DEVELOPMENT OF DIGITAL COMPETENCIES IN PRESCHOOL TEACHER TRAINING

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Abstract

Compared with the educational system early childhood education can be still considered as a newcomer in integrating information- and communication technology (further mentioned as ICT) into kindergarten teaching and learning process. Furthermore, the process of digital competencies development in teacher education and integrating ICT into pedagogical practice has not been widely researched. The purpose of the article is to analyse the development of digital competencies among kindergarten teachers during the studies and how teacher training supports the formation of digital competencies in kindergarten teachers. Also, how kindergarten teachers are able to integrate ICT into teaching and learning process. Research based design was followed during the research process.

The study was conducted in two phases. The first part of the study which was based on finding out how teacher training can support the development of digital competencies was carried out from October 2013 until March 2014. The second phase of the study which focused on how teachers can integrate ICT into kindergarten teaching and learning process was carried out from November 2016 until March 2017.

Results of the study demonstrate that the initial curriculum design and learning outcomes do not support the development of digital competencies in teacher training with the exception of minor speciality which is based on the ISTE competence model for teachers. Thus, the most important changes in curriculum design are integrating digital competencies into curriculum learning outcomes, course integration and collaboration among the academic staff in curriculum design. Furthermore, supporting the development of digital competencies of the academic staff and creating possibilities for practical technology use in higher education. The research participants also stated that modern technology can be used as a teaching tool, information searching agent, and while creating learning materials, as well as working with children, using a variety of software and technological solutions but it does not necessarily come down to digital competencies rather than teachers’ leadership and self-management skills.

Keywords: digital competencies, teacher training, early childhood education, curriculum development.

1 INTRODUCTION

Over the past twenty years there has been a surge in technology development and in this regard the important issue of information and communication technology (ICT) role and influence in the education system, including pre-school care. The main focus in educational institutions has moved from obtaining technological tools and creating systems to teacher training and using ICT in the learning process.

The computer age generation consider everything ICT related natural, interesting and exciting and are often exposed to technological tools in the first years of their lives. However, the use of technology in pre-school institutions learning process is less common [1]. The reasoning behind being the lack of funds to obtain ICT tools and the lack of skills and interest in teachers to integrate ICT into early childhood learning and teaching process. Technology basis alone is not enough to implement ICT into learning but requires the necessary skills and willingness to introduce and implement new technologies into learning and teaching. The effective implementation of modern technology and practical solutions into teaching and learning process is a priority all the strategies UNESCO ICT Competency Framework for Teachers [2] and the Estonian Lifelong Learning Strategy 2020 [3] that regulate the European and Estonian teacher training. The studies state that in order to support the development of teacher educational competencies it is critical that during the studies in teacher training the main focus is based on the use of ICT skills [4], and the practical skills for pedagogical conceptualising and directed implementation of technology [5].
1.1 The role of teacher training in the development of teacher digital competencies

The important part of professional development in preschool teacher training is to find balance between digital competencies and professional confidence [6]. Implementing ICT tools into teacher training holds an important role to avoid incompetence and demolish possible false models of using technology in early childhood education [7]. Teacher Education is responsible for both the subject based didactics and the specialized studies as well as pedagogical practice to provide learners with the context (in this case, the pre-school education learning process). This gives future teachers the context of the technological expertise that meet real-life opportunities and practical experience of effective possibilities of technology integration into the teaching and learning process [8], [9]. It is also important that preschool teacher training students and practitioners share the best practices and positive experiences [10], [6].

Previous studies point out that the hindering factor of teachers' digital competencies development and implementation may also arise in teacher training at different levels (both undergraduate studies as workplace training), which offers support to particular ICT skills in the content of technological solutions (programs, software), but with little attention to pedagogical analysis on using technology in early childhood education [11], [12]. Implementing the acquired knowledge and skills is most often prevented by the overload of new knowledge and lack of pedagogical practice and conceptualisation.

