,7	4,5	4,4
ILR level	5	3	2	2
level of understanding geology	n/a	5,7	3,1	3,1
level of understanding geology with handouts in English	n/a	6,2	4,3	4,3
level of understanding geology with handouts in native language	n/a	7,1	5	5,1

Source: Own.

Students attempted to translate handouts with the help of online and offline translators, however they did not always give relevant results, due to the specific terminology of geology and the mining materials under consideration.

As a result of this survey, a hypothesis about the possibility of using a specialized application for mobile devices (smartphones, tablets) capable of transmitting information about objects considered in the course with the help of augmented reality in the students' native language was put forward.

Analysis of the literature (Sirakaya and Alsancak Sirakaya 2018) showed the presence of a large number of variants for applications of augmented reality in different areas of knowledge in some works such as

(Erbas and Demirer 2019; Sirakaya and Cakmak 2018; Saidin. Abd Halim and Yahaya 2015; Cabero and Barroso 2016).

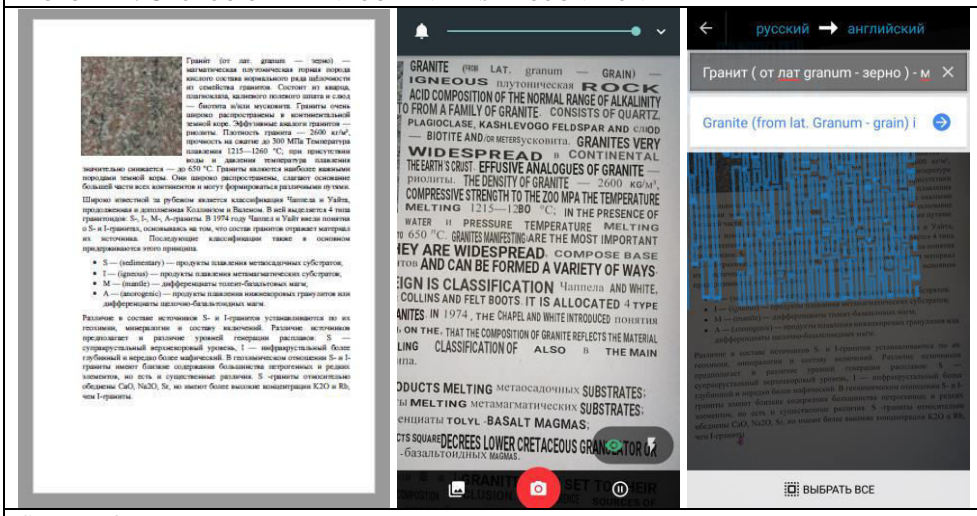
This issue consideration has led to the idea of assessing man-machine interaction and comparing the speed and quality of translation. Research in the direction of man-machine interaction was conducted by such scientists as (Rice and Lartigue 2016; Song et al. 2013), who described the qualitative and quantitative characteristics and software metrics.

Geological application

The handout used in the lectures and practical courses in geology in the 2017/18 academic year had the following parameters: a standard sheet A4 or A5 in size, which contained a black and white photo of a mineral or fossil, which flowed around the text in English or French. Arabic-language handouts were formed in the test mode; however, they were formed by students and contained a number of errors, therefore their use was limited.

Students' attempts to translate the handout text into their native language with the help of discriminating interpreters gave unstable and more often negative results due to the instability of recognizing translators to hand shake, as well as loss of quality when translating specialized geological terms.

PICTURE 1. GEOLOGICAL HANDOUT AND ITS RECOGNITION



Source: Own

For solving the problem of creating a software product, it is necessary to establish the basic requirements for it. For the application being developed, these requirements are the following:

a. Ability to be installed on wearable devices such as smartphones or tablets;

b. Interaction with the camera of wearable device;

c. Recognition of a geological object in space;

d. Application of augmented reality to the object to display its main characteristics

e. Ability to quickly change the language of the output of augmented reality;

f. Ability to test students.

The second stage of development is the modelling of the application interface in order to determine the best location of controlling elements. The method of interfaces prototyping was identified as the most appropriate, and prototypes for interface elements were created with its help.

Due to the large amount of textual information accompanying the graphic elements, as well as possible accentuation of individual elements of the geological sample, it was decided to strictly horizontal orientation of the application, which allows you to display the sample in question, display explanatory comments, and change the comment language with one click as well.

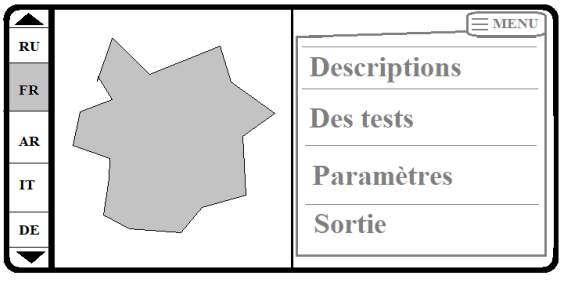
PICTURE 2. MAIN VIEW OF APPLICATION GEOAPPAR

Source: Own

An important element of the main view of application should be the menu, with the help of which it is supposed to change the modes of operation of the application (mode “augmented reality” – mode “Testing”), as well as carry out settings of the application elements.

It is supposed to make customizable font size, colour captions and size of the image coming from the camera.

PICTURE 3. APPLICATION SETTINGS



Source: Own

In the test mode, two basic types of test questions are offered for students: the choice of an appropriate sample, suitable for the description, displayed in the application, and the choice of the correct description, suitable for the displayed geological sample, as well.

PICTURE 4. TEST VIEW OF APPLICATION GEOAPPAR

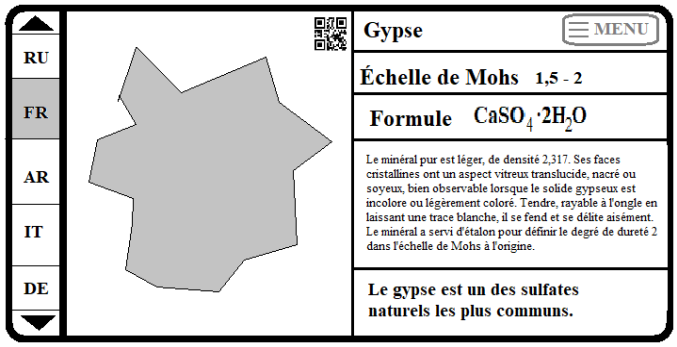
Source: Own

The second concept proposed for development mostly repeats the basic concept, but it has a key difference in the type of information recognition. The first concept in the application of augmented reality focuses on the image of a real object, available in the university collection and offered to students for identification and familiarization. The second concept of the application is focused on augmented reality indirectly and is able to generate virtual reality itself.

The key element of the second concept is the use of QR codes for generating augmented reality. Thus, the problem of the first concept is removed, which is associated with aging and contamination of the samples, which affects the quality of sample recognition and, as a result, the generation of augmented reality around it. In addition, using of QR codes in the future will allow doing without real geological samples, generating a completely virtual space based on the code only.

In the case of using QR codes, the geological sample can even be replaced with a similar one, but with a different shape, which is highly critical for the first concept. At the same time, for the second concept, the compliance of QR codes with samples is critical in order to avoid generating incorrect information, and the constant maintenance of QR codes in readable state to ensure the operation of the application, as well.

PICTURE 5. MAIN AIEW OF 2ND APPLICATION CONCEPT



Source: Own

While considering the variants of the image recognition algorithm, it was proposed to use the OpenCV library or the Point Cloud Library, however, the analysis has showed that the Point Cloud Library is more

specialized for recognizing three-dimensional entities, and OpenCV specializes more in recognizing of two-dimensional images. Thus, if both libraries are suitable for the first concept, then, for the functioning of the second concept, the OpenCV library is more relevant, which makes it the optimal choice for creating both concepts.

To assess the qualitative and quantitative indicators of the system being developed, it is desirable to carry out an analysis-comparison between the system being developed and the variants of software that have been tested in training.

From the used programs, the most popular options were Google Translator for text translation and Moodle for testing.

To obtain quantitative characteristics, we will use the FLM technique described in the work (Song K., Kim J. and Cho Y.-H., Lee A. and others), where the numerical characteristics of the processes of human interaction with the interface of mobile applications were given.

For comparison, we will create a table describing the necessary interactions with the software environment to achieve the goal.

TABLE 2. COMPARISON OF THE INTERACTIONS PROGRAMS OF AUGMENTED REALITY

Operation number	Google Translate/ Quick translation mode	Actions according to FLM method	Google Translate / Translation mode through server	Actions according to FLM method	GeoAppAR application	Actions according to FLM method
1	Start of application	M+T	Start of application	M+T	Start of application	M+T
2	Launch time	R=5	Launch time	R=5	Launch time	R=5
3	Language selection	M+T+M+P+T+ M+P+T	Language selection	M+T+M+P+T +M+P+T	Autofocus	M+P
4	Camera selection	M+T	Camera selection	M+T		
5	Autofocus	M+P	Autofocus	M+P		
6			Take a photo	M+T		
7			Waiting	R=5		

Source: Own

Calculations according to the formulas used for the FLM man-machine interaction calculation methodology give the following values:

Google Translate/ Quick translation mode: M+T+R+M+T+M+P+T+M+P+T+M+T+M+P = 15,94s

Google Translate / Translation mode through server: M+T+R+M+T+M+P+T+M+P+T+M+T+M+P+ M+T+R = 22,6s

GeoAppAR application: M+T+R+M+P = 8,44s

For the second function of the developed program, functions of testing students' knowledge, we will analyse the system being developed in comparison with the system, currently used at the Dnipro Polytechnic University, the Moodle system, which has an integrated testing function.

TABLE 3. COMPARISON OF INTERACTIONS TESTING PROGRAMS				
Operation number	Moodle	Actions according to FLM method	GeoAppAR Application	Actions according to FLM method
1	Browser launch	M+T+R	Start of application	M+T+R
2	Entering on the site through the link	M+T+R	Pressing MENU	M+T
3	Transition to tests	M+P+T	Pressing TESTS	M+T
4	Pressing the "Take Test" button	M+T		
Source: Own				

Calculations according to the formulas for FLM calculations give the following values:

Moodle: M + T + R + M + T + R + M + P + T + M + T = 17.07s

GeoAppAR application: M + T + R + M + T + M + T = 9.98s

Experiments in a test group of students showed the following results.

TABLE 4. COMPARISON OF TIME PROGRAM INTERACTIONS					
	Google Translate/ Quick translation mode	Google Translate / Translation mode through server	GeoAppAR application AR MODE	Moodle	GeoAppAR application Testing mode
FLM data	15,94	22,6	8,44	17,07	9,98
Experimentally obtained value	16,5	23	9,0	17,5	10,5
Source: Own					

The analysis of students' progress

To select the experimental and control groups in the group of the students of the specialty "Geology", for whom the language of instruction is not native, preliminary testing was carried out in the discipline of "Geology" after studying it in the first semester of the full year of study. According to the results of testing of 30 people, two groups of 10 people were formed by pairwise selection, so that students with approximately equal scores fell into different groups. Students with the best ability to use gadgets as a second criteria fell into the experimental group. During the second semester, students of the experimental group used the developed AR-program on the classes.

After studying "Geology" in the second semester of the full year of study a final test was conducted. Test results were processed using t-test. According to the statistical results of preliminary testing, the average score of the experimental group was 69.5 points, and the average score of the control team was 69 points. Thus, we will compare the obtained t-test value (t = 0.123386, p=0.451) with the critical value for p = 0.05, which is equal to 1.734. Since the calculated value of the criterion is less than critical, we conclude that the observed differences are statistically insignificant. These calculations showed that the students of the experimental and control groups had the same level of knowledge in geology before the experiment.

Next, compare the results after training the experimental and control groups. For the analysis, test results were used before training and after training in both groups.

In the table the results of data processing after excluding the effect of covariance (test scores before the experiment) on the test results after the experiment are presented. Since the calculated value of the criterion F=170.86 is bigger than critical, we conclude that the observed differences are statistically significant ($p<0.5$)

The average score of students in the experimental group was 77.03, and the standard deviation was 8.04, the average score in the control group was 69.7, and the standard deviation was 9.73. These calculations showed that the students of the experimental and control groups had the different level of knowledge in geology after the experiment.

TABLE 5. THE ANCOVA TEST RESULTS FOR LEARNING ACHIEVEMENT FROM POST-TEST OF THE TWO GROUPS

Group	M	S.D.	Adjusted Mean	S.E.	N
Control group	69,7	9,73	69,945	0,3845	10
Experimental group	77,3	8,04	77,055	0,3845	10

Source: Own

Conclusion

This research showed that AR actions have some influence on the performance of students studying in a non-native language, using the native language of the student in the DR application. It's obvious that mastering the material in the discipline under consideration has increased when comparing student groups, which can serve as an indicator of the success of application of augmented reality applications.

In addition, the study applied a technique for evaluating man-machine interaction with mobile applications that interact with touch screens. The evaluation of this methodology, obtained as a result of experimental studies, showed a high efficiency in the use of the FLM interaction model for assessing the performance of the Person-mobile device system. The discrepancies between the model data and the experimental data can be explained by the poor preparation of some students in the handling with smartphone software.

Taking into consideration the results obtained in this study, the following recommendations are proposed to guide researchers and application developers in future AR studies:

a. During research, a conclusion was drawn confirming the statement (Sirakaya and Cakmak 2018) that using of the PD improves students' achievements. Note that similar conclusion in our case is characteristic of using the DR application for students whose native language is different from the language of instruction.

b. The primary means of communication with the PD in the carried out experiments was the students' smartphone; however, the use of tablets allows the output of more information about the object of consideration, so application of the tablets for the purposes of learning DR can be recommended.

c. Application of the FLM format is a valid approach at the level of software prototype development and can be recommended as a baseline for calculating time of the man-machine interaction.

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Video in education

THE USE OF EDUCATIVE VIDEOS TO DEVELOP CRITICAL COMPETENCES

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Key words: ICT, videos, critical competence, students

Abstract: An increasingly technologically driven society and the expanding number of communication tools have lead to the development of new forms of teaching. Nowadays it is practically impossible to teach using traditional methods/approaches.
The emerging world of media requires educators to implement new teaching-learning methodologies that enable students to acquire skills for life in society. These skills help them to prepare for a working world in which they will have to face the challenge of utilizing intercommunication skills and understanding.
Therefore, by applying a literary review, this research focuses on analyzing the educational potential of videos and their application in the educational systems of the 21st century. When implementing video activities into classes, students become co-designers of their own knowledge base. To transmit acquired knowledge, students need to develop critical thinking skills as these skills enable students to act autonomously and responsibly.
The main objectives of this paper are: learning and constructive learning that is carried out in an orderly manner, supervised by people who specialize in different subjects.
This study aims to analyze research that has been conducted in the field and prove that there is a need to evolve the traditional approach to teaching. Finally, the study presents the current situation and the future direction for future development.

Introduction: Which is the real situation nowadays

Development of media competency is necessary in a digital context, where people spend more than 6 hours connected to screens. We live in a multiscreen society (Pérez 2008) that often requires a continuous use of technology and digital devices. It is normal and relatively simple to exemplify because if we think about a normal day, people use digital devices from the break of dawn until long after sundown. One such device may be used in the first hours of the day (the system we use to wake up) or then, when we leave our homes (probably by elevator). These cases confirm the enormous and continuous uses of technology.

In spite of this reality, nowadays, there is a lack of educational policies that can be used as an element to follow. Formal education has an objective: to teach students to obtain a certificate. It is very important to acquire the knowledge in the theoretical and practical way because OCDE (1996) proposes that education should focus on skills that are necessary to prepare for future jobs. In this context, there is a big problem that can be presented from two points of view. On one hand, media ecosystem has changed and on the other hand educational policies and educative methodologies have been the same for many years.

In this sense, this research proposes a different methodology detailing how to obtain a better education. ICT, digital media and screens are part of our reality and students use them from childhood. In general, societyis 'infoxicated' (Aguaded 2014) and people need to acquire critical competence (Caldeiro y Aguaded 2015) in order to survive in a digital society. Students in particular need the application of new methodologies in classes where digital devices are implemented, and they demand that teaching methods be reformed. These new teaching strategies are very and important and can increase results all around, regardless of the subject being taught. The advent of a technology dependent society and the increase in the

number of communication tools have given rise to the development of new forms of teaching. At the present time it is practically impossible to teach using traditional approaches. This concept is reinforced by studies which explore the relevance of new methodologies (Espejo y Sarmiento,2017).

This context justifies media literacy as a means to survive in a digital society. Since the end of the last century, this discipline has been proposed by the European Parliament and the European Commission as a way to integrate media in every aspect of life. Moreover, the same opinion is held by educational institution and reports of teachers including media literacy in their teaching have surged However, in general, educational policies do not include any particular recommendations as to how to implement it into different subjects in order to conform to curricula. Despite this fact, there are researchers who focus on good practices that are used in different contexts (Caldeiro-Pedreira, Aguaded and Pérez-Rodriguez 2019).

Nevertheless, some initiatives can be mentioned, studies which refer to media competence and digital competence as a ways to obtain critical competence. For example, the Comunicar Group in Huelva (Spain) works on Media Lit and Media Competence. In this sense, a lot of research can be used to argue the relevance of media competence and its usefulness in academic settings. In this sense it is necessary to explain audiovisual competence as an ability that spans six dimensions (Table1).

TABLE 1. DIMENSIONS OF MEDIA COMPETENCE	
Dimension 1	Technology
Dimension 2	Language
Dimension 3	Interaction
Dimension 4	Production
Dimension 5	Axiology
Dimension 6	Esthetic

Source: Adapted from Ferrés (2007)

Despite this, it is necessary to establish active methodologies, such as new approaches to synchronizing ICT, educational objectives, and new forms of teaching. Different processes of obtaining results allow curricula objectives to be met. In this sense, a flipped classroom is a good example because it seeks to improve the relationships between students. This and also uses educational videos and systems considered appropriate in order to obtain adequate results in subjects in different fields.

Relevance of educational videos

The flipped classroom is a teaching model based on the principle that teachers prepare educational videos or online video lectures for students prior to class, and the class time itself is dedicated to active learning activities (Bergmann and Sams 2012). Educational videos have been around for some time, and a great amount of research proves that the use of videos can be a good tool for enhancing learning (Brame,2015). What makes educational videos such an effective tool for learning? Kay (2012) points to five positive perceptions of students on educational videos: learning improvement (learning anywhere, anytime, at any

pace), positive attitude towards videos (videos are effective, helpful, motivating), shifts in learning style, regular class attendance, and improvement on tests and with related skills.

When utilizing videos in classes, it is important to consider video design (Guo & Kim & Rubin 2014) conducted research focusing on analyzing the attitude of 127, 839 university students toward watching educational EDx videos in math and science classes. The results of his study show, for example, that students are more engaged when the videos are shorter than 6 minutes, are recorded in Khan-style (talking head), or are filmed in informal setting. Shoufan (2019) adds that students tend to like educational videos when they understand the explanation potion, when the video implements some aspects like animation, when the quality of recording is good,, and also when the sound quality and voice of the speaker are pleasing.

Furthermore, it is indisputable that the use of videos can become a more effective tool when the media includes some interactive features that help students understand the content and track their own understanding (Brame 2015) i.e. when students take an active part in the learning process. According to Baker (2016) when students do not interact, they probably fail to learn.

Brame (2015) mentions that guiding questions, which students answer while observing a video, enables them to be active learners. Lawson (2007) adds that students who were asked to answer questions while watching videos achieved higher scores than students who watched videos without answering any questions. Lawson also adds that "giving students guided questions to answer while watching an educational video may improve their achievement by helping them select, encode, and record the important information in a video".

Technology helps to enhance not only the production of videos, but also to make the videos more interactive and engaging for students. Baker (216) states that some of the interactive elements of video learning are: quiz questions, links to Websites, audio overlay, posting comments, and assessment results.

There are different applications such as EdPuzzle or Playposit that allow teachers to insert questions into videos and make videos more interactive. EDpuzzle is a tool which enables teachers to "upload a video from a computer or find a public video from a hosting Website." Users of the application can modify the length of the video, add subtitles, voice over or insert questions. After students have seen a video, teachers can track whether the students have seen the entire video and also assess replies to the guiding questions.

The above recommended features of educational videos can help teachers to prepare interactive video lessons for their students which they can watch prior to class. The lesson time can be therefore open to discussions and activities which can help students to develop their critical thinking skills. In addition, according to Mu&Paparas (2016, p.45) educational videos "..... can free up the class time that lecturers are able to devote for learner-centered activities such as problem solving and active learning".

Methods

This research presents a analytically descriptive methodology. It research analyses the real situation

through a bibliographic review and argues, through a descriptive methodology, the relevance of new strategies and good practices to teach in twenty one century. At the same time, it proposes the use of educational videos to develop media competence in citizenship in general and particularly into students.

Results

This kind of methodology, based on cooperative work and with a new educational philosophy, increases students` participation in class and virtual environment (Garcia-Aretio 2018). For example, to design an educational video it's necessary to develop technological dimensions insofar as students must use technology to record their product. They must also create a text using proper language, then they must develop the language dimension. In summary, they must be a prosumer (García-Ruiz, Ramírez, Rodríguez-Rosell 2014), that is to say, people who create, are active with, and responsible for images and content. Besides this, they must create an educational video using axiological values and they must respect esthetic dimensions.

If students develop all of these dimensions, they will achieve critical competence and they will become a citizen of the media (Gozalvez 2013). In order to obtain this objective, students must practice new methodologies in their classes. That is, new forms of learning which underline their relevance. To obtain these objectives, the lifelong training of teachers in multiple literacies is also necessary (Bergomas 2019).

To teach using new methodologies, as it is, for example, in different schools in Spain (Table 2) it is necessary to train teachers well. They must be integrated (Eco 1993) with the use of ICT and they also develop media competence because they must teacas the example.

TABLE 2. DIMENSIONS OF MEDIA COMPETENCE	
1. Congrès-Indians	A project based on the principles of active and active education
2. LA QUINTA'L TEXU	College of active non-directive pedagogy
3. Ikastola Arizmendi	Confident pedagogy
4. Colegio Público Princesa de Asturias	It follows a philosophy is based on the fact that the school is a place to learn to learn
5.CEIP Ponte dos Brozos (https://bit.ly/2Eshhxh)	In this example technology is put at the service of pedagogy

Source: adapted by 25 innovative schools (https://bit.ly/2EBiLoK)

The last example in Table 2- CEIP Ponte dos Brozos (https://bit.ly/2Eshhxh)- has been selected by Unesco as one of the seven best examples in the world using ICT in education. This confirms that the use of ICT and new pedagogies not only reinforces knowledge, but contributes to the development of responsible, critical and autonomous citizenship.

Definitely, this research demands the use of new educational methodologies that require hard work from teachers and, at the same time, a change in the teacher's role. In order to obtain this goal, the design of educational videos could be a good approach.

Conclusion

In this sense, media literacy is a good discipline to improve in order to develop skills in digital society. In general, citizens must achieve a higher level of literacy. To achieve this objective, training is necessary "to reflect on the education that the young generations need" (Daza 2010). In this way, education and communication require people to work together because in a digital society, people need to develop different types of knowledge. In such cases, media education (Pérez 2003) could be an alternative approach to contributing to the achievement of twenty-first century skills.These days wisdom that prepares students for both virtual and classroom contexts is desirable. Because of this, educational videos are proposed as a part of an adequate methodology to reinforce millenial and non-millennial knowledge.

In other orders of things, the possibility of using ICT to innovate must be taken into consideration. In this sense, there are many experiences (Table 2) that can act as important models for other schools. In reference to schools that are working with new pedagogies, methodologies that aim for collaborative work and provide opportunities to work based on the necessities of digital context. Besides this, good educational practices (Caldeiro-Pedreira, Aguaded and Pérez-Rodríguez 2019) are an example of that which must be riposted in academic life on all educational levels.

In conclusion, lifelong learning (Longworth 2005) is proposed as an approach that must be implemented into every person's life. Nowadays, the continual development of the media requires continuous and systematic training for teachers.

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A NEW PERSPECTIVE ON LEARNING: FLIPPED CLASSROOM AND TRANSMEDIA LEARNING

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Key words: flipped classroom, transmedia learning, video content, self-learning skills.

Abstract: This paper draws upon a novel approach of using Transmedia and Flipped Classroom strategy to improve the self-learning skills of the students at Informatics, especially skills in programming, in the "Spiru Haret" Lyceum, Chisinau, the Republic of Moldova. Transmedia learning is an important element in the educational environment, its development and integration should be a priority in order to address modern students' demands.

The paper presents the impact of the Flipped Classroom strategy on the teaching and learning processes and focuses on the Transmedia learning, involving students in creating educational content and completing the learning process with instructional videos created by themselves. This strategy, in which students learn at their own pace, promotes personalized education opportunities, being easy to apply in any classroom, costing not so much as it involves little financial support for implementation, and helping self-directed learning.

Introduction

Nowadays, when the teaching-learning process is inconceivable without the broad integration and use of educational resources in various digital formats, it is necessary to update and modernize the contents and the didactic approaches. In addition, for a long time, it has been told to the teachers to supply a customized education for every student and most of them believe that personalization may be a positive goal to achieve for each student. Therefore, the Flipped Classroom strategy and Transmedia learning offer a new powerful way to learn and promote personalized education opportunities, being easy to apply in any classroom. As a result, with the traditional teaching-learning process in Informatics (computer science), especially in the programming module, the class advances slowly and, in this context, it has been implemented Flipped Classroom strategy using Transmedia learning in "Spiru Haret" Lyceum, Chisinau, the Republic of Moldova. This pedagogical approach aims to improve the teaching-learning process changing students' abilities to become self-directed learners and, consequently, to develop students' information and communication technology skills contributing to their digital literacy.

Theoretical Framework

The flipped classroom has nowadays become a very popular implemented strategy. It has begun in Woodland Park high school in Woodland Park, Colorado, in 2007, and it has been popularized by Jonathan Bergmann and Aaron Sams (Bergmann, Sams 2012). They stumbled on the idea when they had to re-teach lessons for students who did not attend the classes. They also noticed that students who were stuck on certain homework concepts were not able to complete subsequent homework problems until they received help the next day at school.

A Flipped Classroom is a pedagogical approach that reverses the traditional learning environment by delivering instructional content outside the classroom (online: Wikipedia), helping us to spend less class time lecturing and more time doing hands-on activities and skills practice such as problem-solving, discussions, and debates. Empirical research conducted by Bergmann & Sams (2012), Tucker

(2012), Herreid & Schiller (2013), Bergmann, Overmyer, & Wilie (2012), Baker (2012), Strayer (2012) has described the advantages and disadvantages of the flipped classroom method in comparison to the traditional classroom.

Therefore, in the flipped classroom the students have as homework to study from an educational video-content, a PowerPoint presentation, an article, a book, etc., or a combination of these among others. Most of these teaching aids are based on new technology. Therefore, in other words, the flipped classroom method does not work without transmedia learning.

Transmedia is an emerging form of creating content using different media and it is used successfully for transmedia storytelling experience (Jenkins 2011). Fleming Laura (2013) defines transmedia learning as "*the application of storytelling techniques combined with the use of multiple platforms to create an immersive learning landscape which enables multi-various entry and exit points for learning and teaching*". Transmedia learning is an important element in the educational environment, its development and integration should be a priority in order to address modern students' demands. These strategies contribute to a better understanding of how students consume, produce, share, create, and learn in the digital environment and give the possibility to each student to learn at their own pace and helping self-directed learning.

Methodological approach

The strategy was aimed at improving the self-learning skills of the students at Informatics, especially skills in programming, in the "Spiru Haret" Lyceum, Chisinau, the Republic of Moldova. In the traditional teaching-learning process, the teacher has to lecture during the class and there is barely enough time for students to consolidate understanding. Therefore, being limited by class hours, we have implemented and combined the flipped classroom method with *Transmedia learning* in which the students were involved in the design of transmedia learning activities, guided by their teacher in creating instructional content and completing the teaching-learning process with videos created by themselves. In Burlacu's opinion (2018), a video tutorial is a digital remedy, a product of information and communication technology applications that allows students to accumulate knowledge from various curricular areas, from elementary to performance grades.

This study followed a pre-test and post-test quasi-experimental design to analyze the effectiveness of flipped and traditional classroom requirements in enhancing the students' performance of the 11^{th} lyceum form, namely the humanities profile, in Informatics (computer science). About 490 students have participated in this experiment, but only one class completed the course with the exam at Informatics by the end of May and this paper will draw only the impact of flipped classroom on the 11^{th} form, 65 students (33 students in a flipped classroom versus 32 students in a traditional classroom).

Firstly, a pre-experiment questionnaire was distributed online with the purpose of investigating the students' opinions about the traditional teaching-learning methods, the participation in class activities

of Informatics, the practical knowledge they had gained from Informatics course, their opinions concerning the use of video contents in the teaching-learning process, their involvement in creating video contents, and their opinion about studying the new topics before classes. Comparing their survey results, we divided the students into two groups: for the experiment group, the flipped classroom method has been implemented, while for the control group – traditional teaching method. The survey results showed that many students were open to adhere to the flipped classroom strategy and get involved in creating instructional video content, thus being ready for new changes to improve the teaching-learning process. Hence, in flipped teaching knowledge-transference mainly relied on videos, the students, being grouped in pairs, had to choose a new topic to study prior to others in order to create educational video content for their colleagues. It was important that the instructional videos be short and interactive.

In order to produce qualitative video content in accordance with the national curricula, every pair worked with their teacher. The steps that have been followed while creating instructional video contents were as follows:

1. To determine the topic and the objectives pursued;
2. To collect the necessary materials;
3. To design, record, and edit the tutorial video content;
4. To render and share the tutorial video content with other students, their schoolmates (colleagues), before classes.

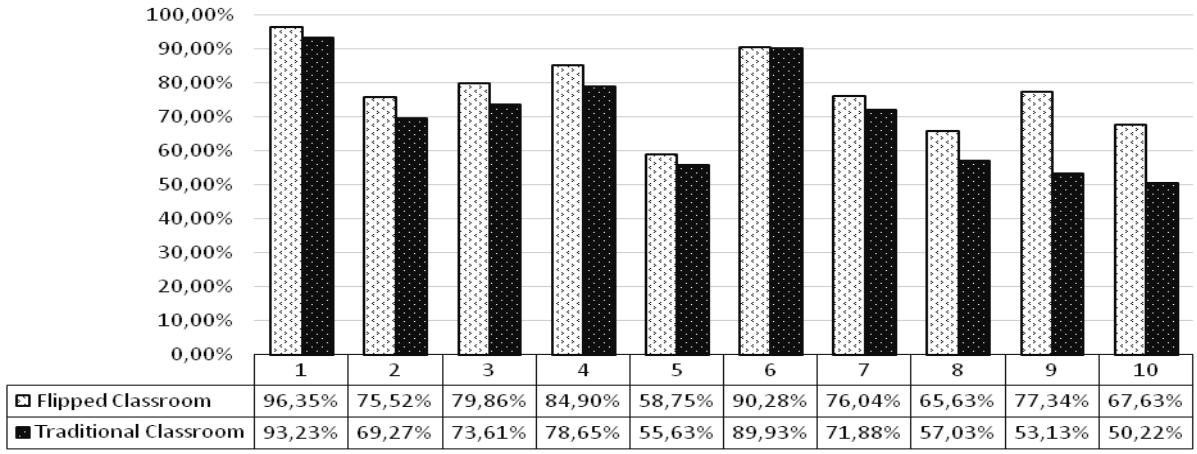
Creating educational content by themselves proved a challenging task that generated a great amount of interest, aroused students' enthusiasm, enjoyment, and motivated them to watch, analyze and study the instructional content, improving in this way their learning process. Therefore, the students had the opportunity to arrange their time for spare-time study and thinking, control the video times of replay, consolidate and review the teaching objectives. When somebody had questions related to the video content, they could ask the whole class and the teacher to find a common solution before classes, especially for aspects that required the understanding the new topic and the application of the knowledge in some situations. For this reason, a closed group on the Messenger platform was created. During the class, they had the possibility to discuss face to face with their teacher the questions that required application, integration, demonstration, and analysis of the studied content outside-class.

Most of the classes have begun with a short automated quiz to verify if the students have successfully succeeded in the understanding of the given content. The results of the quiz guided the teacher from where, to begin with, the lecturing giving a range of activities centered on students to consolidate understanding. Therefore, the teacher tutored the students when they became stuck explaining to them the misunderstandings that were occurring during the process, meanwhile the gifted students were provided with advanced content.

The experiment was applied during the current year of studies (2018-2019), and at the end of the term, the students passed an exam in Informatics, programming module in Pascal ABC. The contents of the test were created for the curriculum items such as procedures and functions. Both classes were taught the same contents and were given the same test for the exam. The black columns show the distribution of the score of the control group and the white columns show the distribution of the score of the experiment/flipped group obtained in the Informatics exam out of a total of 66 possible points in 10 tasks (See Chart 1).

Collecting the data and comparing the test results of both classes, we can conclude that there are no significant differences in the results between flipped and traditional classroom for the items of understanding and application of the knowledge in some situations, but, in case of the items that need the analysis and synthesis, the results of the exam show a higher score for the flipped classroom (See Chart 1. Task 8, 9, 10). This type of items demands more rigorous practice that is why the students from the flipped classroom have achieved a better result. The results also show that students in the flipped classroom have preferred the method and have displayed a higher level of innovation and cooperation, being able to solve problems in creative and unique ways and to discuss ideas with others, than students in a traditional classroom. Although there is not a significant difference in the exam results between these two classes, we can say that in the flipped classroom the students were more engaged and motivated; they experienced quality instruction, felt the improvement in their studies. Still, they did not differ significantly in their performance.

CHART 1. DYNAMICS OF THE RESULTS AT THE INFORMATICS' EXAM IN FLIPPED AND TRADITIONAL CLASSROOM



	1	2	3	4	5	6	7	8	9	10
Flipped Classroom	96,35%	75,52%	79,86%	84,90%	58,75%	90,28%	76,04%	65,63%	77,34%	67,63%
Traditional Classroom	93,23%	69,27%	73,61%	78,65%	55,63%	89,93%	71,88%	57,03%	53,13%	50,22%

Source: Own

In order to implement successfully the flipped classroom, the teacher's professional competence must be strengthened to avoid students' confusion during discussions; it requires multi-level teaching for the competent students who can extend their learning scope and promote their own abilities. In addition, it is very important to have an educational professional team, professional video producing

software, which can facilitate the production of excellent videos, a material cloud platform inside the school and, the involvement of the school in providing the teacher team with technical equipment. This strategy was easy to apply in the classroom and did not need so much funding for its implementation.

Conclusion

The Flipped Classroom and Transmedia learning offer a new powerful way to learn more effectively and provide several options for the differentiated learning among students having different levels of intelligence. The results of using them gained so far have stimulated teachers from our Lyceum to change their teaching strategy and methodology due to the possibility to create flipped classroom and digital content involving students' communities. The implementation of the new strategy at "Spiru Haret" Lyceum in the teaching-learning process was rather challenging at the beginning, but with the full cooperation of all involved educational actors, the strategy yielded efficient results. The outcomes presented in this paper are only from two classes and are insufficient for drawing clear conclusions about the impact of the flipped classroom methods, so the research is still being carried out. We are also interested to exchange experiences with other colleagues with similar needs to enrich this experimental research with international collaborations.

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Media and information literacy

CROSS-AGE PEER TUTORS AS IMPORTANT ACTORS OF UNIVERSITY ONLINE COURSES –INFORMATION LITERACY COURSE CASE STUDY

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Key words: distance education, online course, tutoring, higher education

Abstract: If we want to think about developing online education at universities, we are at the same time faced with the question of who should facilitate it. Caring for students in massive online courses and ideally formative feedback is time-consuming, and currently, it is not in possibilities of scholars. However, other participants in the educational process can make a unique contribution to this role – cross-age peers.

The question is how to prepare students for the role of peer tutors? What makes their position specific? How do they perceive their tutor's experience? What makes their assessment distinct? How do students evaluate peer tutors?

In the case study of the Information literacy and academic writing online course at Masaryk University, we answer these questions by interviewing peer tutors, analysing the results of the course students in the form of a final seminar paper and course evaluation.

Peer tutors typically perceive their position as challenging and responsible, tend to have problems with student-teacher-expert identities, as an essential aspect of tutoring they mention their learning. They evaluate the final work of a student differently depending on whether they assess the student they have to cooperate during the semester. Students award peer tutors (4.5 points out of 5), appreciate them and perceive them as tutors or mentors (22 cases) rather than classmates (2 cases).

This case study is part of broader research of online education facilitation and competencies of educators. The aim was to point out the role of peers, question our view of a teacher as expert, and contribute for better understanding cross-age peer tutors in university online education.

Introduction

This case study deals with the involvement of older students in distance learning at the university. As tutors, they help students through the course, evaluate them and give feedback during the semester. Thus, they are teaching assistants, offer some service to other students, but also teach themselves. The question is how to prepare students for this role and how students perceive the role of tutor. More specifically, we set out the following questions: How to prepare students for the role of peer-tutors? What makes their position specific? How do they perceive their tutoring experience? What makes their assessment specific? How do students evaluate peer tutors?

Together with other authors (de Metz 2015; Rotta 2009), we suposse that there are currently not enough authoritative sources and studies to prepare online tutors and online peer-tutors (de Smet 2008). Thus, this study is the beginning of a broader exploration of the competence and preparation of tutors, in the context of transforming the educational environment through the influence of digital technology in a hyperhistoric society (Floridi 2014). Tutors need to be educators equipped with digital competencies (Redecker 2017) and competencies for working with information in the educational context (Rotta 2009; Black 2019). We also suposse peer tutoring and other forms of peer and collaborative learning plays important role in digital university, as reflected, for example, in the European Framework for Digitally Competent Educational Organizations (2015). Peer-tutoring helps to run staff-intensive online courses. At the same time, they learn and prepare themselves for their profession. In this early study, we will first focus on the perception of the role of online peer-tutor and experience in one university online course. We will also discuss the importance of tutors preparation.

Related work

One of the highly referenced work (using Google Scholar: 404 citations Berge 1995a, 892 citations Berge 1995b, 1166 citations Berge and Mauri 1995) is the Zane Berge The Role of the Online Instructor/Facilitator (1995) created in context of online conferencing. Berge created categories: pedagogical, social, managerial, technical. For each area, Berge wrote set of recommendations - what to do, what to avoid, etc.

Another competence model was created by Denis, Watland, Pirotte, Verday (2004) which connects roles and competencies inspired by TPCK – Technological, pedagogical, content knowledge model (Koehler, Mishra 2014).

TABLE 1 ROLES AND COMPETENCIES

Competencies Roles	Pedagogical	Communicational	Discipline expertise	Technological
Content facilitator		X		
Metacognition facilitator	X	X		
Process facilitator	X	X		X
Advisor/counsellor	X	X		X
Assessor (formative/summative)	X		X	
Technologist				X
Resource provider			X	X
Manager/administrator				X
Designer			X	X
Co-learner	X	X		
Researcher	X			

Source: Denis, Watland, Pirotte, Verday (2004).

Criticism of these schemes is offered by Rotta (2010). He points to the need to reflect new roles in addition to e-tutoring such as e-counselling, e-tutoring, e-brokering, e-networking. Rotta shifts the reflection of the e-tutor, emphasizes the need for information literacy and digital competences and highlights the interdisciplinary role that he relates to the information worker or librarian.

De Metz (2015) focus on the analysis of competences in open distance learning at universities in the study An importance-competence analysis of roles and competencies of e-tutors. For example, they asked How do e-tutors perceive their roles? What specific competencies do they need to fulfil them? To what extent do they perceive their competencies needed to successfully fulfil the role of e-tutor? The judges evaluated the perception of the importance of the given competence and its level in its fulfilment. The authors also investigated factors of influencing the effectiveness of e-tutoring, the barriers and any other comments of tutors.

Heuel and Feldmann (2014) present the CET - Certified European E-Tutor project, which was also attended by the Czech Republic (National Institute for Education) with the aim of creating a qualification framework. The project focused on lifelong learning of teachers as e-tutors. Among the competencies is

the design and implementation of an "electronically" supported learning process, and the creation of lessons.

Rapp, Gülbahar, Adnan (2016) propose a training program consisting of 14 modules, e.g. Online Learning Theories; Learning and Content Management Systems; Managing Virtual Classrooms; Online Instructional Design.

Peer tutoring can be defined as a teaching in which "… people from a similar social group who are not professional teachers help to learn, and thus learn themselves" (Topping 1996). It is possible to divide according to various factors. We can distinguish it by age and level of same-age peer tutoring, that is, tutoring students of the same age and level, and cross-age peer tutoring, that is, tutoring younger students with lower levels of knowledge and skills (De Smet 2008). In our case we are interested in even more specification - online peer tutoring. As de Smet, et. al. (2009) Much attention has been paid to peer tutoring in the context of face-to-face education, but there is not much research in the context of online courses. The research group de Smet, et al. has contributed numerous researches.

The study of authors de Smet, Van Keer, Valcke, Blending asynchronous discussion groups and peer tutoring in higher education: An exploratory study of online peer tutoring behaviour (2008) explain the behaviour of peer tutors asynchronous newsgroups. The behaviour of the tutors differs by subject, but there was no development of behaviour over time. The authors identified three subtypes for tutors - motivators, informers and knowledge creators (motivators, informers, knowledge constructors).

Study of de Smet et. al (2009) Studying thought processes of online peer tutors through stimulated-recall interviews the authors aims to identify specific themes raised by student tutors for creating a better peer-tutor traning. For example, the topics of the students were: students create and apply specific strategies to communicate with tutees, use their own online disscussion experiences, appriciation of faculty support. The study also revealed some peer-tutor concerns. The main dilemma was the problem of deciding when, how and how often to intervene, but also the feeling that they are not sufficient experts.

Study Structuring asynchronous discussion groups: Comparing scripting by assigning roles with regulation by cross-age peer tutors De Wever et. al. (2010) compares the influence of two ways of supporting students in the course to the level of knowledge creation: by assigning roles to their own course students (apparently as "helper") and peer tutoring. The level was evaluated by content analysis of students' posts in discussion groups. According to the authors, the level in the peer tutor groups was significantly higher.

Methods

The aim of this case study is to describe and explain the experience of peer tutors with tutoring a university online course through explanatory single case study. Study include semi-structured interviews

with peer tutors, analysis of seminar paper assessment and student evaluation.

The case study focuses on the analysis of peer-tutoring in a fully distance online course in information literacy ("Course in Work with Information" 2018) taught at Masaryk University, Czech Republic. The course focuses on teaching information literacy skills in the context of university study and academic writing. In 2018, the course covered ten topics, e.g. Topic definition, Internet browsing, Reading and organization of information. The course is open for all the students of Masaryk University. The greatest proportion of enrollees was represented by first-year students. Up until now the course has been successfully completed by 130 students (37 male and 93 female). The course is a one-semester one. It is taught on a weekly basis, with one topic, a quiz and an assignment being scheduled for each week. At the end of each semester the students have to pass an online test, complete a self-assessment questionnaire and hand in a seminar paper. The environment of the course consists of the course website ("Course in Work with Information" 2018) and Google Classroom ("Google Classroom"), with the latter being used for course organisation and assignment description, submitting and evaluation.

The tutors are 7 master's students of Information science and librarianship (peer-tutors) and 5 librarians from university libraries.

Tutor's main competencies:

- Every of the ten weeks to give formative feedback on the assignments using guidance manual created by teacher,
- answer to student's questions in Google Classroom or e-mail,
- in the end of the semester to give a feedback to seminar work a) to own student group b) to group of students of one other peer-tutor.

Google Classroom is the main environment for tutors. They use the stream for communication with student group. For the feedback they use Google Docs comments or comments under homework in Classroom assessment site.

Every tutor participated in simple tutor training. The training is one face-to-face session before the beginning of the semester and from online materials. The tutors shared a Google Classroom to try out the course environment on their own and to communicate with each other throughout the semester. For each task, tutors had instructions for assessing tasks. A special table with criteria and scoring was available to evaluate the seminar paper.

Interviews with students

At the end of the semester, a semi-structured interview with each peer-tutor lasted a maximum of 30 minutes. The interview structure was as follows. Peer-tutors were asked to answer these three questions

freely:

- What impressions do you remember from tutoring during the semester?

- What are the benefits, whether positive or negative, of your tutor experience?

- How do you evaluate the time required for tutoring?

At the same time, students were offered a set of statements that they could use to structure the interview or to talk about. Students were asked to mention all that mattered to them. The claims were inspired by De Metz, Bezuidenhout (2015). In our case, the individual statements have been simplified into Table 1. The interviews have been analyzed using open coding.

TABLE 2 ROLES AND ROLE'S STATEMENTS

Role	Example of statement for each role
Content facilitator	I facilitate understanding of the content.
Metacognition facilitator	I support reflection.
Technologist	I improve the online environment.
Process facilitator	I provide a welcoming online environment.
Assessor	I provide feedback.
Advisor	I provide students with advice.
Resource provider	I recommend resources.
Manager/administrator	I manage.
Designer	I design.
Co-learner	I am learning.
Researcher	I am researching.

Source: Own

Analysis of seminar work evaluation

The tutors evaluated the seminary work in a special table. It contained 33 ranked items in 6 more general categories - Content; Logic and argumentation; Language and typography; Work with resources; Compliance with citation rules; Originality and professional focus. They could comment on individual items by negative or positive comments. At the end, we added all the positive and negative references to each criterion, peer tutors, and librarian tutors, the group's own students, and the other tutor's rated group. A total of 138 seminar papers were evaluated, of which 75 were peer tutors and 63 were librarians. For comparison of peer tutors and librarian tutors, references were recalculated to ten student papers.

Evaluation questionnaire

At the end of the semester, students were asked to fill out an online questionnaire. Number of answers is 24 including 11 answers from students of peer-tutors. In the questionnaire, there were several questions about tutors:

- With whom did you collaborate during the semester? (Choose name)
- How do you call his or her role? (Choose one)
    - Professor
    - Teacher

    - Mentor
    - Tutor
    - Coach
    - Peer
    - Advisor
    - Friend
- How fast was the feedback? (Scale 1-5)
- How was the quality of the feedback? (Scale 1-5)
- How was the motivation by tutor to improve? (Scale 1-5)
- Which factor was the most important for choosing this tutor at the beginning of the semester?
- How was your collaboration?

Results

Specifics of peer-tutor positioning and experience with tutoring: semi-structured interviews

Lack of competencies

Some peer-tutors have doubted their competencies for tutoring. “Am I competent to do it?” Doubt was in some cases reflected as a lack of experiences "I felt inexperienced." Peer-tutor was afraid of potentially conflict situation "I was afraid the student would complain" "What if I meet someone personally?" Although the course leaders have been actively speaking to students and communicating with peer tutors, peer tutors have been intensively reflecting on their position and identity, "I lack the confidence in the role of a teacher." Some have taken a different stance and did not put themselves in a superior role as a teacher. "We are at one level with students." "I try to perceive students as partners - people who, like me, want to learn something and improve themselves". This attitude then apparently led to a lower degree of stress and doubt.

Similar concerns of peer tutors are also described by de Smet, M. (2009) “What if I add something wrong? I am not sure that my answer is right as I find the assignments quite difficult. ” (De Smet, p. 655) and also speaks of a strong sense of responsibility. Of course, the mismatch between the perception of needed competencies and the current state of affairs may not only apply to students, as de Metz (2015) shows that the tutors felt insufficiently competent in 10 of the 16 competencies discussed. At the same time, however, they said they felt they lacked training and support.

A sense of responsibility for students

Also, as de Smet said, peer-tutors in our study often talked about a sense of responsibility. The tutors felt a general responsibility, and more specifically, in giving points that would affect the student's grade. "I felt responsible." "I feel that I am deciding on destiny by giving marks."

The need for objectivity and fairness evaluation

Because of the scoring that affects the final grade mark, fair and objective evaluation was an important criterion for peer-tutors. However, the level of objectivity they wanted to achieve was very high. "Is it at all possible to grant marks fairly?" "To be fair, I evaluated the seminar papers all day and night at a time."

If students are unsure of their own experience, they are not clear about what a fair assessment is for them, scoring may be stressful for some of them. "To someone might help not giving marks to students…" "I don't want to give points, but advise to students, I don't like points." According to Goold, Coldwell, & Craig (2010) they cling more on the formal criteria and are less flexible in the assessment.

Need for contact with tutors, sharing and assurance

Perhaps even more important for peer tutors is contact with other tutors or course managers who provide support, assurance, advice. The tutors in our study were in contact during the semester especially in the Google Classroom. "The others gave me assurances." "We can help each other as tutors when we have a problem." At the same time, it was not possible to see how other tutors evaluated, which the peer-tutor reflects in the interview. "I missed the opportunity to watch other tutors' evaluations." The seminar work was always evaluated by two tutors, which some students perceived positively "... helped me to get in touch with the second tutor." a reference or professional group that provides support in the new situation.

Reflection of own study style and high expectations of students

Peer tutors sought contact with each other, but also compared with students. They were comparing ideas about study engagement. Some were very surprised that someone was not as honest as themselves. "It took my ideals about students. I am honest student." "What pleases me is that I am losing the illusion of students. I came up with the feeling that people are responsible at universities and when they write something, then they will be diligent in fulfilling their duties…" So peer-tutoring can be a moment for students to reflect on their own identity and study style.

Peer-tutors then expressed negative impressions of working with some students. Students sometimes did not meet their expectations of mutual cooperation. "They will not take advice serisously." "I felt helpless in accepting the advice." Peer tutors often expected the same commitment as they put into feedback and the student's effort to achieve the best results. "I was disappointed with the failure of students to put energy into them."

One-way communication and the need for more feedback

There is also a lack of feedback connected with expectations. "I felt desperate." "Do they feedbacks?" "It was demotivating when students repeated mistakes." Lack of student participation, and the frustration of students' lack of feedback, are also described by tutors de Metz (2015). Tutors lacked insight into the student's situation. Tutors expected a higher degree of student collaboration in their progress. It is difficult for them to accept if the student does not attach sufficient importance to the job.

Focus on help and student's success

The benefit of tutoring was perceived by the peer tutors in the success and feedback of the students. "As a plus, I see students' feedback." "It's great to see the progress." There was also a strong focus on helping students. "I helped a few people" "Perhaps I am helping." It was also evident that they had a relationship with the students. "I'm sad that the students are leaving."

Own progress and learning

Students generally agreed that the tutor's experience enriched them. "I made a progress." Students reflected their own learning and were able to say what they learned – to be more responsible, to communicate, to structure information, to evaluate, and so on. "I learned to have responsibility." "I learn to structure and explain something." "I learn to evaluate and accept student reactions to my assessment." Peer tutors also learned from topics and students seminar work. "I have learned a lot in general through seminar work topics." They also mentioned what they failed to do. For example, a peer-tutor doubted his rating in the online environment. "I think that in a personal meeting, I would give students a better comment on the work." Some also had difficulties in organizing time and working mode. "I needed a better organization of my time."

Tutoring as a challenge

Tutoring was quite challenging for students in terms of organizing time and work in addition to studying. Some students said that counted with the demanding tutoring and took it as part of the tutor's experience. Difficulty was a challenge for them. "I felt a burden and I see it as a positive." "At the beginning I had negative emotions, it was uncomfortable and it came to me."

For most students tutoring was very time-consuming. Task evaluation took them more time than expected. They also mentioned the difficulty in addition to their own study duties, especially when correcting the final seminar papers during the examination period. "The exams were hard."

Ubiquity

There was also a need for tutors to manage the working mode and the distance from the course, which was reminded of them by e-mail notifications. "Tutoring is a challenge… to preserve a certain personal

space and overcome the urge to be constantly online" "I was always online, it kept me looking and answering students." Thus, peer tutors may have difficulty managing their environment, notifications, free time and personal space.

Peer-tutor evaluation by course students: evaluation questionnaire

In the anonymous evaluation questionnaire, a predominantly positive evaluation of tutors appeared. Students (11) have usually identified the role of peer-tutor as a tutor (10x), at least as a friend (1x). In comparison with librarian tutors, students (13) mostly referred to tutors (8x) as mentors (5x). Peer tutors were highly rated at 4.5 / 5 points, feedback quality (4.5 / 5 points), and the tutor's ability to motivate further development (4.4 / 5 points). Librarian librarians were rated similarly at 4.6 / 5 points, 4.8 / 5 points, and 4.8 / 5 points. They described the way of cooperation in positive words "Good, professional, responsible", "good, helpful", "very kind, beneficial cooperation, critical but very supportive". Thus, we can conclude on high satisfaction, acceptance of tutors, and small differences between student and librarians in terms of student satisfaction. however, the obvious limit of the questionnaire is a low number of responses.

Specifics of peer-tutoring: analysis of seminar work

The tutors evaluated the seminar work in 33 categories. They should write a positive or negative comment at the necessary points. Based on 10 papers, peer tutors gave their students 87 positive comments and 122 negative comments. 92 positive comments and 134 negative comments were given a similar number of comments to another tutor's students. They were approaching the two groups in a similar way, they were slightly stricter to the foreign group. The order of the commented criteria is very similar, mostly with a maximum of three places.

What is interesting is the comparison with the tutors of librarians who gave 25 positive comments and 47 negative ones to their students. They also gave only 11 positive comments and 47 negative comments to another tutor's students.

TABLE 3 TUTOR COMMENTS	PEER-TUTOR	LIBRARIAN
Negative comments to own group	86,7	46,5
Negative comments to another tutor group group	92,1	47,1
Positive comments to own group	121,9	24,6
Positive comments to another tutor group	134,0	11,6

Source: Own

So, we can see almost twice the number of negative peer-tutor comments. This means that the student has made a greater effort to highlight errors and the need for improvement. This does not mean the bad work of librarians, but rather the great honesty and criticism of the students, as was also evident from the

interviews. Hence, librarians seem to be able to choose more essential points and probably also save time. Furthermore, we can see the extreme difference in the positive comments granted. Students marked more positive aspects, so what was done well in seminar paper, rather than negative comments. Apparently, librarians find positive comments to be less important and more error-oriented than praise.

Discussion and conclusion

The preparation of tutors and peer-tutors should not be underestimated. Providing feedback and evaluating a student is not a mechanical process from which one can easily keep distance. For students, peer-tutoring is an important experience with a variety of emotions that they may not be able to deal with easily. The preparation of tutors and their guidance should reflect this. Peer-tutoring is not just helping the faculty and classmates. Peer tutors don't just perceive themselves as older classmates, they automatically take on the responsibility of a teacher. It is a certain professional experience and training. Peer tutors are similar to novice-teachers in the context of online education. According to Fantili (2009), beginning teachers often feel stress, uncertainty, have a great need for community support, according to Gavish, et. al (2009) need to feel they are admitted by students. Students need help in adopting a new role. They tend to personal attitude, a sense of responsibility, and they lack professional distance.

The results show that students wanting to be peer-tutors have some common characteristics. These are the focus on help, altruism, at the same time high expectations from themselves and from students, or tendency to perfectionism. Peer tutors need feedback and sharing from the tutor and other tutors. They also need to find ways and characteristics of student feedback in an online environment. This can be helped by the design of the course in which novice tutors appear.

Existing role and competence schemes are limited to preparing tutors, for example, by not reflecting some phenomena that were not very topical at the time of their creation. These include the pervasiveness of technology, the difficulty of separating work, personal, learning life, inseparability online and offline.

Peer-tutors are positively evaluated by course students. Although the feedback rate was smaller, it pointed to peer tutoring and satisfaction with speed, feedback quality, and collaboration.

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MEDIA COVERAGE OF SCHOOL BEHAVIOUR ISSUES: A CONTENT ANALYSIS OF DIGITAL MEDIA MESSAGES

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Key words: school related behaviour, media coverage, content analysis

Abstract: The School related media messages are forming the public opinion on the education and media reportage on the school related issues impact the effectiveness of policy implementation. This research was placed within the framework of the current educational reform in the Republic of Croatia, based on the educational policy changes (which) started almost two decades ago with the European integration process. The Literature review conducted for the purpose of this study revealed the research studies on the media coverage of the school behaviour issues that may be grouped in three categories: (a) the media coverage and its influence on the public opinion and educational policy, (b) the media coverage of the school violence and the later incidents as a consequence of such a behaviour; and (c) the content analysis of the media messages focusing on various educational issues. The aim of this study is to determine prevalence and analyse content of the school behaviour related to the media items on selected online portals in Croatia. For the purpose of this study, the online editions of four most popular newspapers were selected in accordance to the website ranking for the news category and media (SimilarWeb LTD 2014-2019). The reviewed newspapers articles which were selected based on the relevant thematic keywords for the time period from 2014 to 2019, were analysed using the content analysis method. The study findings were presented in relation to the dominant topics and message frequency. The presented research detects and deals with the dominant media frames on the school behaviour issues in Croatian news in the last five years. This study findings could be used to enhance the educational policy and practice.

Introduction

The school related media messages are forming a public opinion on education. This research was placed within the framework of the current educational reform in the Republic of Croatia which is the extension of the educational policy changes which started almost two decades ago with the European integration process (Žiljak 2007). The presented research deals with the dominant media frames about the school behaviour issues in Croatian news in the last five years. The insight into the type and frequency of the school related media messages could lead to raising the awareness of the possible impact of the school related media messages. The media coverage on the school related issues has a role in the policy enactment process (Baroutsis 2016). An important topic of the media coverage research is the issue of news impact on different educational issues, and the formation of educational policies. The specific goal of this study is to determine the prevalence and analyse a content of the school behaviour related media items on the selected online portals in Croatia.

Theoretical framework

The literature review conducted for the purpose of this study revealed the research studies on media coverage of school behaviour issues that may be grouped in three categories: (a) media coverage and its influence on the public opinion and the educational policy; (b) the media coverage of the school violence and the later incidents of violence; and (c) the content analysis of the media messages focusing on various educational issues.

Media coverage and its influence on public opinion and educational policy. Media messages are strong part of the social environment, pointing out at certain issues by its frequency and the time of their coverage. For example, the environmental issues and the concepts associated with the sustainable

development are dominant media theme in the last decade. A research study of 112 worldwide newspapers focus on the relation between the increased coverage and a general awareness of sustainability concepts. More so, the researchers argue that there are links between increased coverage to the major world policy events (Holt and Barkemeyer 2012). The research on the media influence has primary interest to determine the way in which media messages affect its users' behaviour and to what extent a behavioural paradigm has impact on the research studies, and there is a raise in the recognition of the importance of cognitive processes related to the influence of media messages (Gunter 1999).

An important topic of the media coverage research is the issue of news impact on different educational issues, and the formation of educational policies. The analysed research studies have diverse findings in relation to the impact of media messages on shaping educational policy (Osler and Starkey 2005; Stack 2007; Cohen 2010), and implementation of educational policy (Muschert and Carr 2006).

Although the public opinion on the education system is influenced by media, this aspect is partially considered in relation to the educational leadership and policy. For example, in the 2007 study, Stack argues that the media interprets the major world standardized test results in alignment with the business and political elites, as a failure of marginalized students, rather than a failure of society. According to Stack (2007), media is giving little attention in determining what happens in the educational system. Another study finding indicate the ways of shaping public policies based on the research and by media representations in France and England. According to the research findings and media representations in England, in the last 20 years, there was a shift from policy discourse on the social inclusion towards need to combat crime. In France, it is emphasized that schools structurally produce disaffection and violence. In both countries, disaffection is associated with minorities. Nevertheless, despite the research and media representation, both countries offer universal rather than targeted policy responses (Osler and Starkey 2005). A study of the discourse in the articles on education published in the major USA newspaper, is indicating a position of the teacher's identity in relation to knowledge and authority. The teacher's identity is described in terms of accountability and caring where in the context of societal conditions, accountability has a larger impact on shaping education policy (Cohen 2010). The research study by Muschert and Carr (2006) focused on the presentation of news in national and local media as a way to disseminated education policies across boundaries. The research findings suggest that media coverage has impact on the implementation of education policies beyond the given geographic boundaries.

