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INTEGRATING ICT AS PEDAGOGICAL AND INNOVATIVE TOOL IN SECONDARY SCHOOL CLASSES

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Abstract

The application of ICT is changing the paradigm of secondary school educational environment. The pedagogical forces include greater information access, communication, synchronous and asynchronous learning, cooperation and collaboration, and pedagogical improvement. The question which a lot of teachers, including the lecturers and researchers from pedagogical faculties keep asking is, whether the implementation of ICT into a teaching process has positive impact on teaching and learning environment. We aimed to verify whether ICT is contributing to the development of teaching and learning processes. To detect and to study the teachers´ confidence the CUEFORTIC questionnaire was distributed among secondary school teachers. The results of our research indicate that, where the use of ICT is most effective in enhancing the learning experience, teachers have been able to integrate a number of technologies such as laptops, interactive whiteboards and the internet. Such combinations of hardware, software and connectivity allow them to develop innovative approaches to learning and teaching. ICT has also become integral to the teaching-learning interaction and when teachers are digitally literate and trained to use ICT, these approaches can lead to better thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with ongoing technological change in society and the workplace.

Keywords: ICT, teaching-learning, effectiveness, Index of Leaning Styles.

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1. Introduction

Educational system in the Czech Republic has been adopting new technologies to integrate ICT in the teaching and learning process, to prepare students with the knowledge and skills they need in their subject matter. In this way the teaching process is evolving from teacher-centred to student-centred learning environments.

ICT integration is understood as the usage of technology seamlessly for educational processes like transacting curricular content and students working on technology to do authentic tasks (Kainth & Kaur, 2010). Currently ICT facilitate not only the delivery of lessons but also the learning process itself. In educational context, ICT has the potential to increase access to education and improve its relevance and quality. Tinio (2002) stated that ICT has a tremendous impact on education in terms of acquisition and absorption of knowledge to both teachers and students through the promotion of active learning, collaborative and cooperative learning, creative, integrative and evaluative learning.

1.1. ICT as pedagogical tool

Secondary technical schools in the Czech Republic use information communication technologies (ICT), except for professional reasons, in an attempt to deliver quality teaching and learning, improve students' participation, and provide collaboration and engagement in authentic learning. According to Meyer (2003), ICT includes any medium to record information in diverse formats for teaching and learning. As such, the launch of ICT in secondary schools has significantly changed the teaching and learning methods. ICT as a pedagogical tool facilitates a shift from the teacher as the only source of knowledge to a teacher as a facilitator of the teaching and learning process. Besides, with ICT as a pedagogical tool, the teacher delivers knowledge, communicate skills and provide assignments and collaborate with students. As Nilsson (2018) claims, there is a shift of teachers' primary role from being someone providing instruction to someone enhancing construction of knowledge among students themselves.

Mwalongo (2012) describes pedagogical roles for teachers in a technology-enhanced environment including improved cooperative learning and shareable experiences metacognition, fostering multiple perspectives and scaffolding learning. This means, the use of ICT is changing the pedagogical roles of teachers which are a potential catalyst for the 21st century for transforming the teaching and learning process (Drent & Meelissen, 2007). An integral part of using ICT as a pedagogical tool is, of course, a qualified teacher, that is, a teacher who is skilled and knowledgeable enough to perform the teaching and learning procedures using ICT available facilities, services and infrastructure. As Koh (2019) states it, teachers need to possess knowledge of what to teach, why and how to teach the subject matter by using ICT.

1.2. ICT as innovative tool

While the innovative use of ICT in teaching is expected to be logical, very few articles report innovative use of recent technology. Most of the research reports on the use of computers and traditional computer software. Overall, teachers in do not integrate technology into their teaching out of many reasons. It is believed that if teachers perceived technology programs as neither fulfilling their own needs nor their

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students' requirements, it is likely that they will not integrate the technology into teaching and learning. Steyn, De Villiers, and Twinomurinzi (2018) conducted a study about factors which influence the innovative use of ICT by teachers. Their study revealed that student–oriented pedagogical approach, positive attitude towards computers, computer experience, and personal entrepreneurship of the teacher educator have a direct positive influence on the innovative use of ICT by the teacher. Teachers are expected to use technology in innovative ways that provide students with an engaging and empowering learning experience to prepare them to interact with a globally networked society (Kopcha, Rieber, & Walker, 2016). Research indicates that the effective use of technology in teaching and learning is one of the factors contributing towards the improvement in the quality of instruction (Khan, Bibi, & Hason, 2016).

2. Problem Statement

In certain contexts, ICT has become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises. When teachers are digitally literate and trained to use ICT, these approaches can lead to higher order thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with ongoing technological change in society and the workplace (Goodwin, 2012).