1.2 The role of digital competencies in integrating ICT into early childhood education learning process

Important part of comprehensive development in early years is the environment that learning takes place. Thus, it is the adults, in this case teachers’ role to create a learning environment that can support and motivate the learning process. ICT skills are largely based on previous experiences and access to technological tools [14]. Multitude of research states that nowadays children come into contact with technology as early as 1.5 years. Important aspect in using technology is the supervising adult, whether it being the parent or teacher who must act as a guide in safe use of the tool [13], [14], [5] and analyse the possible threats to the child's' development when using new technologies [15], [16]. The adult must serve the role of encouraging the use of technology, increasing the child's' self-confidence, allowing them to explore and experiment and to become a competent user of ICT.

Integrating ICT into learning is most of all connected to the teacher's personality and attitude towards the implementations of ICT, which are significantly Influenced by the teacher ICT skills and experiences. The ability to integrate technology in the learning process and the desire for self-development in the field (finding new technologies and solutions, collecting and distributing best practices) are the main prerequisites for the implementation of technology [17], [18], [19], [20].

Various studies point out that the main issue in implementing technology into learning are the teachers’ attitudes towards new technology [8]. Also, the insufficient training, skills and experience, including the lack of time to introduce new ICT tools (both hardware and software) into teaching process [11]. Furthermore, the lack of resources and the support from the higher levels of the organisation [10]. Finally, the confidence in using ICT tools and didactic competencies that would give courage to experiment with various technological tools and solutions [6].

Previous research highlight the implementation obstacles relating particular technology and the teachers attitudes towards integrating ICT tools into learning process. Furthermore, as of now there has been few studies that explore the changes that are needed in teacher training to support the development of teachers’ digital competencies and how to integrate ICT into early childhood learning process. The aim of the article is to provide an overview of the development of kindergarten teachers’ educational technology competencies in preschool teacher training and the level of the necessary changes in teacher training to support the development of educational technological competence of the future kindergarten teachers. It also analyses the educational possibilities of integrating educational technology competencies in early childhood institutions in the opinions of kindergarten teachers and the leaders of their institutions.

2 METHODOLOGY

Research based design was followed during the research process and the study was conducted in two phases.
The first phase of the study which was based on finding out how teacher training can support the development of digital competencies was carried out from October 2013 until March 2014.

In the first part of the study a mixed method of quantitative and qualitative research was used to create a broader picture of the study. The first part of the study was divided into two sub-steps (referred to as sub-steps 1.1 and 1.2).

Sub-step 1.1 focused in curriculum document analysis with the aim of assessing the development of digital competencies during the preschool teacher training studies and how ICT is reflected in the curriculum learning outcomes, activities, environments and teaching materials. Analysis was carried out based on the undergraduate programmes targeting preschool teacher training primary studies. Protocol analysis was used to analyse the curriculum documents and the categories were based on assessment model ISTE (2014) standards for teachers (facilitate and inspire student learning and creativity; design and develop digital age learning experiences and assessments; model digital age work and learning; promote and model digital citizenship and responsibility; engage in professional growth and leadership).

For data collecting in sub-step 1.2 and objective based two sample groups were created. First sample included preschool school teacher training students who took part in group interviews in sub-step 1.2. The second sample group included lecturers who similarly took part in sub-step 1.2 individual and group interviews. The first sample group included 102 students and the mean of the age was 29.5 years. The second sample group included 5 lecturers with 1-7 years of work experience and all of the participants had master's level education.

In sub-step 1.2 interviews were conducted with preschool teacher training students and didactics lecturers. Interviews allowed to get an overview of the lecturers’ opinions on how teacher training supports the development of digital competences. The interviews conducted with students allows to get a complete view on how students evaluate the possibilities to use ICT in kindergarten learning process and the role of teacher training in obtaining digital competencies proficiency. During the data collection process during March-April 2014 two paired interviews and one individual interview was conducted both the lecturers and also group interviews with students. All the conducted interviews ranged between from 23 to 30 minutes. Qualitative data analysis was conducted based on the survey questionnaire and open-ended questions in order to describe the participants’ opinion on the role of preschool teacher training in digital competence development.

