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## Study content and motivation for using ICT in education

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### Abstract

Only a digitally competent teacher can effectively use ICT in the educational process. Teachers must be educated and adequate ICT learning contents are required. The study contents should fulfil the objectives of knowledge upgrade and motivation for use of ICT in educational processes. The aim of this study was to get better insight into the pre-service teacher's assessment of topics' popularity, estimations of achieved skills and motivation for implementation of ICT in education. Our research sample consists of two generations of students of elementary education that attended the ICT in Education course. The two-year time gap is considered suitable to discover differences between generations because of the rapid development of ICT. The data were statistically analysed using descriptive and inferential statistics. The results show the increased acceptance of ICT in education, but the trends for the forthcoming generations are left to future researches.

Keywords: ICT in education, pre-service teacher, motivation, teaching process, digital competences.

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## 1. Introduction

Contemporary teaching processes are inevitably connected with the use of ICT. The use of ICT in teaching also includes the preparation of multimedia elements, their inclusion in multimedia learning materials and the distribution of materials (Krasna, 2010 & Krasna, 2014). This has benefits for both the teacher and the student. Multimedia elements comprise text, image, audio and video. Multimedia learning materials are study materials comprised of multimedia elements that are connected into a coherent whole (Weingand, 2014). The contemporary teacher must be able to cope with these challenges, a requirement that can be fulfilled through the provision of appropriate syllabus content in the primary part of teacher education and later with continuous in-service training (Facer, 2011 & Garrison, 2011). An important objective of pre-service teacher education is the shaping of a technologically competent teacher (Duh, Bratina & Krasna, 2012). From the viewpoint of ICT use in teaching, the technological competence of a teacher is understood as digital competence, which can be classified into two aspects. The first is the ability to effective use of ICT and multimedia learning materials in teaching. The second aspect is the ability to recognise the strengths and weaknesses of ICT and to observe the specific rules and ethics of its use (Duh et al., 2012). Regarding both the aspects, the didactically appropriate use of ICT is very important.

Careful planning of ICT implementation according to the psychological and didactical postulates is therefore essential. The complexity of any particular teaching topic can be explained by the term Didactic scenario (Dagdilelis & Papadopoulos, 2010). The didactic scenario represents a relatively complete description of the lesson, including teacher actions and expected pupil's reactions. Therefore, the role of ICT in the didactic scenario requires careful planning. To achieve this goal, both digital competences and didactic skills are required. However, the suitable level of knowledge and skills (competences) about ICT in education is essential.

### 1.1. ICT in education

According to the wide set of possibilities delivered by the ICT, many teachers think that ICT provides instant solutions or replacement for almost every didactical situation. Such thoughts are actually wrong, but they are somehow understandable in the students' community and among pre-service teachers. Contemporary students have encountered the continuous use of ICT at all levels of their education. However, their experience with the ICT has been mostly limited to the learners' experiences (receivers of the instructions). Soon after the teacher's education begins, pre-service teachers change their role and they become 'teachers' (providers of the instructions). To be effective, they need to provide instruction and support their teaching process by exploiting the potential of ICT. Teaching through technology (Mayer, 2010) is a comprehending term of the combination of teaching and ICT. According to Mayer, two different approaches are considered to achieve such goals: the technology-centred and the learner-centred approach. The technology-centred approach uses ICT to support teaching. The learner-centred approach uses ICT to assist (support) learning. Both the approaches are vital in the professional work of pre-service teachers.

The rapid development of the use of ICT in education is evident. At the beginning of the century, the possibility of personalised learning services was an upcoming trend (Dryden & Vos, 2001), but that trend soon became something obvious.

The greatest challenge of contemporary teaching is awakening of pupils' attention and interest. ICT appears to be the appropriate tool for increased motivation. Strategies increasingly include gaming, which can result in a substantial increase of interest in the syllabus material and a higher level of acquired knowledge (Caligiuri & Ominelli, 2014). Educational materials that increase learners' interest also means higher learners' motivation and is a key factor for successful learning. The use of ICT should not be limited to the support of the teaching process during the lesson only. Some part of learning contents should also be available to pupils after leaving the classroom. Such learning materials provide the possibility to refresh or upgrade the already achieved knowledge.

