Handicraft and Home Economics Teachers' Understandings of the Possibilities of ICT Usage in Their Practice

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Abstract: Manual activity has been considered as an essential component of personality development for a couple of centuries in Estonian education. Although handicraft and home economics (HHE) is school subject where the student obtains basic skills that are constant in time, its content is also reactive to the changes in the society. One might think that using ICT is the opposite of the physical process of making with hands and that HHE subject's predominantly practical content has difficulties when trying to keep up with rapid digital development. People like to make things by hands and share them not only on the pragmatic purpose, but also for sense of belonging. As digital technology has become part of our everyday life, therefore it may be viewed as an extension of the physical space offering a meeting place where it is possible to act, find like-minded people and meaningful information without the limitations of physical world. The aim of the study was to find out HHE teachers' understandings of the usage of ICT tools in subject teaching in the compulsory school. Data consisted of teachers' writings where they described the personal experiences of using ICT tools. Writings were analysed using inductive coding. The results of the study show that HHE teachers' readiness to use ICT tools is dependent of their subject specific views. Even if HHE teachers see digital technology as a part of daily life that can be integrated in their work they do not use the full potential of new possibilities. Their writings showed lack of digital pedagogical skills and inability to apply modern technologies in student-centred instruction.

Keywords: teachers' understandings, ICT, school education, handicraft, home economics.

Introduction

Working with hands is one of the main activities of the human being. Humans have a natural desire and need to use their hands in a satisfying and harmonious way (Kojonkoski-Rännäli, 1995). Although some craft skills have lost their necessity due to the social changes, their educational and psychological significance have remained until today (Pöllänen, 2009). In Estonian education, manual activity has been considered as an essential component of personality development and with a few exceptions craft has been a school subject since the early 19th century (Lind, 2009). Presently, craft skills are taught under the subject field Technology throughout the basic education (National curriculum…, 2014): the subject is called handicraft in the first stage of school (grades 1-3). In the second and third stage (grades 4-9), pupils are divided into two groups learning either handicraft and home economics or technology education. Craft subject reflects school's two-fold nature. On the one hand, the aim of the general education is to maintain traditions and pass on accumulated important knowledge. On the other hand, it is future oriented, trying to prepare individuals who can cope with the ever-changing world. Even if making artefacts and precise mastery of techniques has been the central goal of the earlier craft subject syllabi (Lind, Pappel, 2007), then in today's world, the aim of developing craft and everyday skills is to promote the emergence of new ways of thinking (Karppinen, 2006).

One might think that using ICT tools is the opposite of manual activity and therefore handicraft and home economics (HHE) subject has difficulties responding to the changes in society brought by the digital revolution. S. Karppinen (2006) finds that teaching crafts at its best helps a person independently look for and find the sources of her willingness, inspiration and making, and introduce those processes to others as well. As digital technology has become part of everyday life, the virtual space can be seen as the extension of the physical space (Nevejan, 2003). Our living environment is closely related to the changes that digital revolution has brought to the mode of living. For that reason, home economics' subject content should also focus on those topics.

ICT resources have become important leaning tools today (Sánchez, Marcos, 2012). Accordingly, Estonian National Curriculum for Basic Schools states that, in addition to subject knowledge, pupils should be taught to use those resources. ICT related themes are embedded across the curriculum as a general competence and a cross-curricular topic called Technology and Innovation (National curriculum …, 2014). For example, digital competence gives pupils the ability to use constantly

renewing digital technology for learning, communicating, finding and evaluating information, and participating in society through online engagement. Subject teachers are supposed to integrate and shape ICT related skills in everyday learning. It is expected that teachers know technological possibilities and apply them effectively in the teaching. Such expectation might prompt teachers to doubt their basic knowledge and change their action (King, 2002). However, the lack of digital competence and high expectations may also cause additional tension in teachers – bring confusion, discouragement and frustration (Pruulmann-Vengerfeldt, 2012).