The second phase of the study focused on how teachers can integrate ICT into kindergarten teaching and learning was carried out in two sub-steps (sub-step 2.1 and sub-step 2.2) from November 2016 until March 2017. During the second phase of the study a curriculum document analysis and semi-structured interviews with kindergarten teachers and their institutions leaders was carried out.

Sub-step 2.1 included preschool teacher training elective module educational technologist curriculum document analysis. The course programme gives an overview of the course, introduces learning outcomes, course content and the evaluation method. The document analysis used ISTE standards for teachers [21] and digital competence model DigComp [22].

Based on the assessment model of ISTE standards for teachers the learning outcomes stated in the elective model course programmes were divided in five key categories:

- Facilitate and inspire student learning and creativity;
- Design and develop digital age learning experiences and assessments;
- Model digital age work and learning;
- Promote and model digital citizenship and responsibility;
- Engage in professional growth and leadership.

ISTE standards for teachers’ education technological competence model highlights the skilled use of digital tools and expertise, but does not recognize the need for technological knowledge. Digital competence model DigComp also reflects the technological tools handling skills. Thus, the analysis of the curriculum documents was carried out in two stages implementing the digital competence model DigComp five categories:

- Information;
- Communication;
- Content Creation;
DigComp digital competence model reflects the necessary skills of the citizens in 21st century.

Sub-step 2.2 focused on semi-structured interviews with kindergarten teachers and their institutions leaders. The sample included six teachers who choose the elective module education technologist in preschool education during their studies in teacher training and six of their workplace leaders, including head teachers, directors and acting directors. Interviews allowed to find out the knowledge and skills acquired during the studies in preschool teacher training and which are the possibilities to integrate education technological competencies into kindergarten learning and teaching process. Furthermore, it allowed to analyse the beliefs of the kindergarten leaders in using educational technology in kindergarten and their readiness to support the teachers in planning and implementing technological solutions in learning and teaching. Based on the research findings a comparative analysis was carried out in order to connect the curriculum document analysis and interview results.

3 RESULTS

3.1 Development of digital competencies in preschool teacher training

The first phase of the study revealed that preschool teacher training curriculums include the learning outcomes to support the future teacher to recognize information and communication technology usage possibilities and implement innovative approaches to early childhood education. Also, the learning outcomes in the curriculum, including modules and subjects suggest that teacher training will support the formation of the future kindergarten teachers’ educational technology competences. Research analysis showed that according to the standard category of teachers’ educational technology competences the preschool teacher training curriculums supports foremost the skills to design and develop digital age learning experiences and assessments. Also, the research analysis showed that the curriculums include learning outcomes that subsidize the skills development to facilitate and inspire student learning and creativity. This translates to teachers’ ability to create multimedia (animation, video, image) and integrate its possibilities into learning. Furthermore, the research states that the preschool teacher training supports the skills for modelling digital age work and learning by conducting training sessions, supporting and advising teachers and parents in using ICT tools and also ascertain possible ICT development trends. Based on the research the least supported aspect in preschool teacher training is the teacher involvement in being a part of digital society and teachers’ skills to engage in professional growth and leadership. The graduate student competencies are presented in broader terms, including computing skills and basic rules for using internet. Curriculum addresses the IT-related legislation, copyright and data protection requirements and licensing issues.

Lecturers and students’ skills and attitudes towards integrating ICT into kindergarten learning process. Both students and lecturers who participated in the study acknowledge the wide range of ICT application opportunities. Attitudes towards the use and implementation of information and communication technologies in the learning process and kindergarten were overwhelmingly positive according the lecturers and students in teacher training. However, there were also students who participated in the study, whose attitude towards the use of the technology in kindergarten learning process was negative, justifying it in the first place with well-established teaching traditions, but also with the lack of resources and the negative attitude of the parents and the administration. Although the surveyed students brought out both the obstacles of using technology as well as negative attitudes towards implementing technology to the learning process, they also provided a variety of solutions to overcome obstacles. Solutions they saw were cooperation between teachers and parents, which allows teachers to use more technological and pedagogical resources. Lecturers stated that technology is a priority in terms of implementation possibilities in subject didactics. Also in creation of various learning games and teaching materials, and consider it important to make sense of the purposeful use ICT and quality of technology and furthermore to analyse the risks and dangers while using technology.

