Information and Communication Technology in Education of Prospective Teachers of non-ICT Fields of Studies

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Abstract: Formal education in the Czech Republic has seen some notable changes during the recent years. One of the most significant ones may be the implementation of curricular documents which are essential for pre-school (ISCED 0), primary (ISCED 1, ISCED 2) and secondary (ISCED 3) education. These documents made it possible for schools to give up obligatory syllabus and to introduce their own educational programs. Some schools have modernised their previous plans while others have created new – i.e. alternative concepts. The second, no less important, change, which has influenced all areas of human life, has been massive development of information and communication technologies (ICT) in recent twenty years. Current generation is starting their education with more experience and competencies than their teachers possess. However, the support and application of information and communication technologies is – despite the novelty of curricular documents – still being underestimated or not suitably grasped point.

In spite of that, the educational system is changing rapidly and the pace of this transformation is unprecedented. Modern technologies are being used by the youth on common – everyday basis – as a source of entertainment or as means of communication with peers. It is obvious that these changes must be reflected even by pedagogical faculties which educate prospective teachers. These institutions shall innovate their curriculum in order to enable the teachers to use these tools efficiently.

This paper aims to conduct a survey concerning utilization of information and communication technologies within university studies of aspiring teachers of selected majors and pedagogic faculties in the Czech Republic. The survey is interested in the practical implementation of ICT into lessons of these teacher-trainees. From the viewpoint of curricular documents, this concerns the approaches to ICT and their efficient application in common classroom situations in the context of specific methods and forms of university education. However, the issue will not be researched as educational content included into the specific subjects.

Keywords: University education, teachers' education, education technology, ICT, Czech Republic.

Introduction

The information and communication technologies (ICT) have reached impressive development in the recent 20 years and they have positively influenced almost all the aspects of human life, including the education. In keeping with the contemporary knowledge base and the term base utilised in education, a more general term of "digital technologies" may also be used in referring to information and communication technologies. The ability to utilize these technologies, namely in terms of search for information, its evaluation, production, and distribution, is then referred to as digital literacy (Herout, 2016). The level of integration of digital technologies into the education process becomes one of the key factors of successful modern education; this integration occurs in response to the requirements and needs of our times. It is becoming more and more common for students to encounter methods, forms, and tools that utilize ICT. The growing trend of using the e-learning tools in the combined, but also in the full-time type of study, can serve as an example. The reason for this may be the pressure exerted by the students who demand more extensive use of digital technologies, the thereby implied requirement of further education of teaching staff, and the socio-economic situation that forces the students to work on daily basis in order to secure the funds required to pay for their studies and to support themselves even while participating in the full-time study programmes. Documented by many research studies, the positive influence of efficiently used digital technologies on educational processes may be considered another reason (Garrison, 2011).

There are many organizations (UNESCO, OECD) and government bodies that focus on implementation and support of information and communication technologies. For example, a portion of resources

coming to the Czech Republic from the EU funds during the 2007-2013 period has been dedicated to purchases, implementation, and use of digital technologies in education. In terms of concept, namely the "Strategy for Digital Education" arising from the "Strategy of Education Policy of the Czech Republic until 2020" is dedicated to this issue. As opposed to the preceding concepts and intents of the curricular documents concerned with education of students within elementary (ISCED 1, ISCED 2) and secondary (ISCED 3) education sector, this strategy primarily focuses on integration of information and communication technologies into the education process in general, without a regard to any specifics of particular areas of education. Thus, the aim is to support the use of ICT across the education sector, not to reserve it for the practice of specific isolate subjects as has been the case until now. It is obvious that such change of approach shall not occur instantly, but its stipulation in the official government documentation may be perceived as a step in the right direction.

Pedagogical faculties that educate the prospective teachers also need to react to these changes of approach towards the use of digital technologies in education. Since the expert circles have been demanding this for several years now, the pedagogical faculties are among the first places where this change can be expected to take place, or rather, where it should have occurred already.

The aim of this paper is to conduct a survey concerning utilization of information and communication technologies within university studies of aspiring teachers of selected majors and pedagogic faculties in the Czech Republic.