The management of secondary Public-Law School TRIVIS, which has invested in new technologies in 2017, aimed to verify whether and to what extent ICT contributes to improving the teaching-learning process. The school educates students in the field of security legal activities. Students who study in the 4-year educational program graduate at the age of 19 and are predominantly employed in the bodies of the Ministry of Interior, Ministry of Defence, Ministry of Justice and Ministry of Finance. We were directing our research to this school as it is one of the exceptional secondary schools in the region, whose mission is to provide blended learning environment for students and implement ICT into the curriculum of almost all subjects.

3. Research Questions

In this paper we focus on one research question: how ICT is contributing to the development of teaching and learning processes.

3.1. Bloom's taxonomy

As previously pointed out, one of the main concerns of studies on educational technology has been to identify what uses of ICT are being applied in schools and how teaching and learning processes can be advanced through them. Keeping in mind this perspective, we detected teachers' opinions about the teaching and learning processes when incorporating ICT. The teaching and learning processes we have highlighted are based on Bloom's taxonomy (Bloom, 1956), which is still valued and used, mainly as a referent in educational planning processes and to fix identifiable aims in educational settings.

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4. Purpose of the Study

This research focuses on the need to develop appropriate strategies to face the new teaching role and, furthermore, the students' role when integrating ICT in the teaching and learning processes. The role and the perspective of teachers have become highly relevant, emphasising them as crucial actors in this process. Predominantly, teachers use technology depending on their perceptions and their trust in the way it can contribute to the teacher and the learning process. Through knowing what they think, we can understand what they do or what they might do with technology in their classrooms and in relation to their work.

5. Research Methods

The teachers (No:143) at the secondary Public-Law School TRIVIS, who took part in the research within two years (January 2017- January 2019), were asked to complete a questionnaire to collect data about their competencies, uses and attitudes related to ICT in education. The specific questionnaire (CUEFORTIC) was drawn up with this objective. It was divided into five sections: personal data (six items), use of ICT in teaching practice (79 items), attitudes towards ICT (17 items), training experience and training needs (47 items), and school equipment (10 items). Each item was related to a five-point Likert scale: 1, nothing; 2, a few; 3, something; 4, quite enough; and 5, a lot.

An analysis of the 143 answers was carried out with the Statistical Package for Social Sciences. Although we have data relating to teachers' gender, age and teaching experience, in this paper we will only present the main findings.

5.1. Sample group characteristics

Approximately two-thirds of the sample were women (64.5%), which is the usual average found on current teachers' characteristics and supports the idea of the feminisation of teaching environment in the Czech Republic.

Regarding age, most of the teachers were between 35 and 44 years old (44.3%). Outside this age group, 29.7% were between 25 and 34 years old, and 26% were between 45 and 54 years old. Majority of the teachers in the sample (36.1%) had more than 20 years of teaching experience, followed by those with between 13 and 20 teaching years of experience (26.5%). We would like to note that this was a highly experienced sample, which we could place – on the basis of the Life Cycles theory (Huberman, 1989) – in a stage of consolidation and professional maturity that can evolve towards two different and contradictory trends: to be conservative or innovative.

Regarding the ethical issues, all permissions were requested and anonymity of teachers was respected. Confidential procedure of information, used for statistical and research purposes, was guaranteed.

6. Findings

Knowing teachers' opinion on the influence of ICT in each of the domains established by Bloom puts us closer to their vision on how technology can be used to reach the educational aims related to each

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of the categories of Bloom's taxonomy. When considering these categories, we are investigating the learning aims that the teachers consider might be achieved through the use of technology and the kind of teaching strategies that can be developed in the technology-mediated classrooms.

Bloom (1956) classifies educational objectives into three main domains: cognitive, affective and psychomotor. In the cognitive domain are those processes related to knowledge, comprehension, application, analysis, synthesis and evaluation. In the affective domain we find processes related to attention, elaboration of responding patterns, valuing skills and development of organisational schemes. Finally, from the psychomotor domain we selected perception, expression and communication skills. The average scores from the questionnaires were quite high and were spread evenly across the three domains (see Table 01 and Figure 01).

Table 01. Influence of ICT in developing teaching and learning processes.

Teaching and learning processes	N	Average
Knowledge acquisition	143	3.98
Understanding improvement	143	3.75
Application of learning	143	3.91
Strategies of analysis	143	3.45
Synthesis processes	143	3.54
Evaluation processes	143	3.68
Fixing attention	143	4.25
Response mechanisms	143	3.98
Evaluation strategies	143	3.46
Organisational schemes	143	3.65
Perception skills	143	3.98
Expression–communication	143	3.43

Therefore, we can confirm that teachers from the sample group have a high expectation level with respect to ICT and a positive estimation of its impact on learning: most of the teachers that took part contended that the use of ICT in classrooms supports some teaching and learning processes.