In students’ opinion, the teacher training gives new knowledge, thoughts, ideas, energy and broadens their horizons and encourages them to test various technological options while teaching children. Lecturers who participated in the survey recognized that the implementation of technology in teacher education hinders behind their own knowledge and skills of both technological and pedagogical opportunities. Furthermore, they think that to develop skills and to find new ways for using new
technologies it is important to participate in various trainings, learn from colleagues, as well as to self-study. Lecturers who participated in the survey offered that for the formation of educational technology competences the combination of didactics, pedagogy and practice is a solution for future teachers. Also, self-improvement, and the implementation of new methods in teacher training leading teacher training to provide enough context-driven, technology applying learning process modelling examples and the use of information and communication theory in teacher education to reach the pedagogical practice.

Research analysis showed that according to the standard category of teachers’ educational technology competences students rated most highly their ability to use modern teaching and assessment tools, and serve as a model for the digital age work and learning culture medium. Professional development and leadership for digital age were rated the lowest by the students who took part in the research. Students view that experiencing success and gained practical experiences in teacher training motivate the student to use technology in kindergarten learning process but consider that teacher training offer far too little practical skills to implement the technology in kindergarten learning process.

3.2 The role of the elective module educational technologist in kindergarten in supporting the development of digital skills and integration possibilities in kindergarten learning process

The study revealed that the teacher training curricula elective module supports primarily the development of teaching abilities in technology enriched environment and the formation of the skills for planning, customizing and evaluating learning activities in technology enriched learning environment with implementing digital technology. Furthermore, the study shows that the elective module also supports the professional development of the kindergarten teacher, and implementation of leadership skills in teaching and learning with digital tools. The study revealed that the elective module course description cards need to be supplemented with learning outcomes that reflect the development of teachers’ skills for encouraging the students to develop creativity through learning. Also, the learning outcomes that reflect the development of skills that support the teacher to become a part of the digital society should be presented in the course description. Furthermore, the elective module should be analysed and aligned with the competency models in order to support the development of formative and summative assessment skills.

The teachers who participated in the study stated that the elective module holds an important role in the development of educational technology competencies. The teachers considered educational technology practice to be an important part in shaping the technological competences and highlighted that the implementation of the theoretical knowledge in practice allowed them to become confident in their competencies. In addition, the teachers considered using ICT in teaching and learning process important and stressed that the premise of using technology in kindergarten is the existence of infrastructure, support of the colleagues and the mind-set to carry out learning activities with technology. Furthermore, the teachers said that integrating ICT into learning process is not complicated but requires thorough planning and preparation. Teachers participating in the study stated that they mostly use computers, robotics and smartphones in teaching and learning. The teachers also stated that using web-based programmes and learning environments helps learners ‘with different learning abilities to be an active part of the learning process.

The study revealed that kindergarten leaders consider educational technology in pre-school institutions important and stated that the primary advantage of the teacher with educational technology competencies is the skill to consult and support various target groups in using technology for teaching and learning. They also stated that using technology in learning process does not necessarily acquire technological competencies but the teachers’ interest and motivation to use new technology. The kindergarten leaders who participated in the study pointed out that purchasing the technological tools is supported by the government and a part of the annual budget for kindergarten includes the maintenance of the infrastructure.

4 CONCLUSIONS

In conclusion using ICT in early childhood education requires both technological tools and digital competencies and furthermore teacher training which supports the development of skills and knowledge [7]. The study revealed that the preschool teacher training curricula includes the outcomes
that state the future teachers’ ability to identify possible uses of information and communication technology and implement innovative approaches to early childhood education. They also include a variety of educational technology courses although most are included in the elective module education technologist in kindergarten and are compulsory for students who have chosen the module. Research revealed that the elective module does not support systematic development of preschool teachers’ digital competencies.