### **1.2. Limitations/anticipations of study course materials**

The syllabus topics are being prepared and adapted with consideration to the rapid development of ICT and to the fact that forthcoming generations of pre-service teachers are people who have been in contact with ICT from birth and throughout their previous formal and informal education. The literature designates them as representatives of Generation Z or as digital natives (digitally enhanced generation?). Generation Z includes people born between 1995 and 2012 but also beyond, who enter the study process with the intermediate level of ICT knowledge (Fernandez-Cruz & Fernandez-Dias, 2016). Now the challenge in preparing of syllabus topic is not only in the present knowledge of pre-service teachers for their job, but also the fact that current generation Z pre-service teachers will teach children who are also part of this generation.

The term digital natives come to the digital world slightly earlier and describes people who have been in contact with ICT from an early age. The authors (Palfrey & Gasser, 2008, p. 1) classify people born after 1980 into this group. They describe them as people who *frenetically type messages into their mobile phones, tablets and similar devices in public places, who know what to do when emails crash, who are friends with people they have never met and who easily beat you at any video game.*

The Generation Z students have already developed the skills and acquire knowledge for using ICT during their early contact with ICT, no reservation or fear is present like in pre-1980 generations. We understand the ICT as a tool for electronic communication, data access (information retrieval and/or study materials access), files exchange, and (much less frequent) applied use in specific situations. From the viewpoint of teachers, this relates to the use of ICT in education. The syllabus topics have therefore the intention to use their existing knowledge and experience for the teacher's professional use of ICT, from the theory to practical experience of using ICT in didactic situations or scenarios.

### **1.3. Syllabus topics in the ICT course**

The study course ICT in education at the Faculty of Education at the University of Maribor includes a selection of syllabus topics covering the current demands in contemporary learning process. The main four learning topics' contents comprise the production of multimedia elements, production of learning materials, learning materials distribution and ICT implementation in the educational process. The objective of learning contents is to make the pre-service teachers familiar with the currently available ICT and learn about the possibilities and methods of using ICT in the classroom. During practical work, students are able to test the tools and procedures for preparing multimedia elements and multimedia learning materials and become familiar with the operation of Moodle (Bratina & Dinevski, 2016). In terms of structure, the study syllabus corresponds to the proposed selection of knowledge and experience of a digitally competent teacher. The anticipated use of ICT in teaching is inevitably in connection with the suitable level of interest in and the desire to learn about the possibilities offered by the use of ICT in education. At the same time, students also need to recognise the purpose and applicability of the syllabus topics.

The opinions of students on the specific syllabus topics of the ICT course and topics' influence on the motivation were investigated in a study.

## **2. Methods**

### **2.1. Purpose**

In the preparation of this study, we anticipated that contemporary students (in our sample the pre-service teachers) have a certain level of experience with the use of ICT and prior knowledge of some ICT work processes. Consequently, some syllabus topics will be less interesting for some students. Interest on specific syllabus topics may influence the student's motivation for the implementation of ICT in their teaching process. From the multimedia learning material preparation to the distribution by

dedicated systems, the purpose of study was to discover the student’s interest for specific syllabus topic and their motivation for implementation of ICT and distribution of learning materials. Further, we were interested in whether students’ opinions on syllabus topics and motivation for ICT implementation change with generations. The following research questions were posed:

- Which syllabus topics are the most popular for the students?
- Are the popularity of syllabus topics and competences for preparing multimedia learning materials related?
- Are the students motivated to implement ICT in the teaching process?
- Are the student motivated to distribute the learning materials by LCMS Moodle?

## 2.2. Sample

The sample includes 169 students (pre-service teachers) from the 2016/2017 and 2014/2015 academic years attending the ICT in Education course at the Faculty of Education, Maribor. The structure of the sample is shown in Table 1.

**Table 1. The sample structure by academic year**

Generation (academic) year	f	f%
2016/2017	90	53.3
2014/2015	79	46.7

## 2.3. Data collection

Data were collected in the 2014/2015 and the 2016/2017 academic years by the questionnaire provided in online surveying tool. Students received the questionnaires after completing the course and before taking the exam. This excluded the eventual effect of the course grade on the assessment of elements of the syllabus. The opinions are assessed by five-point Likert type scale. Other questions are of multiple choices type.