Media coverage of the school violence and the later incidents of violence. Significant studies of the 60s and 70s of the last century have dealt with the violence impact in the media (Gunter 1999). Within this study theme, it is important to review the research studies that deal with the school violence and their later impact on the incidents of the peer violence. The school violence which includes student aggression against

peers, school staff, and property is a common theme in the media and the one which causes concern of the public. Specifically, we reviewed studies that were dealing with the questions of the extent to which media coverage of school violence affects the occurrence of school violence, especially when it comes to events such as armed attacks at school. In the last two decades, the topic of school violence coverage and its impact on the later incidences of violence was researched in several studies with focus on the school safety (Hyman and Perone 1998; Burns and Crawford 1999; Herda-Rapp 2003; Towers et al. 2015).

Burns and Crawford (1999) argue that social problems that are likely caused by the incidence should not be presumed without a case specific assessment. Analysis of the survey data, anecdotal evidence, and clinical studies suggest that victimization practices by teachers, administrators and other school staff in the name of disciple towards students, may contribute to school violence (Hyman and Perone 1998). Furthermore, Herda-Rapp (2003) examined ways in which school violence is constructed and reconstructed and how local decision-makers interpreted their own school violence threat in the context of the news media's constructions. It is determined that in the social construction of threat, risk is intentionally distributed across the population. As our understanding of the school violence and places with which it is associated become more elastic, threat is more broadly distributed.

A great number of studies provide overviews of the role of media in the construction of school shootings as a moral panic, and report how media reports of mass shooting can increase the likelihood of another event (Towers et al. 2015; Meindl and Ivy 2017). For example, a study which examined data on school shootings from 1998 to 2013, found significant evidence that school shooting incidence are triggered by similar events in the immediate past (Towers et al. 2015). In the scope of the research findings, Meindl and Ivy (2017) propose media reporting guidelines in order to minimize imitation and likelihood of a mass shooting.

Content analysis of the media messages focusing on various educational issues. News items may create large number of news messages on a specific story or a topic. Media framing is the process for shaping public perception in terms of a value, theme, stereotype or ideological principle and has impact on the awareness, understanding, knowledge, and policy (D'Angelo 2017). When analysing studies on the media messages focusing on various educational issues, there is a presence of media framing visible through intensive media presentation of certain topics (Vasterman 2005), promoting a specific social problem over others (Wondemaghen 2014), and different sources which are presenting same issue in a different way (Tarasawa 2009; Tollefson 2015).

Analyses of a theoretical framework of media-hype, focusing on the aspects of the specific dynamic of media-hype and the role it plays in the process of framing and social amplification were researched through the issues of media coverage of street violence in the Netherlands. The content analysis method was used to evaluate the consequences of intensive media presentation of a particular societal topic (Vasterman 2005).

In a research on ways in which socially and psychological related crime was presented as a gun related problem, the journalist did that in order to promote a specific social problem over others. This media framing had also goal in reinforcing political battle for tougher gun laws. In this case, media fail to address appropriately the real causes of the problem of a school shooting which occurred (Wondemaghen 2014).

Two reviewed studies (Tarasawa 2009; Tollefson 2015) focus on ways in which mass media shapes the policies that are adopted in multilingual contexts. In the Tarasawa (2009) study, content analysis of media messages is used to compare the portrayal of bilingual education in a mainstream publication and ethnic minority publication. The differences were noted and these differences in the coverage suggest ways in which the media may influence audience opinion by framing issues. Tollefson (2015) reports on a comparative analysis of the coverage on the major newspapers of two important controversies in multilingual education, mother tongue versus English in Hong Kong and the role of English and Spanish in Arizona. Authors identify the major components of the ideological framing of policy in these contexts, the implicit political agendas, and the implications for language policy research and practice.

Objectives

The research goal is to recognize the level of media coverage of the issues of positive or negative forms of behaviour in school, and make grounded conclusions on reasons for the changes in frequency and the type of the media messages in the five-year period. In the content analysis studies, such as this one, it is possible to make conclusions based on media message categories and message frequency in the context of changes of educational system. The study findings are presented in relation to the dominant themes and message conveyed and changes in data through the selected time period. Two research questions are:

1. What are the prevailing categories of recognized media messages?
2. What is the frequency of media messages on positive and/or negative events in schools?

Overview of Methodology

In order to obtain this study objectives, the researchers use a framework for content analysis as described by Krippendorff (2004). The framework consists of six steps: (1) selection of a body of text, (2) posing research questions that analysis seeks to answer by examining the body of text; (3) a context of the analyst choice in relation to body of text; (4) construct that shows what analyst knows about the context; (5) inferences to research question; and (6) justification of the content analysis.

In the first step of the content analysis, the online editions of four most popular newspapers in Croatia were elected in accordance to the website ranking for the category news and media (SimilarWeb LTD 2014-2019). Consequently, we analysed articles published in the electronic media, namely Slobodna Dalmacija, Večernji list, Jutarnji list and Dnevnik hr. The analysis included relevant articles published from 2014 until 2019. In the second and third step we posed research questions and selected the thematic keywords for the article search. The thematic keywords were selected prior to the research, based on the literature review in

the area of the school behaviour. The keywords used in the research were: school behaviour, behaviour in the classroom, inappropriate behaviour in school, school violence, students' success, good and appropriate behaviour in school. In the fourth step, the selection of articles for the analysis was made based on the keyword search, and the content analysis was carried out to identify the main themes. Initially, we found 302 articles and the content analysis focused on 228 media items. Articles that had high resemblance but were published in different electronic media were analysed once. In the fifth and sixth step of the content analysis we make direct inferences at research questions and further justify the findings.

Findings and Discussion

A review and analysis of the selected articles shows that the analysed media sources do write about the student behaviour. The themes which are present are: humanitarian gestures or achievements in competitions by students, a class or whole school (104 articles), different forms of undesirable behaviour in schools (74 articles), changes in the educational law amendments or legislative changes related to different pedagogical measures (16 articles), and general reflections on behavioural problems, the behavioural measures, the results of research on student behaviour or projects that are organized on this topic (34 articles).

While attempting to answer the first research question we did the content analysis of the selected articles and determined the topics which could be grouped in the 3 prevailing categories: articles on positive school behaviour, articles on negative school behaviour and articles writing about school behaviour in general. These three categories will be presented in a table form and subcategories recognized in each of the categories will be discussed more thoroughly. Furthermore, the findings on the second research question about the frequency of media messages on positive and/or negative events in schools will be presented and demonstrated in a table form and discussed along with the first research question.

As shown in table 1, the majority of the selected articles (N=104) focus on the different aspects of the positive school behaviour.

TABLE 1. THE FREQUENCY OF TOPICS OF THE ARTICLES ON POSITIVE SCHOOL BEHAVIOUR

	Examples	Frequency
Humanitarian work	fund raising for children with health problems, homeless people, animals...	13
Accomplishment in competitions	achievements on competitions on international and national level from different school subjects	34
Individual students' accomplishments	interviews with the high achieving students – related to the competitions or humanitarian work	29
Projects	different projects against violence, volunteering	28
	Total	104

Source: Own

In a positive context, about the behaviour in schools it is mostly written about students' achievements in international competitions. These media items are mainly focusing on the high achievements in mathematics, robotics and natural sciences. When writing about achievements in the national competitions the media is mainly focusing on students from vocational schools. Media reports on individual cases of successful

students and presents their achievements either in competitions or in the charity humanitarian work and these media items are mostly in the form of an interview. Media items on the humanitarian work are focusing on student initiated fund raising for children with health problems, homeless people, and animals in the shelters. In a positive context, media reports on different achievements of students and schools and on the student participation in projects, especially in the projects against violence. For example, the themes of some articles were: The Pink Shirt Day activities in one school, students making the thematic postage stamp – Say no to a speech of hate, art-school student exhibition on non-violence.

Table 2 presents frequencies of published articles in different years in relation to the previously established subcategories of the articles on positive school behaviour. With the exception of year 2016, the total number of the media items on positive school behaviour does not differ much. Nevertheless, there has been a change in dissemination of the media items on certain topics through a five-year period.

TABLE 2. THE FREQUENCY OF DIFFERENT TOPICS OF THE ARTICLES ON POSITIVE SCHOOL BEHAVIOUR IN 5 YEARS

	2018	2017	2016	2015	2014
Humanitarian work	3	3	1	3	2
Accomplishment in competitions	3	5	15	5	6
Individual students' accomplishments	5	2	9	9	4
Projects	4	3	18	2	1
Total	15	13	43	19	13

Source: Own

The total number of media items is highly related to the items on student achievements in competitions and other individual students' accomplishments. Media coverage of the positive behaviour did expand in regards to the types of behaviours which are in the focus. A large increase in the number of the articles on the positive school behaviour occurred in 2016. In that particular year, the public interest about educational topics increased due to the debate on implementation of the Educational reform, which started in 2015. The delay in the educational reform which occurred in 2016, caused a huge public interest. Apparently, digital media recognized public interest and was selecting news items that were in the focus of the public interest. For example, a number of educational projects that are implemented in Croatian schools did not decrease in 2017 and 2018, but media did not recognize projects as a publicly relevant topic.

The next recognized category were the articles on the negative school behaviour. The media reports on individual cases of inappropriate behaviour, such as bullying, verbal abuse, psychological and physical abuse, abuse of teachers by students, abuse of students by teachers, abuse of teachers by parents, different kinds of abuse between teachers. Except of the violence, as well as a sort of misconduct, it was also written about student truancy and inappropriate behaviour on school trips. The results are presented in the table 3.

TABLE 3. THE FREQUENCY OF TOPICS OF THE ARTICLES ON NEGATIVE SCHOOL BEHAVIOUR		
	Examples	Frequency
Teachers' violent behaviour toward students	verbal abuse; physical violence after being provoked by students...	18
Violence between students	organised fight between female students after school; student suffering of PTSD after physical and psychological abuse in school	38
Students' violence toward teachers	physical violence; student attacking teacher on the prom	5
Violent behaviour between the teachers	sexual harassment; teachers fight	3
Parents' violent behaviour toward teachers	verbal threats and intimidating; physical violence	4
Student truancy	problems of more and more cases of skipping classes	3
Other	inappropriate behaviour on school trips; inappropriate behaviour of students on the last day of school	3
	Total	74
Source: Own		

The most of the articles report about recent events on some kind of violence in schools. The subcategory Violence between the students is the most present in the media. It is interesting, that there was a number of articles about the single organised fight between two female high school students. The media items were also linked to the available video of the event, and this attracted a large audience. The digital newspapers were reporting on the event, made interviews with the students from the school these girls attended and made a number of interviews with the experts on the topic of violence in schools. They were following the story through the several weeks and finally reporting on the consequences for the students that were involved in the violent act.

Except the articles about physical violence, there were also media items some about verbal and psychological abuse between the students and about the bullying in general. The articles in this category mainly criticize negative types of behaviour and call to the school to introduce severe penalties or some other measures that would be aimed at reducing inappropriate behaviour of students. The majority of the articles are focusing on inappropriate behaviour in school, and seldom articles write about behavioural issues in general. In the analysed online sources, there were media items on the cyberbullying but since they were not written in the context of school related behaviour, we did not include these articles in the analysis.

Table 4 presents frequencies of published articles in five-year time period, regarding different topics of the articles on negative school behaviour.

TABLE 4. THE FREQUENCY OF DIFFERENT TOPICS OF THE ARTICLES ON NEGATIVE SCHOOL BEHAVIOUR IN 5 YEAR					
	2018	2017	2016	2015	2014
Teachers' violent behaviour toward students	9	4	3	1	1
Violence between students	13	5	4	8	8
Students' violence toward teachers	2		2		1
Violent behaviour between the teachers	3				
Parents' violent behaviour toward teachers			2		2
Truancy		1		1	1
Other	2				1
Total	29	10	11	10	14
Source: Own					

In a time period from 2014 until 2017, there were not many articles on the negative school behaviour category. In the year 2018, there is a raise in a number of articles for the category of teachers' violent behaviour towards students and in the category of violence between students. In 2018, there was an intense media coverage of the situation in which an older teacher aggressively responded to the persistent aggression of one student. Also, the increase in the subcategory of violence between students in partly connected with the above mentioned event of organised girls' fight which raised a huge public interest. The last category includes articles on sexual harassment of one male teacher towards several female teachers in one school. In the world media, the issue of sexual harassment in different fields of work is more present. This tendency started with the Me Too movement in October, 2017 (Frye, 2018). It is possible that this world trend is related to the fact that Croatian teachers decided to report this type of behaviour, and it possibly influenced its media coverage. While there is an increase in the number of news items about violence which involves teachers, there were no major changes in frequencies for other subcategories through the five-year time period.

The third recognized category were the articles on school behaviour issues in general. The media reports on these issues periodically. The results with the subcategories and frequencies are presented in the table 5.

TABLE 5. THE FREQUENCY OF TOPICS OF THE ARTICLES ON SCHOOL BEHAVIOUR ISSUES IN GENERAL

	Examples	Frequency
Reflections from teachers, other school professionals and community members	protest of the teachers because of their poor position regarding safety in the classroom	34
Laws and regulations	comments of the teachers and the union regarding changes in regulations about pedagogic measures	16
	Total	50

Source: Own

Media coverage of general behaviour issues may be grouped in two subcategories: reflections from teachers, other school professionals and community members; and Laws and regulations. Most of the articles are from the first subcategory and the topics were: research results on the school behaviour issues, interviews with relevant experts about some aspects of the school behaviour issues, interviews with the teachers and reportage on protest of the teachers on the safety issues in the classroom. The latter subcategory included articles on changes in laws and regulations on pedagogic measures for the appropriate and inappropriate behaviour.

Table 6 presents frequencies of published articles in different years regarding different topics of the articles about school behaviour issues in general.

TABLE 6. THE FREQUENCY OF DIFFERENT TOPICS OF THE ARTICLES ABOUT SCHOOL BEHAVIOUR ISSUES IN GENERAL IN 5 YEARS					
	2018	2017	2016	2015	2014
Reflections from teachers, other school professionals and community members	12	10	4	6	2
Laws and regulations	1	3		8	4
Total	13	13	4	14	6
Source: Own					

There is evident increase in the number of articles from the first subcategory from 2014 to 2018. There is an increase in media coverage of school behaviour issues from the perspective of teachers, other school professionals and community members. It appears like media found their voice as something important and worth writing about. The second subcategory has different number of articles in different years and this is due to the relevance of the topic – media covers this topic mostly when some changes in the laws and regulations are about to happen or something changed in the recent time. In 2014, there were planned changes on the Law on Education in Primary and Secondary Schools (Official Gazette 2018), regarding more rigorous penalties for violent behaviours. So that, the articles in 2014 were focused on this particular issue. In 2015, there was a change in the Regulatory Act on the Pedagogical Measures (Official Gazette 2015), and it was the topic that was very much talked about in media.

Conclusions

The prevalence of media messages on the positive and negative aspects of behavioural issues was determined by the content analysis method. Identified themes reflect everyday school occurrences, but they also reflect the level of public interest on educational issues. The current conclusions are directly linked to educational occurrences in specific year. When summarizing findings for all categories and subcategories of school behavioural issues, it is possible to conclude that digital media editors in Croatia are recognizing public interest in a specific year and are selecting themes that can attract readers. It is not possible to make conclusions on changes media coverage in positive vs negative behavioural issues, nor conclusions about media framing that is eventually happening. These conclusions could possibly be made if the research would encompass larger time period and would include more in-depth analysis of the text of analysed media items.

Both media studies (Cook 2010) and educational policy theory (Baroutsis 2016) suggest that media reportage on school related issues impacts the effectiveness of the policy implementation. Considering the findings on increased media coverage of educational themes in year 2016, which was a result of delay in implementation of educational reform and increased public interest in educational issues, it remains the question if that was a case of media framing or media responding to the public interest.

While these study findings could be used to enhance educational policy and practice there are some study limitations. While the keywords for the research were selected in accordance to the relevant literature on school behaviour issues, the more extensive list of keywords could possibly impact the findings. Although the research literature commonly recognizes that cyberbullying victimization is significantly and positively

related to school (Lester, Cross and Shaw 2012), in this analysis we did not include media items on cyberbullying. This decision was made based on the text analysis of the media items on cyberbullying which were not relating these negative events to school.

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PHOTOS VERIFICATION WITH MOBILE INTERNET DEVICES AS THE WAY TO IMPROVE MEDIA LITERACY

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Key words: photo, verification, information, media literacy, mobile device.

Abstract: The paper describes a media literacy course, designed to master students' skills to verify photos, images and iconographics used to illustrate information messages on the Internet. The classes were held on the campus of the State University of Telecommunications (Kyiv, Ukraine), students of 17-18 years old. It is important to say that we demonstrate the results of the first step of our research (students of the first year of studies) that concern images, photos and iconographies verification with mobile technology.

Students learnt about the basic techniques and resources they can employ using mobile internet devices. We introduced students to free web-resources available on any mobile device. An obvious advantage of the course is that besides learning media literacy, it expands knowledge and experience in using pocket devices. This course promotes the development of analytical skills, critical thinking and the ability to collect and analyze information, improves the computer literacy level, and acquaints with free and accessible resources for verifying information.

The survey results show before completing the course most students were not aware of the existence of special verification tools. Also, the majority of the respondents could not distinguish junk information from the authentic one, just using intuition and sensory-emotional perception.

The surveys conducted after the course demonstrate that students realize that information that we are not sure about, or which is designed to influence our emotional-sensory sphere is better to be tested. The advantage of these lessons is that students learnt how to use mobile internet devices as useful tools for checking facts and images online.

The results of the survey showed an increase in the media literacy level through the ability to analyze photo materials and iconographies with statistical data. After the training the students recognized the dominant role of mobile internet technologies for checking informationand learnt how to use them in practice. The authors highly recommend including the about to be mentioned classes in the general media literacy course.

Introduction

The up-to-date information space has become more and more crowded with diverse fast-moving information. Indeed, news feeds, social networks and messengers are an essential part of our private space, which is being filled to the brim with news and messages 24 hours a day, 7 days a week.

When constructing the concept of the research, we studied how much time persons spend on their mobile device per day, the resources they use to receive information, and the degree of their trust in selected information sources.

According to the latest Global Web Index data, the average Internet user spends about 6 hours a day on the Internet, which is approximately one-third of the total active lifetime (Global digital report 2018).

Analyzing statistics, we exposed that most users tend to trust materials derived from resources considered credible andreliable. As claimed by the 2017 Digital News Report based on the Reuters Institute for the Study of Journalism survey, most people aged 18 to 44 get information from online resources, namely 64% of young people aged 18 to 24, 58% of young people aged 25 to 34 and 49% of users aged 35 to 44 (Reuters Institute for the Study of Journalism / Digital News Report 2017). As for the trust in the media, the 2018 Digital News Report based on the Reuters Institute for the Study of Journalism survey demonstrates the following: 44% of respondents trust the news in general, 51% trust the news they use, while only34% trust the news foundvia search engines. The given results manifest fewer than half of respondents (44%) said they trust the media most of the time, but they are more likely to trust media they use by themselves (51%)

(Reuters Institute for the Study of Journalism / Digital News Report 2017). Such findings testify to the low level of critical thinking and the tendency to intuitive perception of information at the sensory-emotional level. As a result, most people are not inclined to check the information they receive from different sources.

Thus, by comparing the number of mobile Internet device users among the young workable population with the amount of time spent online, we came to the conclusion that the use of students' own mobile Internet devices would be the most effective way to improve their media literacy level. Mobile Internet devices are multimedia-capable mobile devices providing wireless Internet access, such as smartphones and tablet computers.

Moreover, to build the concept of training classes it was vital to determine the details that Internet users primarily pay attention to. According to the Poynter Institute findings, only two-thirds of users read the text to the end. Scanning is a common routine in the visual perception of information, i.e. the user concentrates on images, photos, headlines or on an abstract. Therefore, identifying an authentic image, as well as spotting a fake one, singling out iconographies with manipulative data or a photo that has nothing to do with the given text, is one of the components of the general media literacy course.

Furthermore, we have used mobile internet devices, because they are the most accessible way how to analyse and check Internet information that does not require additional resources, because they are an integral part of most people's routine, they are extremely affordable, easy to use, and always at hand.

At present, variety of media literacy courses are being described in literature. Issues related to the study of media and information literacy are viewed through the development of critical thinking (Dorr 2011; Masterman 1983, 1990; Paul, Elder 2016;Worsnop 1999; Parry, Potter, Bazalgette 2011;Tyner 2015); understanding the structure of the media (Frau-Meigs 2017; Buckingham 2015; Hart 1998; Krylova-Grek 2018); and media psychology (Giles 2003; Rutledge 2013; Asrafi-rizi et al. 2014)

The study of the implementation of mobile internet devices was covered in the works of Traxler (2009), Kolb (2009), Wan et al (2010), Keengwe (2013), Herrington et al. (2014). The researchers also consider the use of technical devices in online education and Blended education. (Kitchenham 2009; Parsons 2016; Chao 2011). The study of abovementioned scientists proved that the integration of mobile Internet devices into the learning process increases the effectiveness of learning process.

After analysing the existing media literacy courses and learning programs with the usage of technical devices, I noted that most of them do not consider the issues related to the use of mobile internet devices for quick information analysis and fact and picture checking for media literacy education.

The conducted study proved that young people prefer to read news on mobile Internet devices. Therefore, we view the use of such devices as a convenient and accessible way of improving media literacy.

Lesson goals are to demonstrate that employing portable mobile devices is an effective way of fact-checking and verifying images and photos that improve the media literacy level.

The main objective of the course is to teach students actionable ways they can verify information's accuracy, applying mobile technologies.

Hypothesis: the media literacy level can be significantly enhanced by learning specific techniques of image and iconography verification using modern portable mobile devices.

Methods

I applied the following methods: the methods of data collection and analysis(questioning, analysing results, and processing the obtained data), the teaching methods (explaining, demonstrating, collaborating /discussions, group work, role-play game, practice by doing). To spot fake images we used the resources that are freely available on the Internet.

The main strategies I used were active learning and integrating technology. Our training provides an opportunity to apply what students learnt to real life by using personal mobile technology that is always at hand.

The classes were held on the campus of the State University of Telecommunications (Kyiv, Ukraine) in March 2018. The classes were attended by first-year students of Information Security Department. Their total number was 83. The age of students were 7-18 years old.

Before the very first lesson, I conducted a survey to find out the students' level of media literacy in terms of picture and infographics. The multiple-choice questionnaire consisted of a stem and several alternative answers (yes-no-difficult to say).

The survey showed that only 19.7 % of respondents were able to distinguish between true and false information in most cases (by most I mean more than 50% of the correct answers).

Results

Thus, the results of the first stage proved the expediency and necessity of conducting further classes. The conducted course was divided into three stages, which we describe below.

The first stage description.

The first stage was divided into two blocks:

The first block implied the acquaintance with photo fakes, recent years published in online resources. We categorized them into 1) fake images, made by imposing new elements on the photo; 2) fake images, using authentic images to illustrate events that have nothing to do with them; 3) fake images, which can be detected by fact-checking (comparing other data, checking the date, time and place the photo was taken, etc.).

Image analysis is the extraction of meaningful information from images. Thus, it includes acquaintance with testing tools for checking whether a third party has added anything to the photo, and acquaintance with tools for checking the photo-context ratio (the date the photo was taken, the resource the photo was published in before, etc.).

The second block was devoted to acquaintance with iconographs and schematic images published in recent years that proved to be false.

In addition, students learnt about methods and techniques for checking photos using free online resources. Students were introduced to the following free online resources for image verification.

The easiest way to find an image is using Google Chrome, which allows users to verify whether photos or videos have been used before and under what conditions. For those using Firefox, I suggested using the "Who stole my pictures" resource.

The other examples of resource are the following "FotoForensics" is an online resource for determining error level analysis (ELA): modified or added details. Using the software, one can get EXIF-data as well. "Findexif.com" is an online resource used to verify photos taken in the EXIT format, which allows getting data about when and where a photo was taken. The simplest way is to use "Google Search by Image". You just upload a photo there in order to find its origin source and to examine where else it was published; "TinEye" – free on-line resource for reverse image search. The search engine "Wolfram Alpha": you can verify a photo by looking at weather conditions in mentioned place on the day specified. However, it is conversant in themes concerning exact encyclopedic information, not in current events. It does not give links to other sites but produces a ready answer; "WebMii" searches the reference with the name of the person, produces the "web visibility" rating, using which you could find out fake accounts; "Pipl.com" can be used in case one needs to check who exactly is distributing information. The given resource is especially useful for social networks. It should be noted that the software is included in the search engine of American-based social media networks, such as Facebook, LinkedIn, MySpace etc.

It is worth mentioning that the given resources have certain disadvantages as well. Their key drawback is that they sometimes are not able to give an unambiguous answer whether the image is false or authentic. For example, FotoForensics does not show the pixel difference in case the photo was saved and reloaded several times, so the more such operations were performed, the less it is possible to notice the pixels of added items. Therefore, when in doubt, I advise students to exploit various tools for data verification, like alternative resources and sources, logical analysis, data comparison, etc.

Furthermore, the students got to know the features needed to determine the authenticity or falseness of the data presented in the texts, iconographs, etc. (the source of information, who conducted the survey, the

probability of statistical error, comparison with the original sources). Further, the students were offered examples (artificially created and genuine statistics, respectively) and asked to assess their credibility.

During the second block of classes, students learnt the ways to check statistics via on-line resources. They were also provided with signs of manipulative statistical data submitted in a form of statistical surveys.

Before starting the second stage, the students got the task to find and inspect images and iconographies on the Internet in order to identify their authenticity or falseness.

The second stage description.

At the second stage, students presented their projects and proved the findings. The part of home assignment was provided for group discussion. Students worked in small groups of two or three people: they checked the proposed images or iconographies to determine whether they were junk, manipulative or authentic. Then they grounded their conclusions in the entire group.

Before the third stage, students got the task to prepare authentic and fake images, iconographies or statistics.

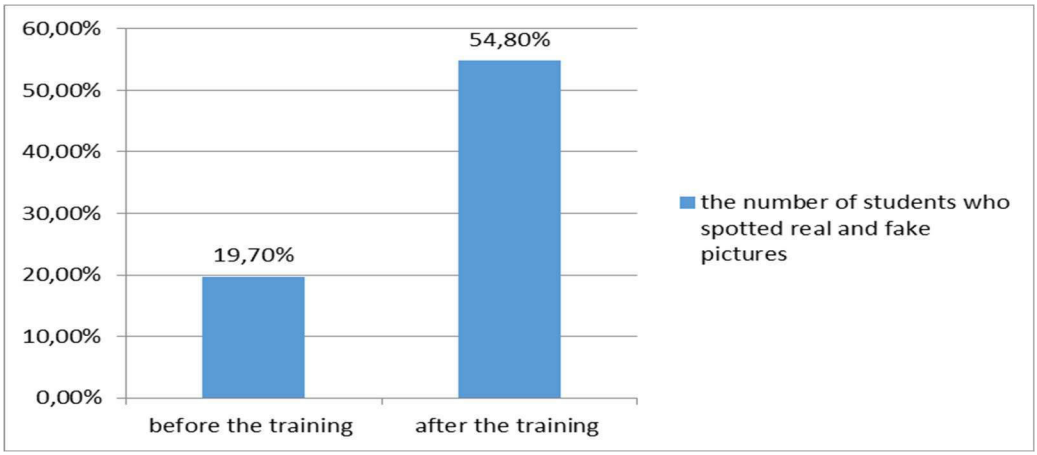
The third stage description.

At the third stage, students offered other members of the group to identify the authenticity or manipulative nature of the information provided.

The given stage also implies a repeated questionnaire to point out the students' media literacy level after the course completion.

The final questioning that was conducted to determine the level of ability to spot fake and real information (pictures, iconographics) showed that 54.8% of the respondents were able to give the correct answers. The correct answers were obtained in the majority of cases. (By the majority, I mean more than 50% of the correct answers).

PICTURE 1. THE LEVEL OF ABILITY TO SPOT FAKE-REAL PICTURES AND ICONOGRAPHIC BEFORE AND AFTER THE TRAINING



Source: Own

That hypothesis is accepted that the proportion of level of media literacy after the training is higher than it was before. Moreover, after the training the students recognized the dominant role of mobile internet technologies for fact checking and used them in practice.

Thus, the obtained results demonstrate an increase in media literacy by a rate of 45.2%. Furthermore, 79.8% of the students answered that they planned to apply their new skills into practice.

The obtained result confirms our hypothesis about the effectiveness of mobile internet devices for media literacy trainings in terms of verifications of photos and iconographies (See picture 1).

The survey results show that before completing the course most students were not aware of the existence of special verification tools. Also, the majority of the respondents could not distinguish junk information from authentic information just by using intuition and sensory-emotional perception.

At the same time, after the course it became clear that intuition and emotions are not always helpful assistants for fact-checking. The surveys conducted after the course demonstrated that students realize that it is better to test information that we are not sure about or that is designed to influence our emotional-sensory sphere. The advantage of these lessons was that students learnt how to use mobile Internet devices as useful tools for checking facts and images online.

When applying the given course, I advise teachers to pay attention to the following issues: 1) one source is not always enough to verify facts and images. In some cases, several sources and methods should be used: technical methods (images and iconographic verification resources), critical thinking and logical methods (analysis, data comparison, studying several sources, etc.); 2) the number of classes for the consolidation of theoretical knowledge and practical skills may be different, depending on the students' age and computer literacy level; 3) additional assignments are given if the group is ready for self-guided and independent work at home. Otherwise, the work must be done at classes.

Conclusions

Therefore, the use of mobile Internet devices for fact-checking and verifying images and iconographies is an efficient and affordable way to improve one’s overall media literacy level.

This training also improves computer literacy because during the course students deepen their knowledge about the functionality of their own smartphones and tablet computers and practice new skills.

The media literacy level is related to the ability to think critically, distinguish facts from judgments, decide between junk and authentic messages and, equally important, prevent emotions from overriding critical thinking.

This training is one of the parts of the general course "Media and Information Literacy". It employs advanced technical tools to develop skills of analysing and processing information that contribute to: 1) the development of critical thinking (creating user-generated content, understanding the technology of writing

fake news, the basic techniques that affect the emotional sphere, and forcing others to believe the illusory truth effect); 2) the development of the skills of using available technical devices for quick and rapid information verification; and 3) analysing logical errors and their analysis in media content.

Hence, this training promotes the development of analytical skills, critical thinking and the ability to collect and analyse information, improves computer literacy level, and acquaints the student with free and accessible resources for verifying information.

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IS THE HUNGARIAN HIGHER EDUCATION MEDIA-LITERATE? ANALYSIS OF COMMUNICATION AND MEDIA SCIENCE UNIVERSITY PROGRAMMES IN THE LIGHT OF MEDIA LITERACY

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Key words: media literacy, media education, media competences, higher education, Hungary

Abstract: In an age when young kids become the teachers of their parents in handling the various smart gadgets while they lack responsibility and critical thinking about the digital content they face, the long-standing processes of socialization become evidently challenged. In an age when the traditional, good old pedagogical methods fail to convey the knowledge to students however prepared the teacher is, the age-old concepts of teaching and learning need to be clearly rethought. Finally, in an age when a good deal of our knowledge comes from online sources, while our screen time surpasses our offline looks, dealing with the wise and responsible use of media is undoubtedly a must.
The steadily growing scientific and public discourse on the various aspects of conscious and literate media use proves that not only the actors of education and science have recognized this need above. Media literacy seems to have become one of the key competences of our age as well as one of the main challenges of today's education.
This study aims at giving a stop-gap glance at the Hungarian Communication and Media higher educational scene in the light of media literacy education. It introduces a piece of research casting light upon the state of play of media literacy higher education in Hungary as mirrored by the regulatory documents (programme descriptions, operational curricula and course syllabi) of 16 universities launching a Communication and Media Science BA and/or MA programme in the school year of 2018/2019.

Introduction

We fight. The researcher fights with the claims of pseudoscience, the politician with fake news deceiving his voters, the teacher with the attention of her students having been socialized on new media gadgets, and the child fights with the bullying messages coming from her classmates and landing on her phone 7/24. Fake news, disinformation, screen addiction and cyberbullying are only some of the related key words of the concept, the importance of which has now been recognized by more and more agents of education, science and politics, and the improvement of which can serve as a shield in our fights for the wise, conscious and responsible use of media.

According to its generally accepted and most cited definition, media literacy is the ability to access, analyse, evaluate and create media content and messages, and act using all forms of communication (e.g., Christ and Potter 1998; NAMLE n.d.; Thoman and Jolls 2003). Besides the everyday practice, the recognition of the importance of this set of competences can also be seen from the revival of the Hungarian as well as international scientific echo of the topic in the last years. One of such is the establishment of European level working groups by the European Commission, such as the Media Literacy Expert Group and the Safer Internet for Children Expert Group, or the emphasis of the topic within the Digital Single Market Strategy of the Commission. In Hungary, the Digital Education Strategy of Hungary (2016) and the Digital Child Protection Strategy of Hungary (2016) as parts of the Digital Success Programme of Hungary (2016) were introduced, dealing with the development of digital competencies of children and the youth as well as with their protection.

The number of lectures, presentations, conferences and pieces of research dealing with media literacy has constantly been growing both on national and international levels. These mainly thematise the advantages, challenges, risks and threats of new media use; the addictive and other mental impacts of the use of smart gadgets on the personal development of an individual; the social changes and their consequences induced by new communicational patterns; and the challenges of new educational methods trying to address the generations of new types of learners (e.g., Buckingham 2000; Bulger and Davison 2018; De Abreau, Mihailidis, Lee, Melki and McDougall 2017; Livingstone 2004).

Nevertheless, given the complex and hardly measurable nature of this set of competences, the research and education of media literacy lags far behind the pace of technological development as well as the everyday practice of media use (Bulger 2012; Hobbs 2017; Livingstone 2011). Although the demand for the conscious, responsible and media-literate use of digital tools and media has been expressed in more and more regulatory documents of education, few national educational policies (like Finland) took firm decisions followed by concrete steps on integrating media literacy into the everyday practice of education. One of the reasons behind the delay of these steps in Hungary may root in the lack of wide-scale, national-level research and competence tests measuring the level of media literacy, as well as in the lack of qualitative pieces of research delving deep in mapping the state of play of media literacy education.

This paper presents a smaller part of a research attempting at a partial fulfilment of this hiatus in the Hungarian higher educational scene, examining the state of media literacy education within the Communication and Media Science programmes of the Hungarian higher educational scene. In the Hungarian educational history, the concept of media literacy first appeared in educational policy documents in 2012 as a key development area and educational aim in the 2012 version of the main regulatory document of Hungarian education, the National Core Curriculum (Nemzeti alaptanterv 2012). In addition, the voluntary subject of Moving Image Culture and Media Studies, offering room for media (literacy) education in formal institutional contexts, has been introduced in Hungarian public education already in 1995. Nevertheless, at the time of composing the plan of the research introduced in this paper, the presence of media literacy education in the Hungarian higher educational arena was weak and the place of media education in the plans of the new National Curriculum (at that time undergoing national and professional consultations) was at risk. At the same time, higher education is considered to be the segment which is expected to train experts for researching the field as well as teachers for educating the upcoming generations. Moreover, it is also supposed to show and set progressive trends for education, in accordance with societal development as well as international trends.

Taking the above problem recognition as a starting point, the aim of this research was to map the presence of media literacy education in the Hungarian language Communication and Media Science Bachelor (BA)

and Masters (MA) programmes of Hungarian universities, as mirrored by the main regulatory documents of these programmes, specifically: programme descriptions, operational curricula and course syllabi.

Research design

The research applied the method of document analysis. As the first step, based on the felvi.hu database of the Hungarian Educational Authority, a list was composed, collecting all higher educational institutions where Communication and Media Science BA and/or MA programmes in Hungarian were launched in the time frame of the research (i.e., in school year 2018/2019). As a result, the research sample consisted of the following 16 institutions: Budapest Business School, Budapest Metropolitan University, Budapest University of Technology and Economics, Corvinus University of Budapest, Eötvös Loránd University, Eszterházy Károly University, Károli Gáspár University of the Reformed Church in Hungary, Kodolányi János University, Milton Friedman University, Pázmány Péter Catholic University, Szent István University, University of Debrecen, University of Dunaújváros, University of Pannonia, University of Pécs and University of Szeged.

As the next step, the most recent available versions of the main regulatory documents (operational curricula and course syllabi) of the examined universities' Hungarian Communication and Media Science BA or MA programmes were collected from the websites of the universities. Besides the above, the programme descriptions of the above programmes were also collected and analysed. These focus on the aims, content, main courses and areas of education as well as the main professional competences to be developed by the programmes.

The document analysis was preceded by a desktop research for getting a literature overview of the existing media literacy competence frameworks, i.e., theoretical models of media (and information) literacy (namely, Aczél 2018; Carretero, Vuorikari and Punie 2017; Hobbs 2010; Mediawijzer 2011; Schilder 2014; UNESCO 2013) which operationalize the concept of media literacy by setting and naming its skills and competences. This step was needed in order to be able to recognize the presence of media literacy education even within programmes and operational curricula which do not explicitly contain a separate course on Media literacy (named as such); nevertheless, they do include courses focusing on a similar field and touching upon specific skills and topics of media literacy. The identification and examination of these competences helped in finding the cross-curricular elements of media literacy education during the analysis of course syllabi. The examination of the three above mentioned documents (programme descriptions, operational curricula and course syllabi) related to the 16 university programmes included the analysis of 26 BA and MA operational curricula with further curricula for the specializations as well as the analysis of 379 course syllabi. Since the state of play of media literacy education in the Hungarian higher educational scene has been unmapped so far, this exploratory research served with several new insights.

Results

The results of the research have shown that in spite of the fact that media literacy is a set of essential and intrinsic skills and competences of the 21st century (Thoman and Jolls 2003; Viola 2016), its education appears in the Hungarian BA and MA Communication and Media Science programmes rather scarcely. Although the examined programme descriptions generally named several skills and competences which the programmes aim to improve, the concept of media literacy—as an embracing and comprehensive set of 21st century competences—did not explicitly appear in any of the programme descriptions, either as a set aim, a main development area or a set of competences to be developed. From the identified competences of media literacy, the most frequently appearing ones were cognitive skills related to the understanding of the media and mechanisms of media industry. Besides, the development of critical thinking as a critical skill as well as the creative-productive skills related to the creation of various pieces of media content appeared in the programme descriptions.

The examination of operational curricula and course syllabi offers a similar overview. Media literacy as a separate, individual course is only present in the BA programme of Corvinus University of Budapest (as a compulsory third semester subject of the second-year students, named as "Media psychology, media literacy"). Media literacy as a separate subject has also entered the operational curricula of Pázmány Péter Catholic University from the beginning of this school year (2018/2019) as a voluntary masters' course; however, according to the evidence of course syllabi, it has not been launched yet. Thirdly, the conscious use of media appears as a stressed element in the masters' course syllabus of the "Psychological grounding of media use and habits" course of University of Szeged.

Nevertheless, while the examination of the operational curricula proves that media literacy typically does not appear as a separate subject in the Hungarian Communication and Media Science university courses, the course syllabi bear witness to its partial presence, in the form of certain competences of media literacy. The analysis of the course syllabi (including the examination of the topics covered during the courses as well as the competences to be improved) has brought forward one of the main results of the research. Namely, that the education of media literacy, including its topics and competences, has been present in the current Hungarian higher educational scene of Communication and Media Science programmes fundamentally in cross-curricular form. Table 1 below highlights the most typical types of courses integrating some common topics and the development of specific competences of media literacy as appearing in the examined course syllabi:

TABLE 1 MOST TYPICAL COURSE TYPES INTEGRATING TOPICS RELATED TO MEDIA LITERACY AND THE DEVELOPMENT OF MEDIA LITERACY COMPETENCES

Course types	Competences of media literacy
News and programme editing, Journalism, Journalistic genres	cognitive, critical and creative-productive skills related to news formulation and the knowledge of different journalistic genres
Social communication, Public communication, Political communication, Media and politics	cognitive-critical skills related to the understanding of the various forms and mechanisms of social, public and political communication
Media regulation, Media economy, Media law, Media ethics	cognitive and critical skills related to the understanding and knowledge of various agents of media industry and media economy, knowledge of the legal and ethical aspects of media regulation
Visual communication	cognitive and critical skills related to the recognition of persuasion by images
Networked communication, Digital communication, New media communication	cognitive-critical (and in a smaller proportion also participative) skills based on the understanding of new media phenomena
Multimodal content creation, Online video creation, digital cut	functional skills based on the acquisition of technology use and creative-productive skills related to content creation
Persuasion, propaganda, Advertising, Media consuming and influence	cognitive-critical skills related to the understanding of the toolsets of persuasion and manipulation

Source: Own

The examined operational curricula and course syllabi also show that the topics and competences of media literacy related to new media use (i.e., new media literacy) are even less present in the analysed programmes. According to the examined documents, there are only a couple of universities where the risky and dangerous topical situations and phenomena of social media (such as cyberbullying or personal data and privacy issues) are being dealt with. Nevertheless, it must not be forgotten that these results mirror the state of play of media literacy at the examined programmes solely based on their descriptions and aims as indicated in their main regulatory documents. The research did not target to explore the actual in-class practices taking place within the walls of the classrooms.

Conclusion

This paper examined the presence of media literacy education in the Communication and Media BA and MA programmes of the Hungarian higher education scene, as mirrored by the main regulatory and operational documents (programme descriptions, operational curricula and course syllabi) of the programmes. The results of the research have shown that media literacy education is partially present in the examined field. There are only a couple of universities where "Media literacy" appears as a compulsory or voluntary individual subject, while the topics and competences of this skillset typically appear in the programmes in cross-curricular form, spread among various courses. Nevertheless, it has to be underlined that this research and its methods have not allowed for having a look into the classrooms. The exploration of the essential educational work taking place beyond the declarative documents of the programmes and their courses as well as within the walls of the classrooms calls for further research. In addition, as a next step in mapping the state of media literacy education in the Hungarian higher educational scene, the

examination of the field of teacher training programmes at universities would also be of high importance, since this is the field where future teachers, who are supposed to develop students' media literacy competences, are being trained and taught.

Given that the presence of media literacy education has not been mapped in the Hungarian higher educational context before, the results of this research yielded stop-gap insights into an essential segment of the Hungarian university scene. The findings have also contributed with a small but new piece of mosaic to the exploration and current knowledge base of the Hungarian media literacy research and education as well as to the fight for the promotion of wise, conscious and responsible media use.

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Other

E-LEARNING FOR SMART CITIES EDUCATION: A CASE STUDY ON AVOIDING TRAFFIC CONGESTIONS

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Key words: Smart cities, Traffic, Management, Knowledge Management, Sustainability, Education, E-Learning Tools

Abstract: Today, people have the possibility of much more information than it was used to be provided in the past years. So, all this information, is necessary to be managed properly so people to understand it. That is the reason of the knowledge management. Knowledge management means that, there is the possibility of locating, creating, organizing and representing ideas and information. In addition, smart cities are enhanced developed cities which are able to use the information and communication technologies to be safer and sustainable in terms of learning, transportation and mobility, public services wastes and energy consumption. According this last idea, occurs a topic which focuses on transportation and the way of managing traffic in smart cities. That occurs, when smart cities lack traffic management. As a result, it is more probable to appear traffic congestion, vehicles collisions or car accidents. The approach which is suggested to this specific research suggests ways of making transportation friendlier to individuals and the ways which could applied to avoid traffic in roads through smart cities' services. That could be an appropriate way to help individuals who can use a platform. This specific platform could help, with the technology of E-Learning tools which would be taught in schools.

The purpose of this article is to present an architecture for an E-learning system design for Smart Cities targeting in the avoidance of traffic congestions. In our future research directions we integrate this approach with Real Time Analytics and Visualizations towards the implementation of Dashboard for advanced decision making.

Introduction

Nowadays, people can have access in a lot of information from a big amount of variety. In order individuals as also organization to understand or to communicate that kind of information is necessary that the specific kind of information is well managed. For that reason, is very important knowledge management, in smart cities is quite big. That for the main reason, which is that is a city that is using the information and communication technologies so to be more helpful to its civilians. A tool which would make unique importance in a smart city would be smart mobility with the additional help of monitoring traffic. The present days, organizations have the possibility to collect information for variety of different activities through a big number of sources. Thus, there is a big amount of information organizations need to organize the data that are given so they can learn that information appropriately. As a result, these actions constitute, the necessity of knowledge management. Knowledge management is the organization of allocating, creating, organizing and finally representing ideas, information, ways of thinking and thoughts in an appropriate way. The previous should occur so, the information to become knowledge.

Smart cities are cities which have been designed so, that they are able to use information and communication technologies. That occurs for the enhancement of the performance, as also the quality of urban services such as, transportation and mobility, energy and consumption of resources. In addition, smart cities are designed so to have less cost and wastes as a total.

By the term traffic congestion is called what could be occur on roads, that are characterized by more long time in terms of trip, or increased queue that comes from vehicles and, also very slow speed of movement of a vehicle. A main very often case is that of too many vehicles on a road network.

Mobile application is defined as a software application type that is designed to run on mobile devices. Such devices could be tablet and, also smartphone devices. People are very often use mobile applications

for the same reason that they use PCs. That occurs because, nowadays it has the same importance as the Personal Computers do.

By the term big data which it is worth to be noticed that the meaning is to gather and to store large amount of information and data so to have the possibility to analyze these data in the future. The above term of "big data" gained fame in the 2000s from the industry analyst Doug Laney. Doug Laney has made a separation in the term of Big Data and articulated the three Vs of big data. According to SAS (2018), these three Vs are the following: Volume, velocity and variety. Volume means that the organizations are collecting data from a big variety of sources. Such sources exist cause of the business transactions, the social media etc. Velocity means that the speed that data streams is very high and because of that time stands as an enemy. Variety stands for any type of data that exists. That occurs because there is very big amount of variety of data. Such data are including emails, videos, audios, texts, documents as also financial transactions.

Literature review

The authors (Kumar, Kushwaha 2017, 3761-3773) suggested in their article which focuses on country of India, the speed limit violation detect system and the term intelligent traffic surveillance, which is quite interesting. Also, an important role depends on the factors of what is the Region of Interest, as on the term about tracking accuracy. The critical exploitation for my research, are the ways that traffic surveillance and speed limit violation can be detected and in the long run avoided.

A report of FRPT Research (Smart cities… 2014) presents several ways of how smart cities can become less urban congested. The critical exploitation which helped me in my study was the reason of communicating the idea of how smart cities can easily become urban decongested.

According to the authors (Kanamori, Takahashi and Ito 2016, 3-12), it is explained, how a system which could help users avoid traffic congestion on roads through a smart app service could function. The critical exploitation of the specific article is so to understand the idea of how to use a smart city traffic surveillance service so the citizens not to experience traffic jams or traffic congestions.

According to a report of FRPT Research (Odisha… 2016), which is relevant to the city of Odisha and the investment of smart city implementation, existed information about the government of Odisha, in India and the fact that is trying to find ways of developing a smart traffic management system that un-complex the roads from traffic congestion. The information which was critically helped this research was that in that record article is very important to be noticed how in India the government has found ways in how to develop a smart traffic management system so to be able the smart city of India to avoid traffic jams.

In addition, as the authors (Zaree, Honarvar 2018, 1302–1313) stated in their article, air pollution within a smart city, as the correlation with the conditions of the weather is quite interesting. The main contribution was that the authors analyze the importance of smart cities concept. On this part, also explain

about big data and how they can work within a smart city. Then are offered ways of how smart cities can make air pollution to be minimized or even disappear through the big data help. The critical exploitation was in the above record article it is very good to be mentioned that a smart service in a smart city can be used so to control and monitor the air pollution which can be occur in a smart city also from the vehicles.

As the authors suggested (Ding, Zhang and Zhao 2017, 72-82), in their article, it is referred what happens in smart cities when there is traffic congestion and how to deal with that phenomenon and how to avoid it. In my point of view, the important aspect was that smart cities can also have traffic congestions or traffic jams and there must be ways to deal also with that kind of problem.

The general idea which is suggested in this article from the authors (Su, Li and Fu 2011, 1028-1031), are certain ways for environmental protection, public security and safety in a smart city in which can be used services as applications of the smart city. Thus, this article is very important. That because it can be shown how a smart city can use applications and services.

The author (Kitchin 2014, 1-14) states in his article, the importance of the functionality of smart cities. Also, in the same article are stated, how urbanism works today what it is and how it could be in a smart city with the additional help of big data. So, regarding the appropriate study of this research the specific article is useful because of the meaning and the functionality of smart cities. Also, it discusses the additional help of big data in smart cities.

The article's authors (Kumar et al. 2018, 37-39), refer to today's mainly existence of vehicles. Also analyzes the importance of the traffic systems as also the emergent carefulness that must exist not to be violated. Therefore, are provided ways of how a smart traffic rule violation system can monitor such cases and detect them. I consider this article very resourceful because it can be identified a way of monitoring violations in traffic in smart cities.

The authors of the specific book (Ejaz and Anpalagan 2019) present their arguments about the importance of Internet of Things in a smart city and give also some related examples which are quite logical. I found the idea of combining two different topics such as smart cities and internet of things (IoT), very attractive and interesting as well.

As it suggested by the author (Dalsgaard 2006), nowadays there is a scope of the ways in which e-leaning systems could be introduced and used beyond learning management systems and offer new learning possibilities. That is very correct because of promoting the idea on how the e-learning systems could be introduced as a way of learning system.

Research problem description

In order to find, allocate and codify a research problem there are two main scopes. For that specific part there are research questions, and research hypothesis.

Research questions

How knowledge management could be related with smart cities and traffic congestion problem?

In what ways could knowledge management help in monitoring violation of speed limit?

What is the meaning of Smart Traffic Management Systems, and how could it help in un-complexing traffic congestions?

Why the importance of smart traffic rule violation system is significant?

How Big Data could be useful in Smart Cities and how much would help in traffic de-congestion or the avoidance of traffic?

Research hypothesis

If the domain of knowledge management could be used with the domain of smart cities that would constitute that knowledge management would be very helpful in smart cities.

A Monitoring Road System could be very helpful according to that research because it could watch the roads and, in such ways, prevent traffic congestion or traffic jams.

A Smart Traffic Management System could be found very useful in terms of traffic decongestion or traffic un-complexity if it could be monitoring the traffic rules violation, so to exist security and safety in mobility.

If there should exist a Monitoring Road System that could monitor the traffic and the traffic violation that would mean that there should be provided a lot of Data. Hence, it is significant the importance of Big Data.

Internet of Things (IoT) is a very necessary tool that could bring the different change because it could help smart cities by monitoring with cameras the roads, so to prevent events like, car collisions and traffic congestion.

Discussion & limitations

According to the research which was conducted above there is the following outcome. In a smart city there are many innovative services which are also very creative. More specifically about the case of mobility, to continue to be a safety in the road system the must be a Smart City Road System. That should happen so there are not traffic congestion or in order to not complex the road system with traffic surveillance. To create such a system there is a necessary and important construction of sensors or even cameras in road system which could monitor the roads and notify the civilians or the traffic authorities if there is a case of traffic jams. That would be very important if it could be prevent the traffic congestions and could prevent car accidents such as car collisions and crashes.

There are also some limitations about this research idea that was discussed in the above research. These are the firstly, the one that there should all the sensors or even cameras be connected through Internet of Things (IoT). The previous would have also some dangerous impacts. The second limitation about that research would be that there would be very great need of storage. That because the data of the sensors should have a lot of storage capacity to place on.

Conclusion

As it has been discussed, nowadays, people are tending to have access to a lot of information in order to manage and understand it is very important the knowledge management. Such help is a very well accepted in the case of a smart city which could be appreciated as a tool. In that case as a tool to monitor mobility and traffic so to prevent car accidents and congestion. The use of E-Learning systems can help nowadays learning systems and even offer much more possibilities through this way of learning. Although, in my article I have not completed a scientific research as only a research at an academic level, I think that it would be an additional way of how to interpret

The reasons that helped me conclude for the selection of this topic is that nowadays smart cities topic is a very interesting domain and has many capabilities and perspectives for the future for an environment with less consumption in energy resources, less wastes and friendlier to the civilian's mobility and, also transportation. Also, on my point of view, traffic congestion is a very important domain because in many cities of the world there are effects such as traffic jams, traffic congestion or even car crashes due to traffic congestion. So, the conclusion that came to me was that if combine these two domains then, which could be a very interesting topic.

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HIGHER EDUCATION IN GLOBAL DIGITAL SOCIETY: COMMON FRAMEWORK FOR PROGRAMMES

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Key words: Educational system, LLL, Principles of educational process, Higher education, EHEA.

Abstract: Higher education objectively is aimed to meet the needs of the future in providing the labor market to specialists who have a set of knowledge, skills, competencies that will be required after five years and more the student enters the university. Accordingly, for universities, the problem of providing programs aimed at a more proactive response to changes in the needs of society in the future remains a topical issue. The development of a comprehensive model of educational process should aim at building competencies that provide a forward-looking response to the changing needs of society in the future, taking into account the trends and prospects for the development of the business environment, information technology and civilization. Long-term benchmark in this case is transformation of higher education systems through the expansion of the relationship between social-oriented and professional components as well as the use of substantially certified forms of education in the integrated link "business- state-university". Key point in this way must be the development of lifelong learning with promoting the integrated development of cooperation between industries and public-private partnership through the use of interdisciplinary and multisectoral links. Principles of the education process should include: mobility and flexibility, international orientation, certification of educational items and study programs, practical orientation, emotional intelligence, integration of general competencies between educational programs, block instruction of teaching disciplines (A-baseline, B-medium level, C - advanced level), consolidation of disciplines, the emphasis on the individual component of training. Expected result are strengthening the practical orientation of study programs based on understanding the trends of civilization, the system of social and individual values, the business environment in the future.

Introduction

The training of students in the system of higher education objectively aims at meeting the needs of the future in providing the labor market to specialists who have a set of knowledge, skills, competencies that will be required by employers in five and more years after the time of the student's entrance to the university. Accordingly, the problem of ensuring the formation to be competitive in the modern market of educational services, and in the medium and long term perspective, a set of study programs aimed at advancing responsiveness to the changing needs of society in the future remains a topical issue. Such programs should take into account not only the socio-economic but also geopolitical and demographic trends of the business environment, information technology and civilization as a whole.

Social life is increasingly mediated, influenced, and augmented by online interactions that take place through the Internet (Graham, Zook and Boulton 2013).

The global digital divide is largely an economic story. In 2015-16, roughly four-in-ten adults surveyed said they used social networking sites. As of 2017, 53 % use social media. Across the 39 countries surveyed, a median of 59% reports owning a smartphone. A further 31% report owning another type of mobile devices, such as a flip or feature phone. Only about one-in-ten (8 %) across the 39 countries report having no mobile device at all (The Pew Research Center's Spring 2017).

Education has a second major influence on Internet usage (Blank, Graham, and Calvino, 2018). Better-educated people are much more likely to be Internet users and more likely engage in most types of Internet activity; the exception is that they are less likely to use instant messaging (Blank and Groselj 2014; van Dijk and van Deursen 2013; White and Selwyn 2013). Moreover, Emejulu and McGregor argue (Emejulu

and McGregor 2019) that the ‘digital’ and its attendant technologies are constituted by on-going materialist struggles for equality and justice in the Global South and North which are erased in the dominant literature and debates in digital education.

Higher education institutions themselves also become more diverse in their missions, mode of educational provision and cooperation, including the growth of internationalization, digital learning and new forms of delivery (Communication from the European Commission 2013; ESG 2015).

In the past decades, the issues related to e-learning have been widely discussed around the world. Measure issues and concerns faced by the Indian higher education system was examined and identified as well as the factors responsible for the crisis in higher education (Hussain and Khan 2019). Trends and research issues of mobile learning studies in nursing education were reviewed (Chang, Lai and Hwang 2018). However, the development and trends of applying IT (mobile technologies, social network, and e-learning) in higher education still lack systematic analysis. The common problem, in this case, is: what is the way to create qualitative programs aim to fulfill multiple purposes.

In this study, a framework for programmers was conducted to systemize and analyze the common approaches, subjects, principles to design, transform and deliver study programs in higher education institutions.

Development of a comprehensive model of the educational process should include study programs as well as teaching and methodological support. Programs should be directed towards the creation of competencies that provide a proactive response to the changing needs of society in the future.

Methodology

The higher education process in the global digital society must be based on the following three key goals: integration, development, and promotion. The integration involves expanding the relationship between socially-oriented and professional components and applying substantially certified forms of education in the "business-state-university" system. The development takes into account the development of lifelong learning through the introduction of short-term programs, the provision of dynamic and flexible educational approaches to organization and conducting the educational process. The promotion set contributes to the comprehensive development of cooperation between sectors of the economy and public-private partnerships through the use of cross-disciplinary and multisectoral links.

Programs should be delivered with the usage of student-centered learning and teaching. It includes flexible learning paths and recognizing competencies acquired outside of a formal curriculum. The ESG notes (ESG 2015) the implementation of student-centered learning and teaching respects and attends to the diversity of students and their needs, enabling flexible learning paths. This method considers and uses different modes of delivery, where appropriate. It also means flexibly using a variety of pedagogical

methods and regular assessment and adjusting modes of delivery and pedagogical methods. Student-centered learning and teaching encourage a sense of autonomy in the learner while ensuring adequate guidance and support from the teacher as well as promoting mutual respect within the learner-teacher relationship.

For higher education in the global digital society, student-centered learning and teaching are an orientation towards the output, which is based on a competent model of a specialist (profile). Such a model should be created with the most active participation of all stakeholders. The basis of student-centered learning in the development of study programs is the idea of maximizing students' chances of getting the first place in the labor market, increasing their "value" for employers.

Technology “management of a set of study programs for an institution” should include the following steps:

analysis of trends – to conduct study of the positions of stakeholders (business, graduates, existing and potential consumers of educational services, professional non-governmental organizations) and on its basis identify trends in the changing professions and the needs of the global digital society, taking into account the prospects for the development of the business environment, information technology and civilization;

forming a profile of the institution - to identify a competitive set of training directions, fields of study, specializations and study programs that are consistent with trends in the development of the labor market and changes in business needs in the future;

formalization of the graduates' profiles - to form a system of profiles of the necessary knowledge, skills, competencies of employees for the future business in the context of components of a competitive complex of training directions at the levels of "bachelor" and "master";

design and structuring of study programs - to develop study programs and plans, the structure of study programs of disciplines for preparation for the levels of "bachelor" and "master" taking into account needs of the business environment of the future simultaneously creating conditions for activating the development of programs "double diplomas". Basing on their adaptation to the best world experience and practice of higher educational institutions - partners of the University in the field of international educational activities.

Results

An integrated model of the educational process is developed separately for each university. Such a model should be based on the concept of higher education and include study programs, teaching and methodological support for bachelor's and master’s programs.

The Framework for study programs for Institutions provides for the construction of a comprehensive model for all study programs and levels of education. Such a model is effective provided that its

application provides for the development of competencies aimed at advancing responsiveness to the changing needs of society in the future, taking into account the trends and prospects for the development of the business environment, information technology, and civilization.

The framework of programs includes:

common approaches to educational content, principles of programs, structuring of educational components.

basic approaches to the formation of educational content are applied within each study program.

In order to create educational content for the future, such approaches should provide such characteristics of educational content as integration, flexibility, and adaptability.

The basic approaches to the formation of educational content, taking into account the needs of the future, are proposed to determine: 1) evolutionary growth; 2) synergetic development; 3) practical orientation.

Evolutionary growth implies a comprehensive disclosure of the material at levels (A, B, C). This approach is widely used in international practice while learning a foreign language. Thus, at the level of A (elementarily) mastered basic knowledge comprehensively. This makes it possible to form a general understanding of the subject of study. Level B (pre-inter) involves more details, studying specifics. Level C involves a background study of the material in specific areas - specialization. For example, the study of banking is carried out consistently in 3 courses as follows: the course "Banking" (Level A - Principles of the banking system) - 2 semester, the course "Banking" (Level B - Banking Transactions) - 3 semester, the course "Banking" (Level C - Banking Analysis) - 4 semesters.

Synergetic development involves the creation of educational content through interdisciplinary consideration and the integration of common competencies. For example, the "Leadership and Teamwork" study has been implemented by the University in all bachelor's study programs. This involves creating teams of students who are studying in different study programs in order to solve business cases, business simulations. In this case, each participant takes part in his/her study program and specialization: manager, marketer, accountant, lawyer, IT specialist. When dealing with a case, they will exchange the roles. Such an approach allows developing "soft skills" and launches mechanisms for self-realization and interaction among students.