Methodology

Usage of digital technologies is not only in the hands of enthusiastic and technologically proactive teachers who, since the very beginning, have seen them as versatile and useful didactic aids. However, ICT are becoming more and more universal tools and means of modern education. The use of ICT in the education is not viewed just as competitive advantage with a "wow-effect", but it is considered to be a common part of educational processes which has positive influence on their quality (Herout, 2015).

The aim of this entry is to provide an insight into the matters of the use of information and communication technologies during the preparation of prospective teachers – students of selected education programmes and pedagogical faculties in the Czech Republic. Our main research tool is a survey that aims to determine the extent to which the digital technologies are used by the tutors of the faculties that focus on the preparation of the teachers of elementary and secondary schools (ISCED 1-3).

The respondents participate in pedagogically oriented education programmes of three selected universities, and they are full-time students of third year and beyond. Among the respondents, there are students of Pedagogical Faculty of South Bohemian University in Budweis (S1), Pedagogical Faculty of Charles University (S2), and Pedagogical Faculty of Masaryk University in Brno (S3). The basic data are presented in Table 1.

Table 2

Number of Respondents and Return Rate of the Survey

School ID	Reach	Return	Return in %
S1	75	51	68 %
S2	100	64	64 %
S3	100	71	71 %
Total	275	186	68 %

The respondents have been aged between 19–27 (the average age being 22.4 years). Out of the total of 186 respondents, there have been 72 % women and 28 % men. The higher number of females corresponds to the higher ratio of their representation in the pedagogically oriented education programmes. The survey aimed to determine the extent of usage of material didactic aids in the academic environment. The respondents have been asked to evaluate the extent of usage of specific material didactic aids and study materials across all the subjects they have participated in during the past academic year 2015/2016 – subjects that relate directly to their academic orientation (field of expertise), and take place on the faculty premises.

The survey has consisted of two basic categories (questions). In the first category, the respondents expressed their opinion on the extent to which the tutor uses didactic aids (computer, projector, tablet, visualizer, voting equipment, board, flip-chart, interactive whiteboard, recording equipment…) during direct, face to face tuition. The second category consisted of evaluation of the extent of usage of material didactic aids that aim primarily to convey the information that is the object of the tuition process (e-learning, slide-show, mind map, printed study material, electronic study material, audio-visual study material, textbook, book, education program, education application, education website, social network…). When the respondents answered this question, three viewpoints have been used: to what extent are these aids used by the tutor, by the students during the tuition, and by the students during their individual learning sessions.
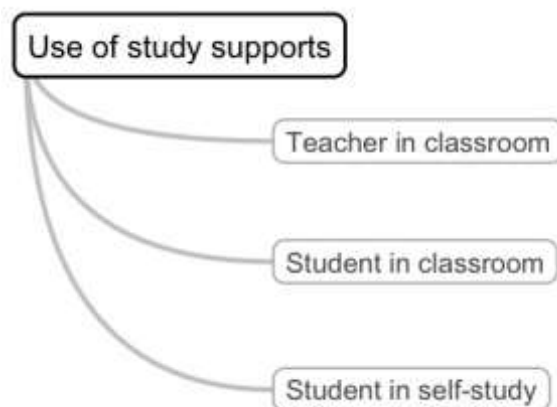

Figure 1. The different perspectives in the Question nr. 2.

The individual items within those categories have been created as a result of pilot testing. It has been nonetheless possible to add additional items at will. No respondents have taken advantage of this option.

Results and discussion

The research has been conducted in October 2016, and among the invited respondents there have been students of all education programmes, with an exception of IT and physical education oriented programmes. The exclusion of IT students has been intentional — the main reason being their more intense preparation in the area of didactic aids, or, more precisely, educational technologies. The physical education students have been excluded namely because of the high number of skill-oriented subjects in their curriculum, which are usually taught on the sporting premises of the faculty rather than in standard classrooms. The replies of respondents within the first category are listed in the Table 2.

Based on the results, it is possible to infer that the most frequently used didactic technical aids include the Computer (75 %), the Projector (75 %), and the Blackboard (55 %). The Voting Equipment (2 %), the Recording Equipment (7 %), and the Interactive Whiteboard (8 %) may be subsequently included with the least utilized technical aids.