Data were analysed with the SPSS statistical software. The statistical methods of descriptive statistics and chi-squared test were used, while chosen non-parametric tests were also employed to process rating scales.

## 3. Results

### 3.1. The interest for syllabus topics

Students estimated the syllabus topics popularity by choosing the points between Do not Like at All (value 1) and Like Very Much (value 5) at the five point Likert type scale. Table 2 shows the assessed popularity of each particular syllabus topic. Table 3 shows the popularity of particular syllabus topics by the generation (academic year).

**Table 2. The popularity of syllabus topics**

Syllabus topics	$\bar{R}$	$\chi^2$	P
Multimedia elements production	2.76		
Authoring tools	2.01	43,422	0.000
Distribution of learning content by Moodle	2.54		
Implementation of ICT in the teaching process	2.79		

According to the average range of assessments, the most popular topics are the implementation of ICT in the teaching process and the syllabus topic about multimedia elements production. Regarding the similar assessments of all other topics, the popularity of the learning content may have an influence on the student's motivation for implementation of various ICT means in their future teaching process. Presumably, the estimated high popularity indicates student's recognition of advantages brought by ICT implementation. Due to the popularity of the syllabus topic on multimedia elements production, we expect the inclusion of multimedia learning materials into the teaching process. The teachers themselves will be prone to produce different forms of multimedia learning materials. The students also understand the necessity of distribution of learning materials by ICT like LCMS Moodle or similar. Similar is the popularity of the topic about distribution of learning materials by Moodle. The topic about authoring tools is least popular ( $\bar{R} = 2.01$ ), which is somehow unexpected considering the popularity of multimedia materials production. Based on experience, we assume that the reason is in the relative complexity of the authoring tools and expensive dedicated software products. On the other hand, some free versions presented to the students during the course have many limitations, are unreliable and lack support.

**Table 3. The popularity of syllabus topics by academic year**

Syllabus topics	Academic year	$\bar{R}$	U	P
Multimedia elements production	2014/2015	81.80	3302.500	0.494
	2016/2017	86.89		
Authoring tools	2014/2015	79.06	3086.000	0.162
	2016/2017	89.33		
Distribution of learning content by Moodle	2014/2015	64.13	1906.500	0.000
	2016/2017	102.58		
Implementation of ICT in the teaching process	2014/2015	72.77	2588.500	0.001
	2016/2017	94.92		

The popularity of multimedia elements production is similar in every generation. Younger students estimate the popularity slightly higher but the difference is not statistically significant ( $P = 0.494$ ). According to the lower popularity of authoring tools in Table 2, the popularity estimated by younger students is slightly higher. The difference between groups is still not statistically significant ( $P = 0.162$ ). The distribution of learning content by Moodle has become more popular during the past academic year. The increase in popularity is remarkable and statistically significant ( $P = 0.000$ ).

According to our experiences, the positive shift is a consequence of upgrading the Moodle to the latest version during the past academic year. The latest version of Moodle is more user-friendly, enabling students to produce their own courses with fewer efforts. The assessed level of popularity for the topic on implementation of ICT means in teaching the process has grown during the period of the past two years. Younger students assessed the topic to be more popular than older students. The difference between assessments is statistically significant. The analysis shows that topics concerning specific application of ICT in education are well accepted.

### 3.2. Topic popularity versus competence

The syllabus topic on multimedia elements production is among the most popular topics with the similar popularity assessed by both generations of students. After completion of multimedia elements

production, students have to produce some exemplary multimedia learning materials. We expect that the higher estimation of the syllabus topics about multimedia elements production will be in relation to the estimations of competences for multimedia learning materials production. To examine the possible relation between the popularity of the syllabus topic and achieved competences, we analysed the estimated topic's popularity versus the estimations of competences.

Students estimate the popularity of the syllabus topics by choosing the points between Do not Like at All (value 1) and Like Very Much (value 5) on the five point Likert type scale. The selections from 'Yes', 'Partially', 'Only very simple form' to the 'No' in multiple-choice question 'Can you produce your own multimedia learning materials after you finished the course?' estimate the achieved competences: Table 4 shows the relation between the popularity of the syllabus topic and the estimated competences.