Despite the investments aiming for successful implementation of ICT resources in the education, the anticipated results are not always achieved. A study carried out in Estonia on the use of ICT in various school subjects showed similarly to the study cited by C. Buabeng-Andoh (2012) that ICT finds the least usage in the classes that require creativity and practical skills – only 27 % in technology education, handicraft and home economics (Prei, 2013). Mere availability of digital tools in school is not sufficient for ICT to be used for the intended purpose in the learning process (King, 2002). Successful usage of technology in the classroom is related to the positive or negative attitudes of the teachers (Gibson, Stringer, 2014; Sabzian, Gilakjani, 2013).

The factors that affect teachers' understandings and judgments can be either personal, organisational or technical. Firstly, teachers find it important that chosen tools add value to teaching and learning. If teachers do not feel the necessity and benefits of technological tools, they probably do not integrate new ways of teaching (Li, 2007). Both M. Fullan (2012) and P. Luik (2010) emphasize that using ICT should not become an end in itself, but should essentially support pupils' learning. P. Ertmer, A. Ottenbreit-Leftwich (2012) and C. Buabeng-Andoh (2012) show that teachers are more likely to use ICT in their teaching when they are aware of its positive impact and benefits.

Secondly, innovative use of new technological resources is connected to teachers' teaching styles. Student-centred (constructivist) approach is directly related to successful utilization of digital technology (Ertmer, Ottenbreit-Leftwich, 2012). Educators who use teacher-centred approaches tend to use presentation software just to replace printed books, while student-centred instruction sees pupils as active information seekers and offers possibilities to combine different technological resources. Unfortunately, as M. Fullan (2012) brings out, teachers are strongly attached to the old instructional approaches and thus not open to new ways of conducting effective lessons.

Additionally, teachers mention the lack of ICT-related knowledge and skills (Ertmer, Ottenbreit-Leftwich, 2012; Prei, 2013) and fear caused by inexperience (Teo, 2008; Buabeng-Andoh, 2012; Sabzian, Gilakjani, 2013) as important influence in digital technology deployment. Little experience may also cause negative attitudes towards ICT because educators do not have enough knowledge to evaluate the efficiency. Although teachers' digital literacy is important for the successful implementation of ICT, it is not necessarily the basis of the effective use of technology in education (Fanni, Rega, 2013). Researchers bring out that the availability and the convenience of use of digital devices (Mathews, Guarino, 2000; Prei, 2012), educational technology support (Luik, 2010), and systemic management of change (Fullan, 2012) have important influence. However, teachers' works load (Buabeng-Andoh, 2012); sex (Teo, 2008) and lengths of service (Mathews, Guarino, 2000; Sánchez, Marcos, 2012) seem to have less effect.

It is apparent from the foregoing that the effective integration of modern technologies in education is a complex process that includes the existing material basis and teachers' positive attitudes and methodological skills. Although studies (Pruulmann-Vengerfeldt, 2012) provide insight into the use of ICT in Estonian schools it is still unknown what HHE teachers think and feel about the use of digital technology in the classroom. Therefore, **the aim** of the present study is to find out teachers' understandings of the possible use of ICT to promote the development of HHE subject related competencies.

Methodology

The study follows qualitative research approach. Narrative writing data collection method was used to find out teachers' understandings. Our goal was to offer teachers a possibility to write a story about the use of ICT in their teaching practice. A web based environment was created where teachers could leave their replies. Teachers were asked to write about *their thoughts and experiences whether and how the*

use of ICT promotes student learning in HHE lessons (including motivation, acquisition and reinforcement of subject related knowledge and skills, presenting one's work, reflection). We aimed to highlight and emphasize the opinion and experience of teachers, value their knowledge and "voice" (Blake, Blake, 2012). It was anticipated that the gathered data supplements earlier quantitative studies conducted among teachers (Pruulmann-Vengerfeldt, 2012) by offering explanations and meanings.

The study was carried out in the autumn 2014. In the cover letter, teachers were asked to participate irrespective of their ICT usage. To understand whether and how the availability of digital equipment and the received training influence the understandings, teachers were asked to indicate these tools that they can use in their schools and give an overview of the ICT training they have received during last three years.