Practical orientation involves the creation of educational content according to business requirements. It provides for the networking of study programs by professional organizations (such as ACCA, CIMA, Cisco). Certification of individual courses and the construction of certified modules is a must-have component of a study program.

The programs are based on the following principles for quality assurance in higher education:

'Lego' - the mobility and flexibility of study programs, educational components as well as trajectories of learning, educational content, terms of training and training format;

International orientation (terminology, approaches, academic mobility, double diplomas)

Step-by-step certification - study programs should provide the possibility of obtaining certificates, professional evidence for educational components, and individual components (for example, the introduction of distance learning courses offered on different platforms in educational content). Successful study of such e-courses is certified by certificates from these employers, platforms. The next step is certification in professional organizations of a particular course. The final stage is the certification of the study program)

Practical orientation - (rejection of theoretical teaching, the creation of a practical environment for the study of courses, the solution of real business cases as an individual work of students at the rate).

Emotional intelligence - in a global digital environment, professionalism is determined by the level of emotional intelligence of an employee. This is due to the transition from the process approach in business to the design work and the individualization of functions. Currently, there is a general tendency of working outside of the office, preferably at home. Goleman (Goleman1998) indicated that EI accounted for 67% of all the abilities deemed necessary for superior performance in leaders, and that mattered twice as much as technical expertise or IQ. Accordingly, self-awareness, self-regulation, social skills, empathy, and motivation are key points to success in the professional world.

Integration involves grouping of disciplines (benchmark - 5-7 disciplines per year where 1 discipline has at least 6 credits). This principle involves the formation of system thinking among students. This is especially important in the development of the digital environment and is a counterweight to the ‘the golden fish effect’ (Hollinsworth 2014). As it was mentioned before, it provokes so-called “clique thinking”.

Focus on the individual component of training (2/3 of the total volume) - thinking professional (business case, own projects, essay, business simulation).

Competences, which gaining implies certain study programs should be classified into three categories:

Instrumental skills (cognitive, methodological, technological and linguistic skills);

Interpersonal skills (communication skills, social interaction, and cooperation);

Systems skills (a combination of understanding, sensitivity, and knowledge, ability to plan change).

Block structure of educational components.

In order to ensure the comprehensibility of educational content and the structural and logical sequence of competency formation, the study program should be structured in separate blocks.

The block of “general training” includes educational disciplines aimed at forming general competencies in higher education, in particular, emotional intelligence, outlook, organizational and communication skills.

The block of “industry training” includes academic disciplines aimed at the formation of special professional competencies in the field of knowledge of the applicant of higher education, in particular, the key to all specialties of a specific field of knowledge and supportive character.

The block of “professional/subject preparation” includes educational disciplines aimed at the formation of special professional competencies in the special of the applicant of higher education, in particular, the subject area and professional direction.

Conclusion

In conclusion, in this article the set of actions and methods, which can be implemented in order to meet the needs of the even not in future, but right here, right now. The world has changed, technological progress totally changed the way we live. In fact, there is no sphere left in our world which was not fundamentally influenced by technologies except education. The way we teach is almost the same as 1000 years ago, the only difference is projectors and PowerPoint.

However, information input and output flows have changed inside of speeding up. This implies a need in a complete change of existing educational paradigm. Creation and developing of block or ‘Lego’ structure, as well as tough work with business should be cores of change. Therefore, implementing points of view of trend makers are going to give an advantage for universities.

The study programs which are based on presented principles should also include international orientation, step-by-step certification, practical orientation as well as emotional intelligence. It is crucial to establish connection and interdependence between different disciplines in order to create synergy and gain emergence. As a result, by grouping different subjects, it is going to be possible to give students more competencies and to become more competitive in the labor market.

So that, there is a special view of expected output:

strengthening the practical orientation of programs, taking into account the real profile of the necessary knowledge, skills, competences based on understanding the trends of civilization, the system of social and individual values, the needs of entrepreneurship and business environment in the future;

ensuring the implementation of innovative learning methods based on the use of cloud technologies, the development of distance learning, individual and project outside the classroom, in the educational process;

optimization of structure and structure of curricula, teaching and methodological support of educational disciplines, aimed at strengthening the block of disciplines on professional training, consolidation and modular combination of general subjects of social and humanitarian direction in the integrated training courses, as well as the establishment of the optimal for the acquisition of the necessary complex of knowledge and acquisition of professional competencies of interrelationships between educational disciplines, periods and volumes of their teaching, duration of training;

formation of a high-level compliance oriented perspective on the development of the labor market and the business needs of the future sample component in the curriculum for the training;

taking into account the best world-wide experience of preparing employees for business by higher educational institutions and adapting curricula and curricula to the needs of developing 'double diplomas' programs.

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STUDENTS' AWARENESS OF PLAGIARISM AS AN ACADEMIC DISHONEST BEHAVIOUR

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Key words: Academic Dishonesty, Plagiarism, Detection, Punishment, Prevention.

Abstract: The phrase 'academic dishonesty' has become a very common and threatening phrase in the academic environment in many countries. It is very often related to the ruin of academics' careers as well as to the failures of many students at university. In this study we tried to investigate the Albanian undergraduate students' attitude toward plagiarism. The study is conducted in two universities in Albania: one public and one private. The number of students who participated in the study is 88. Data from the study show that even though students understand that plagiarism constitutes a dishonest behavior, still the majority of them (78%) admit to have plagiarized at least once during their time at university. The results also indicate that all forms of plagiarism listed in the questionnaire are used by students. The lowest form of plagiarism was paying someone else to prepare their assignment and the highest form was copying sentences or paragraphs from another material without citing the source. The most important finding from this study is that only few students (14%) reported to have been punished for plagiarism. In conclusion, the present study shows that plagiarism is a serious problem in Albanian universities which calls for more studies in order to understand the academic and social factors that encourage this behavior and the measures to be taken in order to prevent it from happening in a fast and effective way.

Introduction

Academic dishonesty (cheating and plagiarism) does not seem to be a phenomenon that is related exclusively to developed countries or developing ones. On the contrary, findings from different studies show that both cheating on exams and plagiarism have become a widespread phenomenon having a negative impact on the academic environment (Ahmadi 2014; Magnus et al. 2002; Davis et al 1992; Crawford & Cloete 2015; Collison 1990; Noah & Eckstein 2001). What makes it worse is that students understanding of the seriousness of academic dishonesty and the way it will affect their career in the future is very low (Bunn et al 1992; Cho & Hwang 2017; Ibegbulam & Eze 2015).

The factors that assist the spreading of academic dishonesty are many. However, the most prominent factor remains the internet and technology (Srikanth & Asmatulu 2014; Campbell 2000; Ashworth et al., 1997; Roberts 2008, Sprajc et al. 2017). Nowadays, internet is available everywhere and almost any one has access to it. Technology along with internet makes the finding of any kind of information required easy and fast and when no punitive sanctions are taken to discourage these behaviours, they represent a means to have fruitful harvest without much efforts. In addition, other factors are blamed for encouraging plagiarism such as poor information literacy and differences in language skills (Yeung et al 2018; Ashworth, Bannister & Thorne 1997; Bloch 2008; Pecorari 2003; Abasi & Graves 2008).

In literature we find that students have different reasons for plagiarizing but when their intention toward it is considered, the term plagiarism falls in one of the two categories: intentional or unintentional (Rabab et al. 2015). Intentional plagiarism as might be easily understood refers to cases of consciously copying or paraphrasing a text without citing the source, whereas unintentional plagiarism occurs when students are not aware of citation techniques and how to use them and as the results students do not even have an idea

that what they are saying are ideas of someone else. Despite these typologies, plagiarism remains an unacceptable phenomenon that should be punished whenever it is detected.

Students movement on December 2018 showed that Higher Education System in Albania is suffering from severe problems. Among them the most prominent problem was the phenomenon of plagiarism among the students and the academic staff members. A study by Lamallari et al. (2016) showed that plagiarism and self-plagiarism among the second group is not only a serious problem, but also an unpunished behaviour. Unfortunately, there is a gap in literature in regard to the level of academic dishonesty among the Albanian students. Neither do we know about the academic and social norms that encourage this behaviour in the Albanian education context. For this reason, the present study represents an attempt to somewhat fill in this gap by answering the following questions: (1) what is the level of academic dishonesty (plagiarism) among Albanian students? (2) what is their attitude toward plagiarism? and (3) what are the forms of punishment taken for the prevention of this behaviour?

Method

One questionnaire was the only instrument used to collect data in this study. The questionnaire was modelled after the study of Ahmadi (2014). To answer the questions raised in the study the first seven statements are separated and discussed separately whereas the last four statements are discussed together. The first seven statements in the questionnaire ask the students about their personal experience of plagiarism, giving them the opportunity to choose between the different types of plagiarism generally used by students. The last statements explore students' attitude toward plagiarism and the punitive measures against the plagiarism applicable at their universities. All items in the questionnaire were structured in Likert format going from Never (1) to Frequently (5) for the first Table 1 and from Strongly Agree (1) to Strongly Disagree (5) for Table 2. The reliability of the questionnaire was checked through Cronbach's Alpha which turned to be satisfactory (.849). Descriptive statistics was used to find the frequency and percentage for each item in the questionnaire. SPSS was used to calculate the percentage and frequency as displayed in Table 1 and 2.

The questionnaire was distributed during seminars and students decided to participate on their own free will. To avoid any kind of misunderstanding the questions in the questionnaires were written in Albanian.

Participants- Eighty-eight undergraduate students from two universities ('Albanian' University in the capital city of Albania and 'Aleksander Moisiu' Durrës) took part in this study. Fifty-two (81%) of the participants were females and thirty-six (19%) were males, ranging in age from 18-26. They were enrolled in bachelor programs that offer training in English Language and Literature as well as Teaching English as a Second Language.

Results

All data from the study are displayed in Table 1 and Table 2. Table 1 shows the frequency and percentage of students' answers in regard to their individual experience of plagiarism in course assignment and the types of plagiarism they use. Data from the study show that the highest scores of not committing plagiarism are recorded in statement 4 and 5 where almost all of the students (85 students out of 88 and 82 students out of 88) admit to have never paid someone to prepare their assignment for them or to have ever used their friend's assignment as their own. Based on our own experience as a lecturer at university, we believe that this finding can be explained with economic situation of students where the majority of those who attend public universities cannot afford to pay for their assignment and what is more important course assignments are not taken seriously by the students since they cover a small percentage of the final evaluation in every course. Also, ninety-one per cent (90.9%) of the students admit that they have never submitted the same course assignment in different subjects nor have they submitted their friends' paper as their own. Almost the same pattern is found in statement 1 "*You have submitted a whole paper taken from books or internet*" where the majority of the students (75%) admit to have never done that.

TABLE 1. DESCRIPTIVE STATISTICS FOR STUDENTS' PERSONAL EXPERIENCE AND TYPES OF PLAGIARISM

Plagiarism	Freq.		Oft.		Som.		Rar.		Nev.	
	F	P	F	P	F	P	F	P	F	P
1-I copy the whole paper from books or internet and submit it as it is.	5	5.7	2	2.3	15	17	24	27.3	42	47.7
2-I copy sentences/paragraphs from books or internet without citing the source.	15	17	10	11.4	28	31.8	17	19.3	18	20.5
3-I have submitted the same paper to different courses.	3	3.4	1	1.1	4	4.5	19	21.6	61	69.3
4-I have paid other people to prepare my course assignment.	1	1.1	0	0	2	2.3	1	1.1	84	95.5
5-I have submitted my friend (s)' paper as my own.	0	0	2	2.3	3	3.4	55	62.5	28	31.8
6- I have used another author's ideas as my own.	1	1.1	6	6.8	6	6.8	30	34.1	45	51.1
7-I have paraphrased sentences/paragraphs or changed the words without citing the source.	1	1.1	13	14.8	19	21.6	29	33	26	29.5

Source: Own
Note: Freq. (Frequently), Oft. (Often), Som. (Sometimes), Rar. (Rarely), N. (Never), F (Frequency), P (Percentage)

The highest form of plagiarism (60.2%) is found in statement 2 "*You use sentences/paragraphs without citing the source*", and statement 7 where 37.5 % of the students admitted to have paraphrased without citing the source. The lowest form of plagiarism is sentence 6 where 13 students out of 88 (14.7%) reported to have used another author's ideas as their own without citing the source. These findings make us conclude that students are making attempts to complete their duties on their own, but the level of success and honesty in this struggle is to be questioned. This conclusion is supported by the fact that each of the items listed above is selected by at least 3 students. Thus, the highest frequency is achieved by statement 2 (60%) and the lowest form of plagiarism is the use of another authors' idea without citing the source (14.7%)

TABLE 2. DESCRIPTIVE STATISTICS FOR STUDENTS' ATTITUDE TOWARD PLAGIARISM										
Plagiarism	**SA.**		**A.**		**N.**		**D.**		**SD.**	
	F	P	F	P	F	P	F	P	F	P
1-I am aware of having done plagiarism more than once during my time at university.	5	5.7	56	63.6	8	9.1	16	18.2	3	3.4
2-I have been punished at least once when I have plagiarized.	2	2.3	6	6.8	7	8.0	18	20.5	55	62.5
3-I consider plagiarism as a normal behavior.	3	3.4	10	11.4	14	15.9	21	23.9	40	45.5
4-I believe plagiarism is a widespread phenomenon in my university.	20	22.7	44	50	10	11.4	9	10.2	5	5.7
Source: Own Note: SA. (Strongly Agree), A. (Agree), N. (Neutral), D. (Disagree), SD. (Strongly Disagree), F (Frequency), P (Percentage)										

Concerning the students' attitude toward plagiarism, data collected through the questionnaire show that students are aware of plagiarism as an unacceptable academic behaviour. The results indicate that 69.4% of them do not consider plagiarism as a normal behaviour at university. Despite this fact, 78.4% of the students admit honestly that they have plagiarized at least once during their time at university. Even larger is this number when comes to the perception students have in regard to the level of severity of this problem at their university. Almost all students (84%) have the impression that plagiarism is a widespread phenomenon. Given that this number is greater than the number of students who have plagiarized it means that even students who have never used plagiarism as a means to earn a good grade have seen at least one of their friends doing so which makes the situation even more serious. An interesting finding is that from 79% of the students who admit to have plagiarized at least once only a very small number of them (17%) report to have been detected and punished for this behaviour. As can be easily understood, lack of punishment in cases of plagiarism is the very problem at Albanian universities.

Conclusion

The present study aims at investigating students' beliefs and attitude toward plagiarism in the Albanian academic context. Students were asked if they commit plagiarism and if they consider it as a normal and widespread phenomenon. The majority of the students admitted honestly that they have plagiarized more than once (78.4%). In our view, the number of students admitting to have plagiarized during their time at university is seriously high. What makes this situation more alarming is that data from the study show that students (69.4%) are aware that plagiarism is not a behaviour that must be tolerated and yet a large proportion of participants report to do it. In addition, even a greater number of students (84%) consider plagiarism as a widespread phenomenon at their universities.

We believe that there is a reasonable explanation for these findings. On one side, the number of students considering plagiarism a phenomenon at their university (84%) which outcomes the number of students

who admit to have plagiarized at least once (78.4%) shows that students are not referring only to their experience, but also to their friend (s)'. At a certain extend this explain why we have a large number of students admitting to have plagiarized. We believe that when a considerable number of students engage continuously in an activity, no matter if it is right or wrong, and when no preventive measures are taken to stop it, more students will follow, until it becomes a norm. this is supported by the fact that only 17% of the students admitted that they have been punished for plagiarism. This means that Albanian students are not afraid of plagiarizing which feels to be quite safe in Albanian context. These findings are is in line with findings from other studies which conclude that lack of punishment for plagiarism encourages this behaviour (Mu 2010; Sikes 2009).

According to the data, all types of plagiarism listed in Table 1 are applied by students to a larger or smaller degree. This means that Albanian students feel at ease to use one form of plagiarism or another without worrying about the consequences. The lowest form of plagiarism was to pay someone else to prepare their assignment (only 3 students out of 88 responded to have done it), followed by the statement that students submit their friend's paper as their own (10%). O the one side, this can be explained with the economic situation in Albania, where most of the students cannot afford to pay for their assignments. On the other side, no one is willing to give their work for free. However, more studies are required to consider which social factors influence this behaviour and at what extend. The highest form of plagiarism was related to taking some parts from another author's text such as sentences or paragraphs without citing the source (60% of the students). The fact that only 25% of them admitted to submit the whole paper by another author as their own, shows that academic honesty is not totally lost and if the right ways and tools are used to inhibit plagiarism and encourage the academic honesty, very soon we will have a different situation.

In conclusion, we suggest that the first step to decrease plagiarism in Albania is to inform students through special courses or training about what it represents in the academic world and how to avoid it. Knowledge that plagiarism is not an acceptable behaviour is not enough to rule out its appearance. This is in line with Curtis et al (2013)'s study which reported that students tended to plagiarize less after being offered an online training of what is plagiarism and how to avoid it. Furthermore, universities should provide professor with software which detect plagiarism and as a result limit its occurrence. Martin (2005) found that when students knew that a plagiarism detection system was used, they are less likely to plagiarize. We work under difficult conditions where the large number of students per course and the lack of tools to check plagiarism makes its detection almost impossible. Finally, the most important thing to emphasize is that plagiarism should not only be detected but also punished. If students know that there are consequences for their behaviour, they will do anything to avoid plagiarism.

Finally, we must recognize the limitation of this study. The number of students who participated in the study is not large: only 88 students from two universities. Second, the students who decided to participate in the study might have been those who have plagiarized more than the rest or who have not been totally honest in their response. It is hard for students of any culture to admit that they have engaged in some dishonest academic behaviour in order to earn what they do not deserve, but for the Albanian mentality this is even harder. Third, we did not take into account the grade level of the participants (Park, 2003). More studies are needed to understand the rate of plagiarism among Albanian students and the factors encouraging it in the Albanian educational context.

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UNIVERSITY AS A CORE OF E-LEARNING ECOSYSTEM

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Key words: E-learning, collaboration learning, information literacy, data analysis, social start-ups

Abstract: The concept and the main stakeholders of E-learning ecosystem are investigated at the article. University is regarded as a center of such ecosystem due to skilled knowledge providers and technical equipment availability. Studying different cases authors prove that higher educational institution plays a driver role in different projects, especially social start-up projects. Different models of partnership between universities and other stakeholders are considered. In authors' opinion, one of the most perspective collaborative projects are in frame of "students – schoolchildren" due to effective knowledge transfer. Such kind of cooperation can fill the gap between school and university education. Particularly the framework of e-learning project in financial literacy for orphans totally prepared and executed by students is considered. The ICT tools are very actively used in these initiatives aiming to develop high demanded skills as critical thinking, creativity and complex problem solving. As a result, schoolchildren are receiving a toolkit for basic data analysis, developing own business plan and adopting evidence-based decisions. The authors prove that E-learning projects are able to improve both information and financial literacy and also increase the level of inclusivity into education of weak and socially unprotected children from orphanages. The article will be useful for the representatives from universities, orphanages, companies who eager to boost the level of their social responsibility. The aim of the research is to reveal different types of cooperation under social projects between higher educational institutions and other stakeholders, using wide range of ICT e-learning tools as well. In addition, to develop a set of recommendations to the universities of collaboration roadmap.

Introduction

Nowadays E-learning has become an integral part of educational process. The ICT instruments of E-learning can be in widespread use by different stakeholders of educational space. Moreover, stakeholders can find common interest between each other's using ICT instruments. Higher and school education are different words. The case of university and school cooperation in E-learning is extremely important and allows to skip the gap between university and school education. In this context, the focus on the critical role of such skills as complex problem solving, critical thinking, creativity was proposed. At the same time, such cooperation with utilizing ICT instruments support the wider dissemination of information about modern study programs and future profession for potential students. In addition, not only for students and pupils such cooperation is useful but also for teachers. Usually university professors are occupied with scientific research and they are able to share with research results of modern science with school teachers. That is why the courses of career enhancement for school teachers designed by university professors are important today.

Methodology

The research is based on analytical review of literature devoted to problems of effective interaction between universities and schools, the choice of the most optimal model, which allows to achieve effective results. Also qualitative research methodswere used. In particular methods of focus groups and structured

interviews were used for identifying the needs of stakeholders and the essential and high-demanded competences to be provided by e-learning ecosystem. A method of system analysis was applied to examine the relationship between elements of the proposed E-learning ecosystem, which are: university, schools, orphans, the Ministry of Education and Science, industry, non-governmental organizations. Additionally, based on the obtained results, a road map of the effective collaboration between the university and the school was developed.

Literature Review

The partnership between universities and schools has a long history. For instance, in USA early phase collaboration supported schools for children from elite families or from families of scientists. Now, the priorities have changed and partnership is aimed to patronize schools where children from poor families where represented (Worrell 2019, 44-55).

The 3-pillars model of collaboration was described in the paper (Mauri et al. 2019, 23-27; da Silva 2019, 217-232), where young teacher students, school experienced teachers and university professors were involved. The research was aimed to study the specifics of their roles in the model. Moreover, the researchers proved that this type of model facilitate peer coaching and improves study programs making them more applied. Such type of university-school cooperation is enhanced in general. Indeed, such cooperation direct on different ways and possibilities of teacher career development (Sokka-Meaney and Haring 2019, 36-51).

There is also other 3-pillar model which is used in Finland, South England, Hungary, Japan. Within this model association which supports university-school partnership offers to upgrade teacher's professional skills working together in non-hierarchical cooperative: school teacher-university researcher and senior leader. This allows for university professors keep their practice up to date and to collaborate in school-based research (Passy, Georgeson and Gompertz 2018, 539-555).

The work with focus group where physical training teachers, school directors and PhD students were as representatives was aimed on studying previous experience which was related to implementation of Comprehensive School Physical Activity Program (CSPAP) (Goh, Webster and Breassou 2009, 238-257). Within this program new leaders of physical activity in the teachers' face will be prepared. The study demonstrates problems of different representatives of school staff. With the reference to them authors offered ways to improve study programs for leaders of physical activity preparation. The same type of collaboration between university and school was explored by Bu and Hun (2019, 200-219). They studied the basic requirements to the educational reform in China, where teacher's role should be changed – the old approach was about knowledge transfer from teacher to pupil, the new is about common creation of knowledge. The core of collaboration with university was to improve study plans in order to growth new generation of leaders among teachers. Pre-practice teacher projects executed in common way with

universities often are used by Australian educational institutions (Lemon at al. 2018, 81-97). It is proved that the quality of the future teacher as a leader depends on different university-school partnership. Korea also effectively uses pre-practices common teachers and university projects (Ko 2018). Moreover, this became a huge database which reflects the effects of implemented educational reform. This allows to make institutional changes in educational system of all country.

Some universities in Great Britain bear the management of the school for further growth of potential students. There is research which show the problems of such collaboration and its solution (Brown 2019, 22-34).

Cooperative model University-school helps develop career of PhD students. Thus, research shows (Chamely-Wiik et al. 2019, 72-81) that demonstration scientific results by PhD students in chemistry to STEM pupils of high schools promote improvement of their communicative skills. Such performance is under the program GK-12 program financed by the National Science Foundation of USA.

Some models of partnership are aimed of common empirical research, where pupils can play role both as participants of research and investigators as well. Existed study shows the variety of the benefits for universities and schools (Asbrand and Bietz 2019, 78-90; Solvason, Cliffe and Snowden 2018, 589-602).

Universities use schools for meeting scientific research by publicity. Such type of partnership is provided by National level in Israel. The fields excursion to University labs are organized for high school students. Such tours allows to be closer both school and universities (Tsybulsky, Dodick and Camhi 2018, 1247-1272). The similar Government programs is in Indonesia and Columbia are also studied (Situmorang, Gultom and Hamid 2018, 249-266; Alvarez 2018, 64-81).

There are also common projects of university students and pupils from elementary school. It is proved high level value impact of children development by using designing process. Moreover, representatives from university and schoolteachers designed open space in school yard as continue of the classroom and studied how spatial planning influence on study process (Menconi and Grohmann 2018, 71-86).

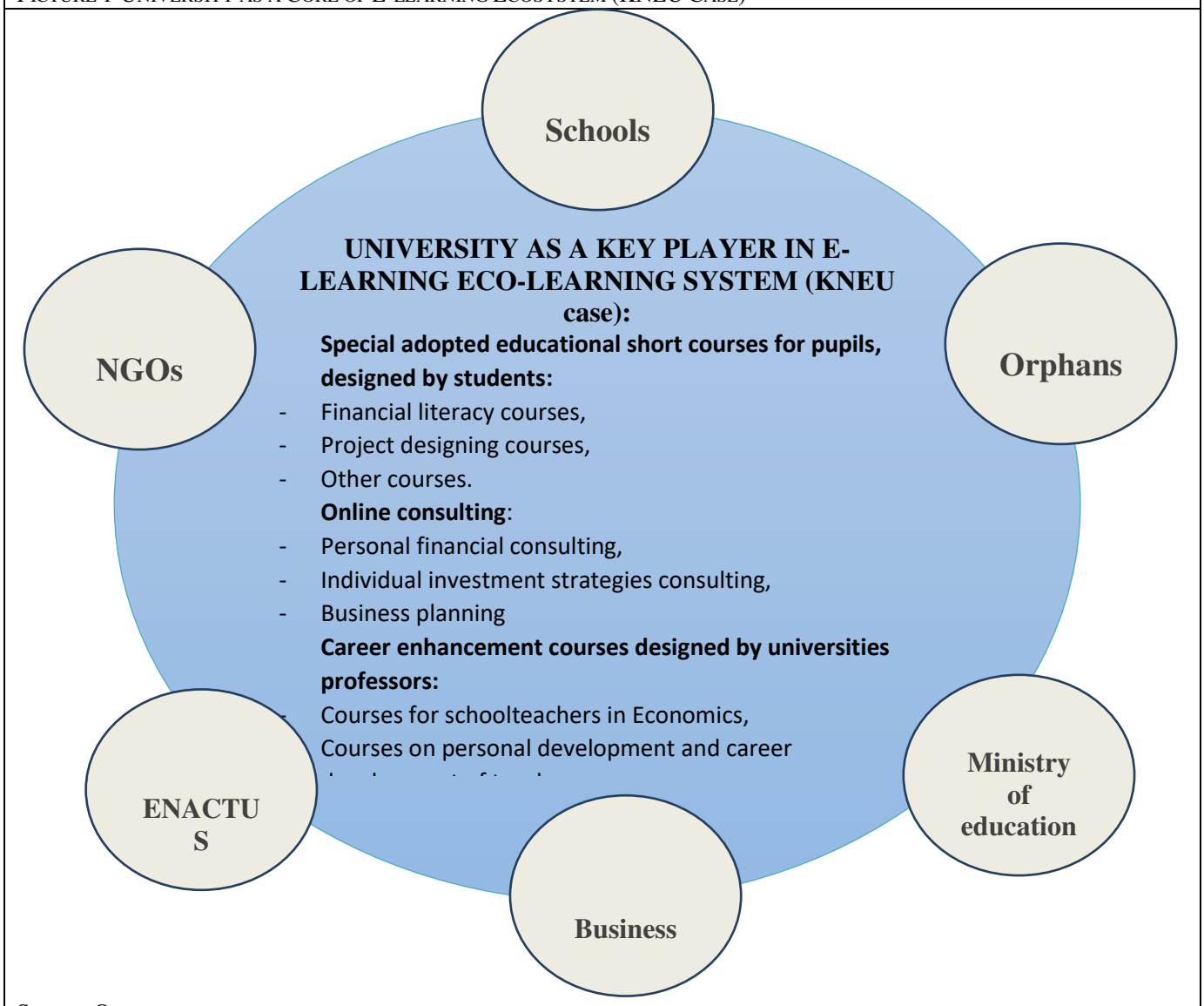
It is also argued that universities do not use all potential of the collaboration with schools (Constable 2018, 39-62). In addition, author suggests that offered ways of conducting research could be more interesting and adopted for high school students. This can be a reason why schools are not motivated to take part in such type of performance.

The partnership programs of common summer schools, for example, in STEM field increase the probability of high school students to build STEM career in future (Kitchen, Sonner and Gerhard 2018, 529-547). Such events help to understand the possibilities of chosen direction in STEM and also allows to make career planning more efficiently.

Nowadays the university professor(s) and schoolteachers' collaboration is very important in order to learn future teachers and feeling modern tendencies and challenges in the modern world (Casale and Thomas 2018, 260-269). Therefore, the development of all effective forms of corporations is in a high demand and requires supports at all levels (school, university, ministries of education and science and other government authorities.

E-learning ecosystem (KNEU case)

PICTURE 1 UNIVERSITY AS A CORE OF E-LEARNING ECOSYSTEM (KNEU CASE)



Source: Own

The University is a key element of the developed ecosystem, since it the only part that possesses all the necessary components for the qualitative development and implementation of courses based on the use of electronic technologies.

University professors have both expertise in a certain field of knowledge, and the skills of presentation and the ability to convey knowledge to the audience. In addition, the involvement of professors from different faculties (specialties) allows for the creation of innovative, modern, tailored courses and training

projects, the emergence of which on the basis of other institutions is much more difficult or impossible due to the lack of skilled personnel.

Students can simultaneously act as authors and recipients of a variety of E-courses or E-projects. Thus, the use of various E-technologies can significantly improve the quality and efficiency of knowledge absorption, as well as improve communication between staff and students. On the other hand, students act as developers of modern educational projects. For example, on the basis of KNEU an educational project on financial literacy for schoolchildren (particularly orphans) is developed.

Finally, the university has all the necessary technical capabilities and infrastructure to produce such courses. In particular, classes, recording equipment, technical staff with skills, such as video mounting. In addition, an important part is the availability of a university site, on which all the materials for the course (video lectures, presentations, links to external resources, tasks etc.) can be published.

So, the combination of these elements allows to achieve a synergistic effect and do truly unique projects.

Schools are important players of the system and one of the main recipients of the product. Thus, users of E-courses can be both teachers and pupils. Projects for teachers are designed to upgrade their knowledge of the key subject or to provide new knowledge on related subjects (e.g. improve presentation design skills, deepen the knowledge of financial mathematics for the teachers of the economy). Schoolchildren through E-learning projects can deepen their knowledge of certain subjects or themes, mostly narrow-profile (for example, to study in detail the economic history of Ukraine or the current state of the banking system), to acquire entirely new knowledge (for example, financial literacy or project management courses), to prepare for the exams. Passing any of these courses will not only enrich pupils with new knowledge, but also greatly facilitate the process of adapting to the requirements and standards of university education.

Orphans – act as recipients of E-learning projects. Therefore, the students of the University developed a project to improve the financial and digital literacy of those pupils. This will reduce the risk of irrational and ineffective financial decisions in the future, as well as improve the chances of employment of such children.

Ministry of Education and Science of Ukraine and other authorities in the sphere of regulation of education (higher and secondary). They develop general rules for the university and school functioning, provide them with special licenses. In some cases, such they can play a consultative role in terms of the relevance and need of certain courses, especially in the context of university-school cooperation, since they have a general view of the current situation in education. In addition, they can serve as a facilitator and mediator in some projects, again through a wide network of contacts. In some cases, the authorities may partially or fully provide funding of E-learning projects.

Business representatives play a triple role in this process. First, they act as recipients of knowledge through E-learning process. Professors and / or students can develop special E-courses aimed to provide a special knowledge necessary for business. The main advantage of such training is that it can be carried out through the Internet, and therefore at a time convenient for the employee and without the need for physical presence in the audience. In addition to courses, online consulting services can also be provided. Secondly, business representatives may become a co-authors of some courses by showing real cases and disclosing features of the company (for example, video tours to the office), as well as advising on the skills that are most needed by employers and should be formed during the course. Thirdly, companies can support the development and implementation of a particular E-project by providing either funding or equipment and other facilities. Participation in such projects for the companies has several advantages. In particular, this is part of corporate social responsibility, which is an important component of company management and positively affects its financial results. Also, by supporting such projects, employers can directly influence the quality of training of future professionals and select the best students even at the stage of their study at the university.

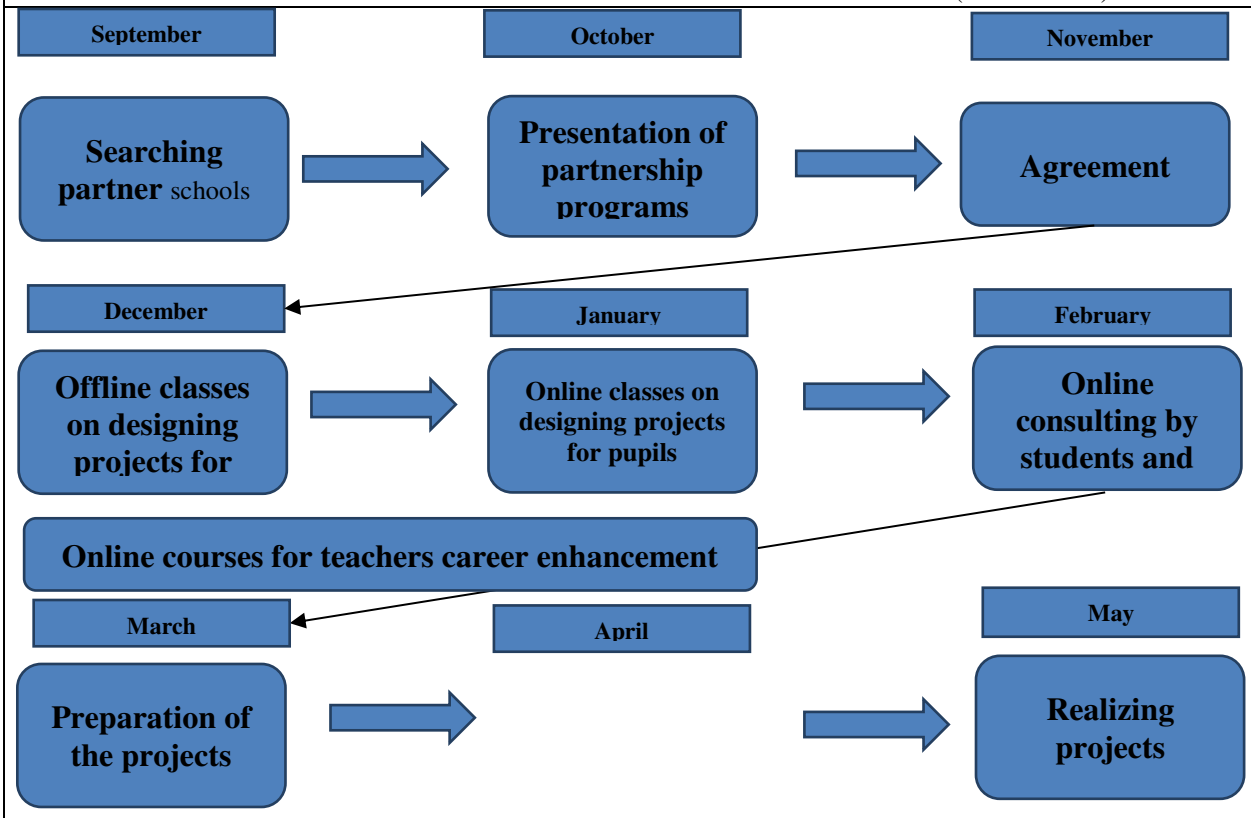
Enactus – the program plays an important role in designing projects by KNEU students as allowing them to do things with powerful social impact and immediate feedback.

NGOs, as well as companies, can act as courses participant, and their co-authors as consultants or lecturers. In addition, they can provide media support for projects developed by the university.

The roadmap of effective university-school collaboration

The performance in university-school model of collaboration is characterized by linking with the beginning and the end of study year. Early stages of university-school collaboration have non-organizing character and the personal of both has a feeling of overload and does not see the benefits of such cooperation. Therefore, there is a need of designing a roadmap of collaboration during the study year. Below we offer an example of such cooperation between Young investor's school, corporative finance and controlling chair in KNEU and different secondary schools.

PICTURE 2 ROADMAP TEMPLATE OF EFFECTIVE UNIVERSITY-SCHOOL COLLABORATION (KNEU CASE)



Source: Own

On the picture 2 it is easy to see the collaboration process during the study year from September to May. Working groups of university professors search the schools which are ready to cooperate and represent for school's different programs and sign the agreement of cooperation. Among them was the blended course (offline and online) of designing micro projects. At the same time schoolteachers have a possibility to take Online courses for teacher's career enhancement in designing projects and how to teach pupils to develop them. Then KNEU students and university professors, who lead Young investors school, support high school students and their teachers online using different messengers: Telegram channel and scrum sessions with different groups via skype. After project teams represented them at National contests of the projects.

In our opinion such roadmap of cooperation is quite understandable for both schools and university. Moreover, it allows to build a strong ground for further partnership model between university and school and to plan their participation in different contests.

Skills, developed through E-learning projects

According to World Economic Forum forecasts, the top 3 skills that most will be appreciated by employers in 2020 are the following: complex problem solving, creativity and critical thinking. In our opinion, the formation of such expertise should be a core element of school and university education. The critical thinking skill is relatively easy to integrate into training courses by encouraging discussions and debates on current topics, setting controversial questions that do not have a clear correct answer. At the same time, the formation of the first two skills is rather difficult to carry out during the study process, because they require much more efforts and time from both from the teacher and the student. Typically, gaining this experience is based on interdisciplinary knowledge, blended learning, and extracurricular time.

In our opinion, participation in E-learning platform will allow students to develop the skills that are most valued in the labour market. Project development is a practical case for complex problem solving, as students will have to go through all stages of classical project life cycle: the formalization of an idea, project planning, project implementation, results evaluation and new iteration. At the same time, there is also the training of creativity skills, which is due to two reasons: firstly, students will not be limited to the formal framework and requirements that usually exist in the university course, and secondly, in order to interest the audience (pupils), it is necessary to use new, interesting methods of presenting a material. Additionally, work on the project will require other important skills, including:

- ability to work in a team and effectively distribute duties among team members;
- ability to negotiate with project stakeholders (including university administration, schools, sponsors etc.);
- emotional intelligence and emotional leadership, as work will be carried out in close cooperation with different groups of stakeholders;
- mentoring, which naturally arises in the process of interaction with schoolchildren.

All of these skills are elements of the so-called soft skills, which at the moment are no less important than hard skills, that is, the actual knowledge of the chosen profession.

At the same time, core competences such as financial and digital literacy will be formed and developed by both groups (students and pupils). The skills of financial literacy are essential for young people, and especially for orphans. Children that are living with parents can get the necessary knowledge during every day routine, for example, how to distribute family budgets between family members and current or capital expenditures, the optimal share of savings and investments. Unfortunately, orphans do not have this opportunity. That is why such projects are extremely important.

In our opinion, financial literacy training should consist of the following components:

- Public Finance – types of taxes and the importance of paying them, the role of central and local government in economic system etc.;
- Personal Finance is the main component of financial literacy and should address the following issues: income generation and making informed spending choices, savings, investment tools and insurance;
- Financial Markets – should be considered in close connection with the previous component and form the following knowledge. Interaction with banks: the choice of stable bank for deposit account, the choice of currency, the term and purpose of borrowing. Interaction with insurance companies, especially in terms of life insurance. Interaction with financial markets in order to form optimal investment strategies and rules for safe investment;
- a separate important component is the formation of entrepreneurial skills and practical knowledge of developing a business plan with such important parts as creating an idea, funding sources and dealing with investors, developing a sales budget, spending budget, forecasting and quantifying potential start-up risks.

Digital skills will be acquired and trained by using such programs and tools as Skype, Google Cloud, MS Word, MS Excel, PowerPoint or even more complex tools like R or Python programming languages.

Conclusion

Different types of cooperation are possible in frame of E-learning ecosystem where university is a key player. As experience of Young investor school and Corporate finance and controlling chair at KNEU shows that the modern ICT instruments make this partnership variable and effective than ever. The proposed E-learning ecosystem takes into account the interests of all stakeholders on a win-win basis. The interaction of all participants of the system will allow to create truly unique and innovative educational products focusing on the diversity of expertise, participants' specialization and ways of communicating information.

All stakeholders get wide set of benefits taking part in this collaboration. Considered models of university-school partnership include a lot of variants and allows to develop different skills both students and skills working in common projects taking different roles. Their social projects or startups can be successfully represented by at different national and international contest and realized in future. The study demonstrated positive effects of such participation for students, businesses (as future employers) and high school students as well. As a result of the study, key skills acquired by students and schoolchildren while participating in educational E-project were identified and analyzed. In the process of working on a project, students not only help children, particularly orphans, but also increase their own expertise, project management knowledge and mentoring skills.

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INTERACTIVITY OF E-LEARNING AND THE MOTIVATION OF LEARNERS

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Key words: interactivity, e-learning, students' motivation, information skills.

Abstract: An important objective of the study was the relationship between the quality of the on-line learning environment and motivation of the students. How to motivate learners to study on the Internet? What educational activities may help learners to develope their individual potential? What kind of active methods of teaching learners prefer? How to organize an on-line course, develop didactic materials, so that these elements would motivate students and encourage them to learn? Do the information skills of learners determine their effectiveness in e-learning? Is the level of information skills related to the level and type of motivation of learners on the Internet? We will try to answer these questions by presenting the results of our own research. A measurable effect of the research was to gain knowledge about learners' skills and the type of educational activities that involve learners via the Internet.

Motivation is a key element of teaching and learning, especially in e-learning. In this research, the students were asked to explain their opinions about the factors increasing their motivation. The surveyed students mostly declared an internal source of motivation in learning, which seems obvious due to the earlier decision to study online.

Interaction has proved to be a key factor in online learning. The research results show that interactive learning environment by differentiated and interactive resources included podcasts and discussion foras, quizzes, tasks and voting affect students' motivation in the online courses. The outcomes suggest that active participation of the students and permanent presence of the teacher in the course - especially by asking questions, permanent common contact, monitoring of the activities within the course, immediate and frequent feedback with reference to the correctness of tasks performed and activity, as well as student's progress and rewarding of the effects of their studying - strengthens and progress student motivation. Application of different teaching-learning methods, from lecture to group work is an important issue too. It is also stated that being efficient in the scope of information skills reinforces students motivation and satisfaction stemming from online studying.

Instructors should facilitate all types of interactions in their distance learning courses when possible and appropriate.

Introduction

As a result of social, cultural and engineering changes taking place in the Polish universities, remote educational technologies are used more and more willingly with the aim to support the educational and training technologies. Usually, blended-learning is applied, which is caused, among others by the possibility to reinforce traditional classes with the access to didactic material irrespective the time and place, the possibility to study in one's pace and the individualization of teaching. In the academic environment the fear of using e-learning courses is still visible. As this form of learning requires the independence and systematic work, determination in achieving aims, ability to monitor the progress of own education. Many students do not see it as the chance for their development. The reasons of being reluctant or giving up the remote learning may be found also in the low level of motivation and engagement of the students, as well as, unfortunately, the lecturers. Still many courses within e-learning platforms do not manifest high level of didactic quality.

Each experienced teacher knows that without appropriate involvement of the students in their studying even the best designed learning environment would be ineffective. Motivation thus is the key element of teaching and learning, especially in e-learning. There are many theories of motivation, however, all of them are linked to the feeling of self-effectiveness, which is the source of satisfaction and drive for action. It is emphasized by Albert Bandura who states that „people who have a low sense of efficacy in given domains shy away from difficult tasks, which they view as personal threats. They have low aspirations and

weak commitment to the goals they choose to pursue. When faced with difficult tasks, they dwell on their personal deficiencies, the obstacles they will encounter, and all kinds of adverse outcomes rather than concentrate on how to perform successfully" (Bandura 1995, 11).

Every effort should be undertaken to make sure that the care for the learner's motivation was not a single act, but thought over and planned process. According to Rosemary M. Lehman and Simone C. O. Conceição (2014, 3), one of the main problems related to on-line education is, among others, lack of learner's motivation to complete the courses. Motivation model, Model Time Continuum (Wlodkowski 1985), by Raymond J. Wlodkowski distinguishes three key periods in the learning process in which motivation is the most important: a) beginning of learning process, b) during this process and c) end of learning process. Separate factors which require different strategies motivating learners are related to these three periods. The factors which are significant at the beginning of the learning process include attitudes and needs. The strategies at this stage should concentrate on supporting the engagement of the participants with the actions of „icebreakers" type by defining clear, significant for the students' purposes of the course and different strategies which would help the students understand what would be needed to be successful in learning. It is suggested that the instructions allowed the choice and independent managing the tasks by the learners and they referred to significant experience, already familiar to students. During studying, stimulating environment should be maintained and the participants should be taken care of by questions asked, good humour, differentiated presentation style and teaching methods (from among appropriate to be applied in group work and discussion). Starting of motivation process at the end of studying within a course should be based on current feedback informing the student of their progress and building their awareness of competence acquisition. Taking up the activities aiming at reinforcing of learner's motivation within e-learning focus should be paid on four components, distinguished John M. Keller ARCS motivation model (Keller 1987): attention, significance, certainty and satisfaction. Inciting thereof and maintaining on appropriate level is dependent both upon the activities and the manner of communication of the teacher with the course participant, by appropriately prepared instructions, tasks and training material, as well as the shape of the course itself and manner of course navigating (Hodges 2004, 5).

The problem of interactivity in e-learning in the context of learners' motivation has been the object of interest of online education researchers for a long time; they tried to understand the meaning of professional preparing and implementation of the course. Similarly, as in the conditions of traditional learning, motivation was identified as a significant factor in online education environment. Charles Wedemeyer, one of the remote education precursors (1981, after: Conrad and Donaldson 2011, 6-7) was of the opinion that the key factor determining the didactic efficiency of the learning process in remote form is the learner's motivation. He underlined the role of the teacher whose duty is to support and develop internal motivation of students through external strategies. Engagement may be incited thereof by

modelling, developing of thoughts of students and taking care of the link between the members of educational community. The teacher should ensure high level of interactivity and participation, which is also underlined by Greg Kearsley (after: Conrad and Donaldson 2011, 5). Börje Holmberg manifested a bit different approach towards this problem (after: Moore 2007, 69-75), as he underlined the necessity to involve the student in the assessment of suitability of didactic material and the freedom of choosing them. He stressed appropriately designed instruction material and inter-relations between the participants of the remote educational process, which make up the basis of the development of the feeling of belonging to educational group. Robert Gagne and Marcy P. Driscoll (1988, after Conrad and Donaldson 2011, 7) claimed that proper external conditions are required to increase the motivation of online students. They include, among others, the following: presenting of the teaching strategy, different communication possibilities and presenting of didactic material, success expectation and positive attitude, feedback – supporting the creativity and original activities of students.

Subsequent researcher, Martina Nehme (2010, 223-239) presents the opinion that the development of social relations between the students and lecturers may decrease not only the students' fear but it may also help the lecturer engage and stimulate the students studying in the Internet environment. The research by Steven F. Tello (2007, 47-62) proves that the application of interactive strategies during the educational process influences positively the attitudes of the students and their engagement. In turn, Rita-Marie Conrad and J. Ana Donaldson (2011, 6) indicate the elements deciding on the motivation of the students, and they include: own aims set up by the students, group work, appropriate resources, interdisciplinary and authentic tasks, shaping evaluation as the interactive assessment of students' progress and their understanding of the didactic material. Also, Cathy Moore should be mentioned, who, in her book Map It: The action mapping book (2017) at multiple occasions underlined that in online training projects planning and implementation of different activities which help people exercise what they need to do not just know is essential. It affects their motivation and the will to solve nagging problems.

The sense of effectiveness being the basis of student motivation in the Internet educational environment depends undoubtedly upon the level of information skills which the student has. Skilful use of information is a key competence which has a significant meaning, especially in terms of independent studies, independent studying and learning throughout the whole life. The multitude of information, differentiated forms of presenting thereof, number and unambiguity of the quality may cause difficulties in reaching, understanding and assessment of information. Commission on Colleges, Southern Association of Colleges and Schools (SACS 1996) indicates *information skills* understood as "the ability the ability to locate, evaluate, and use information to become independent lifelong learners to locate, evaluate, and use information to become independent lifelong learners" as the factor affecting the success of a student in the process of continued learning. According to Christina S. Doyle an information literate person should be

possible to operate the following abilities: a) recognizing the need for information, b) recognizing that accurate and complete information is the basis for intelligent decision making, c) formulating questions based on information needs, d) identifying potential sources of information, e) developing successful search strategies, f) accessing sources of information including computer-based and other technologies, g) evaluating information, h) organizing information for practical application, i) integrating new information into an existing body of knowledge, j) using information in critical thinking and problem solving (Doyle 1992, 4). The enumerated abilities affect the effective work with information and constructing the personal knowledge based thereon, which can be expressed as effectively. E-students need to know what kind of information they need, how to get access to such information, what sources they should consult and how to decide whether the information is reliable and important. Similarly, as in case of traditional environments of studying, in Internet environments the need to be a self-regulating student has a tremendous significance (Whipp and Chiarelli 2004; Azevedo 2005; Dabbagh and Kitsantas 2005; Hodges 2005; Kramarski and Mizrachi 2006; Sharma and others 2007; Barnard and others 2009; Tsai 2009 after: Kiliç-Çakmak 2010, 196). Information skills are a specific intellectual tool manifested in critical reasoning and independence of studying.

Thus, it should be suspected that possessing the information skills reinforces the feeling of self efficiency, and further positively influences the motivation processes of e-learning participant. The results of research by Ebru Kiliç-Çakmak give accurate observations with reference to on-line students' efficiency, their motivation and their level of information skills. The research was conducted amongst 119 students within remote learning programmes at the Gazi Univeristy in 2008. It turned out that the most important factor in the scope of the application of e-student's information skills was using metacognitive strategies. Metacognitive strategies are especially important in planning, organizing, and self-assessing of information processes of self-regulating student. Learners who are capable of using metacognitive strategies are aware and have control over their learning process (Pintrich and others, 1991). Using of metacognitive learning strategies increases both the ability to self-assess, as well as the feeling of self-efficiency, and, by the same, allows the students achieve success, which is also confirmed by Pintrich and De Groot (1990). The significance of using metacognitive strategies in on-line learning process is underlined by the research of Hadwin and Winne (2001) and Azevedo and. Cromley (2004), which showed that tested students in e-learning environments did not use efficiently cognitive and metacognitive strategies and that was why they achieved poorer studying effects (Kramarski and Gutman, 2006). The application of metacognitive strategies being the basis of information skills allows e-students define their information needs, develop proper strategies of search, obtain the access to required information, their assessment and interpretation, as well as the assessment of one's activities and information products which are the dimension of their personal efficiency and influence the educational success of the student

(compare Kiliç-Çakmak 2010, 202). Therefore, the efforts should be undertaken for e-students to improve their metacognitive strategies ensuring learning environment in which the students would be able to plan, monitor and regulate their activities. By assigning the students different tasks, these strategies should be further developed. It would be recommended to use different interactive media, such as wikis and blogs which have been developed to ensure the students apply metacognitive strategies (Kiliç-Çakmak 2010, 203).

The challenge for all participants of online educational process is the creation of unique and stimulating learning environment, adjusted for the needs of e-students. We become more and more aware of the importance of interactivity in e-learning and taking care of initiation thereof and its development. E-learning tools proved to be insufficient to efficiently motivate the students to learn. They must be supported by appropriate pedagogical strategies allowing to initiate and maintain motivation (compare Skibińska, Kwiatkowska and Majewska 2014; Kwiatkowska 2018, 83-121).

Methodological basis of own research

The purpose of the undertaken research was the wish to know the meaning of interactivity in the process of e-students motivating in on-line courses. Intermediate purpose was to acquire the knowledge with reference to relation between information skills of examined students and the type of their motivation of online studying.

Survey research was planned and carried out on sample of 27 students of the Faculty of Education of the Nicolaus Copernicus University of Toruń in 2019. The selection of the research sample was purposeful as the students with online studying experience were invited for it. In the group of examined people there were 25 women and 2 men. Such distribution as to sex results from the specificity of educational studies, where women prevail.

The following research questions were formulated in this exam:

1. What brings most satisfaction to the respondents while studying by e-learning course?
2. What type of motivation determines the activity in the course of those examined?
3. What deficiencies did the examined persons notice in the hitherto undertaken e-learning courses which de-motivated them or made the learning process more difficult?
4. What actions by the teacher in online course are seen by them as motivating and supporting the learning process?
5. Did the communication with the teacher and other participants in the hitherto undertaken e-learning courses have any significance as to the motivation of the examined persons?

6. Did the examined persons look for external sources of knowledge to do the tasks and activities foreseen in the course?
7. What information skills do the examined students have?
8. Are the possessed information skills applied in the process of online learning?
9. How is the interactivity of online courses assessed by the examined persons?
10. Which of the features of online course support the motivation of online learners most?

In accordance with qualitative assumptions the research hypothesis was not introduced to the above questions. In the questionnaire there were 15 questions of open character and 2 closed questions. Such type of questions was to allow the respondents answer the questions freely and the researchers wanted the analysis of wider spectrum of opinions.

The results of own research

The first question related to the sources of satisfaction from studying within e-learning course. The question was answered by 88.9% of respondents. It turns out that the students indicate usefulness of the acquired knowledge and skills, satisfying of their own cognitive curiosity, possibility of independent work, access to online course and flexibility of time and place of studying as satisfactory. Thus, it may be claimed that most satisfaction arises from characteristic features of online education and it may affect it. It is worth to quote some selected answers here:

"The possibility to study from practically every place on Earth which has Internet access is the most satisfactory to me. I can adjust the course to my pace and come back to tasks."
"The possibility to learn useful things."; "Independent ability to acquire knowledge".

The statements obtained are exceptionally precious as they may testify to the readiness and maturity of the participants of this form of education.

Also, establishing what type of motivation determines the activity of students during the course and what are the motives of this activity was significant. The answers indicating internal motivation prevailed, which seems to be obvious due to earlier taken decision to study in online mode. This gives rise to optimism and hope for the real success of students of the course. Therefore, the environment stimulating studying during the course should be created to maintain and increase this type of studying motivation. One of the persons admitted that they are driven by exclusively external motivation which means that their actions do not stem from probably internal need, but what is worse, from coercion or other circumstances, not entirely depending on that person. It is also a sign that the attention must be paid to monitoring of the work within the course, to observing the students and also to developing of the system to award the required activities.

The examined persons were asked to answer the following question: What elements of the course develop the indicated type of motivation? Most of answers related to carrying out interesting tasks during the course, allowing to apply the acquired knowledge or skills in practice. Again, there were also answers relating to the usefulness of acquired knowledge and the possibility to apply it in practice and everyday life and also with reference to support the content of the course with inspiring and differentiated forms of information. Significantly, the persons who declared external source of motivation indicated the need to determine deadlines to finish certain activities. The examined persons were also to determine the deficiencies, which de-motivate them or made the studying process more difficult and which they see in the hitherto undertaken e-learning courses tasks. The attention was paid mainly to little differentiated form of resources in the course and no or delayed feedback. It is confirmed by selected answers:

"Two, among the undertaken courses were to acquire theoretical knowledge which was supported by not interesting forms of transferring the knowledge (large texts to be read, completion of the course in the form of a test)."
"Significant attention is paid by me to the fact whether the information is transferred by picture or in the form of films. I think that most people participating the courses prefer to see something than to read I become tired which involves, unfortunately, demotivation to work."
"Too much content, lack of clear and aesthetic graphic layout."

The need of differentiated forms of presenting the content, with the multimedia material prevailing is not surprising taken the fact that most of examined persons are young people aged between 19 and 24, born in digital era, defined by Marc Prensky (2001) as "digital natives". According to the observations of this researcher, digital natives decisively prefer hypertext, graphics, picture on PC or in other multimedia devices than written words. Unfortunately, large number of statements pointing the need for more multimedia material in course gives rise to assumption that students do not cope with the analysis and synthesis of information in the form of a text, and that, therefore, probably, manifest low level of information skills.

Next question referred to the action of the teacher in online course and which of them are seen by the students as motivating and supporting their learning process. Examined persons decided explaining of instructions, in other words, more legible explaining of tasks, presenting of examples as the most necessary (88.9%). Immediate feedback, the tasks allowing to verify their knowledge and teacher's engagement proved to be necessary (100%). As welcomed the students suggested presenting of interesting facts, answering e-mails, openness and experience (66.7%).

When asked the question: "Were the resources of the course in your hitherto online studying sufficient or were you forced to look for external sources of knowledge to perform the tasks and activities foreseen in the course?" nearly all persons (88.9%) admitted that they look for external sources of information to

deepen, supplement or better understand the content published during the course. Only one person declared to use exclusively published resources.

It is confirmed in the following opinions:

> *"I am permanently forced to look for external sources of knowledge."; "The resources of the course were in most cases enough to perform the task but sometimes I had to look for other sources."; "Looking for the answers on my own, I usually use also other sources"; "They were enough, additional sources were only deepening of basic knowledge".*

It was also important to decide whether the communication with the teacher in the hitherto undertaken by the students e-learning courses was sufficient for them and whether it had any meaning as their motivation to learn. Everybody unanimously admitted that the contact with the person carrying out the course was extremely important for their motivation. However, there were statements testifying to lack of or not sufficient contact with teacher. Here are selected statements:

> *"In most courses the communications with the lecturer of the course was limited (however, in case of questions mail contact was always possible). In fact, the verification of on-line access and time spent in the course was rare."*
> *"Not always, it happened that the teacher answered after a long time and I was no sure how to do a certain task. It influenced my motivation, because if the teacher does not care, our motivation drops and we do not care either."*
> *"It was differentiated, depending on the teacher. With the teachers who are strict connected with e-learning communication was flawless".*

As to the communication with the remaining participants of the hitherto undertaken online courses and the meaning thereof for the learning motivation it was difficult to indicate a tendency. The opinions were very different. Some claimed that it is valuable and motivating, for others it has no significance. Two persons admitted that it was sufficient but it did not motivate them, the same number indicated lack or marginal form of such communication and the lack of its influence onto their motivation. Thanks to the answers provided it may be concluded that the authors of online courses do not pay much attention to joint activities and tasks requiring reciprocal communication and cooperation. More attention of the authors of courses should be paid to the activities requiring the communication of the course participants and their cooperation to ensure fully constructive learning environment allowing for common negotiating of notions and creating of personal knowledge and allowing to improve the information skills by deep analysis and synthesis of communicated content, arguing of positions, expressing of own thoughts, opinions and judgements.

Examined persons were asked the following question: "Were there in your hitherto online learning process the elements of the assessment of effects of your work (tasks and activity) which would allow to compare them with the achievements of other students of online learning. Was it/Would it be motivating

for you?" Most of examined persons stated that the assessment of this type happened quite frequently, and it was a motivating experience, but, what is interesting, not for all. There appeared single opinions testifying to reluctance of being compared to others and publicly inform other participants of the course about the results of one's work. However, for most of respondents, public discussing the results of one's work had a positive and at the same time motivating impact.

Here are chosen statements:

> *"Yes, there were. They were motivating and gave me the image of the hitherto work in the form of result/effects."; "Yes. The effects of works were verified usually at the end of the course (test, final grade in performed task/project). At the very end of the course (only in case of one course) you could compare your results with other participants. However, it was not the result list that motivated further studying but the verification of knowledge and number of points achieved.";*
> *"Yes, there was such comparison and it allowed to motivate for more intensive work."; "I do not like somebody else, besides the teacher, reading my information about the task. So, I would rather not read the messages of remaining participants and not compare them with mine."*

The persons examined were also asked to define the level of their information skills. To that purpose the scale from 0 to 3 was used, where 0 - low (I cannot), 1- basic (it is rather difficult for me), 2 - average (I cope, but I am not sure about the result), 3 - high (no problems). With reference to the ability *to understand and define the problem* most of the persons examined chose average (55.6%) and high level (33.3%). Similar distribution of opinions relates to *the ability to recognize and define necessary information* and *formulate questions defining necessary information.* One person evaluated their *ability to identify potential sources of information* on basic level, but decisive majority on average and high level. Two persons admitted they have difficulties in *using the effective search strategies.* However, the prevailing statements testified to coping in this area, but lack of certainty as to result itself, and, to a smaller degree, on non-problematic use of these skills. *Using of different sources of information, including PC and other IT tools* the examined assessed at a high (55.6%) and average (33.3%) level. Only one person indicated no answer.