**Table 4. The popularity of syllabus topics by estimation of competences**

Can you produce your own multimedia learning materials after you finished the course?	$\bar{R}$	$\chi^2$	P
Yes	95.26		
Partially	73.27	8.840	0.014
Only very simple forms	75.59		

The value ( $\bar{R}$ ) represents the estimated popularity where a higher value means the higher popularity of the syllabus topic. The results show that students who estimate their competences for multimedia learning materials production higher (answer Yes) estimated the syllabus topic as more popular ( $\bar{R} = 95.26$ ). Lower estimations of competences show a significantly lower popularity ( $\bar{R} = 75.59$  and  $\bar{R} = 73.27$ ). The difference between estimations is statistically significant ( $P = 0.014$ ). Results are confirming the expected relation between popularity and competences. Therefore, the learning contents of the syllabus topics should be constantly adapted to be popular (interesting) by the students. Popular or interesting syllabus topics and learning contents will help and stimulate students in developing competences.

### 3.3. Student's motivation for ICT implementation into the teaching process

Presumably, the interests expressed for the particular syllabus topics have their influence on the level of motivation for implementing of ICT into the teaching process. We assess the student's motivation by multiple-choice question 'Intention to implement ICT into your own teaching process' with the set of choices: Always, Often, Occasionally, Rare, Never - prefer traditional teaching approach. Table 5 shows the frequencies of selected choices. Table 6 shows the selections by the generation (academic year).

**Table 5. Motivation to implement ICT in the teaching process**

Intention to implement ICT	f	f%
Always	40	23.7
Often	72	42.6
Occasionally	43	25.4
Rare	10	5.9
Never – prefer traditional teaching	4	2.4
Total	169	100.0

Most students have the intention to implement ICT into their teaching process regularly. However, about 23.7% of students intend to implement ICT in almost every situation during their own teaching process. Such attitude may relate to the fact that pre-service teachers have lack of experiences in aspect of didactical use of ICT and teaching practice. They are not yet aware of the postulate that support of ICT is not appropriate for every didactic situation or scenario (Dagdilelis & Papadopoulos, 2010). About 25.4% of students intend to implement ICT occasionally. Some students prefer traditional teaching without support of ICT. In contemporary teaching, such attitude is nothing more than curiosity.

**Table 6. Motivation to implement ICT into the teaching process by academic year**

Academic year Intention to implement ICT into your own teaching process	2014/2015		2016/2017		Total	
	f	f%	f	f%	f	f%
Always	11	13.9	29	32.2	40	23.7
Often	34	43.0	38	42.2	72	42.6
Occasionally	26	32.9	17	18.9	43	25.4
Rare	5	6.3	5	5.6	10	5.9
Never – prefer traditional teaching	3	3.8	1	1.1	4	2.4
Total	79	100.0	90	100.0	169	100.0

The results show the positive trend in motivation to implement the ICT means into the future teaching processes during the past two years. The portions of expected regular (often) use of ICT remain the same by every generation of students. The intention of younger students to implement the ICT in every situation has grown significantly regarding the previous generation. Simultaneously, the portion of occasional use of ICT found by the older students has decreased by younger generation. The difference between generations regarding the rising motivation is statistically significant ( $P = 0.028$ ). The overall result is positive, indicating the rising motivation for implementation of ICT into the modern teaching process.

### **3.4. Motivation of students to distribute learning materials by the LCMS Moodle**

According to the previous results, the topics of production of multimedia elements and distribution of learning content by Moodle are among the most interesting ones. Since for the distribution of multimedia learning materials LCMS systems like Moodle are required, the result is somewhat expected. We assess the student’s motivation to distribute the learning materials by Moodle with the multiple choices question ‘Will you distribute the learning materials by the Moodle?’ Table 7 shows the selected choices and the analysis by the generation (academic year).