The call for survey participation was sent to the HHE teachers' mailing list and personally to 35 teachers. There were 26 respondents from 13 counties out of 15. 15 of the teachers worked in a town school and 11 in a rural school. Teachers' median length of service was 19 years. The longest and shortest length of service as HHE teacher was respectively 35 and 2 years.

To ensure respondents' anonymity, answers were numbered like this 1/14, 2/18. The first number indicates the sequence number of the respondent, and the second shows the length of service as HHE teacher. The initial reading of the main question revealed three clear understandings. The first, bigger group comprised of teachers who expressed a favourable mindset towards the use of ICT (n=21) and the second, remarkably smaller group was formed by the teachers who expressed disfavour (n=3). The content of the latter was not coded in further detail. The last group of the responses in which the mindset was difficult to evaluate (n=2) was left out of analysis.

The writings expressing favourable attitude were analysed using inductive coding and categories were created for the emerging themes (Shreier, 2013; Miles, Huberman, 1994). Each writing was considered as a whole. The categories were formed as continuation to the sentence "ICT in HHE learning as a tool for…". To enhance the credibility of the results, each researcher (n=3) read the texts several times and composed a preliminary list of categories. Coding was performed individually, and then the results were compared with each other. Revealed categories were largely similar. Single differences were analysed together and final framework was formed.

Results and discussion

The analysis of the background information concentrated on the digital equipment and teachers' participation in ICT trainings. The answers show that the respondents' schools have provided the primary digital equipment to be used in the instruction. However, teachers' ideas and options are limited by the lack of the individual digital devices for students. The results confirm the study (Prei, 2013) conducted in Estonian general education schools, according to which other ICT tools are gaining popularity besides the PC, Internet and projector – for example, in the HHE classes, tablets, smart phones, digital cameras, document cameras. The respondents had participated in a wide variety of ICT trainings from word processing to subject specific courses. Nonetheless, in the context of current study, it is not clear how participation in trainings affects teachers' mindset towards ICT use. For example, a teacher who has not taken any courses over the last years describes how she uses videos to expand students' horizons.

Teachers' writings show that they do see the possibilities for ICT usage in the so called "skill subjects". However, instead of writing their thoughts and experiences whether and how the use of ICT in HHE lessons is beneficial to learning, teachers merely described the activities that can be done with the technological means, narrowing the topic to the selection and use of ICT tools. It appears that teachers are unable to see how ICT could promote the achievement of subject related competencies. Teachers who expressed favourable opinion reported the possibilities of using ICT (based on who uses the tool and what for) as follows: for teacher to illustrate the lessons (20), to simplify teacher's work (6), for teacher to create and organize study materials (5), for teacher to archive and share study materials (3), for student to present their work (15), for student motivation (11), student's source of information (9), student's learning environment (7), for student to carry out their task (8), for student to create content (5), for teacher and student communication (6).

Next, the results are discussed following the categories listed above. First, the overview of the use of ICT from teacher's point of view is given; then, as a tool for student, and last, as an option which brings together teachers and students. Educators use ICT to prepare and conduct their classes, and for the activities afterwards. Teachers see ICT mainly as a tool that facilitates illustrating HHE lessons. They mentioned activities such as presenting, showing or introducing study materials. Illustration has moved from the paper to the virtual environment and the demonstration of techniques from manual demonstration and pre-prepared examples to the "big screen".

> *It is convenient to introduce a new topic with a slide presentation.* Teacher 8/35
> *Document camera is a wonderful device for projecting new techniques on the big screen*. Teacher 6/18
> *One can display pictures from the books or show handicraft techniques with the document camera on the big screen*. Teacher 9/24

Teachers use ICT as a tool that simplifies their work and helps to create versatile learning environment. For example, they mention easily editable templates for worksheets or presentations.

> *I think it is a lot easier later, once the study material is generated electronically, tested in the classroom and the necessary additions or corrections made.* Teacher 25/2
> *Lots of illustration, I could never prepare so many examples.* Teacher 15/16

When planning their classes, teachers use digital devices to create and systematize study materials. They do not only put together or prepare new matter, but also adapt what they find online to suit their needs.