From the perspective of the usage of modern didactic technologies, it is important to mention the use of the Interactive Whiteboard (8 %) and the Tablet (10 %) by tutors during tuition. To a great extent, the resources coming from the European Structural Funds have particularly been invested into such devices, and these devices also constitute one of the pillars of the Strategy for Digital Education.

Nevertheless, it seems that the prospective teachers only encounter the possibility of using them during their teaching practice at schools that have been so equipped during the recent years. Especially the tablet constitutes a device easily accessible to the pupils – in the Czech Republic, as much as 95 % of children aged between 6–7 years have a tablet or a mobile phone with internet access at their disposal (Herout, 2016).

Table 2

The respondents' replies to the first question (%)

	S1	S2	S3	Total
Computer	75	81	68	75
Projector	71	86	68	75
Tablet	4	9	15	10
Visualizer	16	11	23	17
Voting equipment	2	0	4	2
Board	42	74	47	55
Flipchart	25	17	30	24
Interactive whiteboard	8	15	0	8
Recording equipment	0	6	14	7

The second category (question) aimed to examine the extent to which the material didactic aids used to convey the communicated information to students are utilized. In consistency with the preceding instance, the students have been able to choose one of the categories created as a result of the survey pilot testing.

Table 3

The respondents' replies to the second question (%)

	Teacher in classroom	Student in classroom	Student in self-study
E-learning	15	28	45
Slideshow	63	8	64
Mind maps	11	0	4
Printed study material	27	32	38
Electronical study material	38	6	42
Audio-visual study material	16	2	12
Textbook	4	5	37
Book	0	8	39
Education program	6	8	10
Education application	0	0	14
Education website	12	8	25
Social network	0	0	36

Based on the information the respondents have provided when answering the second question (Table 3), it is possible to infer that a presentation is the aid a tutor uses most frequently (63 %). That corresponds to the results obtained through the first question, more specifically to the data on the use of the Computer and the Projector (75 %). The difference between the above-listed figures can be reasonably explained by the use of visualizer or other devices that also need a computer and a projector in order to function. From the tutor's perspective, the Electronic Study Materials (38 %) and the Printed Study Materials (27 %) also belong among the most frequently used aids. It is worth mentioning that some of the options have not been chosen by any of the respondents. These are in particular the Books, the Educational Applications, and the Social Networks.

In terms of students and of the study materials they use, the responses have been divided into two categories. Materials the students use in the course of tuition and materials that primarily serve the purposes of individual learning. According to their responses, the students most frequently use the Printed Study Materials (32 %) and the E-learning (28 %). On the other hand, the least frequently used aids are the Mind Maps, the Educational Applications, and the Social Networks. The results obtained about the use of educational applications and social networks also correspond to what the respondents have indicated regarding the tutor.

The results about the materials primarily intended for individual learning are more varied. Among the most frequently used ones are the Slide-shows (64 %) and the E-learning (45 %). From the large discrepancy in the use of e-learning, which has been used by the tutors during their tuition only in 15 % of cases but has gained 45 % from the students, it is possible to infer that schools use it to support the learning process in controlled individual learning rather than in common (direct or face to face) tuition.

The difference has been apparent also in the use of social networks, which have not appeared in the common tuition at all — even though a survey conducted with 300 students from three different universities in the year 2012 has revealed that as many as 279 (93 %) respondents have a Facebook account, and are also its active users. 34% of the respondents spend more than an hour a day using a social network, and surprising 62 % spend over 30 minutes a day using it (Herout, 2013). The high popularity of social networks among students and the time they spend using them each day provokes a question whether they could be used for the purposes of formal education. Nowadays, the Czech colleges and universities have their own Facebook profiles, which they use largely for marketing purposes. The situation is different abroad where researches are conducted to examine this topic; more specifically, there is — for example — a research aiming to identify both the potential of social networks and the ways they could be used to improve communication between the tutor and the student, collaboration and co-operation among students, and engagement of students in the activities organized by their school or tutor (Selwyn, Mcgrath-Champ, 2009).