**Table 7. Motivation to distribute learning materials by LCMS Moodle by academic year**

Academic year Intention to distribute the learning materials by Moodle	2014/2015		2016/2017		Total	
	f	f %	f	f %	f	f %
Certainly	21	26.6	45	50.0	66	39.1
Possibly	44	55.7	38	45.2	82	48.5
Only if I have some spare time	6	7.6	1	1.1	7	4.1
Only if requested by the staff	3	3.8	2	2.2	5	3.0
I don't like such kind of distribution	1	1.3	0	0.0	1	0.6
Don't know	4	5.1	4	4.4	8	4.7
Total	79	100.0	90	100.0	169	100.0

The motivation for distribution of learning materials by Moodle is present. About 39.1% of students will distribute their own learning materials by Moodle. However, we have to deal with about 48.5% of students who are uncertain if they will use Moodle for the mentioned purpose. According to our former internal studies about Moodle in education and experiences, we assume that the reason for uncertainty is in many Moodle functionalities, which are hard to master during the ICT in the Education course. More than about 35% of students between academic years 2012 and 2016 share the opinion that good ICT skills are required to work with Moodle. Although findings the trend of motivation for the learning materials distribution by Moodle is growing, the expressed intention is significantly higher ( $P = 0.014$ ) by the younger students as by the older generation. Additionally, the growing trend supports the analysis of decreasing portions of students who are uncertain in their intention to distribute the learning materials by Moodle, during the past two years. The portion of students who are uncertain in their intentions has decreased from 55.7% in the academic year 2014/2015 to the 45.2% in the academic year 2016/2017. As shown in the table, the portions of choices expressing denial have decreased during the past two years.

#### 4. Discussion

The effective use of ICT in educational processes of teaching–studying–learning processes (TLS) requires a digitally competent teacher. A teacher can become digitally competent if adequate ICT structure of learning materials during teacher’s education is used. However, the preparation of study contents should consider previous knowledge and skills of pre-service teachers or students as representatives of generation Z (digitally enhanced generation). Therefore, the study topics should fulfil the objective – the students’ knowledge upgrade and increase students’ motivation for implementation of ICT in TLS processes. Our observations have shown that only popular and interesting study topics that take into account previous knowledge and skills of contemporary students can fulfil the objectives. Present study topics of the course ICT in education at Faculty of Education comprise syllabus topics required to educate digitally competent teacher. Syllabus topic of the course were analysed on popularity and motivation effect for implementation of ICT in student’s future teaching process.

The most popular syllabus topics are the implementation of ICT in the teaching process and multimedia elements production. Other syllabus topics are slightly less popular. The overall popularity of syllabus topics is satisfying and shows the study content’s influence on the student’s motivation for application of ICT in their future teaching process. A positive trend in motivation is noticeable by the younger generation of students. The popularity of multimedia elements production raises the higher expectations that teachers own multimedia learning materials will be the part of their future teaching process. This speculation supports the analysis of the relation between the popularity of this particular syllabus topic and students’ estimated competences for preparation of multimedia learning materials.



Students who estimate this syllabus topic as most popular also estimate their competences much higher than others do. The popularity of syllabus topics or more precisely the interesting learning contents has therefore some positive influence to the student's development of competences.

During the past two academic years, the syllabus topic about the distribution of learning content by Moodle has become more popular. It is possible that the newer version of the Moodle is responsible for the positive trend because these topics are significantly more popular by the younger generation of students.

The majority of students intend to use ICT in the teaching process; some of them in almost every situation which is more a didactical issue. The motivation for ICT in education has significantly increased during the past two academic years. The portion representing the intention of only occasional use of ICT in the teaching process has dropped to about half during the past two years. Student's motivation for implementation of ICT in the TLS process is satisfying and shows the increased acceptance of ICT.

The motivation for the implementation of ICT is directly in connection with the intended distribution of learning materials by the LCMS Moodle. Students of younger generation are highly motivated to take the advantages of Moodle. However, the portion of about the half of the students from both the generations are still uncertain about Moodle. The reason is in large set of functionalities incorporated into the Moodle, which is far too complex software package to be mastered during the study course. Negative trend of Moodle disapproving students can also be observed and their absolute number is small in comparison to the course population.

The results of the study show the increasing acceptance of ICT in education. Positive trends show the growing popularity of some essential syllabus topic and rising motivation. Regarding the forthcoming generations, the necessary attention to the learning contents modification and constant research of trends is required for our future work.

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