> Teacher 6/18: "*In addition to the preparation of study materials and presentations, it is good to organize and manage the collections of pictures and sewing patterns in the online environments."*

From the home economics perspective, teachers pointed out looking for, collecting and adapting the recipes. After teaching, teachers use digital tools to capture, archive and share the results of students' written and practical tasks. If previously the products were collected and stored for the annual exhibition, then modern technology allows new ways to present students' works. Teachers mention the compilation of online exhibitions or attending those on school, district, national or even international level.

Teachers' texts revealed that, compared to themselves, they see more versatile ways how students can use ICT tools. However, most examples are given of students using technological means to present their work.

> *Pupils like to make their presentations in PowerPoint, take photographs of their work…* Teacher 18/35
> *Students introduce their practical works and home economics research with the presentations.* Teacher 20/10
> *The presentations of the projects cannot be performed without the PC, either. Previously taken digital photographs of the artefacts are added to the presentations*. Teacher14/30

One of the teachers (6/18) brings out that using slide shows has a deeper meaning: "P*utting together slide shows has become an important part of HHE classes as it develops presentation skills."*

Several teachers see pupils using ICT to find motivation and collect ideas. Here, teachers highlight mainly online environments that bring together different media (e.g. Pinterest) where one can "*look for ideas for their work*" (Teacher 13/12). Teachers guide students to the websites related to subject field with the aim to "*put students' thought in motion*" (Teacher 25/2) and to "*stimulate interest in the topic*" (Teacher 20/10). In addition to searching for images, pupils look for ideas from the thematic videos online. Less are students guided to use ICT tools as the source of information to solve tasks in the classroom or at home.

> *Pupils use internet to work independently: … to look for food recipes in English and translate them*. (Teacher 13/12)
> *It is very convenient to let pupils search for the necessary information; it is even possible to immediately find the answer to specific questions* (Teacher 22/10)

In addition to being pupils' source of information, some teachers see ICT as learning environment that promotes individual learning, where the family members can be a target group as well. Teacher 12/9:

„*It is good to watch later the tutorials of difficult techniques on repeat, and the parents can also learn*." Plus, teachers bring out different websites where pupils can solve tasks independently, such as Garbage Wolf that teaches waste management or Ampser – a healthy eating meter for school kids.

In the HHE classes, students are mostly engaged with creative activities, the output of which is generally a practical item of product. Written work is less produced. Educators expressed that pupils can use ICT in HHE classes to make practical products, mainly by using electronic sewing and embroidery machine. Teacher 11/34: „*We use 4D Embroidery program in the computer class. Every year, we have at least one work where they can use a self-generated embroidery."* Significantly less was mentioned the use of ICT to create and edit written work.

A few teachers give examples how students can use ICT to create content in the HHE subject. They mention writing blogs, using joint work tools and creating portfolios.

> *Joint work tools are irreplaceable helpers in creative work projects.* Teacher 20/10
> *Students keep the diaries of their work on blogs.* Teacher 10/34
> *The possibility to create digital portfolio.* Teacher 15/16

The analysis of teachers' writings revealed that the only category bringing together two parties – the teacher and the student – is ICT as a tool for communication. Those who mentioned communication – though comparatively few – saw it in the direction teacher ↔ student and student ↔ student indicating their versatile and open approach to interaction process.

> *I communicate with the pupils mainly via Facebook Messenger because they do not read their e-mail every day.* Teacher 11/34
> *We were just summarizing our e-Twinning project with the Turkish students on the topic School Lunch. We communicated and exchanged videos on Facebook.* Teacher 18/35
> *It provides an opportunity to give feedback… and get fast feedback from the teacher.* Teacher 2/18

In conclusion, it can be pointed out that teachers find "*the ICT necessary*", because these tools "*give new possibilities to deal with the subject matter thoroughly*", "*promote*" learning, "*provide rich information sources for independent work*" and help to make classes "*more versatile*". "*Without ICT tools one cannot teach today*." (Accordingly teacher 5/24, teacher 16/24, teacher 22/10, teacher 24/28, teacher 1/14, teacher 9/24.)