The ability *to interpret and assess information, as well as classify the information into appropriate and relevant* was evaluated by the students similarly, i.e. on basic and high level (each 22.2%); average (44.4%).

Within the group of examined students there were also people who cannot or for whom it is difficult to *recognize opinions contrary with actual knowledge* (11.1%), they cope but are not sure of the result (22.2%), have no problems in this scope (44.4%). In the case of this question one person did not submit the answer.

Most of the persons examined indicated high level of *the ability to reject unreliable and obsolete information* (44.4%). Slightly lower percentage (33.3%) chose having abilities on average level. One person indicated basic level, meaning they have significant difficulties in this scope.

The evaluation *of abilities of practical use of information* shapes similarly as the above, i.e. average level was indicated by 55.6% of those examined, and high by 33.3%.

With reference to *the ability of including the obtained information to the system of knowledge already possessed* 55.6% chose average level and 22.2% high. One person admitted having problems with this type of abilities. Another one selected no answer. *The ability to use the information for critical reasoning and problem solving* was evaluated by the students on average (55.6%) and high level (33.3%). Again, one person indicated no answer.

The provided answers suggest that the examined students efficiently work with different forms of information, they are not, however, competent persons in this field. It must be noted, that from the statements of the students it results that they cope worse with abilities requiring deepened analysis and synthesis, as well as critical reasoning. In the context of theoretical introduction to this article some deficiencies relating to self-satisfaction, self-regulation and the level of perceived self-efficiency should be anticipated.

Within the research carried out it was to find out also whether information skills possessed by the students, in their opinion, make the online learning process easier, and in what scope. All of them, unanimously, admitted that they were very useful and applied, as they, among others, make reaching the sources of knowledge and verification of information easier and were also helpful in developing the content and using thereof to perform tasks within the course and referring to already existing cognitive structures. Here are the examples of students' opinions:

> *"Decisively yes. The most useful ability is the verification of information and obtaining thereof from different sources to deepen the knowledge. The ability of quick search of information in the Internet (applying of branch search engines or application of different filters in advanced search) is also a useful ability".*
> *"Yes, I think that the abilities I have make the online learning easier for me. I can picture some of information and due to that remember them quicker".*
> *"Yes, because I can choose appropriate information and given the content proper structure which would allow me to combine the newly acquired knowledge with the one I already have".*
> *"Yes, they are helpful in online learning, as with the use thereof performing of certain tasks is easier".*
> *"I think yes and what is more on high level. I have no problems with the use of PC, mobile devices or with the new software. These abilities significantly improve and make the work better".*

"I think that the abilities I have facilitate each form of learning process. At the same time, with online process such activities are improved".

Based on the obtained answers it may be claimed that the students appreciate information skills they have which facilitate their online learning and work within the course due to the ability to look for information, create own resources of knowledge, for instance by developing of one's own electronic notes, tables and picture visualisations, etc., but also due to efficient use of PC and software.

The students declared that being efficient in the scope of information skills reinforces their motivation to work in online course. Only one person admitted it had no significance for them. It is worth to quote some of opinions here:

"It reinforces. Quick search of information would not lead to frustration while looking for necessary information"; "Reinforces, makes learning more satisfactory to me because it becomes more efficient."; "Helps me in work within online course and facilitates taking advantage of the course"; "Reinforces, as I am not afraid to use and getting to know new software".

The respondents connect the abilities in the scope of information skills with the increase of their motivation and satisfaction stemming from studying. Therefore, it can be seen how significant is the fact that young people have such skills. Undoubtedly, in case of the examined students the level of their information skills, in spite of earlier concerns, proved to be sufficient to achieve the self efficiency in online studying and, by the same, to maintain or even increase the level of internal motivation.

It was also interesting to see whether the examined persons use the information skills they have during online learning and how they do it. All of them, unanimously, confirmed the use thereof. These are the arguments they quoted:

"Yes, I use them. I always try to verify the correctness of material containing knowledge. I also pay attention to quoting of professional literature".
"I use them. I search for information on my own so I need to be able to evaluate their quality and to recognize which of them would be useful and for what purpose".
"Yes, and due to that I perform the tasks quicker and I understand better given content".
"Yes, I look for different solutions and manner to facilitate studying. For instance, I create graphics, mind maps, I record myself, etc.".
"Yes, I use them, for instance while searching for additional sources of knowledge".

The information skills possessed by the respondents are used by them to look for information, to verify and evaluate it, as well as to create its new forms, applied to implement the tasks planned within the course or to develop the information designed directly to be coded in long-term memory (to be remembered and included in knowledge structures).

It turned out that the students use information skills mainly to complement the content of the course, to refer them to wider or more specialized context, and not for better understanding thereof.

In the process of online learning the statements of students preferring independence of actions and learning prevailed, however within strictly defined time and task frames (deadlines, teacher's control, clearly defined purposes and tasks). The following arguments were submitted:

> *"Clear defining of certain frames of purposes and tasks is advisable, but within these frames I perform the rest on my own more willingly".*
> *"Sometimes, when I do not have much time for the course, I would prefer to have a deadline set up, to pull myself together and perform the task in the determined deadline. But if I would not make it due to, for instance, lots of work to do or due to other reasons and I would be given the task in the nearest future it would be perfect".*
> *"Concrete dates etc. are more motivating as without them we have more freedom and we do not do what is needed now but we put the work off".*
> *"The dates and clearly defined purposes and tasks are better source of motivation for me. The determination of purposes and dates on my own often results in putting off the course in time".*
> *"I need external sources of information. It results from my type of personality which requires imposing of deadlines".*

From the above statements it results that the teacher should prepare the schedule of work for his students taking part in the course which would facilitate planning of the learning process. In this context the external source of motivation is the kind of mobilisation of efforts and frames within which the students may adjust their own preferences and possibilities.

Two persons stated that they individually plan and implement the tasks and activities set up in the course. It is worth to quote them as well:

> *"I prefer individual planning of the purposes and stages set up within the course. In this way I may adjust the time spent on participation in the course for other duties."; "I prefer individual planning".*

Based on the hitherto experience in online learning the examined persons evaluated the interactivity of the course resources rather inconclusively. The following were described as the most interactive didactic material (although not on the highest level of the assessment): podcasts and discussion foras, quizzes, tasks and voting. The least activating were multimedia presentations, webinars and pdf documents. A significant number of evaluations was divergent, the degree of interactivity of resource of the same type was defined on high and low level at the same time, for instance video recordings, wiki, chat, SCORM, external links, survey and workshop. These discrepancies and some indications seem to be quite surprising, but they may result from a different level of student activation and interactions planned by the author of a given resource, low frequency of other participants of the course (in case of tasks and activities based on

cooperation) or simply resulting from lack of knowledge of the evaluated resource due to not applying of these services.

The examined persons were also requested to suggest the features of online course which, in their opinion, support best their motivation. They were to refer to the following fields: a) type of resources, b) organisational activities, c) progress, d) participants, e) teacher, f) assessing, g) tasks and h) aesthetics of the course.

The students expressed themselves in this matter, taking into account their own needs and expectations. It may be suspected that they have also noticed the mistakes in the hitherto undertaken online courses. Some examples were chosen:

Example I of statements:

a. *Gathered contents from different authors allowing to get to know several different approaches to one issue. They should be presented in relation to wider context (why this material should be studied);*
b. *stating of precise scope of the content to be learnt;*
c. *pace of work of the participant should not be dependent upon the pace of work of other participants of the training, so that the delay of one person while performing the project would not discourage others;*
d. *they participate in the course voluntarily;*
e. *helpful;*
f. *individual, not group;*
g. *clearly precise, not too long, not allowing for uncontrolled increase of the course, because this often leads to discouragement;*
h. *the course should be clear, have possibly even structure and appearance as this testifies to the level of professionalism of the course author.*

Example II of the statement:

a. *types of resources (interesting content, more quizzes, more tasks where you can immediately check your progress;*
b. *organisational activities (teacher should answer the questions asked by the participant as quickly as possible);*
c. *progress (the course would be carried out smoothly);*
d. *participants should be more engaged in the course);*
e. *teacher should make up good and clear course;*
f. *evaluation should be quicker and teacher should point out the participant's mistakes;*

g. *tasks should be comprehensible and best if you could receive the answer on your progress immediately after finishing of the task;*

h. *aesthetics of the course (course should be clear and easy in managing).*

Example III of the statement:

a. *material with "dry contents" and the tasks summing up this content, fora (activating material); adjusted to skills and resources of the course participants;*
b. *planning of the course from the beginning to the end, with the set up dates to solve the problems, information relating to syllabus of the course;*
c. *efficient, systematic;*
d. *systematic, interested;*
e. *good contact, skilfully planning the work;*
f. *component of the evaluation from summing up of individual parts of the course – systematic work to get the evaluation;*
g. *contents adjusted to the abilities and resources of the participants;*
h. *simple and clear form.*

The above statements may be read out as helpful guidelines for the persons designing and implementing online courses. Furthermore, they allow to understand better the students, their needs and expectations, and by the same, to make online learning more friendly. The results indicate to the significance of methodological action in the course, making up the challenge for teachers, designers and persons engaged in online learning. Particular attention should be paid to the statements confirming the necessity to reinforce the motivation of students in key moments of the course according to the motivation model by R. J. Włodkowski (Model Time Continuum), i.e. at the beginning, during and at the end of the course. At the beginning attractive appearance of the course, good climate, recognition of the needs of the participants by the application of so called icebreakers should be taken care of, and most of all, clear purposes of the course and different strategies which would help the students understand what is needed to be successful during the course should be defined. To maintain stimulating learning environment active participation of the students should be taken care for by asking questions, permanent contact therewith, monitoring of the activities within the course, differentiated and interactive resources, as well as, the application of different teaching-learning methods, from lecture to group work. Finally, at the end of the studying, the consolidation of knowledge and reinforcing of skills should be considered. It would be possible due to immediate and frequent feedback with reference to the correctness of tasks performed and activity, as well as student's progress and rewarding of the effects of studying, for instance in the form of awards, praises, etc.

Conclusion

Carried out analysis of the statements encouraged the researchers to come to general conclusions. Understanding of the reasons of failures of online learning forces the necessity to diagnose and implement

certain solutions and verifying thereof through practice. It is worth to focus on the quality of didactic material, the content and their presentation included, improving of educational tasks and interaction between the participants of online learning. The factors motivating most the students of online course included podcasts and discussion forums, quizzes, tasks and voting. They require legible explanations, grading of difficulties forcing the intellectual effort, but, at the same time, setting of the tasks possible to be attained. From the perspective of students' motivation, it is worth to concentrate on the improvement of information skills allowing for critical reasoning and supporting their autonomy, creating of engaging interactive tasks requiring students' effort, bringing the satisfaction from solving thereof, as well as advantages deriving from the results of own work (usefulness of tasks). Also the permanent and stimulating presence of the teacher in the course is essential, as although it may be hoped that the students engage in the course motivated internally, this, however, may be a disastrous or insufficient circumstance for efficient online studying, as a significant number of persons, which was shown in the statements of those examined, needs external incentives and support. Online learning should become committed and common process of knowledge constructing, in which information skills of elearners would be used and improved for the sake of their personal development in the motivating online educational environment. It is essential to keep in mind that it is a difficult task, requiring commitment, time, will and persistence of all subjects of this process, but it is worth to sacrifice them for online education to have sense and value.

It should be mentioned that the presented own research is worth repeating on representative sample which would allow to come to general conclusions with reference to e-learning population. Also, subsequent research problems arise, which could be addressed in further, deepened scientific research in the field of motivation and creation of educational environment of online learning. Among them, the following may be indicated: the role and significance of creation and development of learning community for the sake of the commitment of its members; the need to improve the cooperation competence in course for better motivation of the students. The necessity to approach these and other problems from the perspective of longitudinal (cohort) or even ethnographic studies may be indicated, as this field of cognition requires new scientific perspectives with the preserving of objectivity and scientific reliability.

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EVALUATION OF EDUCATIONAL TOOLS AND ANALYSIS OF DIFFERENT WAYS THAT STUDENTS USE DIGITAL TECHNOLOGIES IN EDUCATION

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Key words: Educational tools, Digital devices, Evaluation, Students, Heuristic evaluation.

Abstract: This paper includes evaluations of educational tools and presents ways that students use digital tools and devices in education. Three studies were conducted. Technology acceptance model is used for the theoretical background, and as a basis for the creation of criteria for the user evaluation of educational tools. First study is user evaluation of educational tools, and the second study is heuristic evaluation based on Nielsen's 10 heuristics. Third study investigates undergraduate students' use of technologies for the purpose of learning. Results of the first two studies reveal that students' evaluations of the selected tools are correlated with usability evaluations based on Nielsen's' heuristics. Half of the analyzed tools have severe usability problems with User control and freedom (H3), Consistency and standards (H4) and with Help users recognize, diagnose, and recover from errors (H9). The best tools based on student evaluations also had no usability problems on Visibility of System status (H1), Error prevention (H5) and Help and documentation (H10). Results of the third study show that computers are the most used devices for all types of study activities, except for communication, whereby smartphones are more widely used. Smartphones are quite often used for literature search and reading, even though they are considered less useful. Among female students, Information Technology courses grades are correlated with using applications for reading and writing, and with using computers for literature search. There are many opportunities for introducing additional class activities that require use of various tools, since the students perceive those technologies to be useful, easy to use, and intend to use them. This technological enrichment of instructional processes would provide students with more opportunities for active learning. For successful technology use, both the users' preferences and the established design standards for interactive learning technologies have to be applied.

Introduction

There is a growing emergence of digital devices and tools used not only for communication, fun and general informing, but also for educational purposes. E-learning covers a range of uses of technology for teaching and learning, but precise definition is that it includes "all computer and Internet-based activities that support teaching and learning – both on-campus and at a distance" (Bates 2008). „Education technology aims to improve education, hence technology should facilitate learning process and increase performance of educational system with regards to its effectiveness and efficiency" (Anshari et al. 2017, 3065). Sitzmann and colleagues (2006, 623-664) have found that effective online courses utilize multiple instructional methods and tend to require students to be more active.

Using digital technology in teaching is a common activity. Digital technologies are becoming an important part of learning process in higher education. Educational tools are present and available in many forms, including mobile apps.

Individual differences in the use of technology can be explained with Technology Acceptance Model (TAM). Davis (1985) had modified more general theories of planned behavior by Fishbein and Ajzen and developed the Technology Acceptance Model. This model describes the role of perceived usefulness of technology and perceived ease of use as the determinants of intention to use technology. There are numerous studies that use TAM or related models of technology use. For example, in a study of the factors influencing the adoption of mobile learning, most of the respondents perceived mobile learning to be useful and easy, and over 76% of them agreed or strongly agreed that they intend to use mobile learning (Lu 2008).

The effectiveness of e-learning has been proven in various previous studies (Tamim et al. 2011, 4-28; Sitzmann et al. 2006, 623-664). In some studies, blended learning has been proved as the most effective form of e-learning (Al-Qahtani and Higgins 2013, 220-234; Means et al. 2009). Nowadays, it is not questionable whether e-learning should be used or not. Instead, the focus is on choosing optimal educational methods and technologies. This requires research on different levels, from specific educational tools or applications to the level of different digital devices used for learning. This paper deals with research problems revolving around those issues, and taking into account both the users' preferences and the established design standards for interactive learning technologies.

Students' use of digital technology in education

ECAR Study of Undergraduate students and information technology investigated perceptions of technology among 184 US university students. Some of the key results show that students perceive technology as beneficial to them for achieving their academic outcomes and success. Students are more actively involved in courses that use technology, and there is an increasing use of smartphones (Dahlstrom, Walker and Dziuban 2013). Kennedy et al. (2008, 108-122) investigated access, use and preferences of emerging technologies and technology based tools among 2588 first year Australian students. The results of the survey and follow-up interviews of 46 students showed that searching for information on the web, e-mail etc. were used frequently, but some "newer technologies, such as blogs, wikis, and social bookmarking tools that allow students to share, collaborate, produce and publish material online are used by a relatively small proportion of students" (Kennedy et al. 2007, 522). Later study from 2011 (Dahlstrom, Walker and Dziuban 2013) showed that students who own only tablets, rated them as very important at a substantially higher rate (67%) than students who own both tablets and laptops (46%). Mobile devices increasingly influence the way students seek and use information (Liu 2005, 700-712) and want to use them more in their academic environment (Dahlstrom, Walker and Dziuban 2013). Later study from Liu on information behavior in mobile environment showed different results, i.e. that reading on smartphones for academic purposes is usually avoided (Liu 2015). The results showed that „about one third of survey respondents use smartphones for email, reading novels, and sending pictures" (Liu 2015, 2). However, very few of the surveyed students „use their smartphones for academic purposes such as accessing library resources (7.8%) and reading scholarly papers (5.4%)" (Liu 2015, 2). Smartphones can be used for learning aid in the classroom or to support knowledge sharing outside the classroom (Anshari et al. 2017, 3063-3079). One of the reasons for that is the fact that „they provide convenience, portability, comprehensive learning experiences, multi sources and multitasks" (Anshari et al. 2017, 3064).

Liu has found that screen-based reading behavior was emerging in the year 2005 (Liu 2005, 700-712). In 2015, people were spending even more time reading digital documents, as various digital devices have been designed to support reading (Liu 2015). Results of this study showed that some of the students liked to read

research materials (15%) and teaching materials (17%) on their e-readers or tablets. „Major reasons for these reading preferences include bigger displays, better reading experience, more functions, and ease in carrying“ (Liu 2015, 3).

Chen and Denoyelles investigated factors that influence use of mobile technology in higher education (2013). This research has shown that more than half of the students inquired used small mobile devices for academic purposes (58%), and that male students tended to use these devices for academic purposes more than females. Tablets also proved to be a powerful digital tool for academic purposes, as 82% of the students who owned tablets used them for academic purposes. This is in line with the ECAR study (Dahlstrom, Walker and Dziuban 2013) that has found tablets to be potentially very usefull for academic purposes.

I Technology and students' distraction

Although there are some prevalent opinions that technology is always positive, there are also some issues concerning use of digital devices in students' daily activities, such as possible distractions or lack of verbal communication (Rosen and Cheever 2013, 948-958; Aagaard 2015; McCoy 2016). Students sometimes put down the laptops as they are aware of the distractions in the digital environment (Rosen and Cheever 2013, 948-958). McCoy investigated „classroom learning distractions caused by the use of digital devices for non-class purposes“ on the sample of 675 respondents in 26 states (McCoy 2016, 5). Students indicated three major reasons for using digital devices for non-classes purposes: to stay connected, fight boredom, and for entertainment. Some negative examples of using tablets and computers are shown in research results which showed that using tablets and computers decreases verbal and non-verbal communication among students, and decreases collaborative learning (Takano et al. 2012, 562-571). Distractions were also highlighted by students as being a negative side of using digital devices (Jackson 2012). Students share less information when they use digital devices, spending more time looking at the tablets than each other, as „digital devices capture more visual and cognitive resources“ (Haber, Nacenta and Carpendale 2014, 95). Similar results were reported by Tossell et al. (2015, 713-724). The results showed that students find their mobile devices as distractors, not as help.

Students' use of digital technology and learning success

There are many studies investigating correlations between students' use of digital technology and learning success. Teri et al. (2014, 121-135) investigated the pedagogical impact of an educational app. Smartphones were the most preferred device on which to access the app, followed by laptop computers (Teri et al. 2014, 129). Students recognised the app as useful, but there was no statistical difference in mean final grade between users and non-users. Another study has shown that students with lower grades used mobile devices more frequently for academic purposes than other students (Chen and Denoyelles 2013). Zhang and Ma's research (2011, 424-435) investigated the use of mobile devices for reading. Correlation between the users' educational level and their mobile reading behavior has shown that users with lower educational levels rely

more on mobile reading. Zhang and Ma (2011, 428-429). Vázquez-Cano (2014, 1505-1520) investigated the didactic use of smartphones and apps, where the use of apps was highly valued by students. „Smartphones and course subject apps can help students to pose and answer questions, to complete collaborative projects and (..) to engage in social interactions foundational to learning“ (Vázquez-Cano 2014, 1516).

Results of the study by Jackson (2012) have shown that 60% of students consider digital devices useful. Wurst, Smarkola and Gaffney (2008, 1773-1774) found that students with laptops were less satisfied with their education compared to students with no laptops. In comparison, results from the study by Rashid and Asghar (2016, 604-612) showed that use of technology has a direct positive relationship with students' engagement and self-directed learning, although no significant direct effect was found between technology use and academic performance. Another study (Witecki and Nonnecke 2015, 82-83) showed that smartphone use was most strongly related to lowered course engagement, while laptop use was also related to lowered engagement, although to a lesser extent. Yet, overall engagement of students using tablets or cell phones was not significantly different than those who did not use those devices. The presented studies show inconsistent results from the notion that smartphones and tablets are very useful and effective for learning, to the conclusions that they hinder learning processes. Hence, further research is needed to clarify the circumstances for which such differences exist.

Usability evaluation of educational tools

For the successful usage of educational tools / applications, certain usability criteria and principles have to be met. Whether students will use computers and certain tools largely depends on their motivation and competencies related to technology use. Their motivation is based on the perceived usefulness of various technologies, ease of use and satisfaction with using the technologies. All of these concepts are closely related to usability.

There are many definitions of usability. International Standards Organization (ISO) defines usability as: "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (Iso 1998).

Jakob Nielsen defines usability as "a quality attribute that assesses how easy user interfaces are to use. The word „usability“ also refers to methods for improving ease-of-use during the design process" (Nielsen 2012, 35). „When a product or service is truly usable, the user can do what he or she wants to do the way he or she expects to be able to do it, without hindrance, hesitation, or questions“ (Rubin and Chisnell 2008, 4). „To be usable, a product or service should be useful, efficient, effective, satisfying, learnable, and accessible“ (Rubin and Chisnell 2008, 4-5). These are defined as usability principles and are essential for any human-computer interaction with systems.

Tools with different purposes generally don't have enough comparable functionalities for an in-depth evaluation. When comparing different kinds of educational tools, a common approach is to apply an inspection method such as heuristic evaluation. For the general overview of the quality and possible usability problems of different kinds of tools, heuristic evaluation gives useful insights. In HCI usability field technologies are evaluated with a variety of methods. In this paper, we will focus on examples of usability evaluation of educational tools.

Kenttälä et al. (2015) evaluated digital learning solutions in different use contexts, such as classroom use, extracurricular activities, usage purposes, user outcomes and user groups (from preschoolers to adult learners). The results showed that the most frequent problems were identified with consistency and standards heuristic, with 16% major (severe) problems, and 12% moderate usability problems (Kenttälä et al. 2015, 4). Few heuristics cover the majority of all usability problems, as a significant amount of usability problems were categorized under one heuristic, consistency and standards (Kennttälä et al. 2015, 5). In another study, Parlangeli, Marchigiani and Bagnara (1999, 37-49) evaluated the way in which the level of usability of the system can affect the effectiveness of a multimedia training course. Usability study showed 90 violations, with the most numerous concerning these guidelines: consistency, simple and natural dialogue, control of the system, minimization of user memory load, allow action reversal, and provide feedback and shortcuts. Those difficulties in using the hypermedia system can negatively affect learning performance.

Nielsen established usability heuristics and explained their importance based on factor analysis (Nielsen 1994a, 152-158). The most important factors are: visibility of system status, match between system and real world, user control and freedom, and consistency and standards. The most important specific sub-heuristics to explain all the usability problems are: consistency: same thing, same way; speak the user's language; feedback: show receipt of user's input. Furthermore, the top sub-heuristics to explain the most critical usability problems are: seeing/pointing vs. remembering/typing; consistency: same thing looks the same, and feedback: timely and accurate.

Constant changes in the availability and various functionalities of new educational technologies require further research. Usability is an important aspect in educational digital tools, as good usability means that learners will use the tools and be more engaged in learning practices. Furthermore, there is a lack of empirical research on students' use of educational tools and digital devices on Croatian universities.

Methodology

The aim of this research paper is to evaluate selected educational tools and to identify different ways that students use digital technologies in education.

The purpose for which the results and conclusions of this research could contribute to is the enrichment of instructional processes, since using effective tools provides students with opportunities for active learning.

This study also analyzes usability issues of digital tools, and the results may be applied in the future design of similar tools.

Research questions:

RQ1. How do students perceive various selected educational tools with regard to usefulness, ease of use and intention to use?

RQ2. What are the common usability problems among the selected tools?

RQ3. How often do students use digital devices and applications in their education, and how do they perceive the usefulness and ease of use of those technologies?

RQ4. Are there any correlations between technology use and students' success in their studies?

Three studies were conducted to answer the research questions.

a. Study I

In Study I, 26 students of the 3rd year of an undergraduate study of Information sciences evaluated 23 educational tools. Students have independently selected educational tools or applications that will be evaluated on the basis of their initial interest and the recognition of potentially useful tools. Each student had a task to evaluate the functionality of the chosen tool, and to present it during a class session. During the class, based on the demonstration of each tool, all other students have assessed the degree of perceived ease of use, usefulness, and their own intention to use the presented tool. These are the three key elements from the Technology Acceptance Model (Davis 1985) and later adaptations of the model (Venkatesh et al. 2003). This theoretical model was used because it can be applied to any technology, including various types of educational tools or applications. Technology acceptance is about user attitudes and motivation, and it depends on psychological and contextual variables. Variability of individual differences in acceptance of specific educational tools was explored, but also the average acceptance of each educational tool. These averages give more reliable insights about the actual usefulness and ease of use of the evaluated technologies, while the ratings from each individual student are less reliable and are more under the influence of individual psychological distinctions or idiosyncrasies. In this paper, the focus is not on individual students' technology acceptance. Instead, average group evaluations of educational tools are explored and further analysed in relation to expert heuristic evaluations. Because of this, and to reduce the semantic redundancy, single item measures with 5-degree scales were used for the evaluations of usefulness, ease of use and intention to use specific educational tools.

Most of the educational tools that students have selected for this evaluation are intended for collaborative work or for enrichment of lectures and class activities. Other uses are task solving, photo editing, tutorials, website design, digital drawing, games, mind mapping, etc. Most of the selected tools are intended for any user group, mostly for students, while 5 out of 23 tools are primarily intended for teachers.

b. Study II

In study II, heuristic evaluation of selected 8 tools was conducted, based on the Nielsen's ten heuristics.

The purpose of this study was to identify usability problems that can hinder learning success and which are to be recommended in the design of future educational tools.

There are many versions of usability guidelines and heuristics which are used in usability evaluation. Most frequently used are those first developed by Jakob Nielsen and Ralph Molich in 1990 (Molich and Nielsen 1990, 338-348). Since then, Jakob Nielsen has revised these sets of heuristics based on factor analysis of 249 usability problems (Nielsen 1994a). The result is a set of 10 usability heuristics. Ten Nielsen's heuristics used in Study II are: „(H1) Visibility of system status, (H2) Match between system and the real world, (H3) User control and freedom, (H4) Consistency and standards, (H5) Error prevention, (H6) Recognition rather than recall, (H7) Flexibility and efficiency of use, (H8) Aesthetic and minimalist design, (H9) Help users recognize, diagnose, and recover from errors, (H10) Help and documentation" (Nielsen 1995a). Heuristics are widely used in usability inspection methods. "Usability inspection is the generic name for a set of methods that are all based on having evaluators inspect the interface" (Nielsen 1994b, 1). Heuristic evaluation is the most informal method in which usability experts judge whether elements of the user interface follow established usability principles or heuristics. „Heuristic evaluation is based on combining inspection reports from a set of independent evaluators to form the list of usability problems" (Nielsen 1994b, 413).

In this study, and based on the proposed heuristic evaluation procedure (Nielsen 1995b, 1-8), evaluators conducted usability sessions individually for each unit of analysis from the research sample. In this study, 2 evaluators conducted the evaluation. Each individual evaluator inspected the interface alone. Evaluators conducted heuristic evaluation 2 times on each unit of analysis from the research sample. Only after all evaluations had been completed evaluators communicated their findings and aggregated them, in order to achieve more precise and valid evaluations.

The research sample consisted of 8 educational tools that can all be used in different contexts, such as classroom settings or extracurricular activities. Most of those tools are intended for collaborative work, followed by enrichment of lectures and class activities, photo editing and task solving. Those 8 tools were selected based on the results of study I. Four of the tools that were rated by the surveyed students as the best and four of the tools with the least good ratings were selected for this next phase of evaluation, study II. Evaluators used severity ratings to evaluate digital tools from the research sample. There are many different sets and approaches for severity rating scales. In this study, the following severity rating scale was used:

0 - no usability problem - everything functions good and it is easy to use

1 - "cosmetic problem" - it is not necessary to remove the problem

2 - moderate usability problem - low priority problem, but it is suggested to be removed

3 - severe usability problem - high priority usability problem, it is necessary to be removed as a user can't perform the task

The optimal number of evaluators for heuristic evaluation is at least three. However, when the focus is not to redesign an individual tool, heuristic evaluation analyses conducted by two expert evaluators are sufficient for the identification of common usability problems. Previous studies showed that evaluations with two evaluators were successful (Kenttälä et al. 2015; Parlangeli, Marchigiani and Bagnara 1999).

In the preliminary phase of the study II, each evaluator a) made a free exploration of digital tools from the research sample in order to get familiar with the functionalities and context of use for each educational tool. After the exploration phase, b) each evaluator independently evaluated digital educational tools from the research sample, giving ratings for each heuristics and describing every usability problem. This process was documented using the structured report problem format (Cockton and Woolrych 2001, 171-191), which included several descriptors: 1) numerical identification of a problem, 2) description of a problem, 3) likely difficulties (i.e. location of the usability problem on the interface), 4) specific context (if applicable), 5) assumed causes, 6) severity ratings for each heuristics (H1-H10). Evaluators were trying to be as specific as possible, according to recommendations. After each independent heuristic evaluation session was conducted, c) evaluators aggregated each set of individual results, and searched for inconsistencies. This third evaluation included the consensual resolution of inconsistencies from the previous sessions. The results were consolidated, and therefore, the final report is not a simple sum of all the usability problems, but a more refined list. The overall result is a list of usability problems, which represented a violation of heuristics. A single report was created, which included a list of usability problems.

c. Study III

In the third phase of this research, 39 students were surveyed. 17 students were from the 3rd year and 22 students from the 2nd year of an undergraduate study of Information sciences. They all have substantial experience with using information technology in their education. The questionnaire consisted of items with 5-degree scales about their habits of using technology for educational purposes, their estimates of ease of use, the usefulness of different types of educational applications and tools, as well as digital devices. Single-item measures were used to avoid semantic redundancy, and because the sample size in this exploratory research is small (Diamantopoulos et al. 2012, 434-449). Data on students' success on Information Technology (IT) courses as well as overall success in the study were also collected. The effectiveness of tools and device usage was explored by analyzing correlations with the students' success in their studies.

Results and Discussion

RQ1 Results - Students' evaluations of various selected educational tools with regard to usefulness, ease of use and intention to use

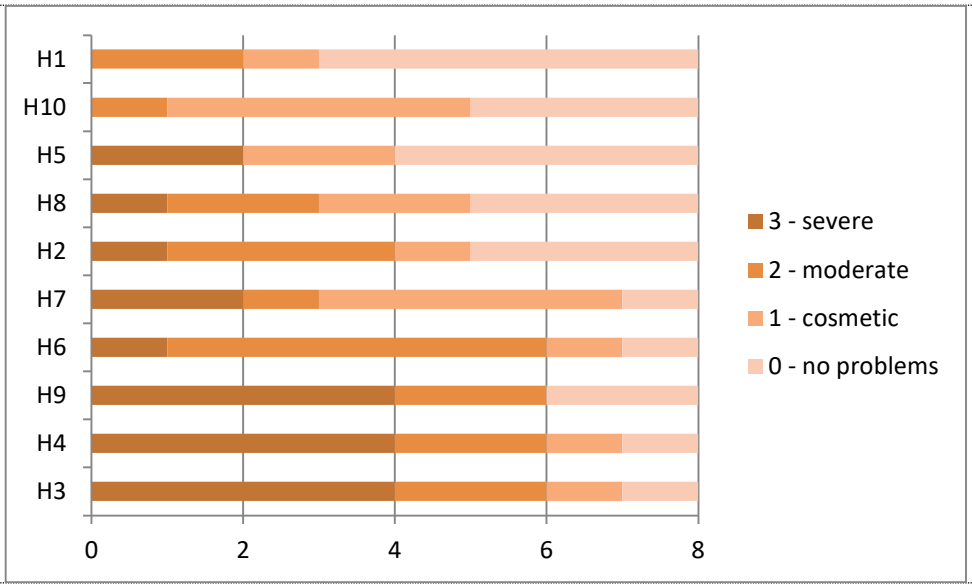
Specific tools presented in a course session are perceived by students as potentially very useful and they have expressed the intention to use them in the future. For example, the following tools were rated as the most useful: Photomath, Lunapic, and Quizlet. As a rule, these tools were also estimated to be easy to use, and students intend to use them in the future. Almost all of the analyzed tools are at least moderately positively evaluated, which is not surprising given that the students have chosen them on the basis of initial check as potentially useful. Purposes of the top ranked applications based on students' evaluations were the following: task solving, photo editing, tutorials, enrichment of lectures and class activities, and collaborative work.

At the sample level of 23 educational applications, average students' evaluations of usefulness, ease of use and intent of use are highly interrelated. In accordance with the Technology Acceptance Model, the results of a multiple regression analysis show that the students' average intentions to use the individual applications depend on their estimated usefulness (beta = 0,59) and ease of use (beta = 0,36). These two predictors explained 86% of variance in the average intentions to use specific tools. As expected, usefulness is a stronger predictor than ease of use. Students will use the tools that have purposeful content and functionalities that enable them to gain some educational benefits, while ease of use is an additional reason that contributes to the overall motivation for the use of technology. Therefore, in further interpretations, greater emphasis should be placed on estimates of usefulness.

RQ2 Results - Common usability problems among the selected tools

Four of the 8 analyzed tools have severe usability problems on these heuristics: H3 - User control and freedom, H4 - Consistency and Standards, and H9 - Help users recognize, diagnose, and recover from errors. Next, two severe usability problems are also present on heuristics H5 - Error prevention and H7 - Flexibility and efficiency of use, while mostly moderate usability problems are present on H6 Recognition rather than recall and H2 - Match between system and the real world (Chart 1).

CHART 1. SEVERITY RATINGS FOR USABILITY PROBLEMS OF THE SELECTED 8 EDUCATIONAL TOOLS



H1 - Visibility of System status, H2 - Match between system and the real world; H3 - User control and freedom; H4 - Consistency and standards; H5 - Error prevention; H6 - Recognition rather than recall; H7 - Flexibility and efficiency of use; H8 - Aesthetic and minimalist design; H9 - Help users recognize, diagnose, and recover from errors; H10 - Help and documentation;
Source: Own

In summary, some of the severe usability problems, in terms of violation of heuristics are:

H3 (User control and freedom) - there is no undo and / or redo option in some applications, e.g. while drawing a picture or while editing a formula. Insufficient control is also present when the content can only be accessed through the search engine.

H4 (Consistency and standards) - there is no clear explanation of some of the functions in the menus; non-standard and inaccurate buttons names, e.g. Details button is actually intended for editing, voting, etc.; The hide control button looks like the download button, pen and eraser buttons are incomprehensible.

H9 (Help users recognize, diagnose, and recover from errors) - there is no explanation of errors, no instructions what to do after an error.

H7 (Flexibility and efficiency of use) - there are no options for advanced users, accelerators or interface customization options.

H5 (Error prevention) - various errors in applications, such as loss of control in using the applications, errors in using certain functionalities such as: eraser tool turns with no notification to drawing tool etc. Certain applications often freeze or crash, which inhibits the user in solving the task

H6 - (Recognition rather than recall) - there are no breadcrumb trails to indicate the current page's location within a navigation hierarchy.

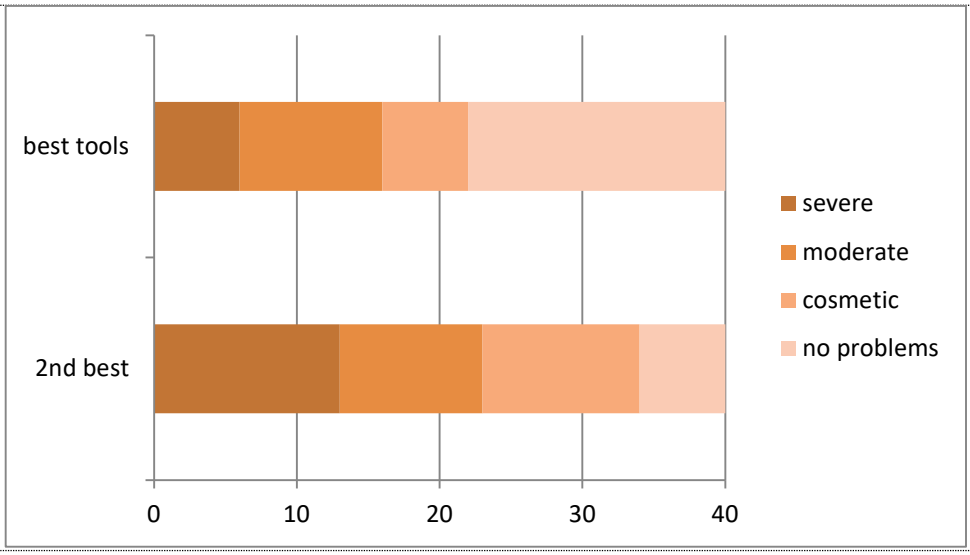
H2 (Match between system and the real world) - there are some inconsistent and non standard uses of language, some elements are situated in unexpected menus and locations on the interface.

Results of heuristic evaluation showed that H1 (Visibility of system status) and H10 (Help and documentation) show no severe usability problems regarding the evaluated educational tools from the research sample.

These results describe usability problems of a specific group of educational tools. Other studies evaluated different samples of tools, but there are some similarities in the results. For example, Kenttälä et al. (2015, 1-7) also found a severe violation of H4 (Consistency and standards), as most frequent problems were found within this heuristic, on various educational tools. Parlangeli, Marchigiani and Bagnara (1999, 37-49) have also identified many problems with consistency in an educational multimedia system, and with other modified heuristics, including: simple and natural dialogue, control of the system, minimization of user memory load, allowing action reversal, and providing feedback and shortcuts. Furthermore, Nielsen has found that in general, regardless of the system purpose, the most important specific sub-heuristics to explain the most severe usability problems are: seeing/pointing vs. remembering/typing (part of H6); consistency: same thing looks the same (part of H4), and feedback: timely and accurate (part of H1). In this current study there were no severe problems on H1, but there were many severe problems on H4, and moderate problems on H6 heuristic. This kind of overview does not imply that only the mentioned heuristics are important. In this study, the results are relevant for the context of educational tools and point out which specific problems need to be addressed. Most of those problems are covered with heuristics H3, H4 and H9, but not all.

The four tools that students have previously evaluated as the best (ease of use, usefulness, intent to use) have also received a better rating in the heuristic evaluation of usability, as opposed to the four tools that students liked the least (Chart 2). The name of this group shown in Chart 2 is "2nd best" because those tools are actually moderately good tools.

CHART 2. OVERALL SEVERITY RATINGS FOR USABILITY PROBLEMS OF THE BEST AND THE 2ND BEST TOOLS



Selection of the best (N=4) and the 2nd best tools (N=4) are based on students' evaluations of tools' usefulness, ease of use and their intention to use the tools;
Source: Own

Based on the results (Chart 2), it is evident that even the best tools have some severe usability problems, for example, lack of user control and flexibility of use. Significant differences between the best and the 2nd best tools are in the visibility of system status (H1), error prevention (H5) and help availability (H10). The best tools did not have usability problems with those heuristics. It can be concluded that the absence of such usability problems contributes to the students' perceptions of tools as being better than others. This primarily relates to Error prevention (H5) since the expert severity ratings of tools on this heuristic are in high negative correlation with student assessments of ease of use (Spearmans' R = -0.85), usefulness (R = -0.77) and the intention of using the tool (R = -0.83). In simple words, students prefer the tools that have less errors.

The overall experts' ratings of usability are highly correlated with the overall students' evaluations of the educational tools (R=-0,73, df=7, p<0,05). Hence, heuristic evaluation has revealed more severe usability problems precisely in the tools that students also evaluated as less good, i.e. the tools that are perceived as less useful, more difficult and less motivating. This convergence of the results of the two evaluation methods confirms that both methods, the heuristic evaluations with two experts and the assessments with a group of students are reliable indicators of the quality of analyzed educational tools.

RQ3 Results - Students use and evaluation of digital devices and applications for educational purposes.

TABLE 1. THE FREQUENCY OF USE OF TOOLS AND APPLICATIONS FOR SPECIFIC EDUCATIONAL PURPOSES (N=39)

Application purpose:	M	SD
editing text, writing tasks	4.21	0.81
making presentations	4.10	0.60
reading and learning	4.05	0.76
editing photos	2.92	1.31
project and collaborative work, team tasks	2.87	1.22
time management, when to study and write assignments	2.41	1.35
creating websites	2.18	1.06
self-assessment of knowledge (eg online quizzes)	2.15	0.96
note-taking during lectures	2.13	1.1
creating mental maps, conceptual maps	1.9	0.88
educational games	1.74	0.97
digital drawing, sketching	1.51	0.72
ANOVA F(11,396)=42,04, p=0,01; Source: Own		

The frequency of use of certain types of tools with regard to their purpose reveals that students' duties primarily include writing assignments, making presentations and learning. The differences between the frequency of these three types of activities are not statistically significant, and are significantly higher than all other activities (post hoc HSD test). In addition to the applications that are used for these three common activities, students sometimes use tools for photo editing and for collaborative work. They rarely use tools for time management, web development, self-assessment, writing notes, and creating mental maps. Lastly, educational games and digital drawing tools are almost never used (Table 1).

Nevertheless, there are differences among students, and the highest variability is in responses to the question about the use of tools for time management (SD=1,35). Precisely, 18 out of 39 students at least

occasionally use such tools, while those tools have never been used by 15 students. Also, 11 out of 39 students are sometimes using the tools for creating mental and conceptual maps, while 16 of them never use such tools. These results reveal that even the least used apps are occasionally used by some students.

There are also some gender differences in the frequency of use (Welch's t-test). Female students more often than male students use digital drawing tools (Mm=1.71, Mf=1.18, p=0.01), and tools to keep notes during classes (Mm=2.33, Mf=1.64, p=0.04), although such applications are rarely used on average. Approximately every third female student and every second male student never use apps to keep notes during classes. At least occasionally, such apps are used by 10 out of 24 female students and only 1 out of 11 male students.

It can be concluded that tools such as MS Word and PowerPoint are still primarily used, while students' activities and assignments that require the use of other types of tools are rarely represented in students' obligations. As previously presented, the evaluation of selected tools demonstrates how students would like to use a variety of applications designed for collaborative work, photo editing, tools for solving specific tasks, teaching enrichment tools and tutorials. Didactic use of apps was also highly valued by students in a study by Vázquez-Cano (2014, 1505-1520).

TABLE 2. DIFFERENCES IN THE FREQUENCY OF USE OF SMARTPHONES AND COMPUTERS FOR SPECIFIC EDUCATIONAL PURPOSES (T-TEST)

Frequency of using devices for	Computer	Smartphone	p
Study-related messages	4,31	4,67	<0,05
Reading and Learning	4,26	4,10	>0,05
Literature searching	4,49	4,03	>0,05
Writing assignments	4,72	2,87	<0,01

Source: Own

Students often use computers to send messages to colleagues and tutors, while mobile phones are even more used for this purpose, almost daily (Table 2). Furthermore, computers and mobile phones are often used for reading and learning, as well as for searching the literature. This is an interesting finding, since there are some indications from earlier research that smartphones hinder learning processes (Rashid and Ashgar 2016, 604-612.; Rosen and Cheever 2013, 948-958.; Vázquez-Cano 2014, 1505-1520).

Students probably use those devices often for reading and searching because they always carry smartphones with them, unlike computers. In contrast, in a study by Liu from 2015., only a small number of students used smartphones for accessing library resources and reading scholarly papers (Liu 2015).

For writing assignments, students primarily use computers (Table 2). Significantly less frequently they use smartphones, on average occasionally. The data on average frequency of use of tablets and e-readers are not shown here since the majority of the surveyed students does not possess such devices. Some studies showed that tablets are becoming an important tool in academia (Liu 2005, 700-712)

TABLE 3. STUDENTS' ASSESSMENT ON THE EASE OF USE AND USEFULNESS OF DIGITAL DEVICES IN EDUCATION (T-TEST).			
	Computer	Smartphone	p
Useful for reading and learning	4,51	4,00	<0,05
Easy to use for reading and learning	4.59	4.26	>0,05
Useful for writing assignments	4.95	2.62	<0,05
Easy to write assignments	4.95	3.13	<0,05
Source: Own			

Students estimate that computers are very useful for writing assignments and are easy to use for that purpose, while smartphones are moderately easy and moderately or only partially useful for writing assignments (significant differences, table 3). More than half of the students (22 of 39) consider smartphones to be largely useless for that purpose, and only one in five students consider them to be mostly or very useful. This is an expected result since computers have larger screens, larger keyboards and computer mouses, unlike smartphones. Nevertheless, students that perceive smartphones to be useful (beta=0,55) and easy to use (beta=0,31) for writing assignments are more likely to be using them for that purpose. The former two perceptions explain 59% of the variance of students' behavior in using smartphones for writing assignments. Again, as in previously mentioned multiple regression analysis with the criteria of behavioral intention for using educational tools, these results also reveal the importance of perceived usefulness, followed by ease of use. Furthermore, high correlations between those theoretically related constructs are in favor of good construct validity of single item measures used in this research study.

There is no significant difference between mobile phones and computers in perceived ease of use for reading / learning (Table 3). Both devices are easy to use. However, computers and laptops are considered significantly more useful (Table 3). Students are probably aware that the benefits or outcomes of learning with computers are higher. It is possible to perform more complex actions with computers, actions that facilitate learning. It may seem strange that the ease of use for reading and learning is not also significantly higher on devices with larger screens. To conclude, smartphones are perceived as rather simple and easy to use for reading and learning, but their perceived usefulness and effectiveness is not as high as compared to computers. Different elements of usability should be explored in future studies in order to clarify what affects the efficiency of some devices for particular purposes. In previous studies, there were also many concerns regarding distractions as being a negative side of using digital devices (Chen and Denoyelles 2013.; Haber, Nacenta and Carpendale 2014, 89-96.; Jackson 2012.; McCoy 2016).

Students from this study have perceived usefulness of tablets and their ease of use as moderate. However, these results are not going to be elaborated upon in detail since most of the students from this convenience sample (N=39) do not own tablets. For comparison, in another study conducted in 2011, tablets were considered a powerful digital tool for academic purposes, as 82% of tablet owners use them in academic purposes (as opposed to 58% for small mobile devices) (Liu 2015). Liu's results (2015, 3) showed that some

of the students liked to read research materials (15%) and teaching materials (17%) on their e-readers or tablets. Major reasons include bigger displays, a better reading experience, more functions, and ease in carrying (Liu 2015, 3).

RQ4 Results - Correlations between technology use and students' success in their studies.

In the last phase of this study, at the level of the entire sample, there were no statistically significant correlations between students' success in their studies and the frequency of use of certain types of educational applications. However, female students (N = 24) and male students (N = 11) differ in their grades and in a number of other relevant variables. Therefore, it is necessary to conduct separate analysis for each gender.

Correlation analysis shows that female students who are successful in Information Technology (IT) courses are more likely to use applications for text editing, reading, and note-keeping during classes (Table 4). Also, female students with higher IT grades use computers for literature search more often. It can be concluded that all of these student activities are important for their success in IT courses. The number of surveyed male students is too low (N = 11), so there are no significant correlations in the male subsample.

TABLE 4. CORRELATIONS BETWEEN IT GRADES AND TECHNOLOGY USE AMONG FEMALE STUDENTS (N=24)	
Frequency of using:	IT courses grades
Apps for text editing	0,49*
Apps for reading & learning	0,46*
Apps for note-keeping during classes	0,45*
Literature search on a computer	0,41*
IT- Information Technology; * p<0,05; Source: Own	

Analysis of the differences mentioned before with regard to gender (Welch's t-tests) shows that female students have a higher preference for using pen and paper, and are less self-confident in using technologies. However, for educational purposes female students use technology more often than male students. These differences include the use of smartphones, computers and tablets, to read, write and communicate. Also, compared to their male colleagues, female students consider those technologies to be more useful and easy to use for searching, reading and writing.

Thus, at the level of precisely-specified educational technologies, female students have higher self-confidence and are using different devices and educational tools more often, while at a general level the new technologies are more favored by male students. A possible explanation for these differences is that male students mostly use technologies for some other non-educational purposes.

At the level of the whole sample, there are negative correlations between success on IT courses and the use of smartphones for literature search (r = -0.37, table 5) and writing assignments (r = -0.41). However, such correlations are probably statistical artifacts, as a result of differences between male and female students. Male students have a higher average IT courses grades and they are using smartphones for education to a lesser degree as compared to female students. This assumption is confirmed with partial

correlations controlled for gender as covariate. Partial correlations adjusted for gender are not significant (Table 5). Nevertheless, it is still possible that using smartphones is less efficient for studying IT courses. In order to clarify these relations it is necessary to continue this research with a larger sample. A study by Chen and Denoyelles has also shown that students with lower grades used mobile devices more frequently for academic purposes than other students (Chen and Denoyelles 2013).

TABLE 5. CORRELATIONS AND PARTIAL CORRELATIONS BETWEEN IT GRADES AND SMARTPHONE USAGE

	IT grades	IT grades (Covariate: Gender)
Information Seeking with smartphones	-0,37*	-0.26
Writing assignments with smartphones	-0,41*	-0.28
*p=0,05 ; Source: Own		

Limitations and recommendations

Research limitations of this paper are the following: student samples are convenience samples, and are not representative for a wide population of university students. Examined educational tools are not representative for all the tools available. The research focus of this paper did not include pedagogical aspects, and it would certainly be necessary in an even more extensive evaluation of educational tools. However, the value of this research is in the triangulation of different data collection methods that has converged to common, reliable results and conclusions. Also, the sample of various educational tools was selected by students, and they are the end users in educational context. Creators of educational tools can apply the qualitative insights about the severe usability problems, in order to avoid common usability issues that hinder student engagement.

Conclusion

This exploratory study has revealed that students intend to use most of the evaluated applications and tools, and perceive those technologies to be useful and easy to use. However, the use of various tools is rare, possibly because it is not required a lot by the curricula of their study courses. Only the tools for writing assignments, creating presentations and for reading and learning are often used, followed by moderate use of tools for photo editing and collaborative work. It can be concluded that there are many opportunities for introducing additional tasks, class assignments or activities that require use of various apps and tools. Students would be willing to use tools for collaborative work, tools that help them in solving tasks, photo editing, teaching enrichment tools and tutorials.

Half of the analyzed tools have severe usability problems regarding these Nielsen's heuristics: User control and freedom (H3), Consistency and standards (H4) and with Help users recognize, diagnose, and recover from errors (H9). Examples of problems include: absence of undo / redo buttons, no clear explanations of rare menu items, inaccurate button titles, no explanation of errors, etc. The best tools based on student evaluations also had no usability problems on Visibility of System status (H1), Error prevention

(H5) and Help and documentation (H10). Among those heuristics, the severity of problems with Error prevention (H5) has the highest correlations with the student evaluations of the tools.

As expected, smartphones are more used for daily communication with peers and teachers, and computers are more used for writing assignments. Computers are very often used for other educational tasks too. Device usage largely depends on the perceived usefulness, followed by ease of use. Students perceive smartphones to be less useful than computers for reading to study, yet they use them quite often for that purpose. They use smartphones for literature search too, probably because of instant availability.

Grades for Information Technology courses are correlated with using applications for reading and writing, as well as using computers for literature search, only among female students. Female students use specific educational tools and devices more than their male colleagues, and are more confident in the ease of use and usefulness of those various tools and devices, especially using smartphones. In comparison, male students are more confident in their general technology skills, and on average they have higher IT grades than female students from this convenience sample.

Introducing various new educational tools could provide students with more opportunities for active learning. This technological enrichment of instructional processes beyond tools and devices for reading and writing is not applied enough. Students perceive various applications presented during this research as useful and easy to use. They are motivated to use them in the future and this is an opportunity that teachers need to take advantage of. Furthermore, creators of the educational tools can enhance the efficiency and effectiveness of applications, and user satisfaction by meeting the established standards of usability. Taking into account both usability standards and user preferences is necessary for the successful use of educational technologies.

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COLLABORATIVE LEARNING AMONG STUDENTS - INCREASING STUDENT LEARNING FOR A SUSTAINABLE FUTURE

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Abstract: Collaborative learning is the way to help students in effective and creative learning. This is an approach that I apply in my courses at the Faculty of Education. To see the effect of collaborative learning within the subject "Basics of research in education", I conducted research to identify the effects of collaborative learning among students, the results of their achievement and the creation of soft skills. The students' task was to create their own ideas for research projects in the ICT field. Ideas should also be creative, contemporary, based on theory and be capable of implementation through ICT.

The research was conducted via a quasi-experimental method. The student group was divided into two smaller groups. One group of 12 students represented the control group. In this group were mainly students who showed high performance during their studies and the other group of 13 students represented the experimental group. This group included students who have shown average performance.

The control group and the experimental group have had the same lectures and projects. The only difference between the groups was that the experimental group worked collaboratively and assisted each other in the preparation of the research projects while the students in the control group worked on their research projects individually.

The division into groups of distinguished and average students was made to extract data on the effect of collaborative learning, especially on students who had average performance, and to compare their scores with students who had high performance but who worked individually.

Measurements of those achievements were conducted according to the Taxonomy of Creative Design (Nilsson 2012).

The results of this research have shown that despite the average performance of students versus those who had high performance, they have been shown to be more successful in creating new ideas for their research projects. Collaborative learning has helped them to be more creative, more substantial, and more qualitative than their counterparts.

Introduction

Contemporary societies have considerable diversity within themselves. Diversity is an attribute of any society, so it is very important to focus our attention on how we can maximize the interaction within societies. To maximize the interaction of individuals, it is considered that we must create opportunities to collaborate, communicate and exchange experiences, while respecting the individuality of each in particular. It is therefore very important to understand that some of the most important skills an individual should possess are the co-operation skills by which he or she exhibits them in relation to others. This form of collaboration skills helps students in effective and creative learning. It is being used widely around the globe in different learning settings and has become a new teaching model. This bearing in mind that knowledge is understood as something shared and built a collaborative process. In this case everyone in a classroom setting helps and contributes to the classroom learning.

Since it started to be widely used decades ago, collaborative learning has been of interest to many scholars and researchers around the globe, who have been defining it and underlining how it can best serve learning environments. Different theories have defined the purpose of collaborative learning. Smith and MacGregor define "Collaborative learning" as an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. (Smith & MacGregor 1992)

Similar to this is the definition of Osipov and Ziyatdinova (2015) who consider that "Collaborative learning is an approach to teaching and learning where students come together to solve current problems, resulting in a joint solution in the form of a product or an idea". (Osipov & Ziyatdinova 2015). Both definitions help us to understand that collaborative learning is a way to teach students to

see themselves as equal members of the designated group they are part of. This creates opportunities to be open-minded, making them more accountable toward the group goals and more responsible members of society.

While there are a variety of ways to conceptualize collaborative learning, in general all of them agree that collaborative learning is an approach that involves students and teachers working together in learning. For this reason many teachers aim to create small groups within their classrooms where students can work together. In small groups we often encounter students who are part of the group but do not actually show any interest in contributing. Another reason they are not included is the sense of inferiority that they are worse than other students in the group, or because there may be students in the group who can naturally dominate in small groups. All of this exposes the risk that students may not feel equal or may hesitate to be active in their collaborative work.

Pluta et al. define collaborative learning as any learning activity that includes the coordinated engagement of two or more learners for the purpose of completing tasks (e.g., solving cases) that lead to desired learning outcomes (e.g., developing deep content knowledge). According to this definition, assigning students to do group work is not sufficient for collaborative learning because purposeful engagement must also occur. In this respect, collaborative learning subsumes cooperative learning and extends it by emphasizing substantial dialogue and co-construction of ideas (Pluta, et al.2013). For this reason, teachers should be aware that small groups are created for specific purposes and as such must observe rules that should be respected by all, but at the same time give equal opportunity to everyone to express their opinion, respect others and get involved in the work together without feeling inferior or unable to dominate. The group work, however, must have its own set of rules, which can then be used to evaluate each student's engagement in the group. In relation to this, Gapinski (2018), has considered it very important that within the group:

Every member is responsible for the team’s progress and success; each of them should attend all sessions and be on time. Members of the group should be willing to listen to and show respect for the contributions of other members and to be an active listener. One of the most important issues is the emergence of group disagreements, which often go beyond the personal level, so the teacher should give clear instructions to the students that they can criticize the idea, based on facts but not persons. Resolving conflicts constructively is a very necessary part of the functioning of the group so that together they can achieve their common goal. The other rule that every student in the group should keep in mind is to pay attention and avoid disruptive behavior and side conversations. This helps students maximize their time towards fulfilling their responsibilities. It is also very important when working in a team that only one person speaks at a time, everyone participates in discussions and no one dominates in the group. Teamwork should also be considered an attractive part of this, so it is important for the team to experience this part and have fun with the work they do together.

It also presents an approach of sharing responsibilities equally and engaging each group in which collaboration is seen as coordination and as synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem .Cooperative work is accomplished by the division of labor among participants, as an activity where each person is responsible for a portion of the problem solving. (Roschelle and Teasley 1995)

This can help students identify their strengths and complement each other. However, this also directly affects their confidence-building. Through collaboration students will achieve better results in their group work, but also during this process they can learn and acquire many things that may have been challenging before. Therefore Baker (2015) considers collaboration "as a specific 'form' of cooperation, or one way in which it can be achieved. It requires students to work together as a team in order to accomplish an assignment or achieving learning outcomes.

On the other hand, Lai (2011) distinguishes collaboration from cooperative learning in that cooperation is typically accomplished through the division of labor, with each person responsible for some portion of the problem-solving. Collaboration, on the other hand, involves participants working together on the same task, rather than in parallel on separate portions of the task.

While we have many definitions of collaborative learning, we have to bear in mind that the idea of collaborative learning goes back to Vygotsky and Piaget. Both of them stressed a constructivist approach to teaching and learning that involves both individual and social processes. A constructivist perspective suggests that individuals create meaning using their prior understandings to make sense of new experience and construct new understandings (Hmelo-Silver, et al. 2013). This helps students combine knowledge and prior experience with new knowledge and experiences that they can gain during the collaborative process. This approach affects students positively and they benefit through collaborative learning in a classroom setting, such as enhancing students' self-belief, enabling students to work autonomously, enjoying learning relationships with others and feeling they are competent to achieve their own objectives, recognizing that teaching and teachers are central to engagement, creating learning that is active, collaborating and fostering learning relationships, creating educational experiences for students that are challenging, enriching and extending their academic abilities, ensuring institutional cultures are welcoming to students from diverse backgrounds, enabling students to become active citizens, and enabling students to develop their social and cultural capital. (Zepke & Leach 2010)

Peer learning is often recommended as a teaching strategy, and both students and teachers can respond well to its use. Many state and national curriculum standards include recommendations about the use of groups and other peer learning situations to enhance critical thinking, conceptual understanding, and other higher-order skills. Students often enjoy interacting with one another. Teachers frequently find that the presence of other students can serve as a key instructional resource. Acceptance by peers is linked to many positive outcomes in school, such as satisfaction with school,

improved academic performance, and positive beliefs about academic competence. (Hmelo-Silver et al 2013)

Motivation is one of the most important things students can find in the process while they are working in a group. In order to be motivated, it is important that the functionality of the group relies on rules that make all students equally important no matter how diverse they may be. Most people have worked in groups, helped another student with schoolwork, received help with schoolwork, or had some experience with tutoring. All these experiences involve peers working together to improve some aspect of academic performance. Another benefit of peer learning is greater interaction and respect among diverse students. For example, when peers are engaged in peer assisted learning strategies, this can result in improved social outcomes for students with learning disabilities (Fuchs, D. et al.).

