Preschool teachers' and Early Years Teacher curriculum student teachers' assessments of content, pedagogy and technology knowledge and integration of this knowledge

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Summary

Introduction

Digital technology is commonly used in our daily lives and plays an increasingly important role in the lives of young children, facilitating the development and learning of children. It is important that the child's first experience with technology would be purposeful because it can affect children's well-being and the future of learning. Therefore, preschool teachers need to be prepared in didactics of digital technology (Vinter, 2013). The professional standards for teachers, level 6, (EstQF level 6) stipulate that one of the recurrent competencies required of teachers is the capability to select and use suitable digital technology that develops the learning environment and supports learning activities (Kutsestandard …, 2017). It is important for preschool teachers to have a good knowledge of technology in addition to pedagogical and profound knowledge about the subjects included in the National Curriculum for Pre-school Child Care Institutions (2008). Experienced teachers are often mentors for beginner and student teachers, so it is important for them to have a higher level of knowledge in all areas than their mentees.

However, many kindergarten teachers have studied at universities during the years when technology was not included in their curriculum. Therefore, it is important to get an overview of the knowledge of preschool teachers and student teachers of the Early Years Teacher Curriculum (hereinafter: EYT students) in different fields and to find out what are the differences between these areas of knowledge. Knowing the areas in which preschool teachers' knowledge does not exceed that of their students allows offering them the appropriate in-service training.

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Because in Estonia digital competences of teachers and students are highlighted (Eesti …, 2014) and TPACK is widely accepted and applied to investigating teachers' knowledge in several studies (e.g. Bate & Maor, 2010; Dong et al., 2015; Rienties et al., 2013; Özdemir, 2016), we use TPACK framework. The framework was developed by Mishra and Koehler (2006), who elaborated Shulman's (1987) model adding technology to content and pedagogy, claiming that in teachers' education the primary focus should be on studying how the technology is used for teaching content in a pedagogical way. They named the model TPACK, which consists of seven parts. Three parts of this framework describe basic areas of teacher's knowledge (Content, Technology, and Pedagogical knowledge) and four overlapping parts indicate integrations between these three areas (e.g. Mishra & Koehler, 2006):

- Technological Content Knowledge (TCK) – knowledge of subject matter integrated with Technology;
- Technological Pedagogical Knowledge (TPK) – knowledge of using technology supporting teaching methods;
- Pedagogical Content Knowledge (PCK) – knowledge of teaching methods in different subject contexts;
- Technological Pedagogical Content Knowledge (TPACK) – knowledge of using technology to implement teaching methods in different subject contexts.

There are a lot of studies about teachers' and students' evaluations according to TPACK framework, but mostly school teachers have been used in these studies as a sample. However, fewer studies are available about preschool teachers (Liang et al., 2013) and the authors did not find any studies about preschool student teachers. Teachers' and students' comparative research has, so far, been limited (Dong et al., 2015). Comparing the evaluations of students with teachers' evaluations, the results are somewhat contradictory. There were no statistically significant differences between teachers' and student teachers' evaluations in a Turkish study (Saltan & Arslan, 2017), but Chinese students gave a significantly lower rating compared to teachers' in all TPACK framework areas (Dong et al., 2015).

Aim and method

This study was designed to describe preschool teachers' and EYT students' evaluations on their content, pedagogical and technological knowledge according to the TPACK framework and compare the evaluations of the two groups. Two research questions were posed: What are preschool teachers' and EYT students' evaluations on their knowledge areas? What are the differences between

preschool teachers' and EYT students' estimates of their knowledge in different areas?

The sample was created by student teachers of the University of Tartu who studied on Early Years Teacher curriculum (62 student teachers) and preschool teachers from Tartu kindergartens who had at least one year of experience (136 teachers). Students' average age was 21.3 years (SD 2.52), median range of the age of teachers was 41–45 years. Median range of teaching experience of preschool teachers was 11–15 years.

The data was collected by questionnaire. For more information about the development and validation of the questionnaire read Luik et al. (2018). According to the results of CFA (ibid.), the TPACK scale corresponding to the Estonian context was divided into three factors: knowledge of technology and its integration – 29 items; pedagogical knowledge – 14 items; content knowledge – 8 items. The questionnaire ended with background information. First, for each respondent, the factors' values were calculated as the means of the items in the abovementioned factors. Multiple Comparisons with Bonferroni correction and independent samples *t*-test were used.

Results and discussion

Preschool teachers perceived knowledge about technology and its integration the weakest and pedagogical knowledge the strongest. Previous studies have also revealed that teachers evaluated pedagogical knowledge as the highest (Chuang & Ho, 2011; Dong et al., 2015; Liang et al., 2013), and technology integration knowledge as the lowest (Dong et al., 2015; Liang et al., 2013). Teacher training of preschool teachers in Estonia has begun to focus on technology knowledge only in recent years (Vinter & Kollom, 2012) and preschool teachers' participation in technology training courses has increased (HITSA, 2016). This may explain why the knowledge of technology integration was assessed at the lowest level. Experiences in other countries (Liang et al., 2013; Nikolopoulou & Gialamas, 2015) have shown that for teachers with longer teaching experience, but without previous knowledge and experience in integrating technology, the provision of in-service education is a critical factor, because, in addition to knowledge, it also provides a sense of confidence in the use of technology. Therefore, as in Cheng (2016), the recommendation that the introduction of the TPACK framework could be part of in-service teacher training, could also be considered in Estonia, and further in-service training in technology use areas could be based on this framework.

EYT students evaluated knowledge about technology and its integration the highest, but no statistically significant difference was found between the evaluations of pedagogical and content knowledge. In Estonian schools for general education, the integration of technology is at a good level (OECD, 2015), which can create the perception to graduates that they have a good knowledge in this field. Also, in some previous studies students have evaluated technology-including areas the highest (Dong et al., 2015; Luik et al., 2018). The result that pedagogical knowledge was not highly evaluated by EYT students is in contradiction with the results of a study conducted in Singapore (Koh et al., 2010), where pedagogical knowledge was evaluated the highest by student teachers. One explanation might be that a majority of students in our study were at the beginning of the second academic year and this result corresponds to a previous study in Estonia (Luik et al., 2018), in which pedagogical knowledge was assessed to be the lowest. Similarly, our results, that content knowledge was assessed lower by EYT students, have also been confirmed in several previous studies (Dong et al., 2015; Koh et al., 2010; Öz, 2015).

As to the second research question, we found that the evaluations of preschool teachers in their pedagogical and content knowledge were significantly higher than EYT students' evaluations. Chuang and Ho (2011) have also found that experienced teachers value pedagogical knowledge and pedagogical content knowledge more than beginner teachers. Surprisingly, on the basis of our results in the knowledge of technology and the integration, there was no significant difference between evaluations of preschool teachers and EYT students. Previous studies have been controversial. While Saltan and Arslan (2017) did not find any differences between teachers and students in any of the four areas of technological knowledge, Dong and colleagues (2015) found that teachers' evaluations were higher in areas of technological knowledge compared to students' ones. Liang et al. (2013) found that technological knowledge was positively related to the qualifications of teachers, but Chuang and Ho (2011) argue that more experienced teachers evaluate technological knowledge lower.

As far as the limitations go, we could refer to the use of a self-reported questionnaire, which provides estimates not only for one's own knowledge, but for those who may not objectively correspond to actual knowledge. Also, the sample was formed on the basis of one town and the University of Tartu, which sets limits on the generalization of the results for all of Estonia.

Keywords: preschool teachers, student teachers, comparative study, technological pedagogical content knowledge (TPACK)