The results of the current study show that HHE teachers see digital technology as a part of everyday life and as the extension of the physical space (Nevejan, 2003) that they can apply in their daily work. Teachers emphasize that also in HHE it is important to keep up with the technological change (bring new technology in the classroom). Similarly to the problem indicated by C. Buabeng-Andoh (2012), Estonian HHE teachers, too, integrate ICT in rather limited and one-sided ways. Like in the results of E. Prei's study (2013) and what M. Hölttä (2014) has brought out, HHE teachers see the role of ICT above all as the facilitator of their own work and to generate interest in learners. The latter has important role in HHE classes and, therefore, the result – teachers presenting slide shows, pictures, videos and sounds – is anticipated. Making presentations gets a slightly wider meaning when teachers describe students' possibilities to introduce their work. A student who has created something with her own hands in the product development process wishes to share the result with others, to get support or recognition (Gauntlett, 2011). For that reason, the application of digital technology in so called "skill subjects" would be very suitable.

The results of current study do not answer the question how teachers see ICT's role in promoting learning. Teachers' responses reflect the concept of learning where the emphasis is on teaching and teachers. This may reflect teachers' relationship with the strongly rooted traditional ways of instruction where the role of supporting pupils' learning is significantly subordinate. The analysis of teachers' writings show that teachers use ICT in the subject lessons and they direct students to implement digital tools (e.g. presentation software). However, when it comes to the teachers' practices that promote the formation of digital competence in students (and the new ways of thinking and acting) there is still room for improvement. According to the National Curriculum (National curriculum…, 2014), the digitally competent learner can create content (texts, photographs and multimedia) and use digital tools in the problem solving. Plus, it means awareness of the dangers of digital environments, and the ability to

protect one's privacy, personal data and virtual identity, and adherence to the same behaviour code as in everyday life.

The limited or no use of ICT may be the result of teachers' insufficient digital pedagogical skills to use such tools on educational purposes (King, 2002). Teachers need to learn and practice the integration of ICT to achieve the learning objectives so that the use of new technology will not become an end in itself (Luik, 2010; Fullan, 2012). Educators have acquired the basic skills to use digital tools (e.g. creating and organizing worksheets, archiving and sharing study materials), but now there is a need for more specific ICT skills. The respondents indicated their desire to become more professional by participating in further training courses and they expressed favourable mindset towards new digital technologies. This shows HHE teachers' need for subject related methodological ICT training.

Promoting either the establishment of teachers' communities where teachers could share good practices and innovative educational materials or the active participation in the existing ones, is one way to upgrade teaching staff's pedagogical skills. The examples of learning tasks that have been tested in classroom give ideas and help provide a fresh outlook on the possibilities of ICT. New methodological knowledge and experience gained from the trainings and teacher communities can turn educators to re-evaluate their current practices or change their non-favourable mind-set (Rogers, 2003). The implementation of ICT resources requires multiway action, only then can digital tools, instead of being a modern instrument, become means to create student-centred learning environment.

Some teachers see the wide variety of examples offered by the virtual world as possible factors hindering pupils' creativity. However, the aim of HHE education today – on the one hand, to preserve the traditions, and on the other, to prepare students to cope in an ever-changing world – should not be forgotten. For example, it is not possible to teach in detail all the knowledge and skills needed in human life in home economics classes. Therefore, it is important to direct the instruction so that the pupils learn to guide their own actions (Hölttä, 2014) and look for the necessary knowledge. Self-directed learner needs comprehensive – including social – support.

The deliberate use of ICT in student-centred teaching could become a place where learning and collaborative activity meet in interaction. For pupils, one such possibility in HHE subject would be the chance to show the results of one's creative work through web-based collaborative content creation to a broader public (Karppinen, 2008). Different communities and sharing one's thoughts online (keeping a blog) offer chances to present individual or jointly made work to a wider community. Thereby gained positive comments motivate the students' further action and learning. At the same time, the student becomes a social human being who participates in cultural development and wants to face challenges also later in life (Karppinen, 2008). Most likely, such communities will slowly play an increasing role in pupils' development and lifelong learning.