Lin (2015) also lists a number of practical benefits that come from using collaborative learning: Collaborative learning provides more language practice opportunities, Improves the quality of students' conversation, creates a positive learning climate, promotes social interaction, and increases opportunities for critical thinking: it makes students more critical in their thinking. Critical thinking through the problem-solving process and collaborative learning helps students build greater confidence and self-esteem than will occur in a competitive learning classroom, and this will lead to increased efforts in language learning and greater willingness to take risks in learning. (Lin 2015)

Collaborative learning is a great way to help students develop skills that will serve them throughout their lives, in addition to gaining knowledge. However, collaborative learning is challenging for teachers, especially when it comes to evaluating their work.

This can be easy if you only evaluate the joint work and everyone gets the same points. However, in order to avoid the misuse of teamwork, to give students the opportunity to be responsible for the group and, on the other hand, not to disappoint the students who are truly active contributors to the group, the commitment of each student and their work should be assessed, so that they can get their individual and group points.

Therefore the most challenging question for all teachers is: **How to evaluate students' collaborative work**?

"In one of the courses I teach, the students had the task of collaborating on a particular project. After a few weeks each of their projects had to be presented. Each group has received from me the general rules that had to be adhered to during the group work process; however, it was their duty to assign specific tasks and responsibilities. In my eyes each project was working very well and excellent results were observed. Finally, after all the projects were presented, I began to rate all the students with points. Generally looking at their enthusiasm I thought the score would be the same for each member of the group, except for the very large difference that could be observed in presentation skills. So, each student in a group was scored with the same score, except for the student who presented her

joint project. She was excellent during the presentation, and during those minutes I was under the impression that she had borne the greatest burden of work. All the members had a right to answer my questions, not only the presenter: however, all of the answers were given only by the presenter. For this reason, the student who presented it was awarded the highest score, because of his excellent performance. All other members of the group were rated low. After a few days the reactions from the students began due to their dissatisfaction with the evaluation I had given to the project presenter.

"While talking to the group members I realized that the student who did the group work presentation had not contributed much to the project. To justify her disengagement, she persuaded the group to take over the presentation, assuring them that the presentation would be of a very high level. However, she had made a request to the group: 'When I ask you questions, only the answers should be given, because they should be answers that highlight the unity of the group's opinions."

This experience of mine has made me think that in this group the students (in the case of the students who introduced the group work together) have used other skills to convince the group and me of its commitment. At the same time those students managed to manipulate all the members of the group so that they would not answer the questions I asked about the project. This has led me to think of other forms of evaluation. I have come to realize that some form of assessment must be applied to a given project so that each student receives an assessment of the work and engagement he or she has done in the group. This would be an evaluation in a way that encourages productive collaboration. According to Baker (Baker 2015) an important part of assessment is providing feedback to students on their progress as an integral part of teaching since the feedback is part of the assessment that students should have. There is even a paradox here: on the one hand, teachers need to evaluate individual students' abilities (that is a societal choice), but this cannot be done if evaluation concerns only the product of collaboration; on the other hand, evaluating individual contributions to collaborative work emphasizes individual contributions, possibly to the detriment of collaboration itself (see below). Baker emphasizes that collaboration is not just a position or collation of individual efforts, so if collaboration has occurred, it will be difficult to evaluate individual contributions from the joint output. However, in order to motivate students to collaborate for a specific purpose, it is important to have an appreciation of their collaborative work and their individual engagement within the group. Therefore, teachers usually opt for a combination of individual and group evaluation (evaluating individual progress on the basis of individual tests following collaboration, as well as the quality of the collaborative product).

On the basis of extensive meta-reviews of collaborative learning research, Slavin (1983) underlines how a clear result emerged: cooperative learning is most effective when the task to be achieved is not subdivided into sub-tasks distributed across participants (i.e. as in the case of "cooperation", as defined below) and when evaluation (feedback) is given to the group as a whole on the basis of (the average of) the cognitive progress of individual group members.

However, the main points made above are not absolute definitions of group work, cooperation and collaboration in every type of situation - they are defining characteristics of such situations as they are studied in CL research, and as such they limit the scope of the model of collaboration sketched out here. (Baker 2015). For this reason, teachers need to explore different ways in which they can motivate students to work together, but at the same time they need to make an assessment so that those students will not be or feel underestimated, or else overestimated in relation to the commitment they have contributed.

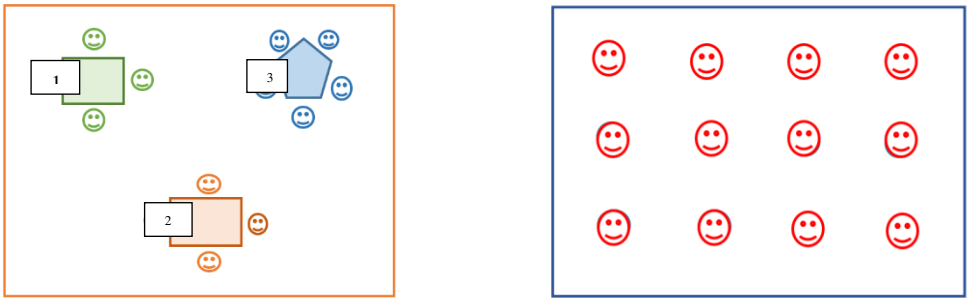
The same thing happened during this study, through which I aimed to find appropriate strategies and forms that could stimulate students to work together and have their individual and group backgrounds evaluated as accurately as possible.

Methodology

The research was conducted via a quasi-experimental method. The student group was divided into two smaller groups. One group of 12 students represented the control (B) group. In this group were mainly students who showed high performance during their studies, and the other group of 13 students represented the experimental (A) group. This group included students who have shown average performance.

The control group and the experimental group have had the same lectures and projects. The only difference between the groups was that the experimental group was divided into three sub-groups and worked in collaboration and assisted each other to prepare the research projects, while the students in the control group worked on their research projects individually.

FIGURE 1. SCHEME OF GROUPS



A)Experimental Group B. Control Group

Source: Own

The division into groups of distinguished and average students was done to extract data on the effect of collaborative learning especially of students who had average performance and to compare their scores with students who had high performance but who worked individually.

Research questions

How learning outcomes can be improved through collaborative learning?

How much impact does collaborative learning have on student creativity?

How much impact does collaborative learning have on the development of students' soft skills?

Progress of the research:

This study is organized in three different stages. In the first stage it is planned that the experimental group will help the students to get involved in teamwork by collaborating with each other and seeing themselves as an active part of their group. Meanwhile in the control group the assigned tasks had to be performed individually. This phase is a period in which students need to understand the importance of collaborating, sharing tasks, and fulfilling the responsibilities that belong to them as part of the group. However, the students have been informed that these assignments will be assessed at certain points, which was not my intention. To accomplish this, I tasked the experimental group to solve various problems which required a group commitment.

Their first task was to deal with a situation where a small ship on the high seas, which is manned by a single person, is in danger of sinking. To save the ship from sinking, the boatman has to decide which of the things he has on board to throw into the sea. This would help the boat carry less weight. But on the other hand, the sailor will be on the high seas for a further period, so he has to be very careful about what to throw into the sea and what he needs to carry with him to his final destination

Students had to make a list out of the list of things the navigator had with them and prioritize what they think they should throw into the sea and what things they should keep. I did not set any time limits for solving this problem because the idea was that they had enough space to collaborate, discuss, argue and come up with a common policy.

Although the students had to function as a group, they failed in this task to come to a common position. In the end everyone had their own ideas that they proposed. As they were far from cooperating in the realization of this task, I offered them a second spaceship task that required cooperation.

""*Since the earth was in danger of being destroyed and with it the extinction of humanity would occur, one possibility for continuing human existence was a spaceship, which would take a certain number of people to another planet in order to continue life. However, not everyone could board this spaceship because there was a limited number of places for people. Therefore, the students were forced to decide which of the people should board the spaceship in order to save them and have the opportunity to continue and multiply humanity."*

The students were given a list of the persons they were supposed to rescue, and this time they had to come up with a common policy, otherwise the ship would not be able to carry out its mission. Students had limited time this time, so they would have to discuss, argue their ideas, and finally come to a consensus on their final decision. The time available was 20 minutes.

Again, my goal was not the outcome of the task but the process of how teamwork was developed.

This time the students were more organized within the group. They managed to create a more collaborative group climate. They had more patience to hear others giving their arguments, but in the end, they again failed to come to a consensus. So, there were some intra-group variants of who would be the people boarding the spaceship.

After this assignment we discussed with the group and reflected on the two tasks that they had to perform. Each of them reflected and identified what challenges they were going through and how we should strive to overcome these challenges so as to result in better work that would merit the assessment they would receive. Since I used evaluation only to motivate them and not actually to see their concrete results, as part of the process, I told them that I will give them a single opportunity so that they were able to get a better rating. But this time the task was more difficult and required more time, cooperation and creativity. On the other hand, this task had to be accomplished through technology using the Minecraft program as well.

The idea of incorporating technology for the students was very attractive and pleasant, and the assignment was very welcome.

"Through the Minecraft program students had to build something that would have a certain meaning, which had to be a common original idea and to present specific meaning for them as a group."

They had two classes available, and they had to complete their assignment within two hours.

This was the last assignment before the students received their group projects, that had to be assessed within the course.

After two hours of work, the students succeeded in completing their assignment and the small groups came up with their original ideas, which had given them a certain meaning and importance. After two previous attempts, it was the third time that the two small groups that belonged to the experimental group managed to cooperate properly, function as a single body, support one another, complement each other, commit to each other, attend to the opinions of other members of the group, be tolerant and ultimately reach consensus on a common goal. That was the purpose of the entire first phase.

On the other hand, work with the control group was based on individual student work. At work, students were in competition with each other, feeling insecure about the work they were doing and demanding more attention and explanation.

While they were working, I observed and kept records of each part of the work process. After completing the third task, with the experimental group, we reflected on the process, their engagement in the joint project, the benefits they achieved and the comparison of the results of the group work and individual work. During reflection, it was evident that the students liked the teamwork, had changed

their opinion that individual work was better, and considered that projects involving technology were much more attractive to them.

The second phase of the project was that both the experimental and the control group had to develop their ideas for new projects. These projects had to be completed by the end of the summer semester.

The experimental groups (the three small groups: A1, A2, A3) were much more adept at proposing their ideas. Each small experimental group had more ideas than members, meaning that some of the group members had each made more than one proposal.

The purpose of the ideas was to be original, relevant and creative. After the ideas were presented students of both groups began working on their projects for five weeks.

The third phase was for the students to present their projects. Unlike the experimental group, the control group took an additional week to present the projects as the projects were individual and each project required time. As there were three sub-groups within the experimental group, their projects were presented within two teaching hours. This was also a factor that helped me rationalize the timing of project presentations and evaluations, which is very important for all teachers. The preparation of the project presentation and the way the control and experimental group students performed also had significant differences. The control group students were more stressed during the presentation, they lacked self-confidence, the way they presented showed more of their ego, the level of creativity in their individual projects was significantly lower, they had more ideas that were copied or adapted and they lacked original, relevant and creative ideas, and what was very distinctive was that throughout their presentation hey were not sure if their project was well prepared and of good quality.

On the other hand, the students in the experimental group performed at a high professional level during the presentation of their group projects. They had confidence in what they had done together and were ready and eager to complement one another so that their presentation was as complete as possible. What characterized the experimental group students was the high level of self-confidence they displayed, and the fact that they were seen to enjoy collaboration and learning new knowledge. In addition to feeling competent in their field of study, they also came up with ideas that were original to them, based on the practices they had learned as students, ideas that they considered very important and relevant. At the same time, their ideas were very creative because they represented a very broad reflection of concepts, treatment and integration with their professional field. The presentation skills I had were very good, as were the time management skills they had at their disposal. Each of the small group members found a way to be part of the presentation by reconciling the experience gained, the knowledge gained, the skills, satisfaction with their work and the contribution they made through the projects they presented. They were really proud of them.

After all the presentations were completed, my student project evaluation was carried out in the fourteenth week, which was the penultimate week. Measurements of those achievements were conducted according to the Taxonomy of Creative Design (Nilsson 2012).

According to this Taxonomy there were five levels of evaluation of student creativity: 1.-imitation, through replication of a previous work; 2.-variation, which represented modification of an existing work ;3.-combination, which included a mixture of two or more works; 4.- transformation, which represented the translation of a work into one or more mediums; and finally 5.-original creation, which represented the creation of something previously unrecognizable (Nilsson 2012).

In addition to my assessment, the students had a duty to evaluate one another and ultimately to evaluate themselves. They too made their assessment through the taxonomy scales.

TABLE 1. SUMMARIZING ALL THE EVALUATIONS, THE RESULTS THAT WERE FINALLY OBTAINED.:

	Control Group (12 st)	**Experimental Group (13 st-3 groups)**
Imitation The replication of a previous work	2	
Variation The modification of an existing work	3	
Combination The mixture of two or more works	7	
Transformation The translation of the work into another medium or mode	/	Group A2 with 4 st
Original creation The creation of something previously unrecognizable	/	Group A1 with 4 st Group A3 with 5 st

Source: Own

Conclusion

From the 15 weeks of research and the final results of the student assessment, the changes that brought collaborative learning to bear on student success were clearly noted, although the students in the experimental group were of an average achievement level compared to the control group who were students with higher success. Students in both groups preferred to work on their own, since they did not want to try to create something together with their peers. The tendency for non-cooperation was more pronounced among students who were more successful, as they had to do most of the work themselves to maintain the quality of their work. Students of average or lower level were open to being part of groups but their commitment to the task was minimal.

For the assignments given before starting the project, the students in the experimental group were not ready to function as a single body. There were different opinions (which was a good thing), but there was no will to synthesize those thoughts and create a common attitude. However, for a very short time they began to adapt to each other, to be able to express their opinions freely, to accept other's opinions, and to help each other so that the project could be appreciated.

At the end of their projects they were completely familiar with each other and functioned as a single body. Their presentation skills were excellent and it was evident that they complemented each other all the time. Time management was another factor in which there was a significant difference with the time management of the control group students.

They took care of each other's presentation time, giving everyone the opportunity to present part of the project on the other hand while respecting the amount of time they had available for each one. Meanwhile the control group students had all the time available and found it difficult to summarize the outcome in their presentation. Project-related preparations were much more factual in the experimental group than the control group. Each experimental group based their presentation on additional work/research in which they each did their part. This was clearly missing in the control group students.

Other results observed in the experimental group were the tolerance and flexibility they created in the group, and the fact that the conversations were more functional and those they were more creative in brainstorming. They complemented each other's ideas and reached a consensus.

Another very important thing was the integration of technology into their work. While young people are very tech-savvy and their minds work better with it, teachers should consider technology to be part of their syllabus. Beka (2014) states: ”Certainly the developments in technology have influenced the education field as well, particularly in teaching and learning”. In the same paper she considers that integrating technology into the curriculum of the classroom is becoming an inseparable part of good teaching (Beka 2014).

In this form students are more open to learning and research and are willing to spend more time working because they are very familiar with technology and their mindset works best when technology is an integral part of their work. Although there are various theories that deem technology not so relevant for learning, today our young people spend most of their time, jobs and life organizing through technology. It is therefore very important for teachers to change their minds and take advantage of this fact to give students the opportunity to work in their preferred way. It is important to say that teachers need to research and find different ways of functioning, to make all students function and to motivate them to work. If students prefer technology, then teachers should seize this opportunity and offer their students the opportunity to learn in their preferred way. It is the duty of the teacher to make all the variations available to enable the students to work.

Based on all of the above, it was noted that if the teacher provides opportunities to the students and at the same time helps them to work together, bridges of cooperation can be created between the students. The teacher should plan carefully and at the same time determine certain strategies and structures to motivate students to work together. Teamwork helps all students and their success will be higher. Teamwork also gives teachers greater opportunity to manage and maximize the time they have available, especially in the assessment area.

If the teacher manages to achieve proper planning and good work organization, it is very easy to get the students involved. During this study, it was observed that despite the challenges they faced, students who worked in groups felt more relaxed and satisfied with their work than students in the control group. The opportunity to hear different ideas from the peer group also allowed them to continually advance their ideas. This enabled them to have creative, original ideas, ideas that were highly relevant to the times, and ideas intended to provide long-term solutions.

Collaborating has also enabled students to develop their soft skills, which are crucial to the jobs market. Time management, teamwork, stress management during teamwork, developing communication skills, and presentation skills were all part of their work process. Unlike the control group students, they were able to improve significantly within 15 weeks. Therefore, it is very important for teachers to apply collaborative learning, because in addition to helping many students with new knowledge and skills, this form of work is also helpful to the teacher, especially in the assessment process.

TABLE 2 ACTIVITIES

Spring semester 15 weeks			
	Week	Activity	Themes
	Week one	Course introduction and group breakdown	Control and experimental group separation
	Week two	The first task	Splitting the experimental group into subgroups
	Week three	The second task	Problem-solving with Ship and Sailor
	Week four	The third task	Solve the problem with the space shuttle
	Week five	Student research projects	Troubleshooting through Minecraft
	Week six	Student research projects	Creating ideas for research projects
	Week seven	Student research projects	Work on projects
	Week eight	Student research projects	Work on projects
	Week nine	Student research projects	Work on projects
	Week ten	Student research projects	Work on projects
	Week eleven	Presentation of projects	Work on projects
	Week twelve	Presentation of projects	Presentation of experimental group projects
	Week thirteen	Presentation of projects	Introducing control group projects
	Week fourteen	Evaluation	Introducing control group projects
	Week fifteen	Reflection with both groups	Evaluating and self-evaluating student projects

Source: Own

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PRIMARY SCHOOL TEACHERS' READINESS FOR ONLINE PROFESSIONAL DEVELOPMENT

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Abstract: A growing number of universities currently conduct their academic courses through an online environment and a significant number of online courses are part of the preservice and in-service teacher training programs. This study investigates primary school teachers' readiness for online professional development. This research study is situated in the context of current literature on teacher professional development and the use of online learning in teacher education. The survey questionnaire was administered to 350 primary school teachers from two municipalities in the southern part of Croatia. The selection process was random and the sample of participants represented 32% of the primary school teacher population in the two municipalities. The questionnaire consisted of demographic questions and two validated scales. For the purpose of this study, we used: the Learner Readiness for Online Learning scale (LROL) (Hung, Chou, Chen & Own 2010) and the Readiness for Professional Development of Teachers (RPDT) scale (Beara & Okanović, 2010). LROL situates survey items in an online environment and estimates a person's attitude toward self-directed learning, motivation for learning, computer/Internet self-efficacy, learner control, and online communication self-efficacy. RPDT focuses on the external motivation for professional development, the importance of teacher professional training, the impact of professional development on teaching quality, the importance of continuous professional development and teachers' initiative in professional development. The results of the statistical correlation indicated that primary school teachers positively value the importance of professional development and teachers' initiative for professional development. Conversely, they do not recognize external motivation as a feature that has a high impact on professional development. Primary school teachers greatly value their own ability for self-direction, motivation for learning, learner control and technological self-efficacy. The research findings may benefit further professional development planning for primary school teachers.

Introduction

School reforms continually evolve as societal and technological changes occur. In the past decades, schools are consistently populated with technology and this reflects on preservice and in-service teacher training programs. A growing number of universities deliver online programs and a significant number of online courses are part of the preservice and in-service teacher training programs. When planning professional development for teachers who work in technology equipped schools and who are required to implement online technologies, the technological conditions need to be factored into professional development opportunities.

To prepare for implementation of the reform initiative primarily focused on technology utilization in the teaching and learning process, since fall 2018, all teachers in Croatia have opportunity to attend fee online professional development courses. When exploring professional development, it is necessary to recognize ways in which reform movements shape conditions, possibilities and constraints. Related to this research study aim, it is necessary to notice limitations of the chosen training paradigm for purposes of achieving the reform agenda, and principles that seem aligned with reform requirements (Little 1993). This survey study was conducted in spring 2018, prior to start of the new professional development circle, and attempted to determine a possible relationship between primary school teachers' readiness for online learning and

perceived readiness for professional development. In order to collect rich data, our survey did not focusing solely on in-service teacher readiness in regards to specific aspects of online learning, but also the general readiness for professional development. The research study results are situated in the context of the current literature on teacher professional development and the use of online learning in teacher education. The research findings may benefit the further professional development planning for primary school teachers.

Theoretical Background

There are number of research studies focusing on different aspects of teachers' professional development, such as teacher readiness (Beara & Okanović 2010), teacher motivation to participate (Livneh & Livneh 1999), environmental conditions that influence quality (Torff & Sessions 2009), and the significance of the role of professional practice (Baltusite & Katane 2014; Van Driel & Berry).

2012). The awareness of the importance of training for the teaching profession is a key feature of professional readiness according to a Serbian survey conducted by (Beara & Okanović 2010). Teachers see professional development as important for the professionalization and modernization of teaching, while they prefer to have options when choosing features of professional development (Beara & Okanović 2010). In another study focused on predictors for teachers' participation in professional development, the researchers recognized both high internal motivation to learn new skills or acquire knowledge and high external motivation to learn which as supportive of teachers' career mobility opportunities (Livneh & Livneh 1999). In order to make adjustments to professional development programs, researchers focus on a variety of environmental factors that are likely to influence professional development quality. For example, when comparing professional development support for teachers in communities of different socio-economic status, it was noticed that support for professional development was higher in high socio-economic communities than low socio-economic ones (Torff & Sessions 2009). In order for teacher education student to learn how to apply theoretical knowledge, within the process of the prospective teachers' professional development it is important to have meaningful pedagogical practice. The development of pedagogical content knowledge is an important goal to focus on in professional development programs. It is necessary to align the professional development programs to pedagogical practice and, while providing teachers with specific knowledge, programs should include opportunities to practice certain instructional strategies and to reflect on their experiences (Baltusite & Katane 2014; Van Driel & Berry 2012).

Consequently, when planning professional development for teachers in the schools that are technology equipped, it is necessary to adjust the in-service teachers' learning experiences. In this scope, a large number of recent research studies investigated teachers' reediness to pursue professional development in an online environment using of technology (Reeves & Pedulla 2011; Reeves & Li 2012; Smith & Sivo 2012; Harper & Nicolson 2013; Holmes 2013; Carter Ching & Hursh 2014; Macià & García 2016; Prestridge 2017; Rodesiler 2017). Online teaching and learning encompasses the formal and informal delivery of learning

and professional development activities, processes, and associations through a variety of electronic methods (Hewett and Ehmann 2004).

Improvements in online professional development often yield higher quality in-service training (Reeves & Li 2012). Recognized issues with higher dropout rates in comparison to traditional training, understanding teachers' insights and satisfaction with online professional development can serve as a guide. Teachers participating in online professional development believe online professional development is as effective as face-to-face professional development, but also recognize impact of technology and actual computer literacy level on overall experience (Reeves & Pedulla 2011; Reeves & Li 2012).

Online professional development includes a number of phenomena. Findings of discussion forum analysis and teachers' course project from an online course on development of web-based applications for in-service teachers indicated the important role of peer cooperation in teachers' learning and innovation adoption (Carter Ching & Hursh 2014). The perceived ease of use, perceived usefulness and social presence have been found to be significant determinants of teachers' intent to conduct professional development in online environment in the future (Smith & Sivo 2012).

Innovation takes place over the Internet and there is renewed interest in the social concept of community to support online learning. Teachers who participate in online learning perceive online professional development opportunities as a chance to address their real needs in a meaningful way, reflect on teaching practice, contribute to the generation of co-created knowledge, but also as a reciprocal process of enhancing confidence and contributing to future professional development offerings (Harper & Nicolson 2013; Holmes 2013; Macià & García 2016; Prestridge 2017; Rodesiler 2017).

Objectives

In order to investigate primary school teachers' readiness for professional development and their readiness for online learning, the following research questions were explored:

1. What is the level of perceived readiness for online learning of primary school teachers?
2. What is the level of perceived readiness for professional development of primary school teachers?
3. Is there a relationship between readiness for online learning and perceived readiness for professional development of primary school teachers?

It is important to better understand primary school teachers perceptions in these three areas in order to adjust opportunities currently offered, enhance opportunities by creating more meaning online professional development tasks/courses and to address challenges (both curriculum and access issues).

Overview of Methodology

Participants. This study investigates primary school teachers' readiness for online professional development. The survey was administered to 350 primary school teachers from two municipalities in the

southern part of Croatia. These two municipalities amount to 13.3% of the population in Croatia (HGK 2019). In the context of this study, it is important to emphasize that educational system finances in Croatia are only partially decentralized, teachers' salaries are paid from the central budget, and that all teachers in Croatia have the same salary (Batarelo, Podrug, Apostoloski 2003) and their in-service teacher training is guided by the central teacher training agency. The selection process was random and the sample of participants represent 32% of the primary school teacher population in the two municipalities. As seen in Table 1, the sample included teachers of different age groups, work experiences and levels of education. Different educational levels of primary school teachers are linked to the ongoing changes in preservice teacher education in Croatia. In 1992, a four-year teacher training course was introduced and in 2005 with the Bologna process started a five-year teacher training (Vizek Vidović et al 2005). The teachers who attended preservice teacher education programs prior to 1992, hold associate degrees, while those who were educated between 1992 and 2005 hold bachelor degrees. Teachers who completed the degree in the last ten years hold masters degree or higher. While we did not evaluate these specific categories, it is important to understand that the teachers have vastly different educational backgrounds that is dependent on when they entered the profession.

TABLE 1. STUDY PARTICIPANTS' DEMOGRAPHICS

AGE	N	%
< 30	61	17,4
30 - 50	180	51,3
> 50	110	31,3
Total	351	100,0
WORK EXPERIENCE	N	%
< 10	90	25,6
10 - 30	189	53,8
> 30	72	20,5
Total	351	100,0
LEVEL OF EDUCATION	N	%
Associate Degree	132	37,6
B.A.	163	46,4
M.A., M.Sc., Ph.D.	56	16,0
Total	351	100,0

Source:Own

Instruments. For the purpose of this study, we used two validated scales, Learner Readiness for Online Learning scale (LROL) developed by Hung, Chou, Chen and Own (2010) and Readiness for Professional Development of Teachers (RPDT) scale developed by Beara and Okanović (2010). The selection of the scales was based on the targeted population, research questions, satisfactory metric properties and dimensional structure of the scales. In the administered survey of both scales, all of the variables used the five-point Likert-type survey items with 1 indicating complete disagreement with the given statement and 5 indicating complete agreement with the given statement.

LROL Scale. This scale has 18 items and a 5-factor structure. The original scale had high reliability coefficients whereas composite reliability coefficients of the subsections were: .736 for *Computer/Internet self-efficacy* consisting of 3-items, .871 for *Self-directed learning* with 5-items, .727 for *Learner control* consisting of 3-items, .843 for *Motivation for learning* with 4-items and .867 for *Online communication self-efficacy* with 3-items. In order to assure translation accuracy, the English version of the scale was first translated into Croatian and then back-translated into English. The translated scale was then revised through both exploratory and confirmatory factor analysis. The principal axis factor analysis supported a robust 2-factor structure explaining 40.52 percent of the variance, with Cronbach's Alpha of .877 for the entire scale. The coefficients of the two subsections were .800 for *Self-direction and motivation for learning* consisting to 9 items, and .882 for *Computer/Internet self-efficacy and learner control* also consisting of 9 items. Table 2 shows the summated scaled variables with mean values, per item means and item to scale correlations.

TABLE 2. SUMMATED SCALED VARIABLES, WITH MEAN VALUES AND ITEM TO SCALE CORRELATIONS FOR THE LROL

Survey Item	Mean	Item to Scale Correlation
Factor 1: Self-direction and motivation for learning		
I carry out my own study plan.	4.34	.509
I seek assistance when facing learning problems.	4.41	.531
I manage time well.	4.35	.556
I set up my learning goals	4.31	.628
I have higher expectations for my learning performance.	4.32	.537
I am open to new ideas.	4.67	.555
I have motivation to learn.	4.76	.528
I improve from my mistakes.	4.68	.593
I like to share my ideas with others.	4.65	.374
Minimum: 23; Maximum: 45; Mean: 40,48; St. Dev.: 3,72; Alpha: .800		
Factor 2: Computer/Internet self-efficacy and learner control		
I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint).	4.37	.609
I feel confident in my knowledge and skills of how to manage software for online learning.	4.15	.637
I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.	4.47	.725
I can direct my own learning progress.	4.52	.628
I am not distracted by other online activities when learning online (instant messages, Internet surfing).	4.22	.665
I repeated the online instructional materials on the basis of my needs.	4.49	.508
I feel confident in using online tools (email, discussion) to effectively communicate with others.	4.37	.871
I feel confident in expressing myself (emotions and humor) through text.	4.43	.647
I feel confident in posting questions in online discussions.	4.23	.674
Minimum: 16; Maximum: 45; Mean: 39.25; St. Dev.: 5.24; Alpha: .882 Source: Own		

RPDT scale. This scale consists of 17 items and has a five factor structure. The original scale is published in Serbian; it has high reliability coefficients whereas Cronbach's alpha coefficients of the subsections were: *External motivation for professional development* (4-items; CA=0.70), the *Importance of training for teaching profession (*4-items; CA=0.72), the *Impact of professional development on teaching quality* (3-items; CA=0.67), the *Importance of continuous professional development* (3-items; CA=0.60) and *Teachers'*

initiative for professional development (3-items; CA=0.63). The scales were translated into Croatian and revised through both exploratory and confirmatory factor analysis. In this study, the principal axis factor analysis supported a 16-item scale with two-factor structure explaining 32.49 percent of the variance. The Cronbach's Alpha for the entire scale was of .557. The coefficients of the two subsections were .790 for *External motivation for and perception of impact of professional development* consisting to 6 items, and .760 for *Perception of importance and initiative for professional developmen*t consisting of 9 items. Summated scaled variables with mean values, per item means and item to scale correlations are shown in Table 3.

TABLE 3. SUMMATED SCALED VARIABLES, WITH MEAN VALUES, STANDARD DEVIATIONS AND ITEM TO SCALE CORRELATIONS FOR THE RPDT SCALE

Survey Item	Mean	Item to Scale Correlation
Factor 1: External motivation for and perception of impact of professional development		
Teacher should get involved in professional training if the school principal expects that.	2.28	.484
It is necessary to attend only mandatory seminars.	2.23	.648
The main reason for attending seminars is to get promotion.	2.76	.625
Professional development is time consuming.	2.81	.666
It is possible to be a good teacher without additional training.	2.79	.591
Teachers do not need additional professional development.	2.53	.663
Minimum: 6; Maximum: 28; Mean: 15,36; St. Dev.: 6,27; Alpha: .790		
Factor 2: Perception of importance and initiative for professional development		
Teaching profession requires constant professional development.	4.46	.579
Teaching profession, more than other professions requires continuous professional development.	4.51	.596
Teachers should get continuously involved in professional development regardless of external incentives.	4.43	.556
Every year, teachers attend some type of professional development.	4.26	.385
It is important for teachers to stay informed about current teaching methods.	4.42	.325
It is important for teachers to keep up with the development of their teaching subjects.	4.52	.526
For professional development and career advancement it is important to talk to colleagues and / or school principal.	4.41	.563
Teachers should independently identify skills in which they should improve.	4.21	.517
For teachers, it is important to set up goals and create a personal professional development plan.	4.26	.436
It is important for teachers to independently find opportunities and ways to improve their own knowledge and skills.	4.25	.390
Minimum: 20; Maximum: 50; Mean: 43.68; St. Dev.: 5.59; Alpha: .760		

Source: Own

Data Analysis. The study data was analyzed on both descriptive and inferential level. On a descriptive level, data were analyzed using measures such as frequency, mean score and standard deviation. To determine the correlation between LROL and RPDT, Pearson coefficient of correlation was used on the $p<.01$ level.

Findings and Discussion

Study findings on the level of perceived readiness for online learning of primary school teachers are shown in Table 2. For the nine items comprising the self-direction and motivation for learning, means ranged from 4.31 to 4.76, indicating high agreement with the items. Similarly, on average, teachers tended to

positively perceive computer/Internet self-efficacy and learner control. All of the mean responses for the second subscale fell between 4.15 and 4.52, suggesting its generally positive valuation. In general, respondents indicated that they are ready for self-directed learning, and also have competencies for learning in technology environment.

In regards to the level of perceived readiness for professional development of primary school teachers, the study findings are presented in Table 3. In the six items comprising the external motivation for and perception of impact of professional development, means ranged from 2.23 to 2.81, indicating moderate disagreement with the items. Responses indicate that teachers do not value external motivators as crucial for the professional development. On the other hand, on average, teachers tended to positively perceive importance and initiative for professional development. All of the mean responses fell between 4.21 and 4.52, suggesting a generally positive valuation of the subscale.

The results of the statistical correlation indicate a relationship between primary school teachers' readiness for online learning and their overall readiness for professional development. The inter-correlations between subsections of the LROL and RPDT scales are presented in Table 4. Both LROL subscales were strongly correlated to two factors of the RPDT scale: Self-direction and motivation for learning and Motivation for and perception of impact of professional development, $r(349)=-.171$, $p<.001$; Self-direction and motivation for learning and Perception of importance and initiative for professional development, $r(349)=-.149$, $p<.001$; Computer/Internet self-efficacy and learner control and Motivation for and perception of impact of professional development, $r(350)=.399$, $p<.001$; and Computer/Internet self-efficacy and learner control and Perception of importance and initiative for professional development, $r(350)=.313$, $p<.001$.

TABLE 4. INTER-CORRELATIONS BETWEEN LROL AND RPDT SUBSECTIONS.

	1	2	3	4
RPDT				
1.External motivation for and perception of impact of professional development	1			
2.Perception of importance and initiative for professional development	-,319**	1		
LROL				
3.Self-direction and motivation for learning	-,171**	,399**	1	
4.Computer/Internet self-efficacy and learner control	-,149**	,313**	,420**	1

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Own

In relation to the posed research questions, the statistical results indicated that primary school teachers positively value importance of professional development and teachers' initiative for professional development. At the same time, they do not recognize external motivation as a feature that has an important impact on professional development. Primary school teachers highly value their own ability for self-direction, motivation for learning, learner control and technological self-efficacy. Consequently, there is a

high negative correlation between teacher evaluation of external motivation role and recognition of ability for self-direction, motivation for learning, learner control and technological self-efficacy.

Recommendations and Conclusions

This research study provided insight into the posed research questions. The data collected from a representative sample of teachers in Croatia showed a high correlation between primary school teachers' readiness for online learning and their overall readiness for professional development. The study findings indicated that primary school teachers positively value their own ability for self-direction, motivation for learning, learner control and technological self-efficacy. They also positively value the importance of professional development and teachers' initiative. Self-directed learning is a theme which is commonly researched in accordance to its relation to the academic success. Furthermore, related to the technology use, research findings indicate that use of technology has a direct positive relationship with learners' self-directed learning (Rashid & Asghar 2016).

These findings are important in that they indicate direction for professional development planning. It is apparent that certain types of external motivators should not be the focus of professional development initiatives. According to the high negative correlation between external motivators for professional development and both subsections of the online learning readiness, it is also possible to conclude that certain external motivators do not positively contribute to the teacher involvement in online professional development. The limitations of this finding is linked to the type of external motivators for teachers' professional development that were researched here and the characteristics of the particular school system. Previous studies emphasize that certain types of external motivators such as career opportunities are perceived as predictors in the involvement of teachers in professional development (Livneh & Livneh 1999).

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NECESSITY OF KNOWLEDGE ABOUT MATH IN SAFETY ENGINEERING

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Key words: real-life application, mathematics, student, distances studies, LMS.

Abstract: Students of bachelor study programme come to VŠB – Technical University of Ostrava from various secondary schools, and their level of mathematical knowledge is thus very different. At the same time, one of the most frequently asked questions by students during the introductory mathematical courses of bachelor study programmes is about the purpose of learning mathematics. Therefore, we have involved higher-level students and teachers of technical subjects in preparing examples of real-life problems where topics of secondary school-level as well as bachelor study programme-level mathematics occur. We have put together 30 real-life problems dealt with in a wide range or technical subjects taught across the faculties of VŠB. The motivational problems are used in teaching of mathematics and descriptive geometry. We would also like to incorporate them into the developing distant study educational materials for Introduction to Mathematics within the Learning Management System. This article deals with real-life problems presented to students of the Faculty of Safety Engineering.

Introduction

It has already been three years since we joined the project of the Statutory City of Ostrava titled "Programme Supporting Education and Talent Management in Technical and Natural Sciences in the Statutory City of Ostrava". Within this project, we have been able to develop cooperation with our talented students (Dlouhá and Hamříková 2018, 301-308). At present, we are cooperating in various activities with 8 students of the full-time bachelor, follow-up master as well as doctoral study programmes. One of the activities in which these students participate is the creation of educational materials for the study of mathematics and descriptive geometry within their fields of study. The students of six fields of study, in cooperation with their teachers, have put together 5 examples of problems related to their field of study, the solution of which cannot be found without the knowledge of secondary and tertiary level mathematics and descriptive geometry. Apart from using these examples at lectures and seminars to answer the eternal question "Why do we have to learn all of this?" we would also like to incorporate these motivational examples of problems developing distant study educational materials for Introduction to Mathematics within our LMS.

Motivational examples of problems

Each of the problems solved includes the information about the year and subject where the particular area of problems is introduced. Then the areas of mathematics and descriptive geometry applicable for solving the particular motivational problems are listed. The brief theoretical introduction is then followed by the problem solution.

Example

As an example of a motivational problem, we have selected "Calculation of fire distance from the window aperture", where the student of the Faculty of Safety Engineering uses the secondary school mathematics knowledge.

The task is solved in the course Engineering Methods in Fire Protection which is included in the first year of the follow-up (Master's) study program Fire Protection and Industrial Safety. In order to solve it, it is necessary to be able to convert units, substitute to formulas, express an unknown from a formula, deal with logarithmic and trigonometric functions, and understand free parallel projection.

Theory applicable in determination of fire distances

During fire in building constructions, thermal radiation from fire open areas, in particular apertures and constructions of exposed walls without fire resistance, takes place. Fire dangerous areas are thus created threatening the neighbouring buildings. The objective of designing the fire safety of buildings is to prevent the spread of fire to neighbouring buildings, which is solved by determining fire distances.

Fire distance is a required distance (gap site) established between buildings for the purpose of preventing fire from spreading by radiation or by falling burning parts of constructions as well. In order to determine fire distances, the Stefan-Boltzmann Law is used and as such it is expressed by following Equations (ČSN 73 0802, ČSN 73 0804, ČSN EN 1991-1-2):

$$I = \varepsilon . \sigma . (T_g^4 - T_0^4), \quad (1)$$

Where, I - density of thermal radiation flow (W.m^{-2}); ε - emissivity of the radiating surface (-); σ - Stefan-Boltzmann constant (W.m^{-2}.K^{-4}), σ = 5.67.10^{-8} ; T_g - gas temperature in room fire (K); T_0 - outdoor ambient temperature (K).

Gas temperature in room fire can be determined by standard thermal curve (ČSN 73 0802, ČSN 73 0804, ČSN EN 1991-1-2):

$$T_g = T_{0i} + 345 \cdot \log(8 \cdot t + 1), \quad (2)$$

Where, t - fire developing time (min), T_{0i} - initial ambient temperature in room fire (K).

Fire developing time can be substituted with calculated fire load, which is determined for non-productive buildings according to (ČSN 73 0802). Equation (2) can be modified as follows (Hurley, 2015):

$$T_g = T_{0i} + 345 \cdot \log(8 \cdot p_v + 1), \quad (3)$$

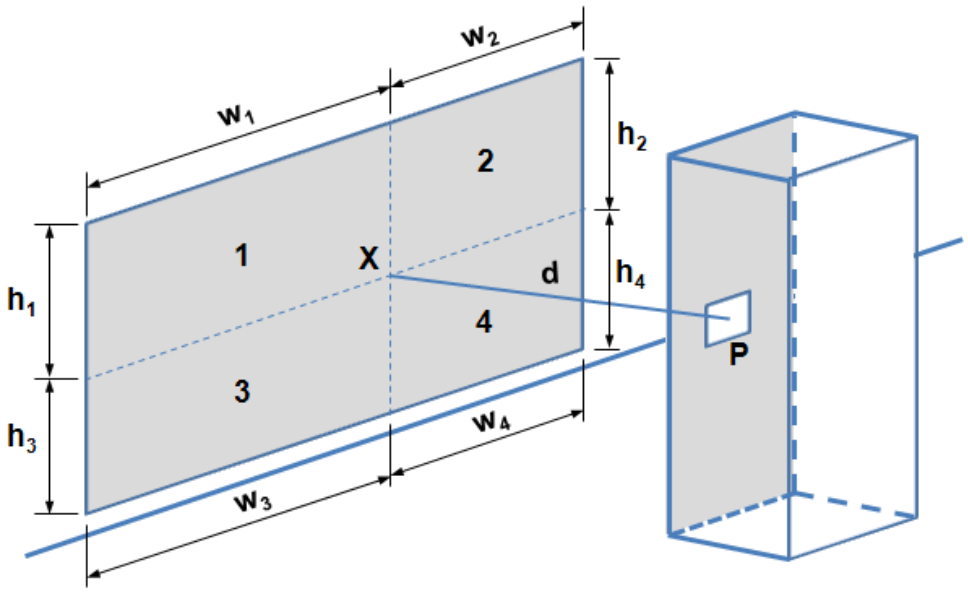
Where, p_v - calculated fire load (kg.m^{-2}).

When heat is radiated from fire open apertures, only part of radiated thermal flow expressed by the position factor falls on the receiving surface (surface of the neighbouring building).

Position factor is part of total radiant heat emitted from a radiant surface, which falls on a given receiving surface. Its value usually depends on the size of the radiant surface, the distance of the receiving surface from the radiant surface and on their mutual orientation. The most frequently used orientation is parallel.

The surface of a radiant surface is usually divided into four parts depicted in Picture 1. (Picture 1)

PICTURE 1. SCHEME OF POSITION FACTOR DETERMINATION WITH PARALLEL SURFACE ORIENTATION



Source: (Kučera, Kaiser, Pavlík,.Pokorný 2009)

TABLE 1. DETERMINATION OF VALUES OF POSITION FACTOR

d (m)	Φ_1(-)	Φ_2(-)	Φ_3(-)	Φ_4(-)	Φ (-)	Φ_{cr} (-)
0.1	0.248	0.248	0.248	0.248	0.992	0.148
0.5	0.218	0.218	0.218	0.218	0.872	0.148
1.0	0.159	0.159	0.159	0.159	0.636	0.148
1.5	0.111	0.111	0.111	0.111	0.444	0.148
2.0	0.078	0.078	0.078	0.078	0.312	0.148
2.5	0.057	0.057	0.057	0.057	0.228	0.148
3.0	0.043	0.043	0.043	0.043	0.172	0.148
3.1	0.041	0.041	0.041	0.041	0.164	0.148
3.2	0039	0.039	0.039	0.039	0.156	0.148
3.3	0.037	0.037	0.037	0.037	**0.148**	**0.148**
3.4	0.035	0.035	0.035	0.035	0.140	0.148
3.5	0.033	0.033	0.033	0.033	0.132	0.148

Source: (Kučera, Kaiser, Pavlík,.Pokorný 2009

The position factor is determined by sum of partial position factors (Hosser, 2013):

$$\Phi = \Phi_1 + \Phi_2 + \Phi_3 + \Phi_4, \quad (4)$$

Where, Φ - position factor (-); Φ_i - partial position factors for surfaces from 1 to 4 (-).

The partial position factor can be described by following equation (ČSN EN 1991-1-2, Kučera, Kaiser, Pavlík and Pokorný 2009, 152):

$$\boldsymbol{\Phi}_{\mathrm{i}} = \frac{1}{2\pi}\left[\frac{a}{(1+a^2)^{0,5}}\tan^{-1}\left(\frac{b}{(1+a^2)^{0,5}}\right) + \frac{b}{(1+b^2)^{0,5}}\tan^{-1}\left(\frac{a}{(1+b^2)^{0,5}}\right)\right], \tag{5}$$

Whare, π - Ludolf's number (-); $a = h_i/d$; $b = w_i/d$; d - distance from point P to point X (m); h_{i} - height of i-th area of radiating surface (m); w_{i} - width of i-th area of radiating surface (m).

Falling heat flux on point P is given by the product of position factor Φ and heat flux (ČSN EN 1991-1-2, Kučera, Kaiser, Pavlík and Pokorný 2009, 152):

$$\boldsymbol{I_0 = \Phi . I}\ , \tag{6}$$

Where, I_0 - falling heat flux (W.m^{-2}).

By new expression of Equation (6) the critical value of position factor can be determined (Kučera, Kaiser, Pavlík and Pokorný 2009, 152):

$$\boldsymbol{\Phi}_{\mathrm{cr}} = \frac{\boldsymbol{I}_{0,\mathrm{cr}}}{\boldsymbol{I}}, \tag{7}$$

Where, Φ_{cr} - critical value of the position factor (-); $I_{0,\mathrm{cr}}$ - critical value of heat flux (W.m^{-2}).

To prevent spread of fire to the neighbouring buildings, the critical value of heat flux in the Czech Republic is considered to be 18,5 kW.m^{-2}. In specific cases only, different values can be selected.

Radiation fire distance calculation procedure:

Selection of $I_{0,cr}$ heat flux density critical value

determination of gas temperature in room fire T_{g} using Equation (3)

calculation of density of thermal radiation flow I using Equation (1)

determination of position factor Φ_{cr} critical value using Equation (7)

determination of fire distance by means of iterative calculation of position factor Φ with increasing distance d (see Figure 1 for the distance from P to X) using Equations (4) a (5),

- resulting fire distance is such d distance value for which $\Phi_{\mathrm{cr}} \approx \Phi$.

Calculation of the fire distance from the window aperture

For a fire compartment with calculated fire load p_{v} = 60 kg.m^{-2} determine the fire distance in the middle of the window aperture with weight w = 2 000 mm and height h = 3 000 mm. The planes take horizontal

position. Initial indoor ambient temperature in a room fire T_{0i} = 20 °C, outdoor ambient temperature T_0 = 0 °C. Estimated emissivity of the radiating surface ε = 1,0.

Critical density value of heat flux is $I_{0,cr}$ = 18,5 kW.m^{-2}

gas temperature in a room fire

$$T_g = T_{0i} + 345 \cdot \log(8 \cdot p_v + 1) = 293 + 345 \cdot \log(8 \,.\, 60 + 1) = 1218 \text{ K}$$

heat flux density

$$I = \varepsilon \,.\, \sigma \,.\, \left(T_g^4 - T_0^4\right) = 1.\ 5{,}67.10^{-8} \cdot (1218^4 - 273^4) = 124\ 472 \text{ W.m}^{-2}$$

$$I \cong 125 \text{ kW.m}^{-2}$$

position factor critical value

$$\Phi_{cr} = \frac{18{,}5}{125} = 0{,}148$$

values of position factor Φ for dimensions w_i = 1 m a h_i = 1,5 m (half of the values of window dimensions) and changing distances d are included in Tab. 1. (Tab. 1)

Fire distance is 3.3 m.

Problems arising during task solution

The most frequent mistakes made by students, even though they have the precise solution process available, are given by insufficient calculation literacy. They failed to unify units and ignored the hierarchy of operations. They even had a problem to use the calculator correctly when calculating logarithmic and trigonometric functions. Expression from formulas, i.e. expression conversion, presents the most frequent problem in solving the real-life technical problem. On the other hand, students have no difficulty in reading the scheme in free parallel projection despite knowing no rules for this representation.

Even-out of secondary school knowledge of mathematics

Uneven knowledge of mathematics of students not only from the Faculty of Safety Engineering but also across the whole university is given by the fact that students come to the university from a wide range of secondary schools (Dlouhá and Hamříková 2018, 67-72). They are not able to objectively assess their secondary school knowledge of mathematics and supplement the necessary knowledge on their own. Some faculties have already incorporated the Introduction to Mathematics subject among the compulsory subjects within their curriculum while other faculties have it among the optional subjects. At some faculties, however, it has not been incorporated at all so far.

In order to help students of full-time as well as combined study programmes to even out their secondary school mathematics, we are developing an e-learning course, which is incorporated in the learning

management system (LMS) of the university. The course is commenced by a test, the objective of which is to assess their knowledge of the mathematics fundamentals acquired at the secondary school. The test is then followed by units focused on one area of problems at a time. Each unit is build so as students can go through it at a pace corresponding to their capabilities. The study part consists of worksheets leading students through the theoretical part of the unit followed by the solved examples of problems, video materials with solved problems commented by the lecturer. The practical part includes unsolved problems accompanied by results for students to practice the introduced problem area. Each unit is concluded with a short test, the objective of which is to assess the level of the student's understanding of the taught problem area. After completing the e-learning course by means of the final test, students have an opportunity to check their progress. The e-learning course will be incorporated in the curriculum of all students, whose education is ensured by us.

Conclusion

Two objectives are followed by the above-mentioned activity. Apart from helping all students to manage their studies, it presents a great benefit for the university because the talented students who cooperate with us would like to stay at the university as postgraduate students and it can be expected that they will stay there as researchers as well no matter the regions of the Czech as well as Slovak Republics. We aim at assisting them in their preparation for pedagogical or scientific career by preparing them for their pedagogical work, for their publication activity, and ensure their participation at expert conferences.

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LEARNING MANAGEMENT SYSTEMS AS A GATE TO NEW EXPERIENCE IN EDUCATION FOR DISABLED STUDENTS

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Key words: Learning Management system, web accessibility, disabled students' education, e-learning for the disabled, LMS Moodle

Abstract: The United Nations has adopted a Convention on the Rights of Persons with Disabilities on 1 December 2006. Article 24 commits the signatory states to offer education without discrimination and based on equal opportunity for gaining self-realization and employment. Adequate education is still not accessible for all groups of disabled in our country, although the Slovak Republic became a signatory to the Convention by the president`s signature on 26 September 2007. This fact was the impulse for addressing the topic of online education of the disabled. Development of Information Technologies in the 21st century opens new possibilities of educating disabled children and students. Rapid changes in the e-learning industry allow the use of various applications included directly in the environment of Learning Management Systems and online education brings new ways of perceiving, understanding, interacting and dealing with the information for all students. The main objective of the paper is to examine the needs of people with disabilities concerning IT in education and to select appropriate software tools and applications that can be implemented in the chosen Learning Management System. We have prepared pilot courses in LMS Moodle 3.6 that include some useful software applications (single source authentication, text-to-speech application, chat dialogue box, skype, etc.), which would simplify the education of people with multiple disabilities. The open concept of LMS Moodle offers plenty of features and new apps in stable versions, which are useful in overcoming educational barriers.

Introduction

The United Nations has adopted the Convention on the Rights of Persons with Disabilities on 1 December 2006 and its Article 24 commits the signatory states to offer an education without discrimination and on the basis of equal opportunity to gain self-realization and employment. Although the Slovak Republic became a signatory to the Convention by the President`s signature on 26 September 2007 (United Nations 2019), till this time we can see many problems in education of disabled persons. Not only children and young people, but also adults with disabilities have problems with gaining adequate education, qualification, retraining or new competencies fit exactly to their abilities, for finding appropriate jobs. Still, the disabled are perceived as an object of social work or as social issues and they are not involved in the society as its full-fledged members. Often the integration into society should be reverse integration (where the society should be taught how to understand, how to be involved into the life of disabled and be useful in an appropriate way) and reverse inclusion in education (Schoger 2006). Especially, reverse inclusion in education could be supported by information technologies from small children by playing educational games to adult people by using training online courses connected with the newest Information technologies and Artificial Intelligence too.

The main goal of our contribution is to find adequate technologies via online learning courses that would be helpful in the education of disabled students (from high school to university and retraining courses); and there is a possibility of connecting them with the LMS Moodle. To achieve the goal, it is necessary to introduce the various disabilities by focusing on their learning styles. However, the contribution has some restrictions; we have no ambition to introduce and analyze all health problems and

combination of disabilities; however, the combination of information technologies and the new technique allow finding the right way of education for many of the disabled. The First Section named Motivation describes chosen disabilities and their main learning styles and presents Information Technologies for different learning styles. The section Motivation includes also a short survey within disabled to gain the opinions of the variety of people with a handicap. Finally, this section summarizes the opinions and discusses them to the real state of usage of these technologies in Slovakia. The Second Section is dedicated to LMS Moodle and used Information technologies putting the stress on the Artificial Intelligence and shows the specific technologies connected to LMS Moodle. The conclusion brings the pilot online courses for disabled and discusses the necessity of finding IT solutions of education the people with special needs.

Motivation

At our universities, we can meet a few students with various disabilities, but many times they have a problem to get involved in the groups of healthy students and in the learning process with their classmates. Although the Economic University has a person responsible for disabled students (to support the students in their needs), still the disabled have no possibility of studying on the basis of an individual personal plan. The individual personal plan is something that is necessary for studying without stress and panic for disabled, because many of them need a quiet place and more time to complete the assessment, tasks, homework, exercises and to hear the lectures in a silent environment. The daily study programmes are prepared in a full-time form and the exercises and seminars are obligatory for all students. They can miss only three times during the semester. The students with disabilities cannot meet these conditions, because they usually have many barriers which do not allow them to come to school every day. For example, students on a wheelchair should come to school every day, even if the weather is bad (raining, snowing, etc.) and if they travel by car. To get into a car from a wheelchair in these weather conditions needs a lot of power and finally, the wheelchair is wet. Sitting in a wet wheelchair for the whole day is dangerous for the student's health. There are also many other health problems and barriers, which do not allow them to visit the university on a daily basis. Many of these students want to study externally, but online teaching or teaching supported by Learning management systems is not obligatory for teachers, so again, this is not an appropriate way of studying. Many teachers do not allow students with disabilities to use the notebook for writing exams (reason: they could cheat!), do not give them more time for written exams, the students cannot have a personal assistant (he/she should wait outside of the classroom), etc. The schools and universities often proclaim they do not have enough money for supporting the disabled students and they could not open a special room with all the necessary devices and equipment, where the students with special needs could follow the teaching process, make the written exams in silence and with the support of an assistant (not a classmate who studies the same subjects), etc. But the easiest way how to meet all the needs of the disabled is to offer them studying that would allow for full usage of online courses supported

by the newest IT and in their own studying learning pace. These problems are familiar for us not only from long-teaching experiences, but also from the other side. I have a disabled son with cerebral palsy and he is on the wheelchair (Rakovská). Although his intellectual abilities are normal, memory is extraordinary, he could not study any secondary school, because he has strong dyslexia, cannot handwrite and his speech is not clear for all. So, he attended a special elementary school and special three year-long "family school". The Slovak education system does not allow to have individual study plans for elementary and secondary schools. Many universities and further education courses for gaining the qualification also do not allow this way of study. The online courses are not perceived as an equivalent to full-time (face-to-face) courses. The online courses are still only IT support for full-time teaching form and the courses are not accepted by accreditation commission in Slovakia.

Types of disability and main problem in education. As we mentioned before, many disabled have some specific learning problems. To describe the variety of disabilities is not the aim of the article, but it is useful to know more about the variety of disabilities and the learning styles that are important for teaching the disabled. The disabilities can be temporary, relapsing and remitting, or long-term (Picard 2015) All types of disabilities have influence on the learning performance, concentration and need a different learning style. By (Picard 2015) „types of disabilities may include:

- Hearing loss
- Low vision or blindness
- Learning disabilities, such as Attention-Deficit Hyperactivity Disorder, dyslexia, or dyscalculia
- Mobility disabilities
- Chronic health disorders, such as epilepsy, Crohn's disease, arthritis, cancer, diabetes, migraine headaches, or multiple sclerosis
- Psychological or psychiatric disabilities, such as mood, anxiety and depressive disorders, or Post-Traumatic Stress Disorder (PTSD)
- Asperger's disorder and other Autism spectrum disorders
- Traumatic Brain Injury"

Some health problems bring a combination of multiple disabilities and are not easy to identify in relation to education. Often the disabled students have a problem to disclose their health problem and they fear not being at the same level as their classmates. They are not less able in learning, but they have different perception of the environment, a different way of logical reasoning or doing the processes and responding to the information (Picard 2015). It is important to remember that "Disability labels can be stigmatizing and perpetuate false stereotypes where students who are disabled are not as capable as their

peers. In general, it is appropriate to reference the disability only when it is pertinent to the situation." (Picard 2015).

To avoid such a sensitive situation, the teacher (or the study program and the courses) can choose and support the appropriate way of teaching and well-chosen Information technologies for online teaching. It might remove the fear of failing in the studies. In this time the students prefer online communication, they use social nets, chats rooms, various forums and web sites for sharing information and knowledge. It is natural that in this virtual environment all students are at the same level and it gives freedom also to the disabled students, without the necessity of disclosing their health problems publicly.

Learning styles and disabilities Although all the students study the same subject, the same topics, we can see different results at the exam. Traditional teaching at the secondary, higher education and universities is oriented on the content, not on the student. This approach is based traditionally on the auditory learning style and leaves the other two basic learning styles: visual and kinaesthetic (Dragonfly 2019) out. Auditory learners are oriented on hearing, they prefer to study by listening to the lectures, audio recordings, they are leaders in discussions, learn by reading loudly and they notice the background sounds (intonation) in the speech. Auditory learners have their own problems with learning, e.g. problems with creative writing; they need exact verbal instructions. Visual learners are oriented on using pictures, slides, diagrams, doodles, when they learn, they are able to remember the people, places, situations, and they create the context from the pictures in their minds. Visual learners are creative, they struggle with verbal instructions or communication. And finally, the kinaesthetic learners are very handy, often good in sports and they seem not to be concentrated on learning (usually they manipulate with objects in their hands). These students are good in practical issues, so they can study vocational schools (auto mechanics, woodworking, etc.) The three described learning styles (and their combinations) are only theoretical ground known as a classification V-A-K (Dragonfly 2019) or V-A-R-K (Rovňanová 2015). Another learning style comes from the theory of multiple intelligences by H. Gardner (Rovňanová 2015) and offers eight learning styles sketched **in Picture 1.**

PICTURE (GRAPH) 1. THE EIGHT TYPES OF LEARNING STYLES BY H. GARTNER

Source: Valeria Kleiner, Learning Styles, web site (accessed 12.6.2019)

The theory of H. Gardner is very popular and it assumes that everybody has the main three "intelligences", and so the variability of learning styles is larger than in previous V-A-K classification. Therefore, every student has his/her learning style as a combination of more ways of learning. We know also other learning style classifications (classification by interconnection of abstract abilities and specific perception, classification according to the perception of reality and the way of information processing, etc.) that affect the way of learning. Learning styles of the disabled are closely related to their health problems (not learning disabilities) and often with lower ability to concentrate on the education process for a longer time. The health problems bring a various combination of learning disabilities like dyslexia, dyscalculia, dysgraphia, ADHD, visual, audio or sensory processing disorders, etc. (Dragonfly 2019). Some health problems, such as a cerebral palsy (various levels of it), relate to more learning disabilities and here it is not clear, which learning style is adequate for the disabled student. It is a difficult task to find an adequate teaching method or to create an online course for students with multiple disabilities. Therefore, we prepared the survey among disabled to gain their experiences with online learning and find out their needs concerning the IT use.

Survey and its results as analysis of the disabled needs in education.

We prepared a survey to investigate the state of IT and online education used for the disabled in the Slovak Republic. We asked the respondents thirteen questions; and we were interested in the following:

- usage of IT in the past respondent`s studies
- which IT could be useful for the respondent
- whether IT usage support in education is adequate in our country.