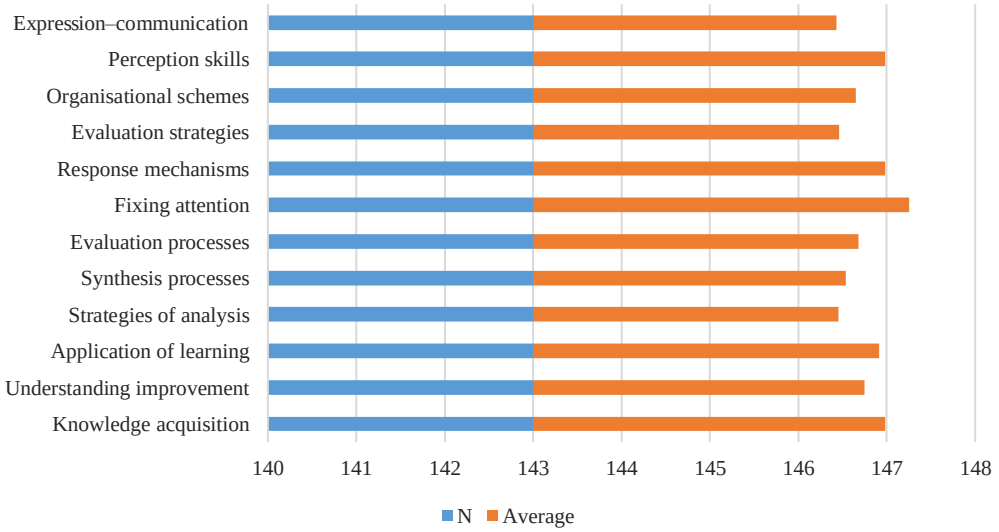

Figure 01. Influence of ICT in developing teaching and learning processes.

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6.1. Findings discussion

Based on the data obtained, we can clearly see that teachers have pointed out that using ICT at school helps to improve students' attention (x = 4.25) and perception skills (x = 3.98). If we take attention as a basic requirement for learning (Ainley & Luntley, 2005), we could suppose that ICT is facilitating learning because it helps create better learning conditions by raising and promoting students' attention skills. Moreover, increasing perception skills could be favourable to learning as students will be able to process and translate the stimuli that allow them to build new thinking and action schemes. The use of ICT also stimulates the creation of responding mechanisms (x = 3.98), needed to face learning experiences and demands. One of these mechanisms relates to applying what you have learned, and in this respect ICT is also perceived as a help.

We should also emphasise the average score obtained in items related to knowledge acquisition (x = 3.89) and content understanding improvement (x = 3.98). This means, that the learning process is re-organised from the previous: to remember, define, and identify particular information; to understand and absorb this information, to organise and mentally sort it, to interpret it and to express it in their own words.

Other teaching and learning processes get lower averages, as in the variables related to strategies of analysis (x = 3.45), evaluation processes (x = 3.68), synthesis processes (x = 3.54), strategies for evaluation (x = 3.46) and organisational schemes (x = 3.65). Expression and communication are the least valued items, most probably because the teachers considered the use of ICT as being one-way, where students act just as receivers. Here we can see that some teachers have not yet discovered or understood the communication possibilities of ICT. Networking, in particular, is based on the communicative opportunities that technological systems are making easier. ICT is also promoting positive attitudes towards a collaborative and constructive learning perspective.

Teachers from the sample group are also less confident using ICT to promote the development of more complex teaching and learning processes, such as strategies of analysis, synthesis, evaluation and organisation. However, these are very important skills for navigating the net and for taking advantage of the enormous amount of information available. This means that the role of the teacher will be fundamental to support the development of these skills.

7. Conclusion

Based on the research results we can conclude there is a mainstream opinion that sees using ICT in teaching as favouring several processes related to teaching and learning – in particular, those involving attention, perception, responding mechanisms, application of learning and understanding. Besides, those related to information transmission and knowledge facilitation are well thought of. However, some of the proposed processes were valued weakly: interaction processes and expression and communication skills were not regarded highly by the teachers, perhaps because they have considered ICT as being generally used in a one-way mode.

Teachers are involved in a global project that takes into account aspects such as continuous training and motivation and they feel the schools have strong leadership. To summarise, the use of ICT is a key factor for innovation, teaching and improvement within learning processes.

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