Conclusions

In summary, it can be argued that Estonian HHE teachers' mindsets towards the use of ICT depend on teachers' understandings of the subject's learning objectives. Since practical activities and outcomes play a major role and, therefore, illustration has an important function in this subject, teachers mostly see digital technology as a helping tool for the latter.

The teachers who participated in the study expressed favourable attitude towards the integration of ICT in teaching, but their writings showed lack of digital pedagogical skills and inability to apply modern technologies in student-centred instruction. The main objection of those who expressed unfavourable mentality was related to the use of helping materials present in the virtual environment. Teachers expressed concern that those materials suppress pupils' creativity. Since students use independently the opportunities offered by digital environment on the daily basis handicraft and home economics should also aim to provide students with skills to operate in today's information overload. The further goal should be, instead of imitating the existing ideas, to use them as the source of inspiration and suitable solutions.

Bibliography

1. Blake R.W.J., Blake B.E. (2012). Introduction: What are Narratives and Why Use them in Teacher Education? In R.W. Blake R.W., Blake J.B.E. (Eds.). *Becoming a Teacher: Using Narrative as Reflective Practice: a Cross-disciplinary Approach.* New York: Peter Lang, pp. 1 – 11.
2. Buabeng-Andoh C. (2012). Factors Influencing Teachers' Adoption and Integration of Information and Communication Technology into Teaching: a Review of the Literature. *International Journal of Education and Development using Information and Communication Technology*, Vol. 8 (1), pp. 136 – 155.
3. Ertmer P., Ottenbreit-Leftwich A., Sadik O., Sendurur E., Sendurur P. (2012). Teacher Beliefs and Technology Integration Practices: a Critical Relationship. *Computers and Education*, Vol. 59 (2), pp. 423 – 435.
4. Fanni F., Rega I., Cantoni L. (2013). Using Self-efficacy to Measure Primary School Teachers' Perception of ICT: Results from Two Studies. *International Journal of Education and Development using Information and Communication Technology*, Vol. 9 (1), pp. 100 – 111.
5. Fullan M. (2012). *Stratosphere: Integrating Technology, Pedagogy, and Change Knowledge*. Toronto: Pearson.
6. Gauntlett D. (2011). *Making is Connecting. The social meaning of creativity, from DIY and knitting to YouTube and Web 2.0*. Cambridge: Polity Press.
7. Gibson P.A., Stringer K., Cotten S.R., Simoni Z., O'Neal L.J., Howell-Moroney M. (2014). Changing Teachers, Changing Students? The Impact of a Teacher-focused Intervention on Students' Computer Usage, Attitudes, and Anxiety. *Computers & Education*, Vol. 71, pp. 165 – 174.
8. Hölttä M. (2014). Tieto- ja viestintätekniikka kotitalousopetuksessa. (Information and Communication Technologies in Teaching Household). In H. Kuusisaari, L. Käyhkö (Eds.), *Tutki, kehitä, kehity: Kotitalous yhteiskunnallisena oppiaineena*, Helsinki: BoD - Books on Demand, lk. 67 – 78. (in Finnish)
9. Karppinen S. (2006). Loovad käed, loov meel (Creative Hands, Creative Mind). Visanti M.L., Järnefelt H., Bäckmann P., Sinko P. (Eds.). *Loovuspedagoogika*. Tallinn: MTÜ Eesti Tehnoloogiakasvatuse Liit, pp. 36 – 39. (in Estonian)
10. Karppinen S. (2008). Craft-art as a Basis for Human Activity. *International Journal of Art & Design Education*, Vol. 27 (1), pp. 83 – 90.
11. King P. K. (2002). Educational Technology Professional Development as Transformative Learning Opportunities. *Computers & Education*, Vol. 39, pp. 283 – 297.
12. Kojonkoski-Rännäli S. (1995). *Ajatus käsissämme. Käsityön käsitteen merkityssisällön analyysi* (The Thought in our Hands. An Analysis of the Meaning of the Concept of Handicraft). Turku: University of Turku, (in Finnish)
13. Li Q. (2007). Student and Teacher Views about Technology: a Tale of Two Cities? *Journal of Research on Technology in Education*, Vol. 39, pp. 377 – 397.
14. Lind E., Pappel K., Paas K., Ojaste A. (2007). Käsitööõpe üldhariduskoolis (Handicraft Education in Comprehensive School). *Haridus*, Vol. 11-12, pp. 33 – 37. (in Estonian)
15. Lind E. (2009). Studying and Teaching Craft: Possibility and Necessity. In Kaukinen L.K. (Ed.). *Proceedings of the Crafticulation and Education Conference*. Helsinki: NordFo, pp. 206 – 212.
16. Luik P. (2010). Kas Eesti kool on valmis õpilaste sülearvutite kasutuseks? (Is Estonian School Ready for the Students' Laptop Use?) *Haridus*, Vol. 1, pp. 18–21. (in Estonian)
17. Mathews J.G., Guarino A.J. (2000). Predicting Teacher Computer Use: a Path Analysis. *International Journal of Instructional Media*, Vol. 27(4), pp. 385 – 392.
18. Miles M. B., Huberman A. M. (1994). *Qualitative Data Analysis.* Thousand Oaks: Sage Publication.
19. *National curriculum for basic schools*. (2014). Tallinn: Ministry of Education and Research. [online] [01.11.2016]. Available at: https://www.hm.ee/sites/default/files/est_basic_school_nat_cur_2014_general_part_1.pdf
20. Nevejan C. (2003) Integrated learning environments. In M. Tokoro, L. Steel (Eds.). *The Future of Learning*. Paris: IOS Press, pp. 33 – 49.
21. Pöllänen S. (2009). Contextualizing Craft: Pedagogical Model for Craft Education. *International Journal of Art & Design Education*, Vol. 28 (3), pp. 249 – 260.