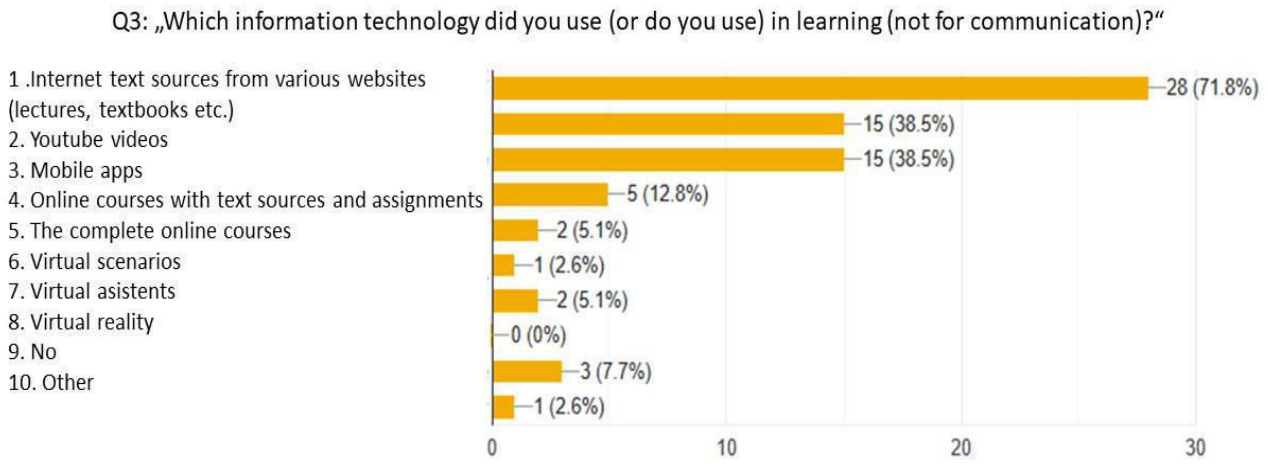
We disseminated the survey using the social nets, our personal contacts with disabled, teachers and educators in a special school, with handicapped students at universities. Although many times we hear that the voice of disabled is not accepted in the society, we were surprised that we received only 39 responses. Some of the friends and acquaintances informed us that they did not want to fill out the survey, because they are too “handicapped“ to use the IT and online education. The same answer we had from many parents of disabled children (“my child has combined disability and online education is not adequate for her/him“).

The main reason of such reactions is, that the special hardware and software are too expensive for many disabled in our country and the financial contribution for disability compensation based on the law (zakon) is not easily achieved. Another problem comes from the lack of money in education in general. That means that many disabled (especially in the small towns and villages) have no opportunity for adequate education combined with online learning. The last, but very important reason is that many parents of disabled children do not have enough financial resources and enough life power to arrange all needs concerning the

education of their children. The state support of education for the disabled is still not adequate (the problem of integration by using the teacher's assistants is still actual).

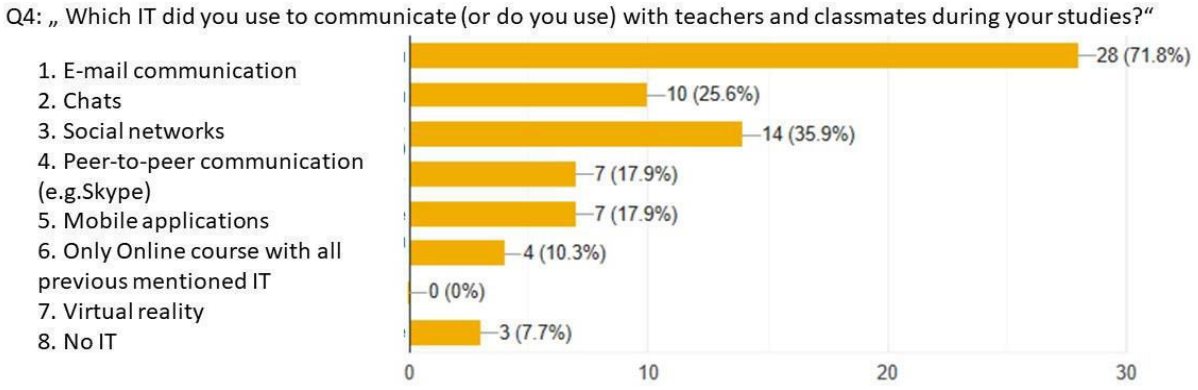
We asked the respondents about their education: 13 respondents reached university education, 8 respondents have secondary education with a high school leaving exam, 5 without a high school leaving exam and 13 respondents finished the elementary school only. So, we have covered equally all levels of education. We created the survey for three levels of questions. The first level was concerning the past or current education of respondents. The first question: "Did you (or do you still) have the opportunity to study from home using information technology?" brought 21 "yes" answers, but then we asked more specific questions. Chart 1 and Chart 2 show that online courses and online learning are not very popular in the education of disabled.

CHART 1. SURVEY RESULTS FROM QUESTION 3



Source: Own survey (accessed on https://docs.google.com/forms/d/16eJKXy60Qgckmzdi4Aa599Bpzdvxpi6WewRz-mrT4kc/edit)

CHART 2. SURVEY RESULTS FROM QUESTION 4

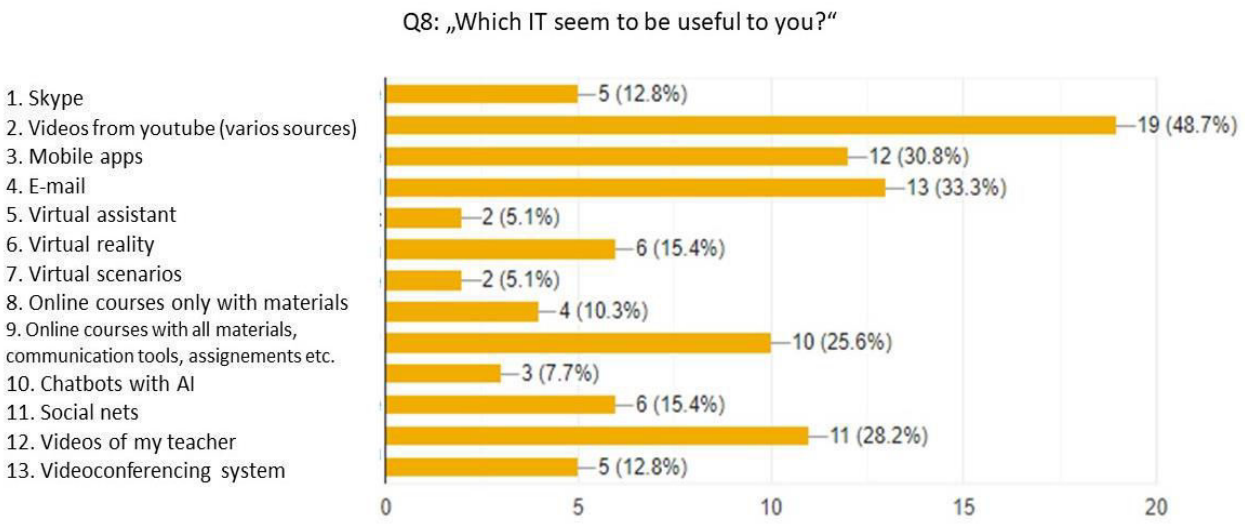


Source: Own survey (accessed on https://docs.google.com/forms/d/16eJKXy60Qgckmzdi4Aa599Bpzdvxpi6WewRz-mrT4kc/edit)

We asked also whether the respondents were familiar with the term Learning Management System (LMS) and whether they know some of the LMS systems. More than one half of the respondents (23 respondents) had no idea what the LMS was, and this result follows the composition of our respondents. Therefore, we asked whether the respondents had an opportunity to use the ”tailor-made“ online course for disabled students. Only five respondents answered ”yes“ to this question. These respondents are blind or visually impaired and they had an opportunity to study at a special school.

The question (Q7): ”What learning style is best for you?“ showed us, that the most of our respondents prefer verbal-interpersonal learning style (22 respondents) combined with other learning styles (for example with mathematical-logic style; with visual-reading style; with visual-interpersonal style etc.). Only seven respondents pick out the kinesthetic learning style combined with visual-interpersonal style usually. This question led us to seek appropriate IT support to different learning styles. Hence the next question (Q8) was concerning the IT for online learning. **The Chart 3** shows the answers and they corresponded to the answers of previous question Q7.

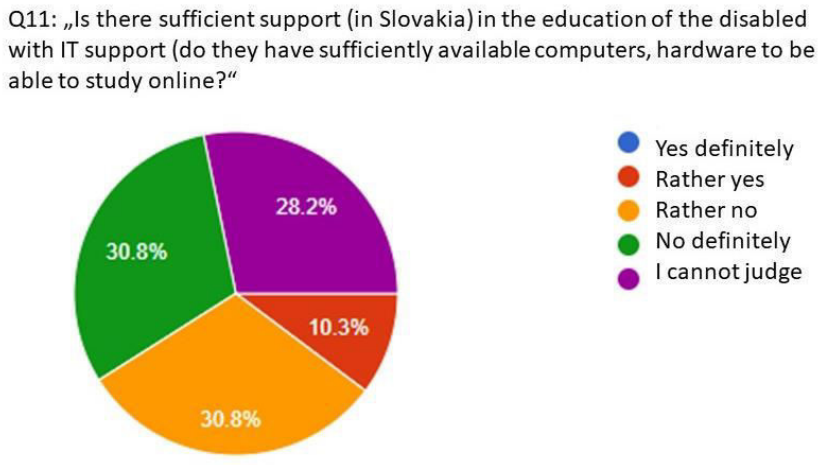
CHART 3. SURVEY RESULTS FROM QUESTION 8



Source: Own survey (accessed on https://docs.google.com/forms/d/16eJKXy60Qgckmzdi4Aa599Bpzdvxpi6WewRz-mrT4kc/edit

Then we asked the respondents whether is useful to have online courses, which support all learning styles by using various IT. Twenty-seven respondents answered ”yes“ and ten respondents did not know. Only two respondents gave negative answer. Answering the question of whether there is sufficient support for education using IT for the disabled offered us real state of education in Slovakia. The responses are in the Chart 4.

CHART 4. SURVEY RESULTS FROM QUESTION 11



Source: Own survey (accessed on https://docs.google.com/forms/d/16eJKXy60Qgckmzdi4Aa599Bpzdvxpi6WewRz-mrT4kc/edit

We asked the respondents to add their comments to the questionnare and here are the most important comments:

a. ”I am not sure if there is sufficient support in Slovakia for special educators who would use ICT to teach disabled students“

b. ”The lambda blind software is unable to read images, there are no podcasts for learning materials“

c. ”It is necessary to communicate more with disabled concerning their needs in education“

The first comment is very important because many problems concerning the education of disabled come from lack IT skills of special educators (they do not understand how the computer works, so they are afraid not to spoil computer; better is not to use the computers etc.).

Resume of the survey detects the main problems in the current usage of IT in the education of the disabled:

- The special educators (and teachers) have not enough knowledge about IT, those could be helpful for disabled; they prefer to use email communication, put the text materials on the web sites, use the online courses as support for full-time teaching.
- The online courses do not use a wide range of technologies for covering all learning styles.

Learning styles and IT tools. In the previous section we wrote about learning styles and disabilities. Our survey showed some relation between learning styles and the usage of IT for the disabled. Table 1 shows which IT covered each learning style.

TABLE 1. IT TOOLS CORRESPONDING TO LEARNING STYLE

Type of learning style	**learning**	**communication**		
visual style				
visual-interpersonal style	videos, videoconferencing styles, peer-to-peer sharing the materials	peer-to-peer communication tools like videocall, videoconferencing		
visual-reading style (intra-personal)	online text books, pictures, charts, data visualization, clearly formatted text	emails, chats, social networks		
audio style				
audio style (intra-personal)	text to speech applications, mobile apps			
audio-interpersonal	virtual assistant or Chatbot for reading social networks, mobile apps	calls using social nets, chatbot or virtual assistant, audio teleconferencing		
kinesthetic style	various scenarios, videos, computer games	videocall		
multiple learning styles			**online courses**	**virtual reality**

Source: Own

E-learning environment. In the previous section, we mapped out the experience of the disabled of using information technologies in their education and their wishes concerning further IT usage. It is not surprising, that most of the disabled respondents (with various health disadvantages) did not use e-learning

and that they would like to expand their education through online courses. The first requirement for creating online courses, which fit exactly to the disabled is to find the appropriate e-learning environment. The second requirement is that the environment should not be expensive for schools and universities. E-learning technologies usually include (Tarliuk 2018)

- Virtual Learning Environments (VLE)
- Learning Management Systems (LMS)
- Web-Based Training (WBT)

All these technologies should be accessible also to the disabled usually from one web site (one-stop-source in education: all sources and tasks are accessible from one web site). The first choice is to use the LMS as a web site for one-stop-source because many LMSs are linkable with other software. Many companies and web sites offer software for Learning Management Systems (Docebo, Adobe, Edmondo, Litmos, iTutor, Totara, Joomla, Moodle etc.) and the web sites also offer rating of LMS every year (Capterra 2019), or make the reviews from various point of view (customer experience, user experience, Value for money etc.), (eLearning industry 2019) It is not easy to choose „the best“ software at once. We can find plenty of tips on how to choose appropriate LMS for university or company (Pappas 2018), but there are not many tips or advice which LMS is the best for disabled. The rapid development of IT brings a lot of possibilities on how to involve the newest technologies to the LMS environment. We can see a rapid implementation of Artificial Intelligence in the software everywhere -in business, in industry, in healthcare and in the education too. So, the new versions of LMS bring many features supported by Artificial Intelligence and many AI apps could be added to the LMS environment.

Artificial intelligence methods in e-learning. As was mentioned before, LMS Moodle supports linking with new information technologies and offers a better opportunity to assist various learning styles. A lot of new ITs use the technologies of Artificial Intelligence (AI) for searching solutions of various tasks, e.g. optimizing the solutions, recognizing some patterns (in pictures, videos, texts or data) and for easier human-computer interaction. Artificial intelligence „is the simulation of human intelligence processes by machines, especially computer systems" in the traditional perceiving (Rouse 2018). These processes traditionally include learning, reasoning, inferencing, self-correction, or the capability of a machine to imitate intelligent human behaviour. We can categorize Artificial Intelligence in four groups: Thinking Humanly, Acting Humanly, Thinking Rationally, Acting Rationally (Norv-Russ 2010). The fast development of technologies brought a more detailed classification of technologies covered by term Artificial Intelligence (Soft Computing, Computational Intelligence, Cognitive Computing, Emotional Intelligence, Social Intelligence, etc.) It is not easy to say whether the technology (algorithm or mathematical model) belongs exactly only to one category. Concerning education, we can find two main

tasks which are important in the process of teaching - optimization and prediction (Duque 2019). In the education process, we cannot use strictly mathematical models, where all the assumptions for calculations are met (Duque 2019). Therefore here is a space for the usage of AI, which does not have to meet all the requirements for classical mathematical models (it does not need strictly all input data, accurate data, may not have characteristics for variables etc.) and AI works based on heuristics (Norv-Russ 2010). The AI models are working with uncertainty of data (Hudec 2016), with expert`s "rule of thumb" (experience, opinion) or self-learning over data (training data sets). The teachers` tasks are not mathematically expressed and the education processes are not exactly predictable. Thereby it is better to characterize the Artificial Intelligence in education using the quote of (Duque 2019) "An automated system capable of performing tasks under incomplete information, based on a given problem framework. The system is capable of making guesses about initial and current states of the framework's variables. It is not reasonable to expect the system to expand beyond its given framework." The AI has already been successfully implemented in many applications which allow to test or develop skills of students. The AI solutions can help teachers work efficiently and can fill the gap in teaching the disabled. The teacher has an opportunity to prepare individual personalized interface and content for a student or online tutoring of the student and preparing various tasks using scenarios. Following the AI categorization, we can use:

Machine Learning (ML) includes statistical models and algorithms of AI to solve specific tasks without exact instruction. ML procedures are based on the method where the target of the task is defined. The steps of the procedure, on how to reach the target, are learned by the machine itself by training (gaining experience in similar samples). ML is used for finding some patterns in data (e.g. the data concerning the students, their assignments, behaviour for prediction or classification etc.)

Natural Language Processing (NLP) is broadly defined as the automatic manipulation of natural language, like speech and text, by software. NLP is used in the applications "text-to-read" or "speech-to-text" which are very useful for the disabled.

Vision as Machine vision (MV) captures and analyzes visual information using a camera, analogue-to-digital conversion and digital signal processing. MV is used in augmented reality, virtual reality or in various scenarios.

Robotics is a field of engineering focused on the design and manufacturing of robots. Small robots (robotic animals) or humanoid robots are very good communicators between real-world and autistic children, but they can be used for other disabled as well.

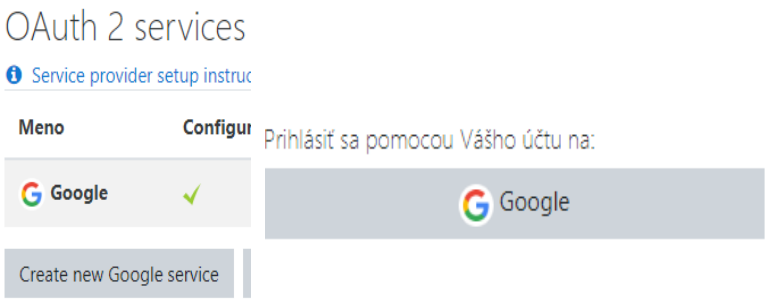
Companies as a Google, Microsoft, IBM are leaders in AI implementation to their software. They offer various solutions also for education e.g. Google classroom and other apps (Google), Microsoft Office 365

for schools (Microsoft 2019) and IBM Watson Education (IBM 2019). All these technologies can be used by developing solutions in the education of the disabled.

As mentioned above, the LMS is a very good base for creating an e-learning course which is well-accessed for disabled. LMS can include some applications and tools to avoid some access barriers in its environment. These tools suitably complement the access of the LMS, for example. We focus on creating online course for the disabled in LMS Moodle 3.6 (Moodle.org, 2019) in our primary research. So the next examples are oriented on the LMS Moodle. Here are some examples of how to use the apps involved in the LMS environment:

Moodle has applications and Google services linked through authentication in OAuth2Service (Service for authentication) in server settings in Picture 2.

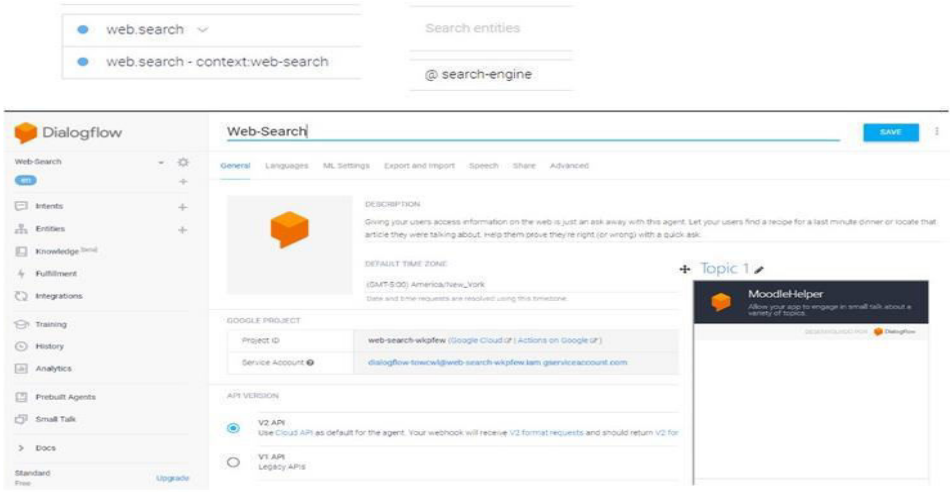
PICTURE 2. GOOGLE AUTHENTIFICATION IMPLEMENTED IN LMS MOODLE



Source: Own

Another example is the creation of chatbots. For example, a chatbot to search the Internet. It can use Google's Dialogflow tool to create Chatbot (Dialogflow 2019). This tool is based on an agent system where a chatbot can be trained through entity setup and intents to build conversation platform. See the Picture 3.

PICTURE 3. DIALOG FLOW CHATBOT AND WEB SEARCH ENGINE IN LMS MOODLE



Source: Own

Google Glass is a service that creates a widespread reality. Google Glass is a brand of smart things - an optical head-mounted display with a wearable computer designed in the shape of a pair of eyeglasses. It takes smartphone technology and makes it even more accessible. It displays information just like a smartphone in a hands-free format which allows communicating with the internet through natural voice commands (Glass 2019). It also uses a neural network to recognize speech and recognize the video scene. Google glass consists of individual parts, display - visual layer and camera (front), GPS and battery on the left side and a microphone and speakers on the right side (Varifocals.net 2019). Main communication runs between Google Glass and the phone, but Google Glass is directly connected to the Wi-Fi network. There are more mobile apps for Android and IOS, as well as ready-to-use apps directly for Google Glass, such as in the operating system IOS is application MyGlass. They can be used by students in the classroom so that they can immediately connect to tutorials or find the necessary information or to enter processes, graphs, calculations directly online. Likewise, it can discreet recordings of interesting teacher presentations or other lecturers. The teacher can also use the online link to check the connection of students to the course via Google Glass or to develop and search for information on their lecture in practice (Pappas 2014). Google Glass presents an even bigger opportunity for disabled people. Technologists suggest that speech recognition is reaching new levels of precision. They are working towards profoundly deaf people being able to see real-time transcripts of what friends are saying to them in the Glass' prism. It is also a new type of communication for the blind, who can receive information via voice prompts and vice versa, they can search for information via voice instructions. For the physically disadvantaged, it is also a new type of communication where, through voice, they can control applications much better than using a mouse on a computer. This technology gives every disabled person the opportunity to develop their knowledge and adapt it to their realities (Livingwithdisability 2013).

Microsoft is working on applications, services, and platforms that use Artificial Intelligence and Machine learning. Microsoft has an entire platform, Azure Machine Learning, based on the Python programming language, which can be integrated with Apache server - application Azure Databricks. Users can develop application with Python framework - Pytorch, TensorFlow (like Google) or Scikit - Learn (for example, data coding – e.g. Clustering, Classification, preparation or selection model, etc.). Ordinary users may encounter elements of AI in applications such as Skype, Azure service bot, speech recognition application or text-to-speech apps. The most widely used applications are Microsoft Office applications, which can be linked to search services (via Artificial Intelligence, such as Bing Search Engine), or a very popular Skype application linked to speech recognition or ChatBot. (Microsoft AI 2019) or a very popular Skype application linked to speech recognition.

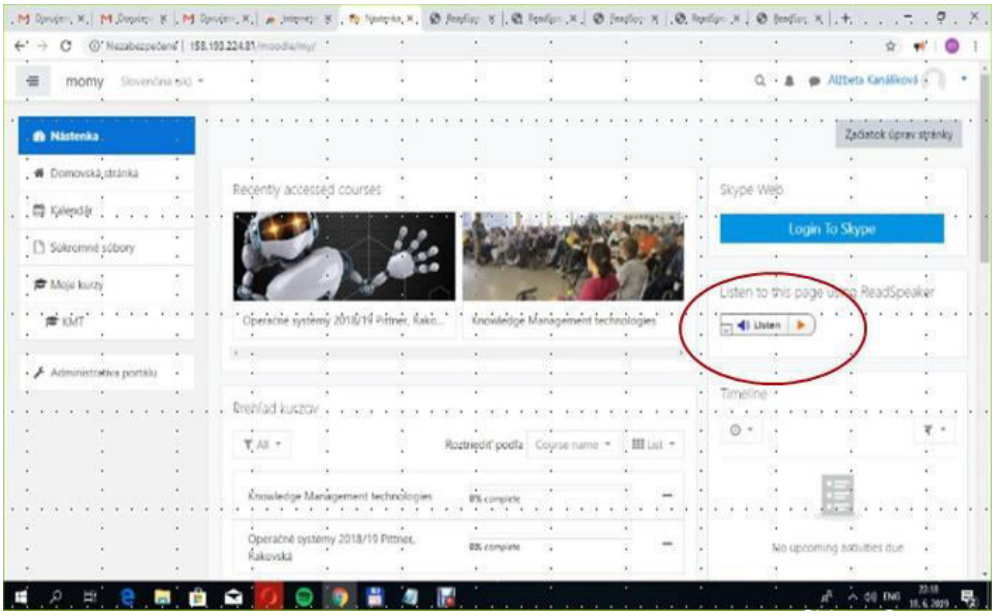
Skype is a very popular application for transferring messages, voice and video between people. The application is suitable for voice and video transmission at the same time, allowing live communication

with the teacher or with other students. Such communication is best suited to the disabled. Skype install via the Microsoft account by logging into Microsoft Azure and activating application Skype and Skype API. Service Skype is assigned an ID number.

Second Life (SL), Sloodle – Virtual reality in Moodle. SL was one of the leading contemporary 3D virtual worlds. There are many definitions of the virtual world that change over the course of technology development. Bell (Bell 2008) defines virtual world as a synchronized and persistent community of people who are represented by their avatars and which is supported by computers on the network. Sloodle is an open source product aimed at linking objects in Second Lifes with Moodle. Sloodle is an open source product aimed at linking objects in Second Life with Moodle. It is developed by an international community of users, headed by Dr. Daniel Livingstone of the University of West of Scotland Jeremy W. Kemp of San Jose State University (Levin 2015). Sloodle's users can attend a virtual classroom where they can meet “face-to-face” with their virtual classmates in their avatar form. The trainer can create a learning environment to fit the training on hand. Currently, the Sloodle plugin does not continue to develop, the latest upgrade was in r. 2012.

ReadSpeaker. The ReadSpeaker software is used to convert text to speech in multiple environments and with multiple solutions for language learning. LMS Moodle is connected to ReadSpeaker via the plugin. The plugin is very simple to implement and can be positioned in various places in Moodle LMS, therefore, students have no difficulty to find and use it. ReadSpeaker is a longstanding Moodle partner and has built a plugin that can be seamlessly integrated into the Moodle (ReadSpeaker 2019) in the Picture 4.

PICTURE 4. APPLICATION READSPEAKER INCLUDED IN LMS MOODLE



Source: Own

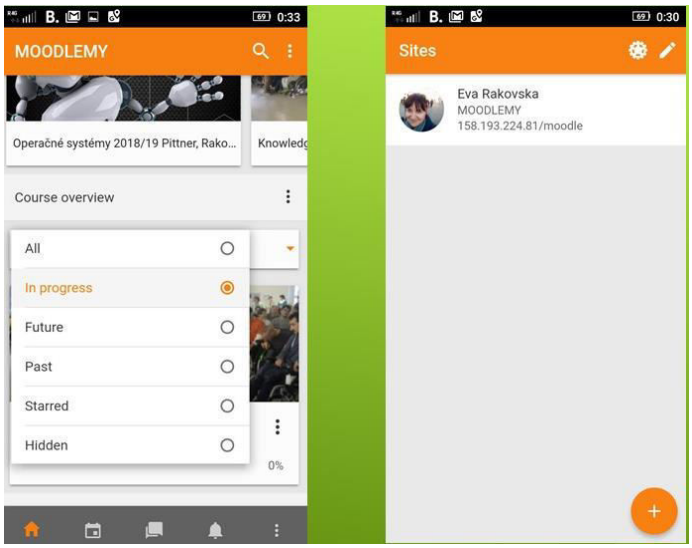
Mobile application. Moodle portal also has access to courses via the mobile version application - MOODLE APP. Using the Moodle Apps, learners can access education and training activities instantly from anywhere. Everything the user does offline in the app is automatically synchronized when connected, so the learning journey is always available across your devices (Moodle, 2019).

Results

We looked into the needs of disabled in the survey. It showed us the necessity of IT usage in the online learning as we mentioned in the end of section Motivation. Following the Table 1, we tried to find appropriate IT to cover all learning styles in online education. The fast development of Artificial Intelligence technologies and their implementation in practical solutions gave us the opportunity to prepare pilot online course with some useful application. We used LMS Moodle 3.6 version, which has some great features and „is a free, online Learning Management system enabling educators to create their own private website filled with dynamic courses that extend learning, anytime, anywhere.“ (Moodle.org 2019).

Moodle is extremely customisable core and comes with many standard features (personal dashboard, modern interface, collaborative tools and activities, all in one calendar, simple and intuitive text editor, convenient file management, notification, tracking progress, multilingual capability, a support open standards, it respects GDPR, regular security, backups and other administrator features. The LMS Moodle 3.6 has a set of management features like encourage collaboration, embed external resources, multimedia integration, inline marking, peer and self-assessment, outcomes and rubrics etc. It also supports the tools for teachers like preparing the variety of tests (bank of questions with more questions categories), tracking current activities, making reports and statistical test evaluation, making analysis by using analytical models (using machine learning in languages PHP, Python) and various learning plan templates. We choose the Moodle because LMS Moodle allows preparing a fully automatic online course. All activities (lectures, assignments, tests, discussions etc.) are driven by the rules, which the teacher can set up. LMS Moodle can include the links to some applications and has also the mobile version. The pilot course named „Knowledge Management technologies” is for university students and includes Skype, Text-to-speech application ReadSpeaker and has mobile version (Mobile application) (Picture 5). We included the ReadSpeaker as a Moodle block and it gave us the possibility to set a language, large font, dictionary, translator, read also pdf files, MS Word files for chosen languages. All these features are useful for disabled and we plan to add Skype via mod_Skype plugin for easier online communication. The advantage of the LMS Moodle is that the access to all application should be from one web site (LMS Moodle course). We tested the online course thanks my disabled son (Rakovská) and his friends.

PICTURE 5: MOBILE APPLICATION FOR LMS MOODLE 3.6



Source: Own

Conclusion

The e-learning education has a long history, especially in USA where are many study program based on full online teaching. Some Universities are leaders in offering distance education by online courses. There are such Universities as Boston University; University of California, Berkeley; Georgia Institute of Technology (Georgia Tech) and others (Study Portals 2017). European Universities offer also a distance learning in many various ways, but in the Middle European area here is not many full online course. As we mentioned before, the main reason is the historical development of the education system (central management) and the accreditation commissions in some countries. Therefore, the system of quality evaluation and self-evaluation has not such support as in the USA. Sometimes many directives and internal instructions make our education system less flexible and open to new technologies, which can be useful for all groups of students. Also, many secondary or grammar schools over the World use the online teaching and LMS as a support of their education. In our research, we looked for, which university offers the best solutions for learning the disabled and people with special needs or some guideline how to prepare a good accessible e-learning course with using the latest IT or AI. We did not find any exact guideline or useful rules on how to develop the online course well-accessible for people with multiple disabilities. Many times the universities and schools have their unique solution for the disabled.

The main goal was to offer well-accessible, not an expensive and relatively easy implemented solution for creating an online course. In achieving this goal, we started with a survey among the disabled and their preferences for their learning style. Based on the survey, we have selected technologies and software solutions that suit each learning style and developed the pilot online courses in LMS Moodle 3.6, which contained some applications for better accessibility of disabled. Consortium W3C prepared Web

Accessibility Initiative which develops strategies, guidelines, and resources to make the web accessible to people with disabilities (W3C 2013). These guidelines are mainly oriented on the four criteria: perceptibility, operability, understandable and robust (Laabidi at al. 2014), which could be implemented also in e-learning. So, the accessibility is not only about content, but also about technologies. All resources, and services should be supported by technologies and offered online general due to their disability. The LMS Moodle 3.6 meets several accessibility criteria and is easily interfaced with various applications. This provides a good basis for developing online courses that provide learning comfort for people with special needs.

The Open University (Open Learn 2019) gives the short information about statistics from World Bank web sites and Eurostat web sites: “There are approximately one billion disabled people in the world – that’s around a seventh of the world’s population (World Bank, 2017). In Europe, one in seven people of working age (15–64) says that they have some form of disability (Eurostat 2017).” The Eurostat offers the Infographic Disability statistics (Eurostat 2019), where offers employment rate of people aged 15 to 64 with and without basic activity difficulty and comparing the percentage points of employment rate these two groups of people within European Union and in the countries of EU separately. Despite progress in technology development, the disabled have difficulties to find an adequate job in Central European countries (Hungary, Slovakia, Poland, Czech Republic) but also in other (e.g. Denmark). This fact strongly depends on their educational opportunities. Therefore, our further research is oriented on the development of the online learning university portal with full accessibility for the disabled.

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APPLICATION OF ARTIFICIAL INTELLIGENCE AND RELATIONAL CALCULUS TO ASSESS THE QUALITY OF EDUCATION FOR UNIVERSITY STUDENTS

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Abstract: At the present time, one of the most important goals for universities is to provide highly qualified, specialized training for their teaching staff. At the same time, an integral part in how education is organized is by way of information and communication technologies. This paper presents the main aspects for developing an effective methodology for assessing various indicators and criteria to determine students' level of knowledge. The aim of the study is to automate the process of assessing this level and make effective and timely decisions on adjusting the education system. We determine objective and subjective criteria for the quality of students' knowledge, taking into account how the system is scaled. We suggest implementing an expert diagnostic system based on the relational model. In this model, in terms of relational algebra, we describe the performance parameters of education and the algorithms for their evaluation. The application of the methodology proposed for assessing the quality of education will allow us to make differential adjustments for each course and for each student in real time. We arrive at the conclusion that our approach allows the amount of students' knowledge to be increased, on average, by 12–15%.

Introduction

Modern socio-economic development of society in the realm of global change encompasses all areas of activities and imposes increased demands on the education profession to provide highly qualified, specialized training. These include the accelerated growth of high-tech and knowledge-intensive industries, the accelerated formation of modern information and the associated technological infrastructure with the widespread introduction of information and telecommunication technologies, etc. The main goal of the educational process is to ensure university graduates receive the highest possible qualifications in order to satisfy the requirements of the modern labor market.

The modern concept of vocational education has three main objectives (Anitha, Deisy, Lakshmi and Meenakshi 2014):

- to reveal certain scientific fundamentals;
- to systematize and generalize knowledge and skills;
- to contribute to the identification and development of students' abilities.

In order to fulfill them, modern vocational education needs to develop new teaching methods while being able to accurately assess the quality of knowledge acquired by the students (Harper et al. 2005).

The quality of education has become a fundamental priority for nations and educational institutions throughout the world. With this in mind, the prioPities for universities are as follows:

- meeting the requirements for ensuring the quality of education in accordance with European standards and recommendations for quality assurance systems ESG-ENQA (European Standards and Guidelines – European Association for Quality Assurance in Higher Education);
- integration of the higher education system into the European Higher Education Area ESG.

Thus, universities are focused on reforming their educational systems while developing and introducing a new generation of state educational standards. These include the national project for the standardization of the quality of education − QUAERE (Quality Assurance System in Ukraine: Development on the Base of ENQA Standards and Guidelines). Dnipro University of Technology, as one of the oldest universities in Ukraine, also actively participates in the implementation of the QUAERE project.

The aim of this paper is to suggest methods of improving higher education by developing indicators to assess the quality of students' knowledge using computer test diagnostics (Da Silva Neves Lima, Ambrosio, Felix, Brancher and Ferreira 2018).

In this paper we consider the problems of developing a procedure to determine the effectiveness of diagnostic methods which are currently being used to assess the quality of students' knowledge.

Methodology of assessing the quality of students' knowledge

In cognitive science, the concept of "knowledge" is explored in a variety of ways, but especially to how it functions (Zhang Huili 2010).

There are the following types of knowledge:

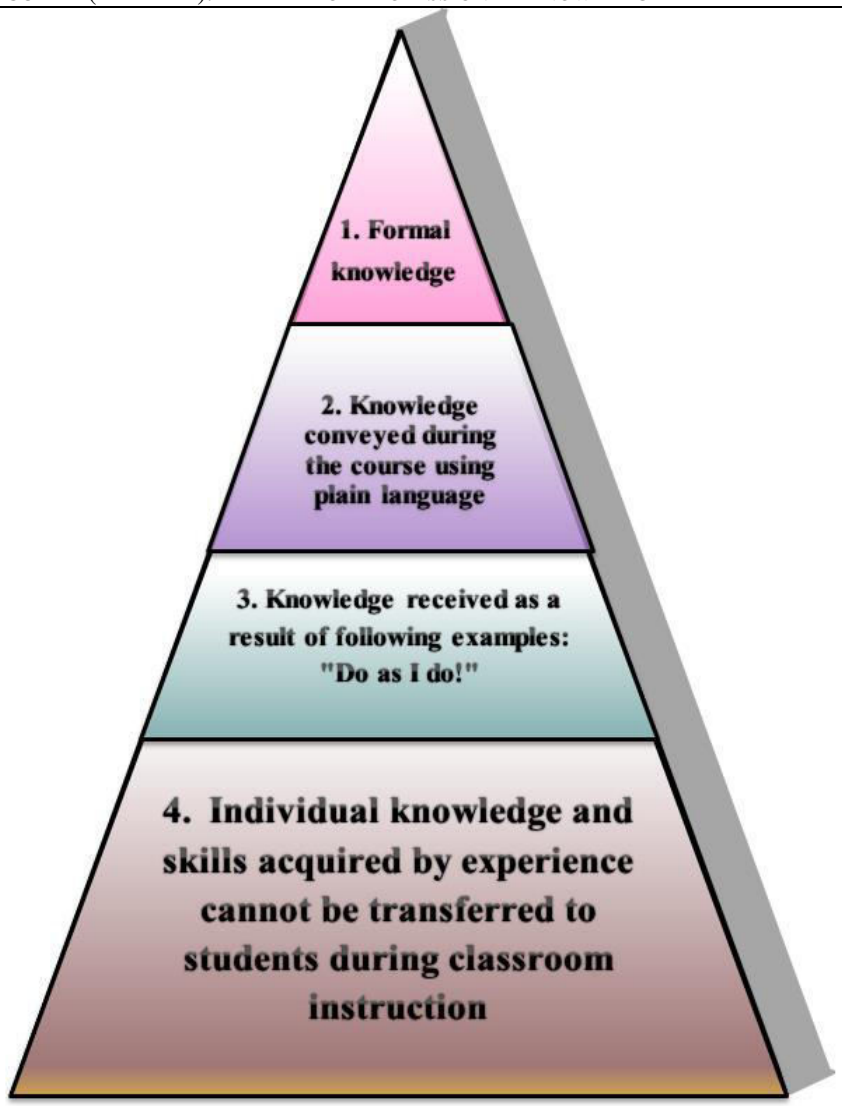
- verbal and non-verbal;
- empirical and rational;
- ideological and scientific knowledge.

The human mind operates on two levels: conscious and subconscious. This makes it possible to speak about explicit and implicit knowledge. Implicit (inner) knowledge is manifested as an empirical experience in the form of sensations and perceptions that arise unconsciously. The explicit (external) knowledge is based on conscious mechanisms and, in particular, theoretical thinking in the form of various theories and concepts.

Transformations (transitions) are possible between the forms of explicit and implicit knowledge. The acquisition of solid knowledge is manifested by its transition from an implicit state to an explicit state.

According to Capobianco, Diefes-Dux and Oware (2006), the general structure of professional knowledge can be represented in the form of a pyramid consisting of "layers" of various sizes. A view of the "pyramid of professional knowledge" is shown in Figure 1.

FIGURE 1 (PYRAMID). PYRAMID OF PROFESSIONAL KNOWLEDGE



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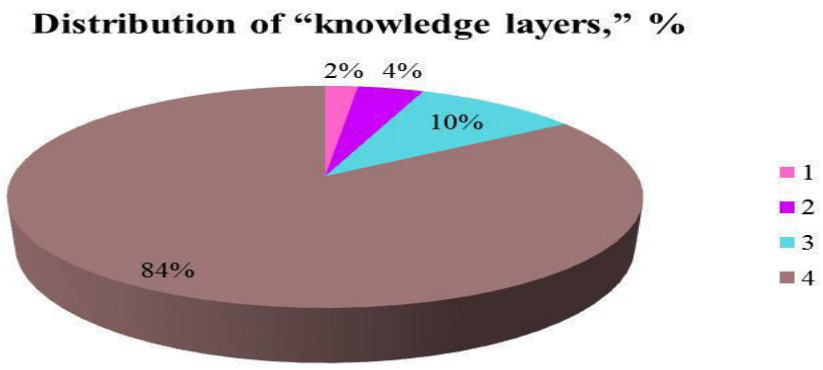
The distribution of the total amount of knowledge by "layers" is presented in the pie chart shown in Figure 2

FIGURE 2 . DISTRIBUTION CHART SHOWING THE PROPORTIONS DESCRIBED IN THE "PYRAMID OF PROFESSIONAL KNOWLEDGE."



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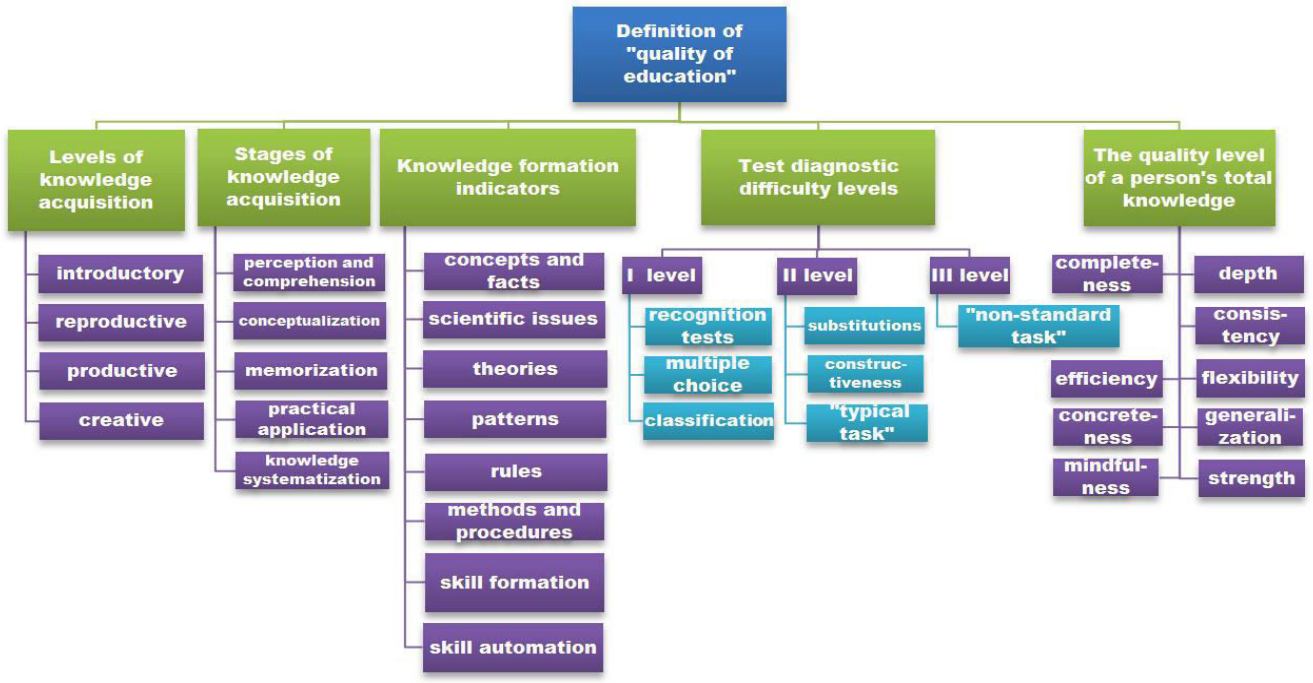
The concept of “quality of education” is a complex and complicated category. Its assessment depends on a relatively large number of interrelated parameters and factors. The result of the educational process is the formation of the qualities within the full scope of an individual student’s knowledge (Lapré and Nembhard 2010). Figure 3 shows a diagram of the hierarchical visualization of the processes, parameters and factors affecting the “quality of education.”

FIGURE 3 (DIAGRAM). DIAGRAM FOR DETERMINING “QUALITY OF EDUCATION”



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in Figure 3 shows not only the stages of learning, but also understanding the information. The most important part of this process is the reflection stage.

The learning process consists of four levels in which knowledge is acquired (Torres, Dodero, Aedo and Zarraonandia 2005):

introductory (recognition of information studied previously);

reproductive (performance of tasks in accordance with a sample,

instructions or under the direction of a teacher);

productive (independent performance of regular, familiar tasks);

creative (performance of non-standard tasks which contain an element of problem solving).

The first three points of the process (perception and comprehension, conceptualization, memorization and recollection from memory) refer to the first, or introductory, level of acquiring knowledge. Knowledge can only be acquired at the conscious perception and memorization stage.

The results of the educational process are characterized by indicators which measure by how much and how well the knowledge is acquired, retained and used by the individual. In our case, the determination of the values of these parameters and their scaling is carried out on the basis of computer test diagnostics. At the same time there are three levels of test complexity (Rakic 2016).

Tests of the first level check factual knowledge, concepts, laws, and theories − all the information that is required by the student to remember and reproduce. The tests of the first level include:

- recognition test (choice of one of two opposite alternatives describing the properties or characteristics of the objects under study);
- multiple choice (selection of one or several answers from a variety of answers containing one or more correct answers and "interference");
- classification test (comparison of the properties declared, parameters, functions or states of the objects studied with the aim of determining the commonality or differences between them).

Tests of the second level verify the practical application of the knowledge gained to solve typical problems. The tests of the second level include the following:

- substitution tests (correct filling in of the missing components of the information field of various information types);
- constructive tests (such tests do not contain hints in the test task and require an independent response, for example: to provide a characteristic, write a formula, analyze a scientific phenomenon, build a graph, etc.);
- tests called "typical task" (such tests are supposed to check how well students remember solution algorithms and calculation formulas). The test task contains the data, conditions and requirements for the desired parameters.

Tests of the third level are designed to check the ability to provide an independent critical assessment of what was studied, to diagnose the assimilation of new information of increased complexity, and to apply the acquired skills in an atypical situation. The solution to a test of this level is to reduce it to a typical task by "clearing" nonessential facts and information and finding additional conditions hidden within it.

Thus, the results of passing tests of various types and levels of complexity determine the current stage of the process of mastering knowledge. These results also include the current level of the process of acquiring knowledge, which is done through the values of the indicators of the knowledge formation corresponding to these tests.

Therefore, the results of taking tests of various types and levels of difficulty determine not only how well the student has retained the knowledge learned, but is indicative of the learning process by which the knowledge was formed.

Determining how much knowledge an individual has and how well he or she understands it is a more difficult task. For the system's implementation, it is necessary to clearly distinguish the scales and criteria for assessing the qualities in the formation of requirements for testing (Mayilvaganan and Kalpanadevi 2014). For example, the completeness of knowledge is measured by the amount of knowledge in the syllabus of the discipline. Therefore, in order to measure the completeness of knowledge, it is necessary to have a set of tests structured across all subjects of the discipline where each test must be representative enough (covering the maximum amount of relevant educational information). The relative scale of completeness of knowledge in the discipline is in the interval [0; 1]. For each student, the value of completeness of knowledge is calculated as a ratio of the number of correct answers to the total number of test questions of this discipline.

Completeness of knowledge involves the assimilation of not only the concepts and facts of the subject area, but also the relationships between them. In this case, completeness allows certain areas of knowledge to be isolated from each other. Unlike completeness, the depth of knowledge is characterized by a set of conscious essential connections between the correlated knowledge.

In order to determine the depth of knowledge, the test must have tasks of varying degrees of complexity (light, medium complexity, and high complexity). Each test task is characterized by the level of difficulty and the number of points, where the number of test task points is directly proportional to its level of difficulty. At the same time, tasks with an average complexity make up 60-70% of tasks within the test. The relative scale of the depth of knowledge in the discipline is in the interval [0; 1]. For each student, the value of the depth of knowledge is calculated as a ratio of the number of points for the correct answers to the total number of points acquired in tests for this discipline.

Some knowledge is extremely complex, and the student may need to express it in a simple, compact way without compromising the body of knowledge. In-depth knowledge is the ability of the student to formulate a system of steps leading to the manifestation of this knowledge. To assess students' complex knowledge, tests should contain tasks for the compilation of educational information. To assess students' in-depth knowledge, it is necessary to have tests conducted on the deployment of the chain of reasoning.

A review of all the qualities of the total knowledge of the individual shown in the diagram (see Figure 3) is beyond the scope of this article. However, it should be noted that the compilation of valid and objective tests for which the requirement of correlating test tasks with diagnostic criteria is fulfilled is a separate problem in the process of creating a computer diagnostic system for the quality of knowledge.

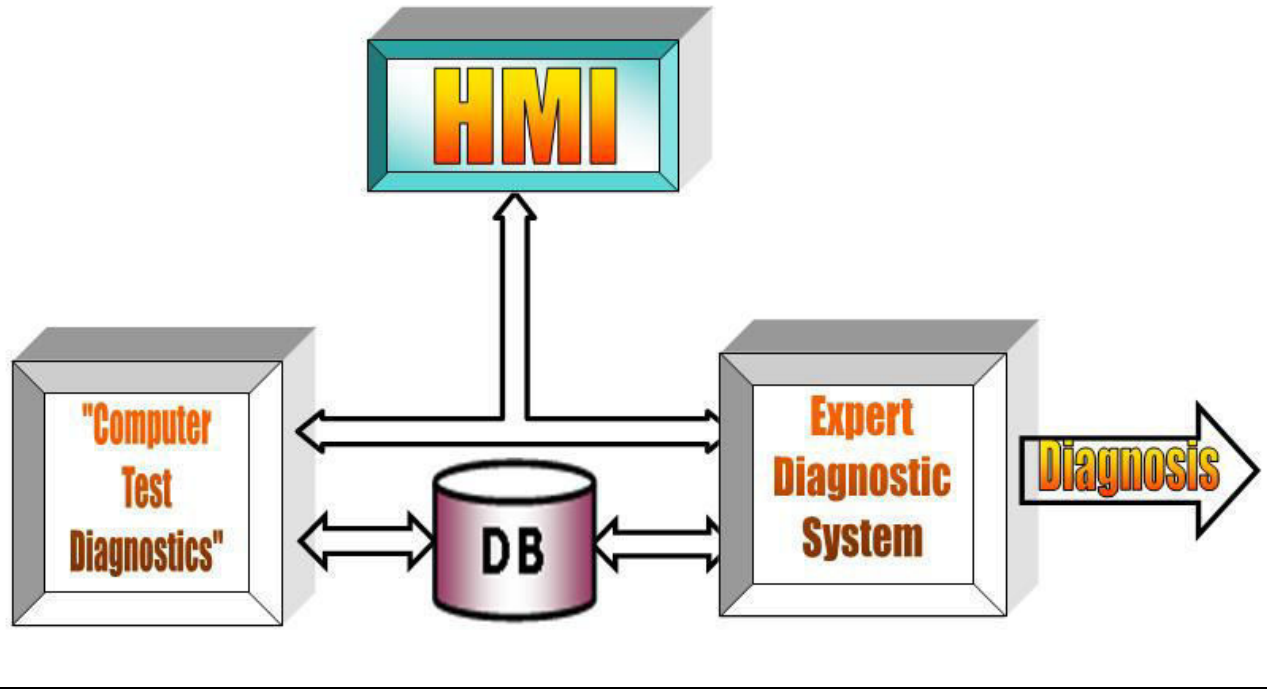
General characteristics of the computer test diagnostic system for assessing the quality of students' knowledge

At this stage, the area of our research is current computer test diagnostics of students' knowledge. This includes diagnostics of indicators of the formation of knowledge of the first level as well as indicators of completeness and depth of knowledge for students after studying the lecture material. As a result, explanatory and illustrative teaching methods are widely used to assimilate a large array of information.

The same indicators determine the effectiveness of a teacher's methods, thus allowing difficult-to-learn blocks of educational information to be structurally organized before being taught. Such an approach mobilizes teachers to search for more visual, accessible and innovative ways of teaching their students and presenting educational material to them.

Figure 4 shows the structure of the system regarding computer test diagnostics as it pertains to the quality of knowledge (TDQK).

FIGURE 4. STRUCTURE OF THE COMPUTER TEST SYSTEM FOR DIAGNOSING THE QUALITY OF KNOWLEDGE



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Computer Test Diagnostics (CTD) performs the following functions:

– provides a convenient interface (HMI) for the formation of tests and provides input/adjustment of tests in the database for teachers of departments who have access to the system;

– provides visualization of tests for students and records their results in the database;

– provides a report on the results of their tests;

– performs the initial statistical processing of their results;

– provides reports and graphs on the results of statistical data processing together with sequential ordering, monitoring, and rating indicators of students' knowledge.

The functions of the Expert Diagnostic System (EDS) include the following:

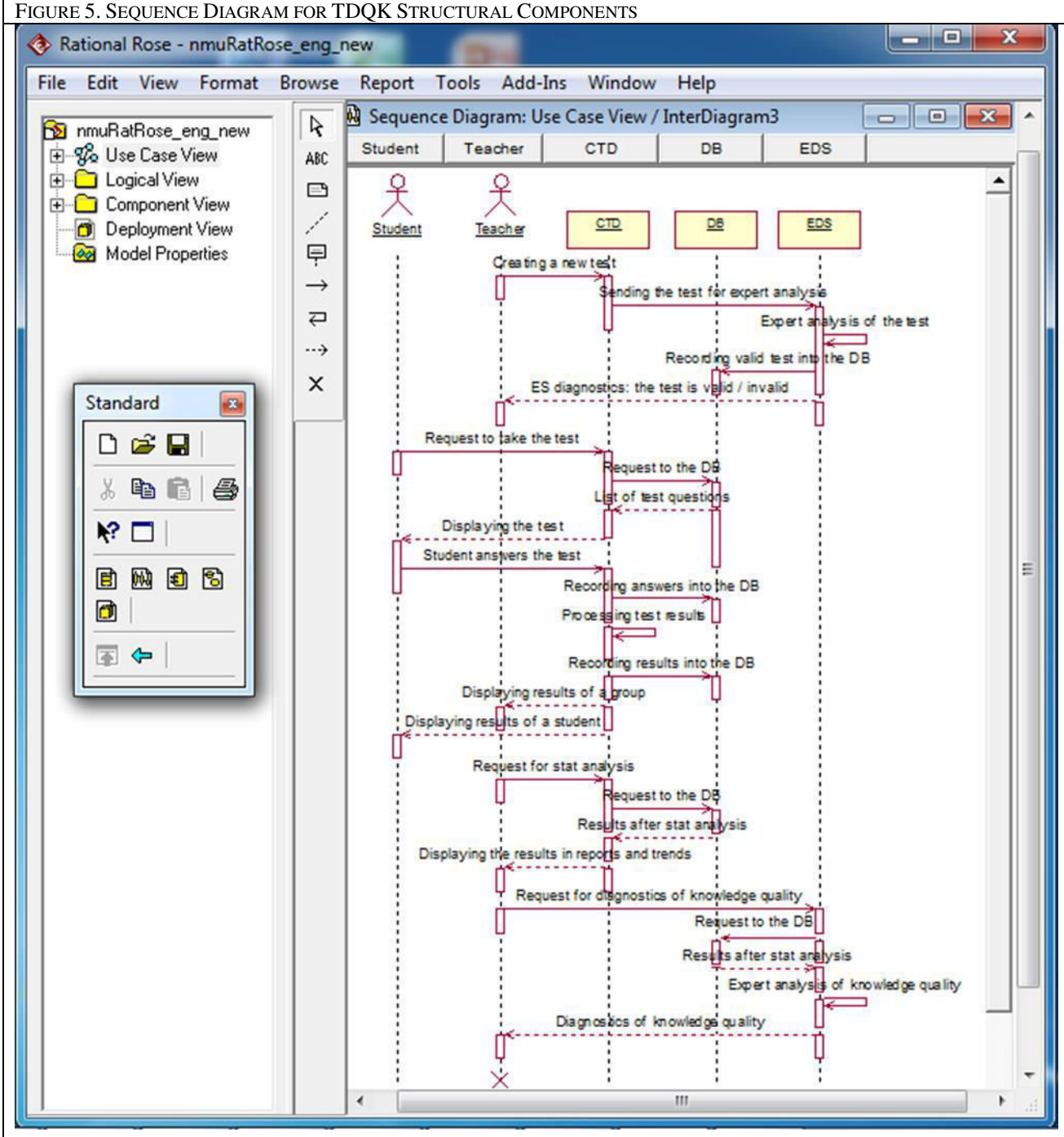
− expert analysis of tests for compliance with their stated controlled diagnostic criteria;

− expert analysis of the quality of students' knowledge based on statistically processed test results stored in the database (DB).

In order to perform the stated functions, the EDS knowledge base should contain a set of heuristic methods which allow us to differentiate the corresponding knowledge qualities (Liu, Duan and Zhao 2011). For the formation of these methods, it is necessary to have a question pool for each EDS training discipline (Hammer, Zehetmeier, Bottcher and Thurner 2018).

Figure 5 shows how the structural components of TDQK, which were developed in the Rational Rose environment, interact.

FIGURE 5. SEQUENCE DIAGRAM FOR TDQK STRUCTURAL COMPONENTS



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Therefore, the following scenario is recommended when working with TDQK.

1) A certified teacher creates a test in the system using the “CTD” software application;
2) The test is submitted to the EDS which checks it for compliance with its stated controlled diagnostic criteria;
3) If the test passes the compliance check, then the EDS adds it to the database. Otherwise, the EDS issues recommendations for reworking the test;

4) Students, through the “CTD” software interface, get access to the test and take it;

5) The “CTD” software application records the results of the tests in the database;

6) The “CTD” software application provides the results of the tests;

7) If the teacher requests, the "CTD" software application provides the test results of a group of students;

8) At the teacher's request, the "CTD" software application performs statistical processing on sets of test results from the database for a specified period of time while providing information in the form of reports and graphs;

9) After taking the cycle of tests, and if the teacher so requests, the test results from the database are sent to the EDS to form a diagnosis on the quality of students' knowledge.

A unique feature of the approach suggested in the TDQK article is that the CTD software application records a particular student's response time to each question and denies access to the test after the stipulated testing time expires. In addition, when a new test is prepared in TDQK, a teacher of that discipline, a test developer or other qualified expert in this field of knowledge takes the test using the CTD software application. The response time to the questions in this case is taken as the standard response time.

Students’ answers are scaled by time parameters. This approach helps to determine the rating of students who score the same number of points during testing. Furthermore, the time parameter is included in the determination of a quality such as strength of knowledge.

In order to further analyze the objectives of the study, it is recommended that a relational model of the *M* database be considered.

General description of the relational model

The *M* database model is represented as a relational algebraic system. (Beynon and Harfield 2005).

$$M =< N, S >, \qquad (1)$$

where, N – a set consisting of n-ary algebraic operations; S –algebraic signature.

$$N = \{R, V, A, D, REL(R), REL(V)\}, \qquad (2)$$

$$R = \{r_1, \ldots, r_m, \ldots, r_{n(R)}\}, \qquad (3)$$

$$V = \{v_1, \ldots, v_m, \ldots, v_{n(V)}\}, \qquad (4)$$

$$A = \{A^{[R]}, A^{[V]}\} = \{A_1, \ldots, A_j, \ldots, A_{n(A)}\}, \qquad (5)$$

$$D = \{D_1, \ldots, D_\mu, \ldots, D_{n(D)}\}, \qquad (6)$$

$$REL(R) = \{rel(r_1), \ldots, rel(r_m), \ldots rel(r_{n(R)})\}, \qquad (7)$$

$$REL(V) = \{rel(v_1), \ldots, rel(v_m), \ldots rel(v_{n(R)})\}, \qquad (8)$$

where, r – relation (table) of DB; R – a set of DB tables; v – view (virtual table) of DB; V – a set of DB views; A – a set of DB attributes; $A^{[R]}$ – a set of attributes of DB tables; $A^{[V]}$ – a set of "resultset" attributes of DB views; D – a set of DB domains; $rel(r)$ – relation scheme; $rel(v)$ – a "resultset" scheme of a view; $REL(R)$ – DB relation scheme; $REL(V)$ – a "resultset" scheme of a DB view; $n(R)$, $n(V)$, $n(A)$, $n(A^{[R]})$, $n(A^{[V]})$, $n(D)$ – the number of relations, types, attributes, relation attributes, attributes of "resultsets" of views and domains respectively defined in the database.

The number and order of the attributes determine the relation scheme:

$$rel(r_m) = (A_1^{[r_m]}, \ldots, A_j^{[r_m]}, \ldots, A_{n(A^{[r_m]})}^{[r_m]}), \qquad (9)$$

where, $A_j^{[r_m]} = r_m.A_j$ – relation attribute r_m (m – index of attribute belonging to relation r_m); $n(A^{[r_m]}) = |rel(r_m)|$ – the number of relation attributes r_m (degree of relation r_m).