Based on the research data analysis it can be said that the elective module supports mainly the development of skills and knowledge to integrate ICT into learning and teaching programme. Furthermore, the learning outcomes state that the elective module supports the development of knowledge to support colleagues in using ICT in early childhood education and also personal development skills. Further curriculum development activities include integrating learning outcomes that support the development of technological skills and knowledge and also, conducting research using digital tools. In addition, teacher training should offer the support for developing skills for using innovative learning methods and tools and for contributing in the development of children's' creativity. Moreover, it is important that the learning outcomes should state the possibilities for contributing in the safe use of ICT skills in early childhood education.

During knowledge acquisition it is important that all learning styles are supported equally and attitudes can be developed through critical analysis and assessment [20]. The students who participated in the study stated that teacher training holds an important part in developing digital competencies and education technology practice supported the integration of ICT into kindergarten learning process. The kindergarten leaders who took part in the research stated that digital skill are not the main aspect in using ICT but brought out that teacher with the knowledge and skills to use technology in learning are more equipped to support colleagues.

Teacher training lecturers evaluated students’ ICT skills high and brought out that often the knowledge derived from previous experiences. The lecturers also stated that students cope with using technological tools during their studies but lack in creativity and use the same tools repeatedly.

Implementing technology into learning process is mostly affected by the teacher perceptions, attitudes and concepts of learning and teaching [6], [8]. Both students and lecturers considered using ICT in early childhood education important. Lecturers stated that in using ICT in subject didactics it is critical to draw attention into conceptualise the use of technology to support the development of preschool children and also assess the possible threats. Although previous research [19] state that teachers mostly use ICT in planning the teaching process and creating learning materials, but not in pedagogical and didactical context the current study revealed that in students opinion technology can be used both in planning and carrying out teaching and learning with using various hardware solutions and technological tools. All of the participants stated that it is important to focus on the quality of learning and provide safety in using digital tools.

However, there were students whose attitude towards the implementation of technology in the learning process was negative emphasizing the importance of traditional teaching methods, but also a lack of funds and the negative attitudes of parents and workplace leaders. The reasons for the negative attitudes of teachers also suggested the lack of skill and experience in the use of technology, which is also shown in previous studies [11]. In conclusion, the study showed that the implementation of technology is affected in particular by teachers' attitudes, inadequate training and a lack of skills and experience.

Integrating ICT into teaching and learning environment supports the development of self-directed learner and enables the learners motivation to acquire new knowledge [5]. The participants stated the use of ICT is driven by technological resources, kindergarten capabilities and support from different focus groups including colleagues, parents and workplace leaders. The results also reveal that important technological solution include web-based programs and learning environments that allow to support different learning traditions and patterns. In addition, the teachers said that the integration of technology in the learning process is not difficult, but requires thorough planning and technological expertise.

The kindergarten leaders who participated in the study stated that prerequisite for the skilful use of technology and advanced training. Also, they evaluated that purchasing the technological tools is supported by the government and a part of the annual budget for kindergarten includes the maintenance of the infrastructure.
In conclusion, it can be pointed out that the future kindergarten teacher digital competence development is based on the didactics, pedagogical knowledge and practical skills of the teaching staff. Furthermore, the cooperation, self-development of new methodologies in teacher training that would provide enough context-driven and technology based integration into the learning process planning [7].

In teacher training it is important to develop the students technological, pedagogical and didactic skills. A significant role in curriculum development and implementation is the collaboration of the academic staff and also self-development played by teachers in the faculty, whose cooperation in curriculum development and implementation, continuous self-improvement which allows students to develop a holistic vision of the learning process in a kindergarten. This in turn has an input for pedagogical practice, where theoretical knowledge is applied in practice cultivation. An important aspect of ICT in kindergarten and teaching process is also the technological infrastructure in workplace and the support of the kindergarten leaders. Thus, supporting the development of digital competencies that ensure the effective implementation of modern technologies kindergarten learning process.

The results of the research allow to propose and implement changes to teacher training elective module education technologist in kindergarten in order to support the development of digital competences in all categories.

REFERENCES