22. Prei E. (Ed.). (2013). *IKT vahendite kasutusaktiivsus Eesti üldhariduskoolides* (The Activity of Using ICT Tools in Estonian Comprehensive Schools). Tallinn: Tiigrihüppe Sihtasutus. [online] [26.10.2016]. Available at: https://www.innovatsioonikeskus.ee/sites/default/files/tekstifailid/Sihtgrupi_kysitlus_2012_2.pdf (in Estonian)
23. Pruulmann-Vengerfeldt P. (Ed.). (2012). *Õpetajate IKT kasutusaktiivsuse mõju õpilaste tehnoloogia teadlikule kasutusoskusele II vahearuanne* (The Effect of Teachers' Usage of ICT on the Students' Conscious Use of Technology. Interim report II) [online] [06.10.2016]. Available at: https://www.innovatsioonikeskus.ee/sites/default/files/tekstifailid/IKT_kasutusaktiivsuse_moju_II_vahearuanne2012.pdf (in Estonian)
24. Rogers E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.
25. Sabzian F., Gilakjani A.P. (2013). Teachers' Attitudes about Computer Technology Training, Professional Development, Integration, Experience, Anxiety, and Literacy in English Language Teaching and Learning. *International Journal of Applied Science and Technology*, Vol. 3 (1), pp. 67 – 75.
26. Sánchez A.B., Marcos J.J.M., González M., GuanLin, H. (2012). In Service Teachers' Attitudes Towards the Use of ICT in the Classroom. *Procedia - Social and Behavioral Sciences*, Vol. 46, pp. 1358 – 1364.
27. Shreier M. (2013). *Qualitative content analysis in practice*. Los Angeles: Sage Publishing.
28. Teo T. (2008). Pre-service Teachers' Attitudes Towards Computer Use: a Singapore Survey. *Australasian Journal of Educational Technology*, Vol. 24 (4), pp. 413 – 424.