Each relation attribute has its own domain:

$$A_j^{[r_m]} \to D_\mu, \qquad (10)$$

$$D = \{D_\mu \mid D_\mu = \{d_1^{[\mu]}, d_2^{[\mu]}, \ldots\}\}, \qquad (11)$$

where, domain D_μ represents a set of data values for an attribute $A_j^{[r_m]}$; μ – index of element $d_i^{[\mu]}$ belonging to domain D_μ.

Relation r_m is a consistent set of tuples:

$$r_m = \{l_1^{[r_m]}, \ldots, l_i^{[r_m]}, \ldots, l_{n(r_m)}^{[r_m]}\}, \qquad (12)$$

where, $l_i^{[r_m]} = r_m.l_i$ – relation tuple r_m (m - index of tuple belonging to relation r_m); $n(r_m) = |r_m|$ – the number of relation tuples r_m (cardinality of relation r_m).

Each tuple $l_i^{[r_m]}$ of relation r_m represents a subset of $n(A^{[r_m]})$-ary product domains for given relation scheme $rel(r_m)$.

$$r_m = \{l_i^{[r_m]} \mid l_i^{[r_m]} = (d_{i,1}^{[r_m]}, \ldots, d_{i,j}^{[r_m]}, \ldots, d_{i,n(A^{[r_m]})}^{[r_m]}),\ A_j^{[r_m]} \to D_\mu,\ d_{i,j}^{[r_m]} \in D_\mu\}. \qquad (13)$$

By analogy, the "resultset" scheme of the view is defined as follows

$$rel(v_m) = (A_1^{[v_m]}, \ldots, A_j^{[v_m]}, \ldots, A_{n(A^{[v_m]})}^{[v_m]}), \qquad (14)$$

where, $A_j^{[v_m]} = v_m.A_j$ – "resultset" attribute of view v_m (m – index of attribute belonging to view v_m); $n(A^{[v_m]}) = |rel(v_m)|$ – the number of "resultset" attributes for view v_m ("resultset" degree of view v_m).

Each attribute of the "resultset" of the view has its own domain:

$$A_j^{[v_m]} \to D_\mu, \qquad (15)$$

"Resultset" of view v_m is a consistent set of tuples:

$$v_m = \left\{l_1^{[v_m]}, \ldots, l_i^{[v_m]}, \ldots, l_{n(r_m)}^{[v_m]}\right\}, \qquad (16)$$

where, $l_i^{[v_m]} = v_m.l_i$ – "resultset" tuple of view v_m (m – index of tuple belonging to view v_m); $n(v_m) = |v_m|$ – the number of "resultset" tuples of view v_m (cardinality of "resultset" v_m).

Signature *S* of model *M* contains operators of relational logic Σ, logical operators Ψ, and comparison operators θ.

$$S = \{\Sigma, \Psi, \theta\}, \qquad (17)$$

$$\Sigma = \{\subset, \not\subset, \cup, \cap, \setminus, \times, \neg, \delta_{<condition>}(r), \pi_{<list\ of\ attributes>}(r), \bowtie, \ltimes, \rtimes, \triangleright^{\theta}\triangleleft, \div\}, \qquad (18)$$

$$\Psi = \{\&, \vee, \neg\}, \qquad (19)$$

$$\theta = \{=, \neq, <, \leq, >, \geq\}, \qquad (20)$$

where, Σ – a set of relational logic operators that includes set-theoretic operators of comparison, union, intersection, difference, Cartesian product and complement, as well as special relational operators of choice, projection, connection (including the following operators: natural connection, left and right semi-connection, connection by condition), the division of relations; Ψ – a set of logical operators including operators of conjunction, disjunction and negation; θ – a set of comparison operators.

We define the *M* model as follows:

$$REL(R) = \{rel(r_1), ..., rel(r_i), ..., rel(r_{n(R)})\}, \qquad (21)$$

$$REL(V) = \{rel(v_1), ..., rel(v_j), ..., rel(v_{n(V)})\}, \qquad (22)$$

where, $n(R)$ =17; $n(V)$ = 15; r_1 – University; r_2 – Faculties; r_3 – Departments; r_4 – Knowledge; r_5 – Specialties; r_6 – Disciplines; r_7 – Teachers; r_8 – Courses; r_9 – AcademicGroups; r_{10} – Students; r_{11} – LectureTopics; r_{12} – LecturesByGroups; r_{13} – LectureTest; r_{14} – QuestionsOfTest; r_{15} – AnswersOfTest; r_{16} – TeachersAnswers; r_{17} – StudentsAnswers.

We provide examples of the definition of views v_j as relational tuples connected under conditions C_j of the equality of the values of primary and foreign keys.

$$\begin{cases} v_1 = \delta_{C_1}(r_{13} \rhd^{=} \lhd r_{14}) = \{l_i^{[v_1]} \mid l_i^{[v_1]} \in (r_{13} \times r_{14})\}, \\ C_1 := r_{13}.A_{pk} = r_{14}.A_{fk} \end{cases} \quad (23$$

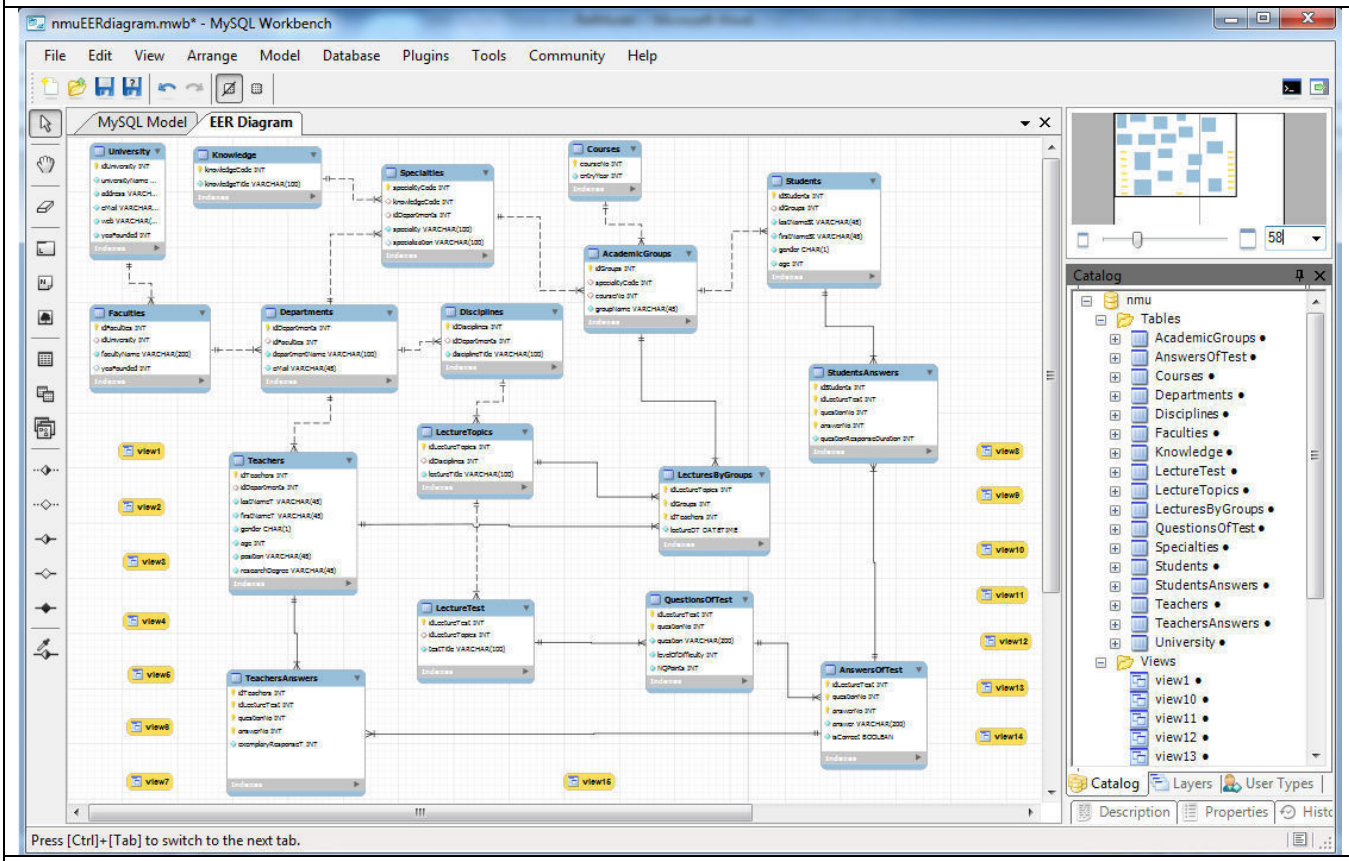
where, A_{pk}, A_{fk} – attributes of primary and foreign keys of relations; $\delta_{C1}()$ – operator of tuple selection by condition C_1; $\rhd^{=}\lhd$ – θ-connection by equivalence.

$$\begin{cases} v_2 = \delta_{C_2}(r_7 \rhd^{=} \lhd r_{16} \rhd^{=} \lhd r_{15} \rhd^{=} \lhd r_{14} \rhd^{=} \lhd r_{13}) = \{l_i^{[v_1]} \mid l_i^{[v_1]} \in (r_7 \times r_{16} \times r_{15} \times r_{14} \times r_{13})\}, \\ C_2 := (r_7.A_{pk} = r_{16}.A_{fk}) \,\&\, (r_{16}.A_{fk} = r_{15}.A_{pk}) \,\&\, (r_{15}.A_{fk} = r_{14}.A_{pk}) \,\&\, (r_{14}.A_{fk} = r_{13}.A_{pk}) \end{cases} \quad (24)$$

Some parameters of the *M* model defined in *REL*(*R*) and *REL*(*V*) as attributes of relations and attributes of "results" of views are as follows: $A_4^{[r_{15}]}$ – level of question difficulty; $A_5^{[r_{15}]}$ – number of points for each question; $A_5^{[r_{16}]}$ – exemplary response time for each question; $A_5^{[r_{17}]}$ – question response duration of a student; $A_2^{[v_1]}$ – maximum number of questions in the test; $A_3^{[v_1]}$ – maximum number of points for the test; $A_5^{[v_2]}$ – exemplary number of test questions processed as exemplary test duration; $A_6^{[v_2]}$ – exemplary test duration (in seconds); $A_2^{[v_3]}$ – exemplary number of points; $A_3^{[v_4]}$ – maximum number of test questions for levels of difficulty; $A_4^{[v_4]}$ – maximum number of test points for levels of difficulty; $A_6^{[v_5]}$ – exemplary number of test questions processed for levels of difficulty; $A_7^{[v_5]}$ – average exemplary test duration for levels of difficulty (in seconds); $A_8^{[v_5]}$ – total exemplary test duration for levels of difficulty (in seconds); $A_2^{[v_6]}$ – exemplary number of test points for levels of difficulty; $A_{11}^{[v_7]}$ – relative to exemplary difference of the response time for a question; $A_7^{[v_8]}$ – total duration of the test for a student (in seconds); $A_8^{[v_8]}$ – number of student's answers; $A_8^{[v_9]}$ – relative to exemplary difference of durations passing the test; $A_7^{[v_{10}]}$ – number of correct student's answers; $A_8^{[v_{10}]}$ – number of points received by student; $A_8^{[v_{11}]}$ – relative to exemplary difference of points; $A_8^{[v_{12}]}, A_9^{[v_{12}]}$ – average and total duration of the test questions for levels of difficulty; $A_{10}^{[v_{12}]}$ – number of student's answers for levels of difficulty; $A_8^{[v_{13}]}$ – number of correct student's answers for levels of difficulty; $A_9^{[v_{13}]}$ – number of points received; $A_9^{[v_{14}]}$ – relative to exemplary difference of points for levels of difficulty for a student; $A_{11}^{[v_{15}]}$, $A_{12}^{[v_{15}]}$ – relative to exemplary difference of the average / total test duration for levels of difficulty.

The *M* model was developed in the MySQL Workbench Visual Database Design for Professionals. The EER (Enhanced Entity Relationship) diagram of the *M* model is presented in Figure 6.

FIGURE 6. EER DIAGRAM OF THE DATABASE



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The working database of the TDQK project was created using the MySQL Query Browser toolkit.

Results of TDQK application to assess the quality of knowledge for university students

The main results of passing tests by students are available in the TDQK project in the form of reports and graphs.

The graphs below (see Fig. 7-12) show the test results for one of the groups of fifteen first year software engineering students, thus forming our representative sample. The student ID number is an alphabetically ordered sample list.

Figure 7 shows the graphs of relative indicators of passing the test by students.

The graphs for students of the same group are formed by selecting the group and test identifiers from the database of the diagnostic system. These are “Group ID” (*gid*) and “Test ID” (*tid*) parameters.

Each test (*tid)* has its own characteristics:

− *ExemplaryTestDuration (tid)*;

− *NumberOfQuestionsInTest (tid)*;

− *NumberOfPointsForQuestion (tid)*;

− *NumberOfPointsForTest (tid).*

After taking the test (*tid*) each student (*sid*) receives the following indicators:

– *TotalDurationOfTestForStudent (tid, sid);*

– *NumberOfCorrectStudentAnswers (tid, sid);*

– *NumberOfPointsReceivedBy Student(tid, sid).*

Relative students' test scores (*tid*) are calculated as follows:

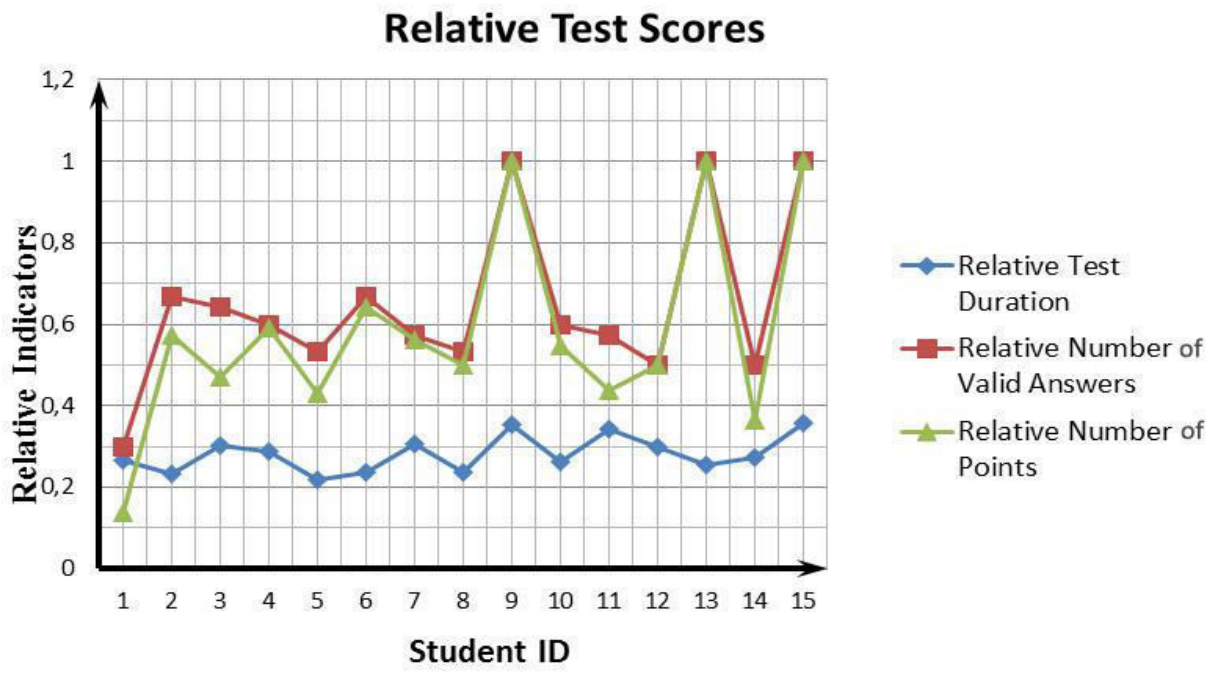
$$RelativeTestDuration\ (tid, sid) = ExemplaryTestDuration\ (tid) / TotalDurationOfTestForStudent\ (tid, sid);$$

$$RelativeNumberValidAnswers\ (tid, sid) = NumberOfCorrectStudentAnswers\ (tid, sid) / NumberOfQuestionsInTest\ (tid);$$

$$RelativeNumberValidAnswers\ (tid, sid) = NumberOfPointsReceivedByStudent\ (tid, sid) / NumberOfPointsForTest\ (tid).$$

Therefore, the scales of the relative indicators of the test (ordinate axis in Fig. 7) are in the range [0; 1]. The higher the value of the relative indicator, the better the result of passing the test.

FIGURE 7 (GRAPH). GRAPHS OF RELATIVE INDICATORS OF PASSING THE TEST



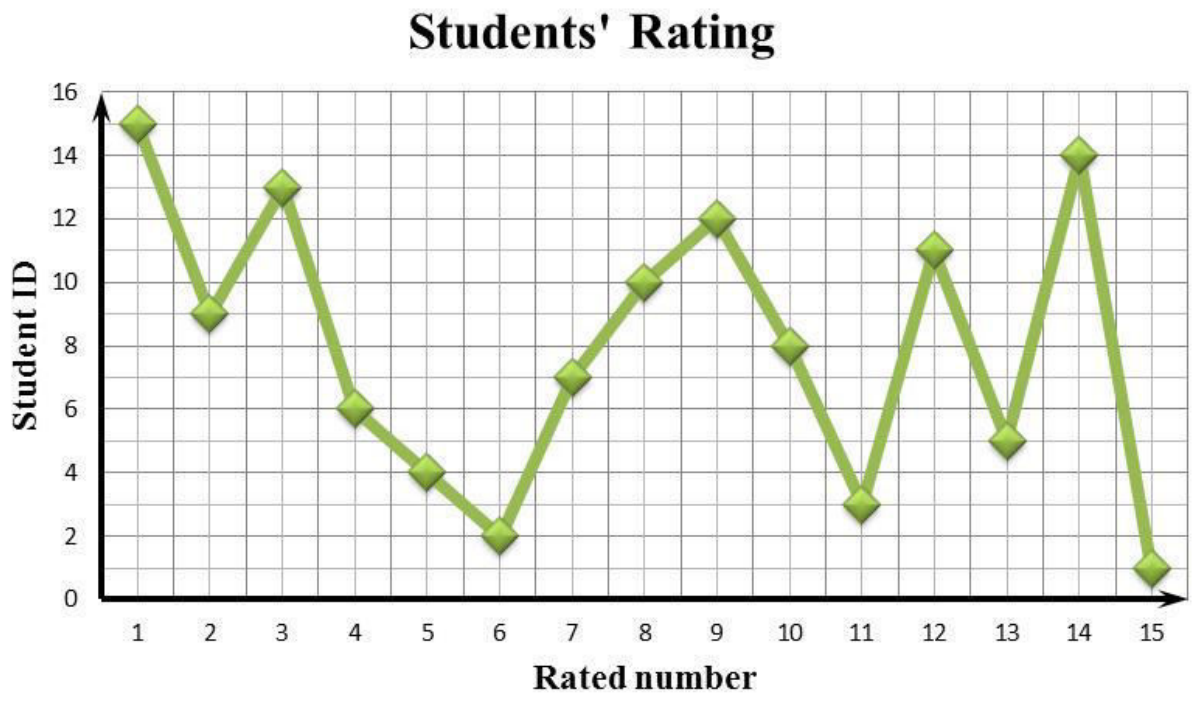
Source: Own

Based on the data obtained, we can determine the rating of students by the results of passing the test / series of tests. Figure 8 shows a graph of the distribution of students by rating according to the results of relative indicators of passing the test presented in Figure 7.

The student rating consists of two stages. The first stage is to arrange the list of students in the group in

descending order of the value of the *RelativeNumberValidAnswers* indicator. The second stage is to order the list of students in descending order using the *RelativeTestDuration* indicator for each subgroup of the sample of the first ordering stage with the equivalent *RelativeNumberValidAnswers* indicator. *RatedNumber* is student's number in the resultant list.

FIGURE 8 (GRAPH). GRAPH OF STUDENT'S RATING



Source: Own

The graphs below (see Fig. 9-11) show the results of passing the same test (*tid*) by the same group of students (*gid*), taking into account the difficulty levels of test questions l (applicate axis). The questions of the test (*tid*) selected in the example are divided into three difficulty levels. In general, the number of difficulty levels for test questions is determined by the test author.

Therefore, each question of the "Question ID" (*qid*) test has the following characteristics:

− *Level OfDifficulty (l)*;

− *NumberOfPointsForQuestion*;

− *ExemplaryResponseTimeForQuestion,* in seconds.

We calculate the following parameters for each test (*tid*):

− *NumberOfTestQuestionsForLevelOfDifficulty (tid, l)*;

− *NumberOfTestPointsForLevelOfDifficulty (tid, l)*;

− *TotalExemplaryTestDurationForLevelOfDifficulty (tid, l)*.

Each student (*sid*) as a result of taking the test (*tid*) receives the following indicators:

− *NumberOfCorrectStudentAnswersForLevelOfDifficulty (tid, l, sid)*;

− *NumberOfPointsReceivedByStudent ForLevelOfDifficulty (tid, l, sid)*;

− *TotalDurationOfStudentAnswersTestQuestionsForLevelOfDifficulty (tid, l, sid)*.

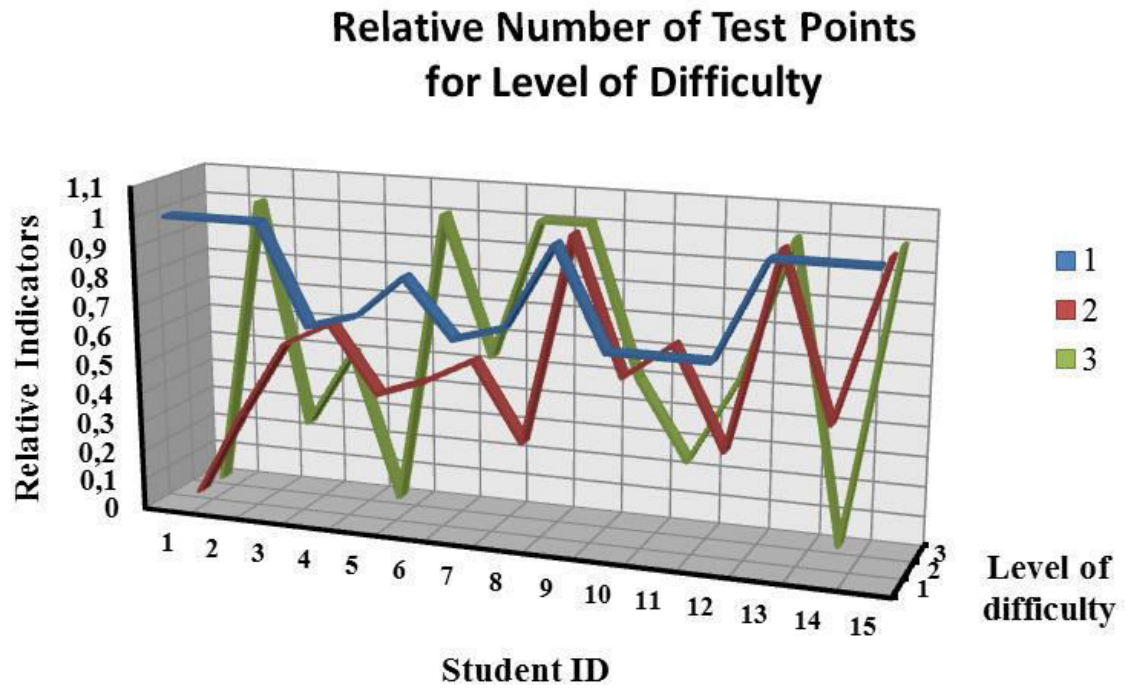
Figure 9 shows graphs of the relative total scores for the number of points for the correct answers for each of the levels of difficulty of the test assignments. They are calculated as follows:

RelativeNumberOfTestPointsForLevelOfDifficulty (tid, l, sid) =

NumberOfPointsReceivedByStudentForLevelOfDifficulty (tid, l, sid) /

NumberOfTestPointsForLevelOfDifficulty (tid, l).

FIGURE 9 (GRAPH). GRAPHS OF RELATIVE INDICATORS OF THE NUMBER OF POINTS FOR THE TEST DISTRIBUTED BY TASK DIFFICULTY LEVELS



Source: Own

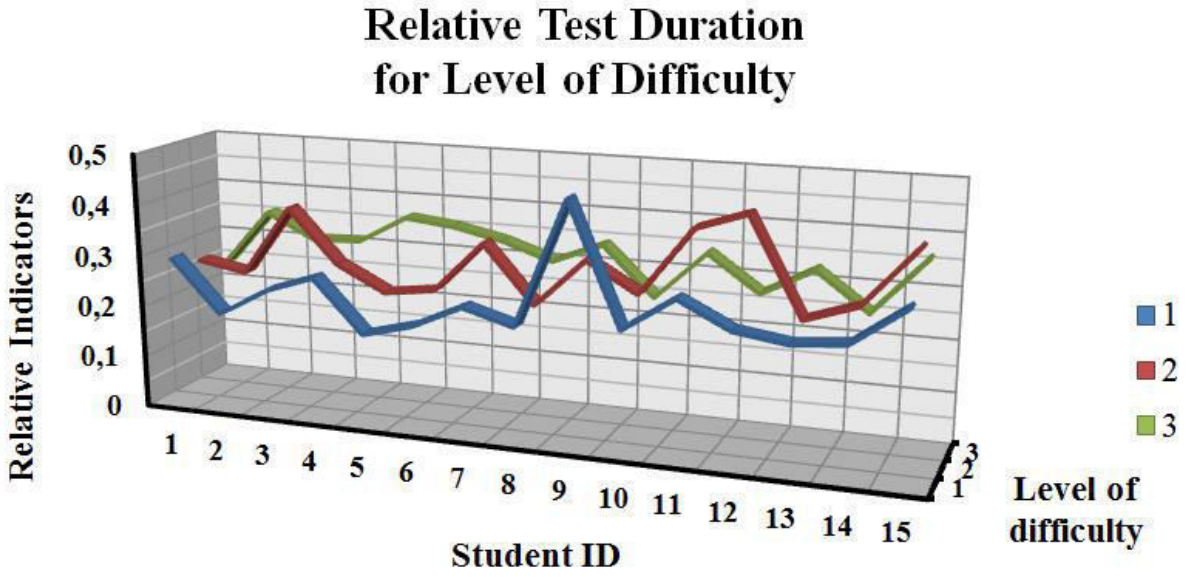
Figure 10 shows the graphs of relative time indicators of passing the test questions distributed by levels of difficulty. They are calculated as follows:

RelativeTestDurationForLevelOfDifficulty(tid, l, sid) =

TotalExemplaryTestDurationForLevelOfDifficulty(tid, l) /

TotalDurationOfStudentAnswersTestQuestionsForLevelOfDifficulty(tid, l, sid).

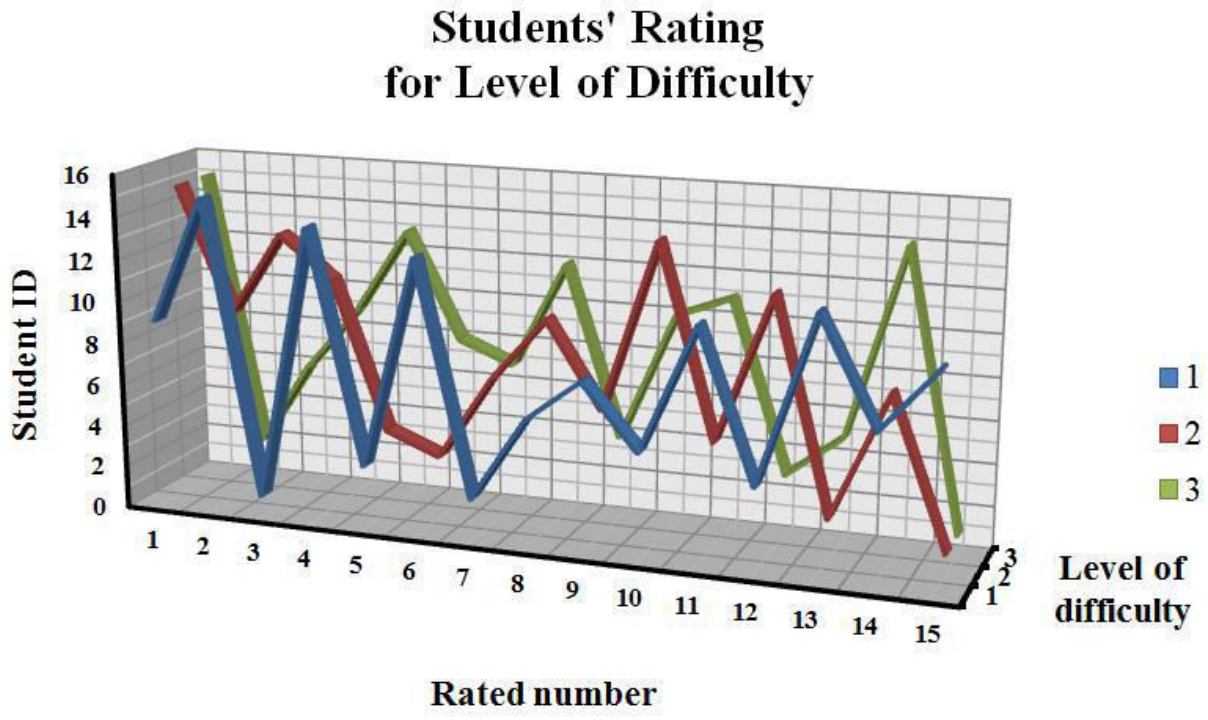
FIGURE 10 (GRAPH). GRAPHS OF RELATIVE TIME INDICATORS OF THE TEST PERFORMANCE DISTRIBUTED BY TASK COMPLEXITY LEVELS



Source: Own

Based on the data obtained, we can determine the rating of students by the results of passing the test / series of tests taking into account the levels of difficulty of the tasks. Figure 11 shows a graph of the distribution of students by rating based on the results of relative indicators of passing the test (see. Figures 9 and 10). Students' ratings are calculated separately for each difficulty level by analogy with the procedure described for the graph shown in Fig. 8.

FIGURE 11 (GRAPH). GRAPHS OF STUDENTS' RATING BY DIFFICULTY LEVELS OF TEST ASSIGNMENTS



Source: Own

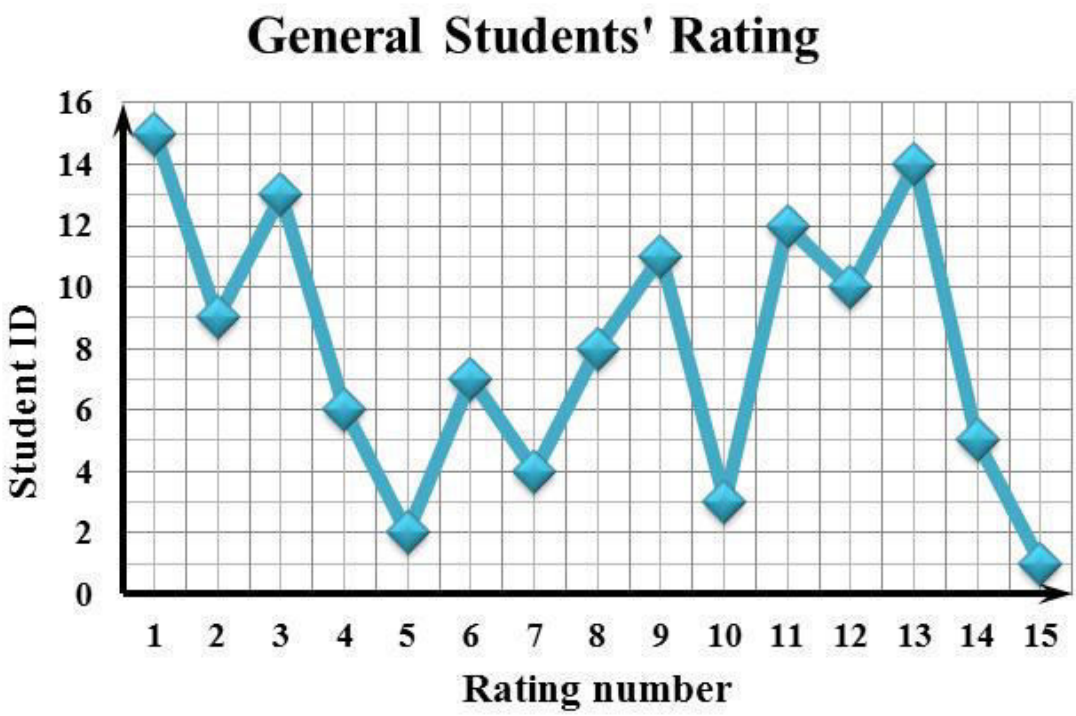
We calculate the general rating of students taking into account the difficulty levels of the test tasks based on the rating data for each level (see Figure 11) using the following formula:

$$R_{sid} = \sum_{l=1}^{n(l)} r_{sid,l} * 2^{l-1}, \qquad (25)$$

Where, *sid* – student ID, *l* – level of difficulty of the test; *n*(*l*) – the number of difficulty levels of tasks in the test; *rsid*,*l* – student's rating at level of difficulty *l*; R_{sid} – general student's rating taking into account the difficulty levels of the test assignments.

Figure 12 shows a graph of the distribution of students according to their general rating taking into account the difficulty levels of the test assignments.

FIGURE 12 (GRAPH). GRAPHS OF SENERAL STUDENTS' RATING



Source: Own

Conclusion

This article considers the method of computer test diagnostics to assess the quality of students' knowledge in the process of their training. It is based on the relational model developed by determining the indicators of knowledge formation. We developed the software application called "TDQK" based on this method and the relational model developed. The first stage of project implementation was applied for ongoing test diagnostics of the first level of mastering knowledge.

The use of "TDQK" software application, even at the first stage of implementation, allowed us to determine both deviations of students' criterion indicators from the normative minimum as well as their pronounced abilities. The methodology developed provides diagnostics of the tendencies of development

of the real possibilities of the individual in mastering specific disciplines in the system of professional training. Quick response and adjustment of the educational process, in accordance with the diagnostics of the "TDQK" software application, allow for an increase in the learning indicators. The Department of Software Engineering employed the "TDQK" application for six months with the participation of 250 students in their 1st to 4th year. This resulted in an increase in the quality of the students' knowledge by an average of 12-15%.

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LEARNING TO CODE IN CLASS BY PAIR PROGRAMMING OF GAMES

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Key words: Coding, Pair programming, secondary classroom, Computational thinking, Collaboration.

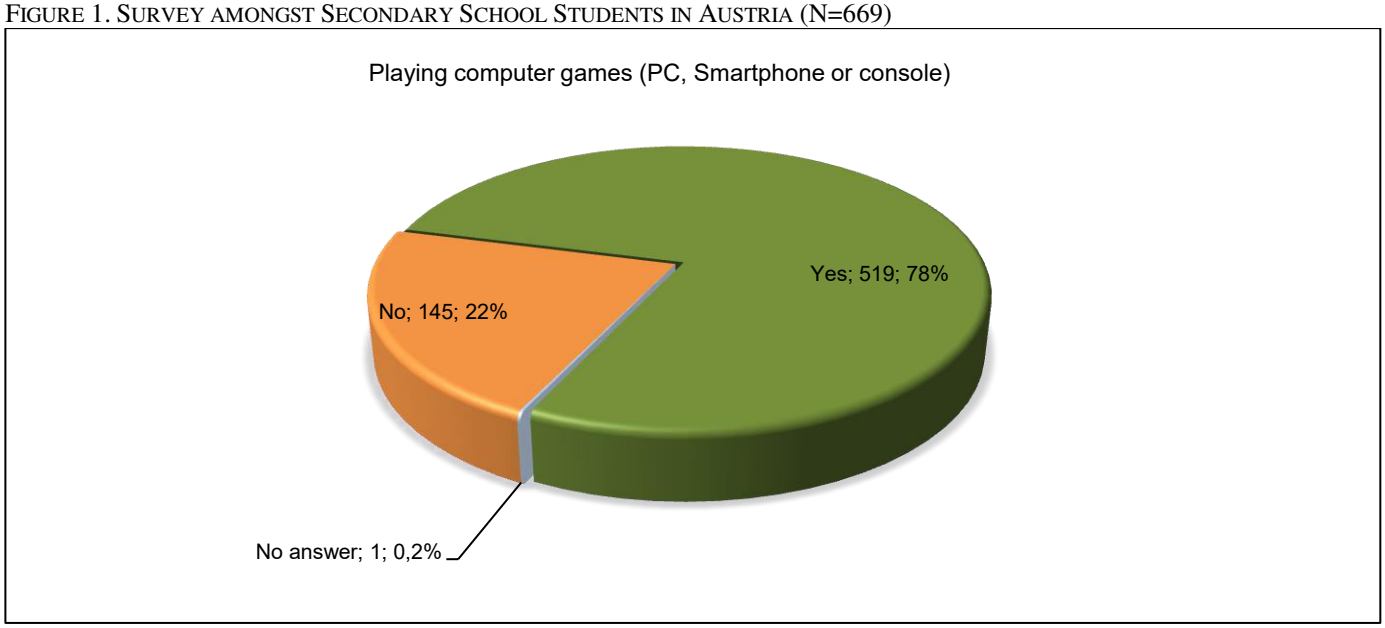
Abstract: Learning to program in a text-based language is known to have a steep learning curve. For several young students the first steps appear hard and exhausting, leaving students with little motivation to follow up. This is unfortunate, since in our era of digitalization, computational thinking, including coding, is a significant benefit, if not a requirement, in numerous job offerings. Hence, we were looking for new and motivating paths to promote students' computational thinking along with 21st century competences such as collaboration and problem-solving.
The core idea of our approach is to motivate students to get over initial hurdles by letting them develop computer games with the open-source, educational version of the professional game development engine Unity ™. To also train the crucial collaborative skills and make it easier for the teacher to oversee and support a class, we chose to employ the agile technique of pair-programming. This study first describes the context, namely the "Learn to proGrAME" project and recalls the essence of the pair-programming technique. After describing related work we proceed with the triangulated research design consisting of three methods. The class observation is followed by a post-design questionnaire that was filled out by the students of one class at the K9 level (about 15 year olds), and a final focus group. The results are deemed to be of interest primarily to secondary level computer science teachers and curriculum developers. They indicate that all students - with some consultation by the teacher - finished the given task and preferred the pair-programming session to individual work. Furthermore, the authors particularly appreciated the collaborative problem solving observed in several student pairs. All in all, with some caution due to the small sample size, we encourage teachers to engage students in pair-programming due to distinctly positive results in both cognitive and interpersonal dimensions.

Introduction

As technology is advancing and maturing, computers are becoming significant tools in our life. Obviously, this holds true for education, in particular. Hence, learning to in–struct computers to serve our needs and wants has been gaining attraction and is progressing to reach people at ever earlier age. This, however, is not a smooth process. The majority of students who are learning introductory computer programming tend to develop superficial knowledge and fail to create problem solving strategies through using programming constructs (Kazimoglu, Kiernan, Bacon, & Mackinnon 2012).

Since learning to program is difficult for many students (Bennedsen & Caspersen 2007), clever innovative motivational and instructional strategies are sought to help students master the steep learning curve that characterizes the effort to learn to program. According to an ongoing survey which has been done by the second author of this paper amongst 669 teenagers (average age: 14 years) in Austria, 78 % stated that they are playing computer games (Figure 1). In this context, the human trait that "games are interesting for young students" comes in handy. It has led the authors to conduct the project "Learn to proGrAME" whose core idea is to motivate students to learn to program by letting them develop video games in class. As a part of this endeavor, the social form of pairs, as practiced for example in pair-programming, seemed attractive to support students by offering a collaborative setting. As collaboration is one of the pillars of computational thinking, pair-programming has the potential to add yet more value to the "learning to proGrAME" initiative and intervention.

FIGURE 1. SURVEY AMONGST SECONDARY SCHOOL STUDENTS IN AUSTRIA (N=669)



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Pair-programming is a collaborative form of programming in which two people work side by side at one computer. Originally, pair-programming was practiced by professional software engineers as part of the Extreme Programming software development methodology (Beck 2000). Since then it made its way to professional software development, mainly in agile methods, and is being taken up at college and school level, as described below. In a nutshell, according to our research (this study and (Issaee et al. 2019), the collaborative setting of pair-programming helps secondary-level students in (k9) to learn how to think computationally while developing a mini-game with C#, using the educational edition of the professional game development environment Unity™.

Related work - The task of learning to program is often recognized as a frustrating and demanding activity by students (Hutchison, et al. 2008; Kazimoglu, Kiernan, Bacon, & Mackinnon 2012) and numerous studies argue that poor teaching methods, low levels of interaction with students and a lack of interest are the major problems in learning programming (Barker, Mcdowell, & Kalahar 2009; Coull & Duncan 2011). It is widely accepted that students need to demonstrate an understanding of the patterns evident in programming rather than focusing only on syntax and semantics of computer programming (Liu, Cheng, & Huang 2011). To achieve this, computational thinking (CT) has been the focal point of recent studies especially within the computer science (CS) discipline in order to integrate CT into the basic curriculum (Guzdial 2008, Qualls & Sherrell 2010; Perković, Settle, Hwang, & Jones 2010; Lee et al. 2011). Wing (2006) defines CT as a set of intellectual and reasoning skills that states how people interact and learn to think through the language of computation. In other words, thinking computationally involves using methods, language and systems of computer science (CS) in order to solve problems in any discipline regardless of where the problem lies (Kazimoglu, Kiernan, Bacon, & Mackinnon 2012).

Regarding pair programming there has been limited evidence on the use, problems and benefits, partner selection, and the general perceptions of this technique in industrial settings. Pair programming became known as part of the Extreme Programming methodology (Beck 2000) that is gaining widespread use in industry. Most research on pair programming, however has been focused in an academic environment with just limited studies about this technique in industry. These studies only provide preliminary evidence of some empirical results related to quality and productivity (Begel and Nagappan 2008). Pair-programming appears to have different roles and purposes in industry and in academia. In industry, there is little research on pair programming, and what little there is shows conflicting results. Surprisingly, we do not have a good qualitative assessment of how professional programmers might explain these results (Begel and Nagappan 2008). In academia, pair programming has been used for education and has been found to have positive effects on student retention. In introductory programming courses in tertiary education, failure and withdrawal rates of 33 % or greater are not uncommon (Bennedsen & Caspersen 2007). According to McDowell, Werner, Bullock & Fernald (2006), the researchers "investigated the effects of pair programming on student performance and subsequent pursuit of computer science related degrees among both female and male college students taking an introductory programming course designed for computer science related majors." They collected data on 554 students who attempted the course at the University of California-Santa Cruz (McDowell, et al. 2003). The results of this study indicate the effectiveness of pair programming as a socio-pedagogical tool. There was evidence that pairing supported course completion and consequently course pass rates. Also, it contributed to greater persistence in computer science related majors. Moreover, students who paired were more likely to pass the subsequent programming course in which students had to work alone. In some more detail, one of the most extensive studies of pair programming was conducted by McDowell, Werner, Bullock, and Fernald (2003 2006) in 2000 and 2001. They studied the impact of pair programming on student performance in four sections of an introductory programming course (CS1) at the University of California, Santa Cruz. Students in three of the sections worked in pairs (n . 404), while students in the fourth section worked alone (n . 148). The paired students worked on all of their programming assignments (both closed labs and homework) with their partner. Paired students were significantly more likely than non-paired students to take the final exam (90.8% vs. 80.4%, w2(1) . 11.21, p 5 0.001) and to pass the course (72.3% vs. 62.8%, w2(1) . 4.57, p 5 0.05). Although a larger percentage of paired students took the final exam, both groups earned similar scores (pairs: 75.2%, solos: 74.4%). As a result, a larger proportion of the paired students demonstrated sufficient mastery of the course material to pass the final exam and the course. This suggests that paired students are as able to apply their learning independently as students who work alone (Hanks, Fitzgerald, Mccauley, Murphy, & Zander 2011).

According to research by Liebenberg, Mentz & Breed (2012), pair programming shapes the experience of secondary school girls taking IT as a subject, with respect to their enjoyment of programming and the subject itself. The study involved six Grade 11 girls who were doing solo programming in Grade 10 and pair programming in their following Grade. The results showed that the girls enjoyed the subject more when programming in pairs due to improved comprehension of the task. They especially enjoyed the socialization and communication brought about by pair programming. The assistance, support, motivation, focus and encouragement they received from partners when stuck or while fixing errors made the programming experience more enjoyable for them. The increased enjoyment brought about by pair programming resulted in the perception of greater learning in the subject IT and also to greater interest in it. It also led to greater persistence in dealing with problems. Pair programming should be implemented right from the start of Grade 10 since it may lead to greater enjoyment of programming and the subject IT in general. The approach may also lead to more girls being attracted to the subject.

Research Questions - In the "Learn to proGrAME" project our main interest is to explore and find out, how computational thinking, including coding and collaboration skills, can effectively be promoted in secondary education. In the context of the research-focus on pair-programming prevalent in this paper, we formulated the following three research specific questions:

RQ1When developing a computer game, do students prefer to develop the game in the form of pair programming, or do they prefer to do it on their own?

RQ2 Does working in pairs while developing computer games motivate students more than working alone does?

RQ3 Does game programming in pairs improve students' understanding of computational thinking more than working alone?

In order to respond to these research questions, we used a mix of qualitative and quantitative methods as described in the section below.

Methods

Research design - The choice of methods was made with the following considerations in mind. Firstly, since there are only few studies so far that had investigated the technique of pair-programming for learning to program in class, we were eager to capture as many facets of the phenomenon in class, such as not to overlook influential aspects. For this reason we videotaped large parts of the happenings and the first author observed the lessons. Secondly, we wanted to capture as many perspectives as possible, so we are going to represent the observations by the participating teacher, the observing researcher (both co-authors of this paper) and, importantly, the students as subjects of the intervention. Thirdly, due to the small sample size of students in class, we wanted to collect simple, quantitative data from students *as well as*

their qualitative responses, both individually and collectively in a focus group. Consequently, we triangulated the respondents (teacher, observer, students) as well as the methods (observation, post-design questionnaire, and final focus group with students) resulting in the following instruments and procedures.

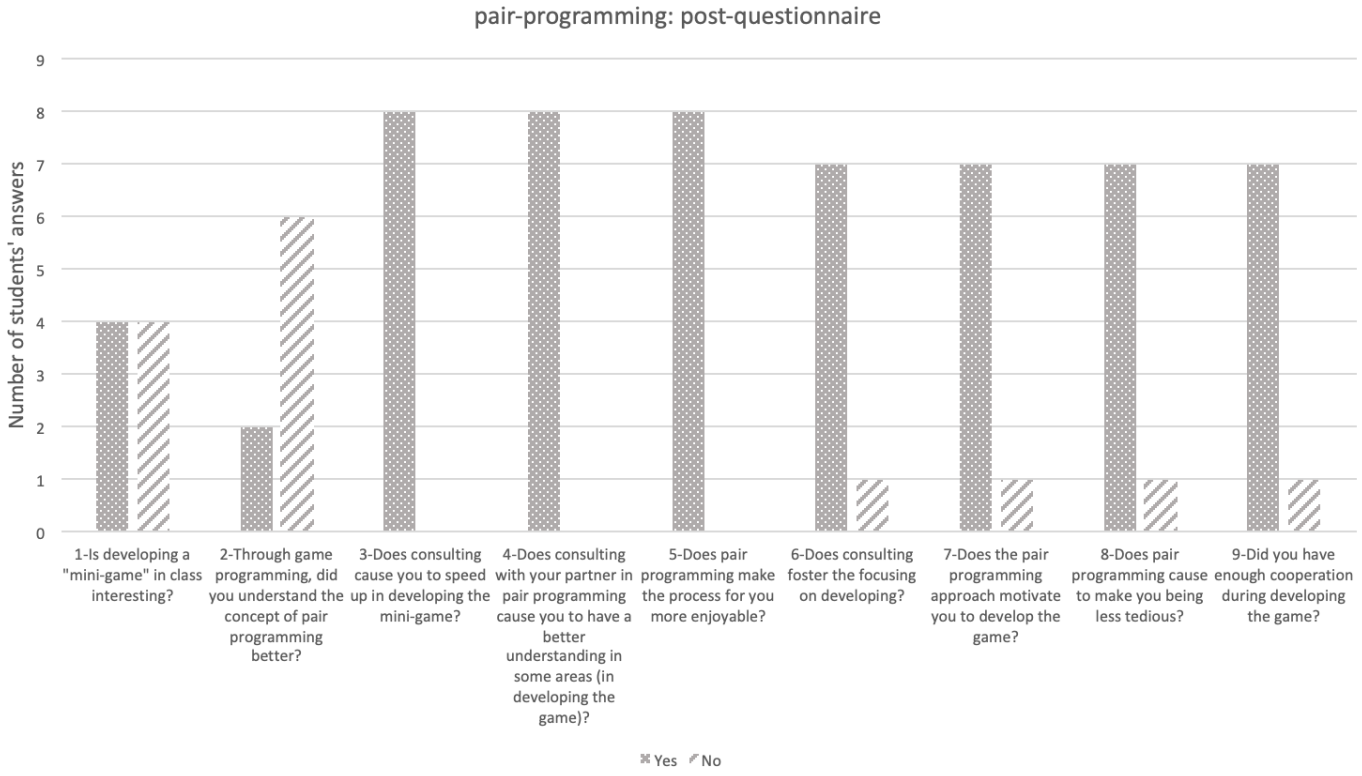
Unit design and observation - We asked students to sit two by two in pairs using one computer to program the mini-game based on tutorials which had carefully been prepared beforehand. Students had been allowed to freely choose their partner. We explained the pair-programming approach to them and emphasized how important collaboration was in this setting. This research took place during four class units within four consecutive weeks. During pair-programming, all students took their turns to act as a pilot and co-pilot. Both knew about their own responsibilities which had been explained to them at the beginning of the class. A pilot role is taken on by students who have mouse and keyboard at their disposal, while a co-pilot role has specified responsibilities such as consulting the pilot of the pair, offering advice, controlling duties and making sure that his/her partner develop the mini-game correctly. The teacher also observed the class and individual students and gave advice when asked questions. A check-list had been prepared for each co-pilot to have better control over the pilot's part and make sure that the game was developed step by step according to the tutorial files. Pilot and co-pilot roles in pair-programming were switched in each class slot. According to the first author's observation during the pair-programming, collaboration between students *in each pair* was admirable. Students were consulting each other to solve their problems and tried not to ask their busy teacher too many questions. Another observation revealed that –towards the end of the lesson - some students were trying to find a solution for a problem they had encountered by surfing on the internet. This points to self-initiated problem-solving activities of students.

Based on the observer's and teacher's observation, students increasingly developed positive attitudes toward pair programming.

Post-design survey - Based on the research interests stated above, the first author of this paper designed a post-questionnaire aimed at inquiring about students' pair-programming experience. He distributed the German version of the post-questionnaire immediately after students had finished the task of developing a mini-game following carefully prepared instructions on a worksheet.

All questions in the post-questionnaires have been designed with "Yes/No" or multiple-choice answers for simplicity (see also discussion in (Issaee et. al. 2019)). The survey questionnaire included a German translation (See Figure 2).

FIGURE 2- STUDENTS' ANSWERS TO THE POST-QUESTIONNAIRES.



Source: Own

Focus Group - Shortly before the end of the lesson, the teacher and researcher (first author) asked the students to sit together to share about the pair programming experience, their learnings, the mini-game, their preferences, and their motivations. The teacher together with the researcher asked students a few questions which were prepared beforehand by the first author. The idea was that – for each question - students would first share their views among colleagues sitting next to them and then with the whole group. Finally, a show of hands would signal whether they agreed with a summarizing statement suggested by the researcher or not. The questions asked during the focus group session included:

In particular, what kind of advantage(s), if any, did you find in the pair programming technique?

How do you evaluate the mini-game?

One important reason for conducting the focus group was to enable exchange among students regarding their pair-programming experience. Furthermore, we sought to get their reactions concerning the task to develop a mini-game. Also, we wanted to give students an opportunity to express their experiences regarding pair programming freely by using their own words. The intention was to let them spark each other, such as to compare their statements in the questionnaire with what they shared in the direct interaction throughout the focus group. This was intended, amongst others, to let us interpret our

observations regarding the pair-programming task with students' individual responses through the questionnaire as well as their interactive responses during the focus group setting.

Results

In the following we describe our findings from applying the three methods characterized above.

Observation - The first author observed the behavior and collaboration between students. He observed that both pilot and co-pilot were playing essential roles while they were consulting most steps in developing the mini-game. Students were enjoying the pair-programming setting. This statement is based on both the author's observation and the students' responses to the 5th question on the survey questionnaire: "Does pair programming make the process for you more enjoyable?" 100% of the students responded that this had been the case.

Those students who searched for solutions for problems they had faced, could find their solution successfully by surfing on the internet. Problem-solving in each pair was observed perspicuously in addition, it was precious to see students' consultation in pairs. Furthermore, students learned how to think computationally during the collaborative setting through the pair-programming.

Post-design survey - It's worth to mention, in three out of nine questions that addressed learning and collaborating better through pair-programming (question 4 and question 5) and positive influence of consulting thorough pair-programming on speed up in developing the mini-game (question 3) , 100% of the students agreed that the pair-programming approach caused them to learn faster and better with an agile setting. Hence, despite the limitations reflected above, the highly positive results in the post-questionnaire and the focus group, along with their consistency with the teacher‘s feedback and the observer's impression let us conjecture that pair-programming is a very good candidate for an effective setting in the context of learning to program and learning to think computationally. In addition, it provides a perfect opportunity to shape communication-, team-, and collaborative problem-solving skills that are essential in all areas of human (co-)existence. Hence, we suggest that pair-programming be given a larger role in informatics education such that students acquire skills which are crucial in the 21st century. All answers from the questionnaire are depicted in Table 1 at the end of this paper. We are aware that yes/no questions are polarizing and limited. We used them for clarity, simplicity, and speed because we didn't want to spend too much time with the questionnaires. More nuanced responses were expressed and noted during the focus group session at the very end of the game development units.

Focus group - Results from students' questionnaire and focus group discussion showed a significant improvement in the satisfaction of students during the pair-programming activity when compared with individual work. All students have the same opinion with their classmate who said: "We like pair programming because we could work faster". Hearing this opinion from students, is as a bright proof that

pair programming has affirmatively an influence on speed in the development of the game. One student described the mini-game with the adjective "cool" which was very appealing. The rest considered the game as appropriately challenging. The students were satisfied with the mini-game's level of difficulty in the pair-programming setting.

Conclusions

Our research stands out as one of the first ones regarding pair-programming in the context of game development and teaching students how to think computationally, while employing the educational version of the professional game engine Unity ™.

Limitations - In the current investigation, we observed and studied a small number of students (N = 8) only, all stemming from the same class and working on the same project. Hence our results may be biased in terms of the influence of the class teacher, the survey-administrator and interviewer. Moreover, the questions asked were all formulated in a way to suggest an affirmative response which might have caused some bias. Consequently, follow-up research will employ more neutral questions and also explicitly inquire about the downsides of the setting. Furthermore, findings may be influenced by the quality of the tutorial and the level of students' attraction to the game to be developed. Nevertheless, the chosen research design with a triangulation of qualitative and quantitative methods brought consistent results as to the high potential of pair programming in secondary classrooms, when students' active engagement in programming is called for.

Discussion - Revisiting our research questions we found affirming responses to all three of them. Regarding RQ1 (Do students prefer to develop a game in a pair-programming setting or do they prefer to do it on their own?), the first author and the teacher observed that students engaged truly collaboratively. Referring to the survey, all but one student responded affirmatively to Q9 that had inquired whether the students had cooperated enough during developing the game. Last but not least, the focus group confirmed that response by having 100 % of students agree that pair-programming caused a speed-up in developing the mini-game within an enjoyable setting.

RQ2 asked whether working in pairs would motivate students to develop computer games more than working alone. It was evident that students were motivated through the pair-programming setting since they had asked to learn further coding skills and even other computer software skills (for creating images, including sound etc.) via pair-programming. This observation was confirmed through the survey, in which question 7 that asked explicitly about students' motivation to develop a computer game in pairs was answered affirmatively by all but one student.

Finally, the response to RQ3 (Does game programming in pairs improve students' understanding of computational thinking more than working alone?) is also "yes". As we had assumed, pair-programming

helped students to understand their tasks better as they consulted each other and engaged in collaborative problem solving. They learned from each other. As shown in Table 1, only half of the students were interested in developing a mini-game. This was probably due to the fact that they had already spent four units with game development and realized that it was not just fun but also a challenge and, after all, hard work! Also, as shown by strong disagreement in question 2, apparently the concept of pair-programming had not been described well enough, such that most students were confused by the question. This points to an issue for improvement on the next occasion of introducing the concept of pair-programming to students. Other than this, all but one student responded affirmatively to the other questions. According to author's observation this one student whose responses were interpreted as an outlier, seemed that she didn't have any passion in the computer science course generally, which we could understand. On the positive side, we observed that students explained the different steps of developing the mini-game to their pair-partners. This approach truly trained their computational thinking as they tried to solve problems by themselves and even refrained from asking their teacher for help. In the survey, question 5, inquiring about students' better understanding of aspects of game development mediated by the pair-programming technique, even received the consent of all students! Above all, pair-programming would also be beneficial for students who were too shy to ask questions in front of the whole class or even their teacher.

Pair programming at secondary schools (K9 level) has been tested in this research with a number of students, and the students' survey suggests that our method works reasonably well. Hence, we would like to extend our research with more pupils and different schools in the– future. Further studies in the context of game development with Unity and Scratch are currently underway.

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TEACHING EMERGING TECHNOLOGIES AT THE INTERNATIONAL LEVEL VIA THE INTERACTIVE METHODS

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Key words: blockchain technology, gamification, interactive teaching, emerging technologies.

Abstract: This research focused on the experience of teaching emerging technologies to students of different specialties via the use of interactive methods. In particular, the learners were presented to the topic of the blockchain technologies through the deliberately designed role game "The Blockchain Game," a hands-on exercise that explains blockchain's core principals and serves as a launching pad for the discussion of Blockchain's real-world applications. This inexpensive, no-computer, exercise has been used in higher education and professional organizations in the US, Germany and Ukraine. This data will be used to improve the current exercise and to develop additional low-cost teaching aids that can be used globally to help prepare students of all ages adapt to the technology of the 4th industrial revolution.
The research goal was to analyse the experiences of introducing emerging technologies via interactive methods using the feedback of the students from two countries. Blockchain technology can be a game-changer for accounting, supply chain, banking, contract law, and many other fields. But it will only be useful if lots of people trust and adopt it. The conclusions were delivered under the context of the student's feedback and analysis of their performance during the game. The paper highlights the importance of identifying good practices in the presenting of the emerging digital technologies to a wider audience under the context of the quality assurance standards for modern education.
In addition, the authors are assessing the effectiveness of this exercise and trying to identify any cross-cultural differences that might affect the efficacy of such a simulation. The low computer literacy, absence of skills in personally adopting the newest technologies, combined with low availability in the educational process can result in challenges for teaching about these technologies and their application.

Introduction

Information and Communication Technologies (ICT) became the key tools on the path of 21st century development, and they will stay the leading factor during the next generations' lives. That is why the ICT implementation into the educational process as a working instrument as well as a knowledge component should be an implicit part of the modern training. Knowledge globalization, fast speed of the information accumulation and processing causes a need to design the new approaches to the educational process. (Bezzub 2016) The higher education as an industry has been functioning for a long period with certain stability and steady profits until the moment of entering the era of the digital technologies. As a logical result of the massive implementation of digital technologies into a lot of spheres and the areas of society's activities, humanity is already able to witness their influence (Kuzminska 2019, 148-170).

The people are experiencing the digital economy advent, the basic elements of which are electronic business operations, and a boost of the relevant infrastructure and e-commerce. That is why digital transformation allowing to launch new business models based on networking effects are in the focus of attention both of the educators and practitioners (Kaminskyi et al. 2018, 128-137). **All around the world** virtual reality and personalized learning powered by artificial intelligence are already employed to provide

a better quality of the training experiences for the students. It is estimated that the global edtech market will reach 93.76 billion USD by 2020 (Ayers 2019). Similarly, blockchain is expected not transform industries and education.