Conversely, students use the least the Mind Maps (4 %), the Education Applications (10 %), and the Audio-visual Study Materials (12 %) in their individual studies. Again, these results correspond to tutor's choice of study materials he/she provides and uses.

An interesting insight into the matters relating to distribution of study materials is provided by an examination of distribution of responses viewed through the perspective of the usage of modern information and communication technologies (Figure 2).
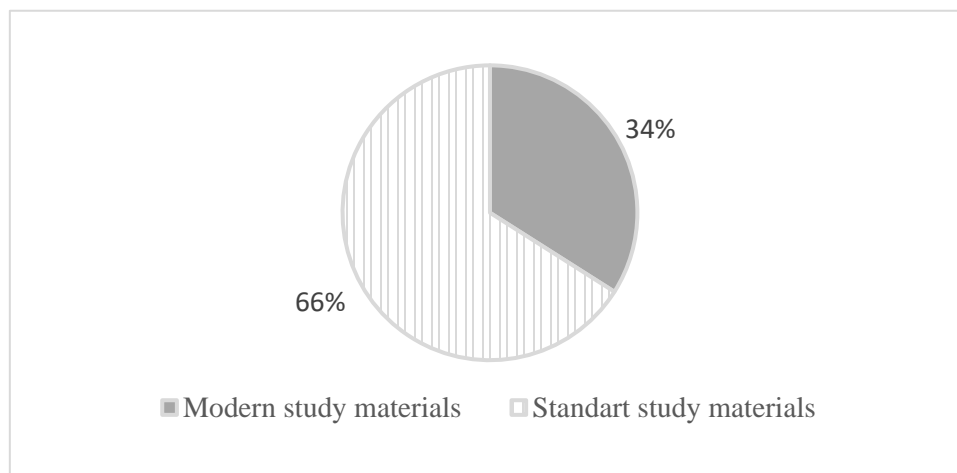

Figure 2. Proportional representation of Digital and Standard Materials.

E-learning, mind maps, electronic study materials, audio-visual study materials, social networks, education programs, applications, and websites can all be perceived as belonging to the aforementioned group. It is possible to indicate all other materials as standard because of the long time periods they have been used for, the low interactivity level they offer, and also other factors.

Conclusions

It has been the aim of this entry to examine the use of the modern information and communication technologies in academic environment, more specifically in the training of the students of pedagogy. It is possible to infer from the results that the tutors prefer to use traditional didactic aids such as board, computer and projector. This is matched also by the high ratio of the use of presentation that constitutes a tool through which the conveyed information is administered.

Although the pedagogical faculties and their tutors who educate the prospective teachers should set the example by demonstrating effective integration and use of modern information and communication

technologies into the education process, the situation is rather different. 66 % of the materials used by tutors in direct tuition may be designated standard rather than modern.

If one looks at the curriculum of pedagogical faculties, it is possible to come across subjects that aim to enable the students to acquire competencies in the area of educational technologies and their use. Pedagogical faculties should aim to prepare their students for the professional teaching practice, and a practical example of the use of acquired competencies provided by the tutors themselves is one of the best ways to do so.

Conversely, from the perspective of the students it is apparent that a wide range of study materials is being used. Since an analysis of these materials has not been the objective of this entry, it does not concern itself with their origin either. They can therefore include materials acquired from one's tutor or classmates, as well as materials that are freely available on the Internet. Nevertheless, the trend of digitalization and a tendency to use the modern information and communication technologies in education are obvious. Looking abroad, the situation is similar. For example, American Duke University has equipped its students with iPod players as early as in the year 2004, and it has thereby provided them with an option to access the vast amount of online audio and video content it has prepared. This included tuition materials, lecture records, information channels, and other resources. Given the massive progress the ICT has seen during the past twenty years; this trend can be expected to develop further also in Czech Republic.

To finish with, it is important to emphasize, that these results are not possible to generalize in any way. These data are valid only for the environment of the researched reality. This paper is intended as one of the contributions for opening a discussion about the necessity of implementation new approaches and standards in teacher education at least within the Czech Republic.

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