Ukrainian educational institutions are involved in the global processes of digitalization and work on engaging the up-to-date trends into their activities, as do American universities. Many universities shift towards ICT use in their educational electronic resources, distance courses and technical devices used for learning. This, of course, changes the grounds of the educational process organization and maintenance. (Buhajchuk 2016) According to the study of Blayone et al. (2018) large percentages of Georgian and Ukrainian students are ill-prepared for many online-learning activities in technical, communicational, informational and computational dimensions (Blayone et al. 2018). Consequently, the modern education system experiences difficulties in merging the various technical solutions with the existing system elements and the educational agenda that has been practiced for years. Using the concept of a convergent cloud-oriented platform, some Ukrainian authors offer the universities to create a space for the digital interaction which would involve the entire education system (Kaminskyi et al. 2018, 128-137). However, while in Ukraine it is only the idea, leading American universities are already there: MIT is a leader in a blockchain-based open standard for verifiable digital records (Director's Fellows program, 2015 for the first time) (Raths 2016); Central New Mexico Community College began issuing "student-owned digital credentials" on a blockchain platform; the City College of New York is assessing bitcoin as a method of payment (Kevin 2019).

Another interesting experience was introduced by the University of Nicosia (Cyprus), a pioneer of the full-scale blockchain implementation in the educational sphere, which has already launched a blockchain library for storing students' grades, diplomas and certificates. The students of this private institution are also able to pay school fees using bitcoin (Universa 2018). Russian platform "Disciplina" was the first to engage the blockchain technology solely for education and recruiting purposes by launching the "TeachMePlease" application. Another blockchain platform "Opet Foundation's" chatbot app was designed to help students with test preparations by answering questions and recommending resources. The track of a student progress will be kept via the blockchain (Kaminskyi et al. 2018, 128-137).

The analysis of all the existing experiences and efforts of introducing the blockchain technologies into the daily life of the humanity, makes it important for all the stakeholders, including the educators, to reflect on all possible implications the blockchain might have. The more it is considered for the daily use, the more areas of application arise from tracking student's/worker's absences to managing homework/tasks deadlines. It can also be useful if a university or an organization are paralyzed by a crisis situation, for example, war, when the blockchain will save the documents kept in conflict zones (Aashish, Sharma 2018).

Nevertheless, the potential impact of the blockchain on academia and the rest of the organizations goes far beyond cryptocurrency and immediate solving the problems. This technology is able to improve the learning quality and provide the increased support and opportunities for teachers, parents and other stakeholders. Some authors notice that the higher education system has been evolving into a distributed model for certain period of time already: the colleges and universities combine their resources for the sake of better effect. For example, there is an Internet 2 Net+ Initiative that provides a range of application, computing and other cloud-based services which may use the blockchain's peer-to-peer transaction-based model. Blockchain could be used in moderating digital content and protecting digital rights, as well as in the evolution of "community content repositories" (the inspiring example of San Jose State University which is a leader in the Library 2.0 movement) (Kevin 2019).

There are also other areas of the emerging digital technologies use: blockchains in healthcare reduce the impact of cybercrime and raise the data security; Sony Global Education designed a centralized modern ledger powered by the blockchain for storing education records and enables data from various education institutions to amalgam together; Bitdegree is the world's first blockchain-powered online education platform with token scholarships and blockchain-based achievement tracking (Soluloid 2018).

According to the "digital skills" index of the European digital economy and society index in 2017 44% of the EU population lacks skills in using digital technologies, while they are recognized to be one of the eight key competencies for a fully successful life nowadays (Digital-agenda data 2005). As a logical conclusion, **the blockchain must be among the emerging technology skills** that will be expected by the employers from the future graduates in the coming years. There are the classes that train the programming skills, but the blockchain technology became a unique educational challenge as it is at the intersection of such areas as: business, commerce and transactions, technology and artificial intelligence, policy and law, intellectual property rights and cryptography. That is why teaching the blockchain requires a certain interdisciplinary approach. There are already such educational programmes and environments that combine several of the mentioned areas, such as the programmes offered by the Berkeley Centre for Law and Business or Cornell Blockchain. They aim at the development of the blockchain skills and growing projects (Kevin 2019).

The blockchain and smart contracts potential is clearly seen in helping to run businesses, exchange goods and services, buy real estate, collect and analyse data, issue educational credentials. Smart Contracts, as the self-executing digital deals, are already essential to any business using the blockchain because they help to reduce costs and increase the security avoiding the need for third-party intervention. (Blockchain App Factory 2018) KnowledgeWorks investigated how blockchain and smart-contract technologies could improve learning, its conditions and personalized learning in the United States. The project was aimed at

developing the capacities to design and sustain vibrant learning ecosystems via engaging the learners into exploration of emerging technologies abilities (King, et al., 2018). An interesting experience of the use of blockchains is to connect the labour supply and demand in specific settings such as in refugee camps is offered by the Karvan project. It is aimed at connecting the refugee-centred NGOs with refugees who can provide special skills or camp members with other inhabitants, as well as fix the volunteers' time invested in working with refugees (Ivancsics 2019).

A "Learning is Earning 2026" platform uses a basic curriculum model with a fragmentation of the program in small blocks that the students complete according to their needs and skills. Then passing of each unit is translated into a smart contract that is supposed to be resolved when the student has reached a satisfactory level (Bartolomé et al. 2017). However, online studies have different features then face-to face education and the approach to setting the educational scheme with the use of interactive methods and gamification is still an obligatory step. This requires certain principles, such as: clear information, relevant practice, informative feedback, motivation and balance between the task difficulty and the level of the student (Lyashchenko, Hryshunina, Pichkur 2018).

Competency-based approach in the modern higher education drives to the need to improve the productivity, knowledge, skills and other personal qualities via practice-oriented methods. That is why the way to explain the blockchain technology via a game that allows experiencing the whole philosophy of the blockchain is expected to be the most effective. Most people do not know about the term "blockchain", not to mention the potential applications of using blockchain technology. Although a lot of developers and practitioners, as well as researchers discuss the usage of blockchain in the current commercial area, there is a few studies focused on how to teach the blockchain technology in the most effective way. **The current research goal** was to analyse the experiences of the emerging technologies introduction to the educational process via the interactive methods using the feedback of the students from two countries: the USA and Ukraine.

Under the pressure of modern business speed and trends, forward-thinking companies struggle with tackling with blockchain solutions in order to use their potential to improve own business results. The blockchain is able to drive innovative mobility services, ensure data stewardship and the accuracy of public records, maintain the supply chain traceability, secure voting and secure the financial transactions. (IBM Blockchain 2018) According to the "Development Strategy of the Innovative Activities Field up to 2030" determined by the Cabinet of Ministers of Ukraine (Strategy for development of the sphere of innovative activity for the period till 2030, 2019) it is expected to stimulate the increase in the use of ICT, commercialization of the innovative solutions and increase of the profits coming from the intellectual

property rights use. In order to achieve this more citizens, we need to understand blockchain technology and its potential.

The Methods Used to Analyse the Experiences of Teaching the Blockchain

As one of the blockchain games researchers, Dave Their, stated: "There's blockchain, and there's gaming". Blockchain has become more of the economy element rather than just bits of code with pseudo-physical presence, it has created the next level of the Web which is "the Internet of Value". For example, the Horizon Blockchain Games Inc. offers its players to own and trade their digital items across an Internet and is currently building an Arcadeum platform for the developers to work on their own blockchain-based games. (Their 2019) Not all of the game companies fully see the potential of cryptocurrency and blockchain that gives a chance to those start-ups working on the intersection of games and the new technology to develop faster and more successfully. Brock Pierce, a chairman of the Bitcoin Foundation, who once was one of the first blockchain investors, became a No. 9 in cryptocurrency wealth within the Forbes rates (VB 2019).

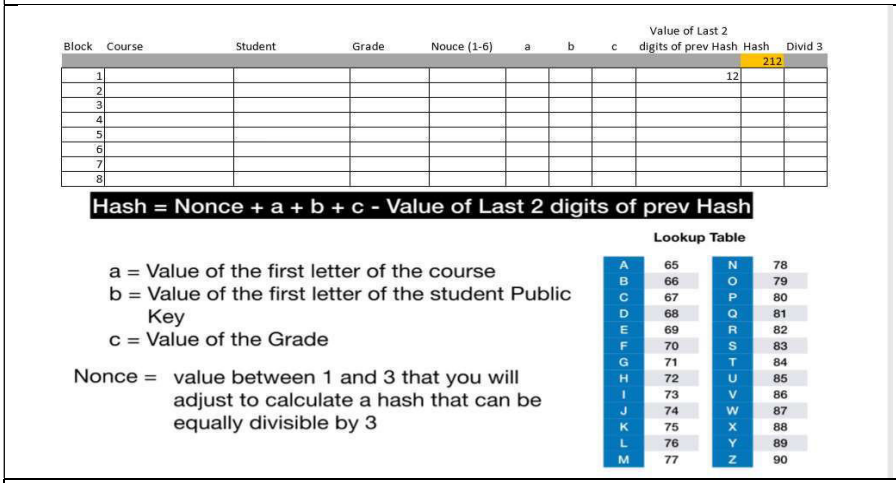
Both for teaching and for developing gaming systems, however, it is important to design a proper set of mind. The Blockchain Game Alliance is committed to promoting blockchain within the modern game industry. They work on dissemination of awareness about blockchain technologies and encourage to foster new ways to create something else around games (BGA 2018). There is also another game that can help to understand the underlying essence of the blockchain-based game we are going to analyse in this paper. The Beer Game (https://beergame.org/) demonstrates the difficulties of managing the dynamic systems. It comes from the late 1950s, MIT, the USA, and introduces the concepts of dynamical systems where different playing strategies may be applied (Grasl 2015).

The Blockchain Game was designed by a teaching professor and technologist J Scott Christianson, Trulaske College of Business of the University of Missouri, USA, for teaching blockchain technology without the use of computers. During the activity the students simulate the computer work and calculate the blocks themselves. They are divided into nodes and miners on a blockchain network which pretends to store some random university students' grades. A group of volunteers are chosen to be the "faculty members" and a separate group are chosen to act as "students", who are given an ID number – called a public key – to access their grades during the exercise. Each public key is one-half of a key pair that includes a private key. The participants record the grade and course data and then they build the block by calculating a hash which secures the grade ledger. The special nodes called miners both validate and execute the transactions on the blockchain and as a result of the simulation the miners find out which answer is accepted by the network to become the right one. The first student to solve the puzzle earns a reward for hashing that block. Hashing within this simulation is the process of solving a complex mathematical puzzle to validate and append new blocks to the blockchain. This gives the students a hands-on experience on dealing with the blockchain system elements (hashes, private keys, etc). A group discussion is supposed to follow the game raising the

topic of the other possible blockchain applications and whether storing student grades is a good use of blockchain technology. The game doesn't use any computers because the participants simulate them. The Blockchain Game is available in English and German translations, and Mr. Christianson has made all of the exercise materials available for free for this he encourages educators/trainers to send their feedback (Fadilpasic 2019, Grimes 2019).

At the personal web-site the author has made all the game materials public (Christianson 2019 b), the slide deck that may be used to lead the audience through the exercise, Apple Keynote and MS PowerPoint versions are provided; game printouts; a MS Excel file with a blockchain ledger that has already been calculated along with a blank ledger (see Picture 1).

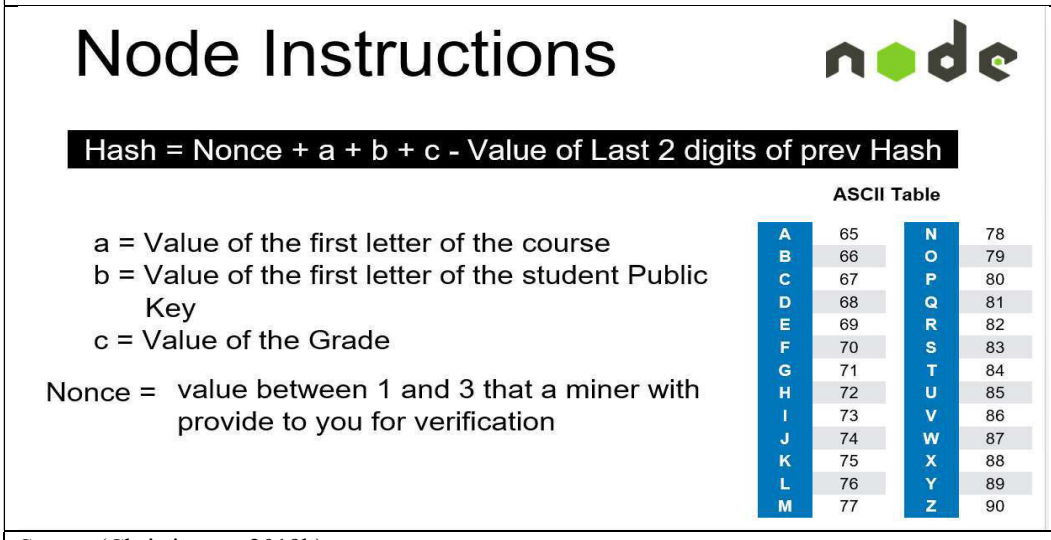
PICTURE 1. NODE INSTRUCTIONS PAGE



Souce: (Christianson 2019b)

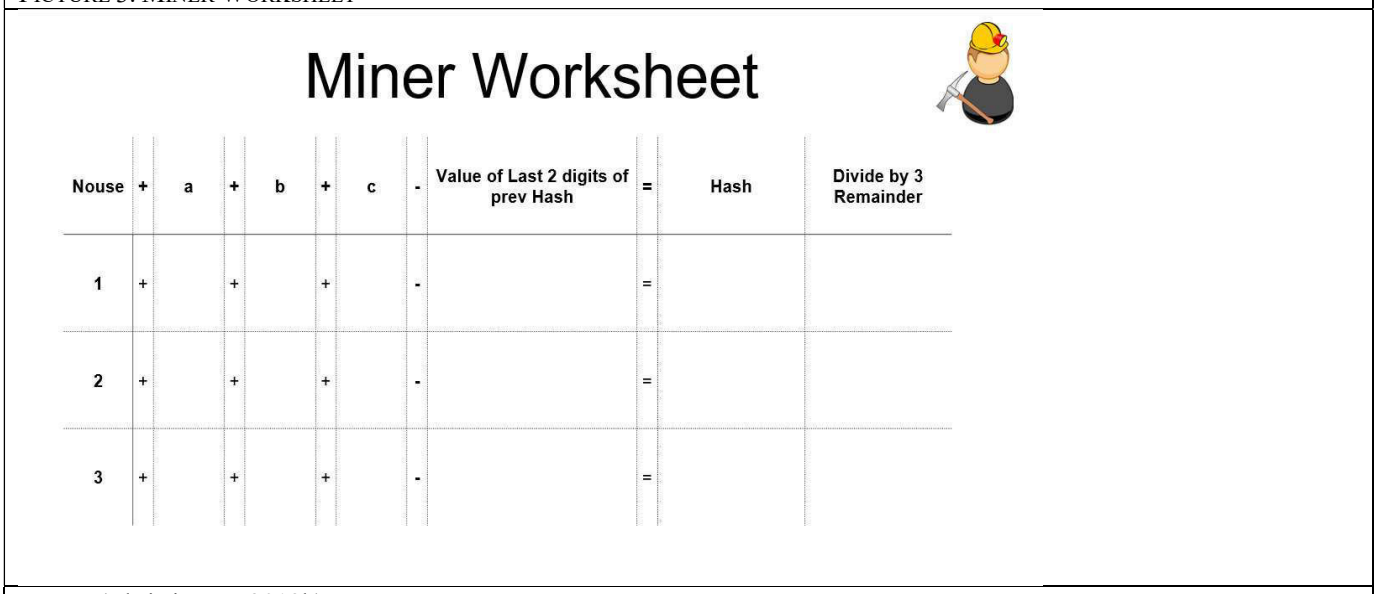
An attendee handout that allows those who are not miners or nodes to follow along and understand better what is happening. Teaching materials needed are simple as well: pencils, student key pair sheets, "node packets" (node instruction sheet (see Picture 2), blank grade ledger), "Miner Packets" (miner instruction sheet, blank grade ledger, Miner Worksheet (see Picture 3), Prizes for Miners).

PICTURE 2. NODE INSTRUCTIONS PAGE



Souce: (Christianson 2019b)

PICTURE 3. MINER WORKSHEET



Souce: (Christianson 2019b)

To analyse the results of this game implementation into the educational process of three higher educational institutions, the authors have designed the survey which was applied before and after the game conduction and then applied the analytically descriptive methodology. Thus, the research analyses the real-life cases of the game conduction in Ukraine and the USA. It is supported by a bibliographic review and concluding arguments to use the interactive game for the development of the competences in the blockchain technology.

Analysing The International Experiences of Blockchain Introduction into the Learning Process

Nowadays, some universities and institutes have already applied blockchain technology into education either as a helping tool or as a part of the educational programme, but most of them use it to support academic degree management and summative evaluation for learning outcomes (Sharples and Domingue 2016). Distributed ledger technology promises transparent, secure applications that can be accessed by students, employees and employers to verify educational records independent of provider or location (Walsh 2019). If the blockchain is taught, then it would be the ICT-related specialty while business- and management-oriented specialties do need the comprehensive understanding of the technology as well. The criticism of the blockchain technology potential to transform the education implies reducing education to evaluation, and the evaluation to the simple certification of competencies (Bartolomé et al. 2019).

Namely this kind of argument motivated Mr. J Scott Christianson, as an educator, to search for the ways to teach students about blockchain technology without overwhelming them with loads of technical details. He was also challenged to design a hands-on exercise that could be applied to any group of students from high school students to adults (Christianson 2019a). This game is also aimed at launching the discussion of blockchain's real-world applications among the students of different academic backgrounds (Christianson

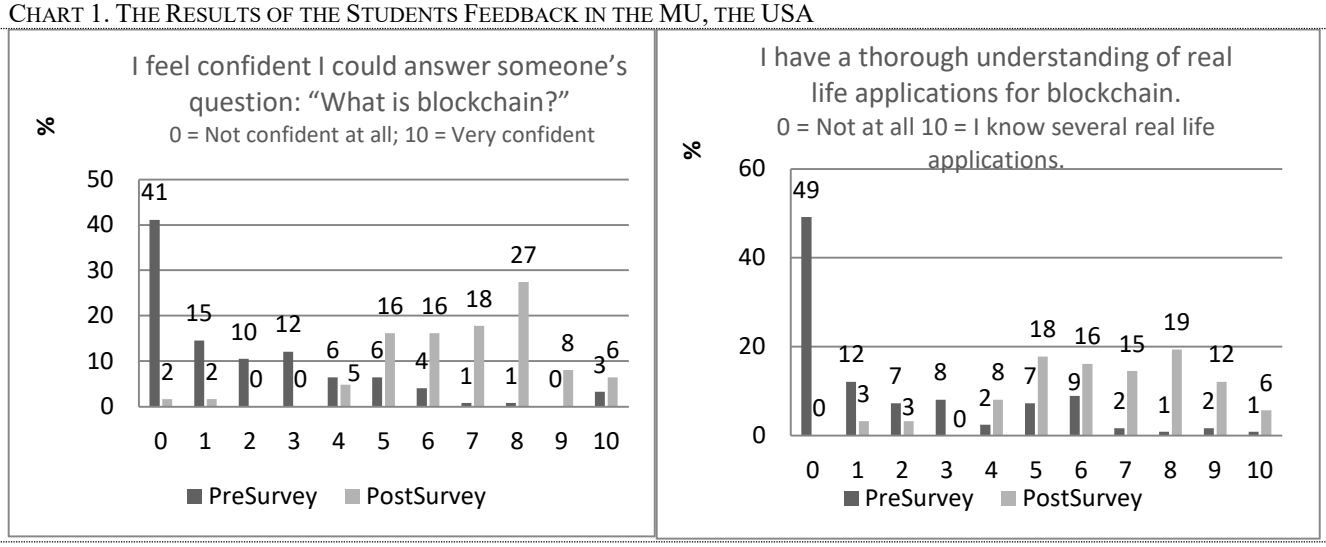
2019a). This inexpensive, no-computer, exercise has been used in Higher Education and Professional Organizations in the US, Germany and Ukraine.

The survey which was designed to analyse the effectiveness of the interactive and gamification approaches via a set of questions asked before the start of the game and after its end. The questions were the following:

1. I feel confident I could answer someone's question: "What is blockchain?"
2. I have a thorough understanding of real life applications for blockchain.
3. Information stored in a blockchain can be modified later.
4. Blockchain prevents fraudulent changes to the ledger from occurring.
5. Which of the following describes the blockchain ledger?
6. A central authority ensures the validity of blockchain transactions.
7. Only certain individuals on the blockchain can see the transactions occurring.
8. If a private key is lost, it can be retrieved from the central server.

As it could be logically expected the trend of the answers were the same for each question, for example, here is an example of the survey results for the two key questions. Chart 1 presents the results obtained at the American university:

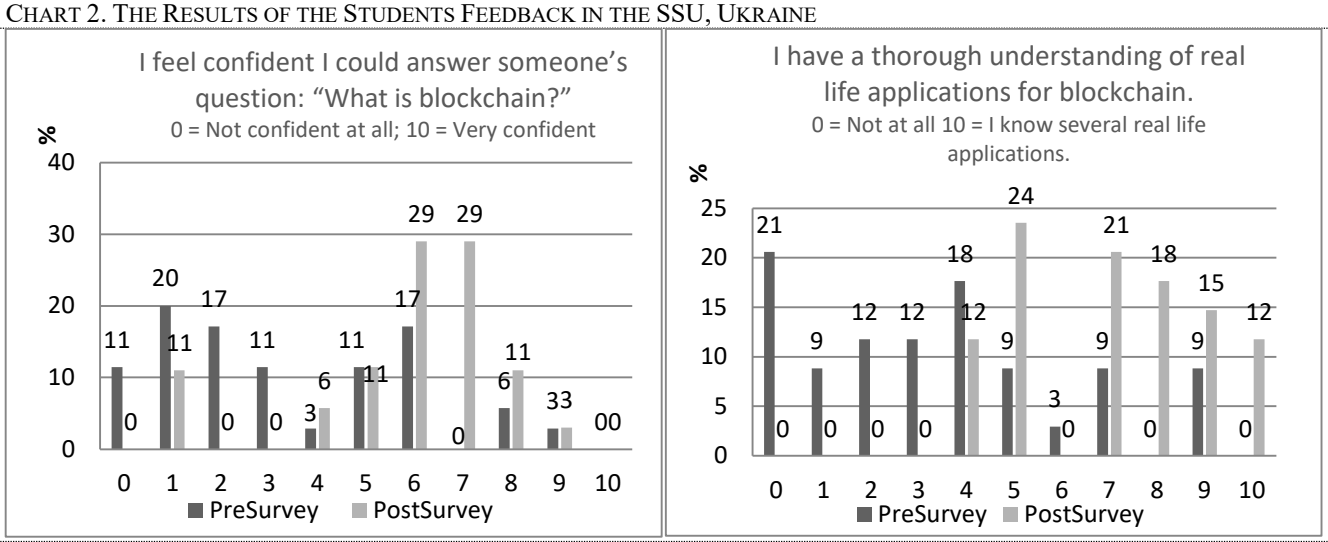
CHART 1. THE RESULTS OF THE STUDENTS FEEDBACK IN THE MU, THE USA



Source: Own.

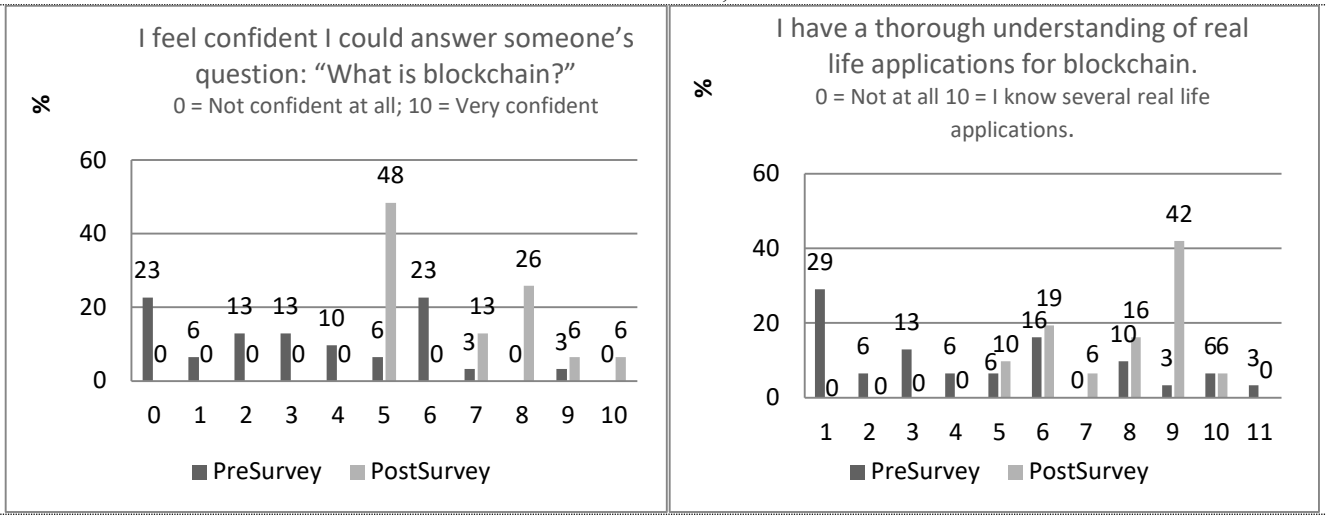
Chart 2 and 3 present the results obtained at two Ukrainian universities:

CHART 2. THE RESULTS OF THE STUDENTS FEEDBACK IN THE SSU, UKRAINE



Source: Own.

CHART 3 THE RESULTS OF THE STUDENTS FEEDBACK IN THE SNAU, UKRAINE



Source: Own.

The results analysis states that at least 10% of the respondents didn't know the answer on a certain question before the game (the share raises up to 60% for some questions which requires specific knowledge background about the game) and at least 3-6% of the respondents improved their knowledge after the game (the share raises up to 50% for some questions).

As an experiment shows, the absence of the interaction during the game and discussions afterwards decreases the percentage of the students that have improved their knowledge about the blockchain, as well as its philosophy and possible implications. During the game and during the discussion afterward the most frequently asked questions were:

1. What is the difference between blockchain and bitcoin?
2. What if a private key is lost?
3. Is it really a good idea to store grades on a blockchain?
4. How do you determine what is a good application for blockchain?

5. How can people hack a blockchain?
6. How would this be used in [accounting, supply chain, finance]?
7. Is bitcoin worth anything?

The main conclusion after the game practicing is that, for the blockchain to make a significant impact on the society life with all the potential it has, grassroots-level change in its understanding is definitely required, as well as collaboration from all the stakeholders: from educators to practitioners.

Conclusion

According to one of the whitepapers of the Cognizant, an American multinational corporation that provides IT services, the current adoption rates of the blockchain will continue to increase and that is why the blockchain's learning and implementation raises comprehensive technological, operating and business modelling issues. It also demands collaboration of the different parties to experiment and deploy the philosophy of the distributed ledger technology (Cognizant 20-20 Insights 2019). To conclude our research, we note that active learning methods modify the role of the teacher from the translator of the information to the organizer and coordinator of the educational process, which makes it possible to form complex competences via the students' direct engagement in the hands-on practices like our game. The experiment results demonstrate that both in the USA and in Ukraine from 3 to 50% of the game participants benefited from the experience. In addition, there were no cross-cultural differences identified during the experiment that could have affected the efficacy of such a simulation. The main challenges for teaching about the blockchain were caused by the low computer literacy, absence of skills in personal adoption of the newest technologies, combined with low availability in the previous educational. This was discovered mostly during the group discussions and personal feedback of the game participants.

It should be noted that the game is not limited to the presented core concepts and is open for any useful modification and a wise expansion to other concepts like smart contracts, supply chain, etc. Due to the relevant changes of the teachers, the students can learn about anonymity, decentralization, and immutability of the shared ledger (blockchain). The potential of the game may be increased in order to discover the blockchain implications as a system of centralized data logging to a distributed system that ensures the maintenance of privacy.

However, the game designer willing to unveil the blockchain full potential must remember that the major challenges lay with the difficulties of its not easy and immediate implementation because of the social, technological and economic reasons, as well as challenges in areas of functionality, privacy, transparency, and possibly the changes which are not always desirable. The main aim of gamification to foster human motivation and performance towards a certain activity (Sailer 2017) – blockchain in our case, was achieved. At least 30% of the game participants in both examined countries - Ukraine and the USA – expressed their motivation to learn more and work over the possible application of the blockchain in their future professional

activities. The number of researchers and practitioners already conduct the investigations on how the blockchain technologies impacts on the currently existing business models (Morkunas, Paschen, Boon 2019) (Angelisa, Ribeiro da Silva 2019).

There are several drawbacks to this exercise, as there are with all instructor lead activities. First, it relies on the instructor making no mistakes when giving directions to the students or walking them through the exercise. If the wrong directions are made, it can be very difficult to get the group back on track. As such some practice sessions are recommended. If students don't have a basic understanding of a standard ledger, it can also be very difficult for them to understand the significant differences between a central and distributed ledger.

A growing interest in the technology demands the necessity to open critical minds combined with the personalized learning and caring educators. Current technologies vision and the cultural mindsets may shift in the future to a different direction and because of these uncertainties about the potential impact of smart transactional models on education and business demands from the educators a more comprehensive teaching approach. It is not enough to teach about the blockchain, it is necessary to set a proper understanding of the philosophy how to apply alike technological solutions. This will help the students to be ready for the major social and technological shifts that may come in the nearest future of the human development.

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STUDENTS' PERCEPTIONS OF ONLINE TOOLS IN THE TRANSITION TO BLENDED LEARNING

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Key words: online tools, blended learning, learning management system, student engagement, formative assessment

Abstract: Online and/or blended methods of course delivery are gaining more popularity in almost all academic areas in higher education today. Rapid advances in information and computer technology have led to the development of an extensive range of choices for online tools. Consideration of the course academic area and the learner characteristics of such a course may jointly influence the choice of the mix of online tools that will best facilitate learning and promote continuous learner engagement with course material in the planned delivery mode. This paper describes a preliminary comparative study on undergraduate student perceptions of the online tools made available through the institutional learning management system in a Science course and a Statistics course. Initial results from the piloted participants include indications of positive engagement of science learners with online quizzes, blogs, discussion boards and flipped classroom activities and of statistics learners with online instructor PowerPoint lectures, online formative problem assignments and the online e-book. The instructors' perspective on the aim of the online tools used, their effectiveness and challenges in relation to student learning and student engagement is also presented. Future study will look into extending the work to include other courses and obtain empirical support for the development of a framework to use as best practice guideline in the choice of online tools to transition to blended and/or online courses in these academic areas.

Introduction

In the era of information and communication technologies (ICTs) and of globalization, the learning environment in higher education changes. A shift towards more integrated and interdisciplinary curricula, more technology-enhanced learning, and an overall higher emphasis on active learning approaches are some of the developments in higher education that will better prepare graduates to address contemporary global challenges and enter the job market. Active learning, a student-centred teaching approach, at which learners "do things and reflect on what they are doing" (Bonwell and Eison 1991) helps students engage with course material, become autonomous and independent learners and develop better "ownership" of knowledge. Active learning empowers students, helping them "challenge and resist knowledge as given" (Berry 1998) and develop higher order critical thinking skills.

Fast developments in ICTs have facilitated the integration of technology in teaching; nowadays all higher education courses use some ICTs, usually delivered through institutional learning management systems (LMS). ICTs have enabled the transition from face-to-face to blended and to fully online learning, with the last two methods of course delivery gaining more popularity in almost all academic areas in higher education today. Benefits of online learning include career advancement, flexibility in schedules, lower cost, requirement for more self-discipline and responsibility from students, a bigger choice of course topics, effectiveness and lower environmental impact. On the other side, online learning lacks the direct interaction with instructor and classmates, may over-rely on computerized tests that focus more on knowledge acquisition than on critical thinking and raises issues of authenticity of student work.

In designing learning activities using online tools in a face-to-face or blended course, instructors must act as more than just "content experts". They should be in a position to combine content knowledge of a specific subject with knowledge of pedagogy and technology, thus demonstrating pedagogical

technological content knowledge (TPACK) (Koehler and Mishra 2009). It is essential that instructors understand the dynamic relationship between these three components of knowledge for any technology integration project to be effective.

The infusion of web-based technologies into the teaching and learning practice creates new opportunities for active learning, as students are asked to interact with their instructors, peers and course content in different ways. The principles of effective teaching described by Chickering and Gamson (1987) have been re-evaluated and lessons have been learned for online learning (Graham et al. 2001). Blended and online learning require a "rethinking" of the educational experience. The principles and practical implications of blended learning in higher education have been discussed, with a focus on the Community of Inquiry (CoI) framework (Garrison 2011; Vaughan, Garrison and Cleveland-Innes 2013). Communities of Inquiry are based on multiple student-student interactions (Lipman 2003, 20) and are facilitated by the use of online tools. In blended and online learning, instructors are asked to reflect more deeply on issues of pedagogy, content and resources; some of them may take the opportunity to change key elements of instructional design such as the learning environment, learning activities and assessment methods (Robertson, Barber and Muirhead 2018).

Online tools delivered through learning management systems are of different types: some are based on delivering online course content (e.g. lecture notes, readings, e-books, web resources), and some aim to stimulate student-student and student-instructor interaction often also providing opportunities for critical reflection (e.g. discussion boards, blogs, reflection journals); some act as formative or summative assessments (e.g. online quizzes and assignments), with feedback on performance (from the instructor or automatic). A major challenge for instructors, is how to maximize student engagement with these tools, especially if the activities do not contribute to the student's grade.

How do students perceive different teaching practices, and more specifically the use of online tools as a way to increase learning effectiveness and improve performance? Numerous studies on student perceptions of active learning and of the use of online tools have been conducted (Chong, Puteh and Goh 2015, Patrick, Howell and Wischusen 2016). Martin and Bolliger (2018) have studied student perceptions on the importance of engagement strategies in online learning. They discuss three types of interactions: learner-to-content, learner-to-learner and learner-to-instructor (classification based on Moore 1993); engagement strategies related to learner-instructor interactions are perceived as most valuable.

This study focuses on STEM disciplines and more specifically on environmental science and statistics. Active learning has been shown to increase learning effectiveness and improve student attitudes in STEM disciplines (Prince 2004; Freeman et al. 2014). More specifically, Patrick, Howell and Wischusen (2016) reported that perception of students and faculty about type of active learning engagement techniques

differs among STEM disciplines; they cited survey work (Smith et al. 2014) showing that in STEM there is not a dichotomy of "strictly lecture" and "strictly active learning" faculty but rather there is a continuum between these extremes. Hence the motivation of this study is to explore if a similar pattern can be inferred to extend to student perception of the online tools used as vehicles of independent and/or collective active engagement within the diverse STEM disciplines.

At the Department of Science and Mathematics in our institution, faculty are growing in their use of various student engagement, active learning techniques. More particularly, the authors of this article have conducted previous studies on student and instructor perceptions of different active learning practices from which lessons can be learnt on effective teaching practices, their challenges and benefits (Misseyanni, et al. 2016, Misseyanni and Gastardo 2017; Misseyanni, et al. 2017; Gastardo 2018; Misseyanni et al. 2018; Misseyanni, Papadopoulou and Marouli 2018). Further, there is strong encouragement to design blended courses, especially in the sciences. Whereas, faculty research work has documented efforts to enhance student learning through active learning techniques, there is to date no documented work specifically on student perception of online course tools implemented as learning support via the LMS for face-to-face classes. The goals of this study are: 1. to explore and understand student perception of the variety of online tools used by STEM instructors; and 2. to determine whether student perceptions of online tools differ across different STEM disciplines. Results of this study could guide the selection of the best mix of online tools effective for specific STEM discipline courses considered for possible future redesign as blended and/or fully online courses.

Methods

Context of the Study

This pilot study explores undergraduate students' perception of online tools on the Blackboard Learn (BL-LMS) of an Environmental Science (ES) course with a lab component and an Applied Statistics (AS) course with a recitation component. During the Spring Semester 2019 when the study was conducted, class sizes of these courses were 22 and 15, respectively. Both courses are face-to-face lecture courses enhanced by the online tools made available on BL-LMS.

Survey Instruments and Participants

Data on student perceptions were collected at the end of the semester using instructor-developed, discipline–specific, pen-and-paper questionnaires consisting of Likert scale items on a 5-point scale (1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree) and open-ended, free-response questions. The number of participants in the pilot survey was 15 for the ES course and 7 for the AS course. No demographic information was recorded, so as to preserve the participants' anonymity. Completion time of the survey was 5-10 minutes.

Data Analysis

Descriptive statistics were obtained on Likert items from each course questionnaire that specifically addressed an online tool provided in the course. The following 2 categories were defined in relation to the learning outcome served, helped or enhanced by use of the online tool: 1. CK – concept-building/knowledge-generating online tools and 2. AP – assessment preparation/performance improvement online tools. Comparison of responses of ES students and AS students on these categories was conducted.

The 5 Likert rating scale responses were transformed into binary response of either 0 (when Likert rating was no more than 3) or 1(when Likert rating was greater than 3), in order to facilitate a comparison of the percentages of students, in the 2 discipline-specific courses, who showed positive perception of an online tool as useful and effective for learning in the STEM course taken.

Learner activity data tracked on the BL-LMS sites of the two courses were accessed to obtain summary descriptive statistics of course usage of the online tools made available during the time period from the first to the last day of the Spring semester 2019.

Responses to open-ended questions pertaining to the instructor-provided online tools were summarized and described for each STEM course.

Results

The online tools provided by instructors in Science and Statistics were different, reflecting the different nature of the courses and instructors' perceptions of the usefulness of different tools. As stated in the data analysis, tools were classified based on the different learning outcomes/goals of the course; some were used mainly for concept building and knowledge generation (CK), while some aimed to prepare students for assessments and improve student performance (AP). In the environmental science course, an important course goal is that students develop critical thinking, reflect on their actions and interact with other students on contemporary environmental issues, thus interactive tools to achieve such goals were also included. Another way to classify the tools used in this study is based on learner-content, learner-learner and learner-instructor interactions (Moore 1993). Learner-content interactions included lecture notes, e-textbook, online quizzes, formative problems, problems with solutions, and other resources available through the LMS. Learner-learner interactions used were discussion boards, blogs and group discussion boards. Learner-instructor interactions included a reflection journal, discussion boards, blogs, and online feedback on coursework. Since the courses run as a regular face-to-face courses, they had an important in-class component, with emphasis on active learning methods; these included interactive lectures, lab and field activities, group work, and a flipped classroom activity for the ES course; interactive lectures and in-class problem solving in the AS course. The open-ended questions aimed to assess students' overall experience from the course.

As shown in Table 1A and Table 2A, the pilot study respondents showed positive perceptions of the use of instructor-provided online tools for supporting learning in the specific STEM course.

TABLE 1A. DESCRIPTIVE STATISTICS FOR LIKERT ITEMS ON STUDENT PERCEPTION OF ONLINE TOOLS IN ES COURSE (N=15)

	Onln quiz Learning	Disc brd concepts	flipped Class	Grp disc brd	Onln quiz Exm perf	Onln Feedbk	Disc brd actions	Blog	Jrnl Rflctn
Mean	4.33	4.2	3.73	3.33	4.07	4.27	4.4	4.07	3.5
SD	0.82	0.86	1.16	1.05	0.96	0.88	0.83	0.92	0.85
Median	4	4	4	4	4	4	5	4	3
Mode	4	5	4	4	5	5	5	4	3
Source: Own									

TABLE 1B. DESCRIPTIVE STATISTICS FOR LIKERT ITEMS ON STUDENT PERCEPTION OF ONLINE TOOLS IN AS COURSE (N=7)

	Onln crse Pkt	Onln Eboo	Onln frmtv Prblms	Onln lect Powerpt	Onln EXCEL	Onln sol Frmtvprbl	Bb Ancmnts
Mean	4	3.6	3.9	4	4.1	4	3.9
SD	1.15	0.98	0.69	1.15	0.69	1.41	1.21
Median	4	3	4	4	4	4	4
Mode	5	3	4	5	4	5	5
Source: Own							

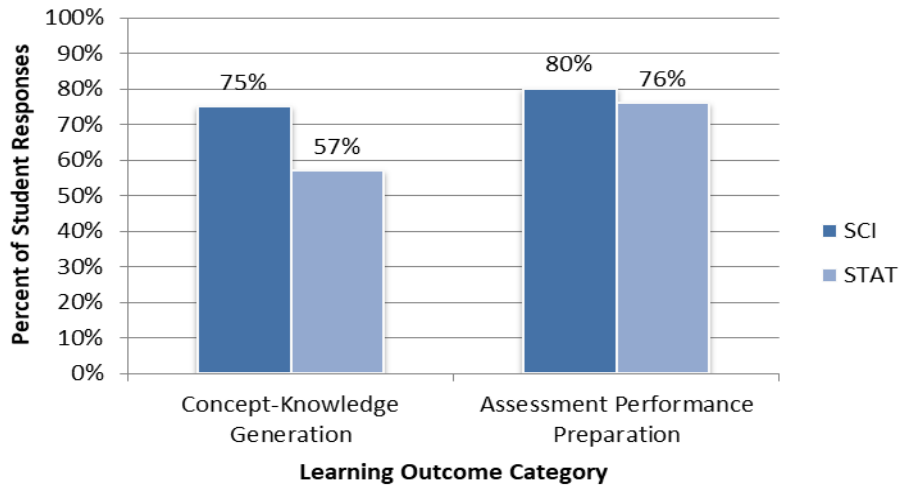
Mean ratings were higher than 4 for most of the ES online tools assessed, with the exception of the group discussion board, the reflection journal and the flipped class which however were all rated over 3. Both the median and the mode values for nine of the ten Likert items in the ES questionnaire were either 4 or 5; only the reflection journal showed median and mode of 3. These results collectively indicate that students in the ES course agreed or strongly agreed that use of online quizzes for concept learning and for exams, online discussion boards conducted in class for understanding of concepts and for critical reflection on actions, and online instructor feedback are effective at supporting learning, whereas they only showed a lower tendency to agree that group discussion board, the reflection journal and the flipped class are effective. Use of the online journal was not perceived in the same light as the other online tools.

Results on the AS course questionnaire showed mean ratings of 4 or 3.9 for all instructor-provided online tools, with the exception of the online e-book, which received mean rating of 3.6. The median and mode were either 4 or 5 for all online tools provided, with exception again of the online e-book for which the median and the mode were both 3. The latter statistic indicates that AS students may not have successfully utilized nor recognized the added features in the e-book as a learning support. Overall however, the summary statistics measures are indicative of a general tendency of positive student perception of the online tools provided in the Statistics course. AS students indicated that the most useful and effective for learning in this course were the availability of the course information packet, the PowerPoint lecture slides, the solutions of the formative problems and the Blackboard announcements, followed by the available link to EXCEL resources for solving application problems and the available formative word problem applications provided online as student self-diagnostic preparation for assessments.

Categorization of Likert items in relation to the learning outcome served, helped or enhanced by use of an online tool led to the definition of discipline-specific groups. The concept-building/knowledge-generating online tools assessed in the ES course, coded as SCI_CK, were the online quizzes for learning, the online discussion board on concept understanding (ecological footprint), the flipped classroom activity and the group discussion boards, whereas the assessment preparation/performance improvement online tools, coded as SCI_AP, were the online quizzes and the online feedback of the instructor to coursework (lab reports). The concept-building/knowledge-generating online tools for the AS course, coded as STAT_CK, were the online e-book and the online instructor-developed PowerPoint lecture slides, whereas the assessment preparation/ performance improvement online tools, coded as STAT_AP, were the formative word problem applications provided online after every major topic and supplemented further prior to exam dates intended as self-diagnostic preparation for summative assessments, and the detailed online solutions of formative problems made available after a set time period had elapsed since posting of the formative problems, in order to motivate initial independent engagement with the applications.

Comparison of responses of ES students and AS students on the categorizations based on learning outcomes indicate overall that a greater percentage of ES students than AS students either agreed or strongly agreed on the usefulness of CK and AP online tools, as shown on Figure 1.

FIGURE 1. PERCENTAGE OF STUDENTS WHO AGREED OR STRONGLY AGREED THAT ONLINE TOOL CATEGORY IS USEFUL FOR EARNING

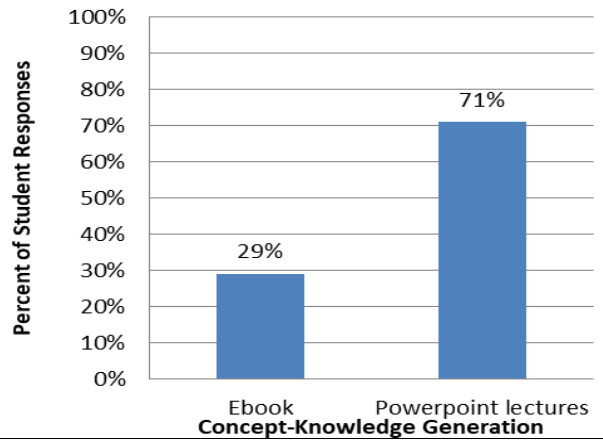


Source: Own

The pilot study indicated similar student positive perception in the Science and Statistics courses of AP online tools (ES-80%, AS-76%), but reflected marked difference on level of perception of CK online tools (ES-75%, AS-57%). Closer examination traced the latter difference to the Statistics course where 71% of AS students showed neutral response and only 29% strongly agreed to e-book usefulness. This large percentage of neutral response is explainable in part as given by students who did not access the online e-book for daily work, as suggested by the BL-LMS low access of online e-book.

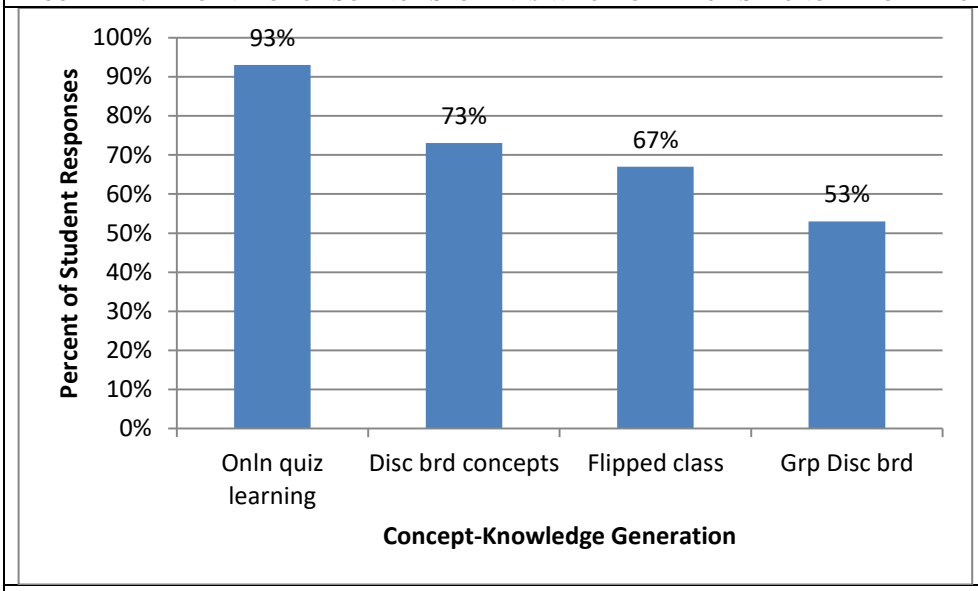
Percentage of students who agreed or strongly agreed on the usefulness of instructor-provided concept-building/knowledge-generating online tools provided in the Statistics course (STAT_CK) are compared with those provided in the Science course (SCI_CK).

FIGURE 2A. PERCENTAGE OF STATISTICS STUDENTS WHO AGREED OR STRONGLY AGREED ON USEFULNESS OF ONLINE CK TOOLS



Source: Own

FIGURE 2B. PERCENTAGE OF SCIENCE STUDENTS WHO AGREED OR STRONGLY AGREED ON USEFULNESS OF ONLINE CK TOOLS

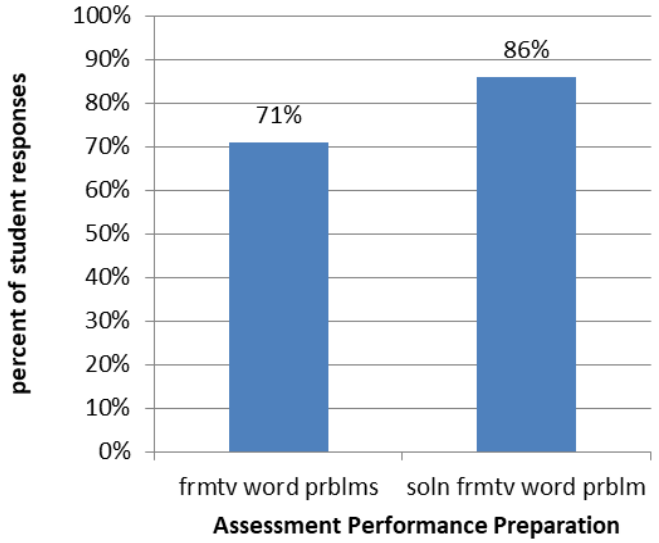


Source: Own

Figure 2A shows that 71% of Statistics students perceived the self-created PowerPoint lecture slides as most useful to learning in the course while only 29% consider the online e-book useful. Student perceptions of the four instructor-provided CK tools in the Science course are shown in Figure 2B, indicating that the online quizzes for concept learning were deemed useful by 93% of students, the discussion board concepts by 73 %, the flipped class by 67% and the group discussion board was rated useful by 53% of ES students.

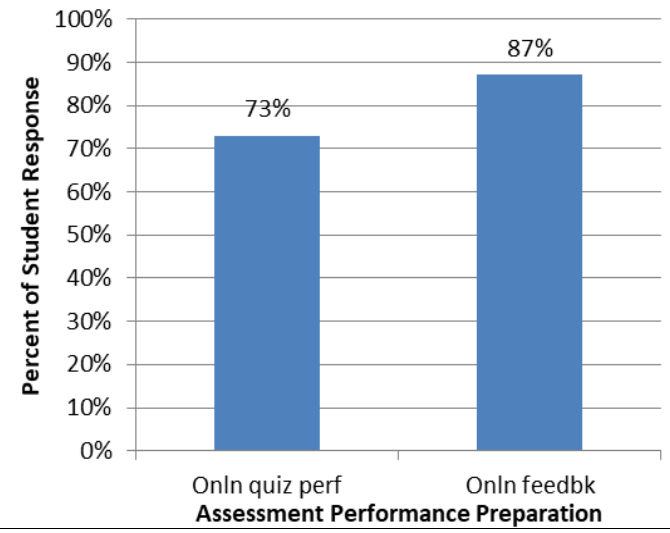
Perception of students in the Statistics and the Science courses were also compared with respect to the assessment preparation/performance improvement online tools (AP) provided by instructors (that is, STAT_AP compared with SCI_AP).

FIGURE 3A. PERCENTAGE OF STATISTICS STUDENTS WHO AGREED OR STRONGLY AGREED ON USEFULNESS OF ONLINE AP TOOLS



Source: Own

FIGURE 3B. PERCENTAGE OF SCIENCE STUDENTS WHO AGREED OR STRONGLY AGREED ON USEFULNESS OF ONLINE AP TOOLS



Source: Own

Figure 3A shows that over 70% of students in the Statistics course found each tool useful for learning. However, while a high percentage (71%) felt that online availability of formative word problems is useful, a higher percentage (86%) felt that the online provision of the solutions of formative problems was even more useful to prepare them for assessments and to improve their overall performance in the course. A similar pattern was reflected by results for the Science course as shown in Figure 3B. A higher percentage (87%) agreed or strongly agreed on the usefulness of online feedback, in comparison to 73% who agreed

or strongly agreed that the quizzes for concept learning were useful for preparation for assessments and improvement in course performance.

Considering student's answers to the open-ended questions, some interesting observations can be made. In the Environmental Science student cohort examined, most students considered online quizzes as the most useful online tool, which also had a positive effect on their performance; they reported that online quizzes helped them remember and understand course material and prepare for exams; they "reduced exam stress"; they helped a student with "weak multiple choice performance" to "engage differently". Instructor's lecture notes (slides) were considered useful, as they helped in the understanding of course material; when used ahead of class, they helped "prepare for class and be more engaged". Discussion boards that were conducted in class (with students using PCs or their laptops), DVDs/videos and lab report information (available online) were also reported as most useful online tools. Online interactive tools with which students engaged less (e.g. group discussion boards, followed by blog and journal) were considered least useful by most students.

When asked what would make them engage more with online tools and how such tools could be used more effectively by instructors, students gave variable responses. "Grade incentives" and "making tools mandatory", using less tools, using only one kind of tool, using all tools sufficiently (some students did not engage enough with online interactive tools), using "more online tools during class time (like journals and discussion boards)", using more video clips and quizzes and using discussion boards, as "they allow students to see how everybody else thinks", would help students of the particular cohort engage more. Additional suggestions that were made were to "use quizzes in class (may be as a game)", to do more in-class activities and to organize in-class student presentations.

What is most interesting is that, to the question on what they liked most from the course, students of the ES class reported mostly face-to-face activities such as field trips, lab activities, instructor's passion and energy, and in-class conversations. As for what students liked the least, answers such as "too much material", "writing lab reports" and "tight schedules" that "did not allow to comment on blogs and discussion boards" were obtained.

In the Applied Statistics course, close to half of students who responded to the open-ended questions indicated that the most useful online tools provided were the instructor's online PowerPoint lecture slides, the online formative problems as well as the online complete detailed solutions to the formative problems. Statistics students felt that these tools had a positive effect on their course performance by helping them to focus on the important parts of the topics and by providing them with applications to practice more outside of class time. Respondents expressed that the use of quizzes and other forms of assignments would make them more engaged with online course tools.

Conclusion

A reflection on students' perception of the online tools used in the environmental science and the applied statistics courses reveals that, overall, students rated online tools positively, with tools used as formative assessments (AP), such as the online quizzes (tool aiming at preparing for assessment) and the online feedback of the instructor on lab reports, being rated as most effective in the environmental science course and formative word problems with solutions being rated as most useful in the Applied Statistics course. Judging from the data obtained from the LMS, these were the tools with which the students mostly engaged, most probably because they were seen as a good preparation for exams (for both courses) and lab report project (environmental science course); and as a tool to improve their performance.

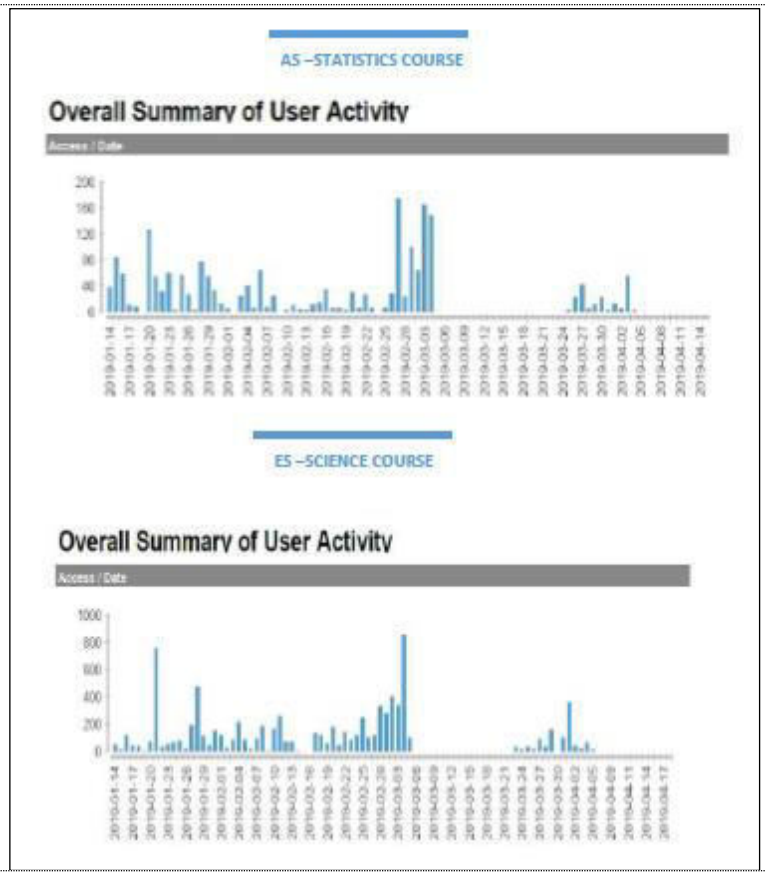
Concerning the knowledge generating and concept building tools (CK), the results obtained for the Environmental Science cohort reflect the level of engagement with the online tool examined, with the online quizzes being the most used tool and the group discussion board being the tool with which students engaged the least. The flipped classroom activity at which students used online course material to prepare an in-class presentation was considered less useful by some students who, either did not engage with it, or "could not understand student presentations"; this last comment indicates a challenge of a highly student-centred classroom. In the Applied Statistics course, the PowerPoint slides were rated as very effective, while a minority of students perceived the e-textbook as useful; this observation is not conclusive, as some students may have used the book, but not through BL-LMS (but through a hard copy or offline copy). Although these two tools were not assessed in the Likert scale questionnaire of the ES course, the open-ended questions for this course also revealed more engagement of students with lecture notes (on PowerPoint) than with the e-book.

As stated in the Data Analysis and Results, some online interactive tools used in the ES course aimed to develop students' critical thinking (mostly on the environmental impact of their actions) and student-student or student-instructor interaction (discussion boards, blog, journal). Among these, a discussion board conducted during class time (students used PCs or laptops) was considered most effective; as this online activity was done in a face-to-face meeting, engagement with it was maximum. Students engaged less with other online interactive tools that were not used during class time (group discussion board, journal, blog) and rated them lower in the Likert scale. (Table 1A).

Examining data on user activity from the BL-LMS system (Figure 4), the following common pattern can be observed for both courses: student engagement with LMS tools peaks on the days before the midterm assessment, followed by a period of inactivity, with students resuming engagement at comparatively much lower levels a few days prior to the final assessment. This indicates that a challenge to

address in the instructional design of a course would be to identify and use tools that would keep students consistently engaged throughout the whole period of study.

FIGURE 4. COMPARISON OF OVERALL SUMMARY OF USER ACTIVITY IN BL-LMS OF STATISTICS AND SCIENCE COURSES



Source: Own

Most students of the courses examined seem to prefer and enjoy face-to-face activities, and particularly those that involve some form of active and experiential learning (lab, field work, in-class discussion). Some students even suggest doing some of the online activities in class, such as quizzes or discussion boards. Grade incentives would increase engagement; it might be worth considering some of these activities as part of a graded student portfolio.

It seems that the transition to blended and fully online learning will require additional efforts to maximize student engagement with online tools. Interactions between students and instructor were shown to be more valued by students than interactions among students (Martin and Bolliger 2018) and the importance of the instructor in online learning has been emphasized in past studies (Volery and Lord 2000 Martin and Bolliger 2018). Dixson (2010) discusses the importance of developing connections in online courses, with instructors designing active learning situations in which students apply knowledge, while also providing meaningful communication opportunities for students. And Bidarra and Rusman (2018) suggest a pedagogical model for science education at which context, technology and pedagogy play a key role in the design of blended learning experiences.

The results of this pilot study, while preliminary, generally indicate that the challenges of choosing the best mix of effective online tools in STEM is influenced by the discipline and the learning outcomes of the specific courses within that STEM discipline. Future studies need to evaluate the effectiveness of online tools in a more systematic way across the different STEM disciplines, by exploring both student and instructor perceptions, and applying statistical test procedures that will allow to make comparisons and generalizations. Based on the learning outcome they wish to achieve, instructors will design learning activities and will select appropriate online tools. Results of such studies can also be used to re-design the curriculum, as well as teaching and assessment strategies, so as to achieve a more effective integration of ICTs in face-to-face courses and a smoother transition to blended and online learning in STEM disciplines.

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