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Wag the dog - The nature and foundations of preschool educators' positive ICT pedagogical beliefs

Citation:

ABSTRACT

It has become evident that the vast majority of early childhood educators feel positive about using ICT with children. However, as they are found to have had no or only a little training or practical experience of pedagogical use of ICT, it is important to explore where the positive attitude comes from, and what pedagogical benefits early childhood educators believe ICT use brings about. This study focuses on the relationships of educators' general and ICT-related pedagogical beliefs, and the foundations of educators' positive ICT pedagogical beliefs.

In their general pedagogical beliefs, the educators emphasized the learning of socio-emotional skills, and reported that they carry out practices where children have an active role in their learning. In their ICT pedagogical beliefs, the educators emphasized the learning of academic skills, and the methods they described were usually individual exercises which were either carried out using ICT or by following educators' ICT-supported instructions. Positive ICT pedagogical beliefs were, to a large extent, based on perceptions of what different devices and software promise in terms of children's learning. Outside influences, i.e., the model observed from primary school, also played a significant role in the construction of the educators' ICT pedagogical beliefs.

KEYWORDS

HIGHLIGHTS

Explores preschool educators' general and ICT-related pedagogical beliefs

Preschool educators' general and ICT-related pedagogical beliefs are incoherent

Preschool educators have uncritical beliefs about the benefits of educational technology

Primary education's ICT culture affects preschool educators' positive ICT pedagogical beliefs

1. INTRODUCTION

A decade ago, Wang and Hoot (2006) stated that teachers in early childhood education[1] no longer ask if information and communication technology (ICT) should be used with small children, but how it should be used. A recent survey carried out by the Finnish teachers' trade union supports this statement. In it, 80% of early childhood teachers reported having a positive attitude toward using ICT with children. However, over 80% of the whole sample reported having insufficient pre-service or in-service training for using ICT with children, and a total of 40% have had no ICT pedagogical in-service training at all. Moreover, only 10% of them reported using ICT with children at least once a week. (OAJ, 2016.) This is mainly due to the fact that ICT – which in this study refers to digital devices (i.e., computers, tablets, smartphones) and products or outputs that are viewed, played, or created on these devices (i.e., applications, games, websites) (see Plowman, 2016) – are scarce in Finnish early childhood education settings (e.g., Alasuutari, Karila, Alila, & Eskelinen, 2014; Hujala et al., 2012). None of these phenomena are limited only to Finland. While doubts and concerns are still expressed (e.g., Dong, 2016; Hernwall, 2016; Palaiologou, 2016),[2] it has become evident that the vast majority of teachers in early childhood education feel positive about using ICT with children (e.g., Aubrey & Dahl 2014; Gialamas & Nikolopoulou, 2010; Jimoyiannis & Komis, 2007). Similarly, the lack of equipment, experience, and training is a common theme in international research reports (e.g., Aubrey & Dahl, 2014; Hernwall, 2016; Palaiologou, 2016; Petrogiannins, 2010).

As positive views are found to predict future ICT use (Gialamas & Nikolopolou, 2010), the key question here is where does the positive attitude come from if one has no or only a little training or practical experience of pedagogic use of ICT? It is a timely question to ask, as stakeholders such as UNICEF (Kalaš, 2010) and the OECD (Taguma, Litjens, & Mackowiecki, 2012) have recommended equipping kindergartens with ICT, and Finland, along with several other countries, has included the use of ICT in their early years curricula or white papers (e.g., Bølgan, 2012; Dong & Newman, 2016; Edwards, 2013; Finnish National Board of Education [FNBoE], 2014, 2016; Vangsnes & Økland,

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[1] This paper follows the Finnish discourse, where the term "early childhood education" is used as an umbrella category for all the institutional education that happens prior to primary school, while "preschool" is used when addressing the final year before children start primary school. In Finland, children attend preschool in the year they turn 6.

[2] It is feared that ICT use will replace play and face-to-face interaction, and hinder children's social skills, physical activity, cognitive development, and imagination (see Dong, 2016; Hernwall, 2016; Palaiologou, 2016). Furthermore, while educational technology is represented as an "essentially positive project" (Selwyn, 2011), it needs to remembered that ICT and social media can also be used – and are used – for bullying and harassment (Guitton, 2014).

2013). In the present paper this question is examined through the theoretical concept of pedagogical beliefs, which have appeared to be one of strongest predictors of teachers' ICT use (e.g., Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Miranda & Russell, 2012). Ottenbreit-Leftwich, Clazewski, Newby, and Ertmer (2010) have argued that the core underlying value for using ICT is that ICT use is believed to beneficial for students' learning. Thus, as pointed out by Hermans, Tondeur, vanBraak, and Valcke (2008), in order to understand how and why teachers use (or do not use) ICT, one must first understand their beliefs about teaching and learning. Inspired by the work of Pajares (1992), Ertmer (2005) has named these as (teachers') pedagogical beliefs.

Pedagogical beliefs are typically understood to include two dimensions: traditional/teacher-centered beliefs and constructivist/student-centered beliefs (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2014). Traditional/teacher-centered beliefs refer to a view where learning is seen as knowledge transmission, which makes the teacher favor teacher-led whole-class activities and individual drill-and-practice exercises as pedagogical practices. Constructivist/student-centered beliefs, in turn, refer to the view of learning as knowledge construction, which makes the teacher favor group work and exploratory learning projects as pedagogical practices (e.g., Chai, 2010; Ertmer et al., 2014; de Koster, Kuipert, & Volman, 2012). However, even though traditional and constructivist beliefs are often presented as ends of the spectrum, teachers' pedagogical beliefs usually include elements from both categories (e.g., Parker & Neuharth-Pritchett, 2006; Tondeur, Hermans, van Braak, & Valcke, 2008), and the classroom reality is often a mixture of methods based on different pedagogical tendencies (Aris & Orcos, 2015; Chen, 2008).

Although teacher beliefs in the context of pedagogical ICT integration have been studied extensively in different educational and national contexts and with quantitative and qualitative methods, the research has mainly focused on beliefs associated only with technology (see the review in Kim, Kim, Lee, Spector, & DeMeester, 2013). A review of studies performed in the context of early childhood education support the aforementioned critique, as with them ICT-associated beliefs are not explored in relation to educators'[3] more general beliefs (e.g., Blackwell, Lauricella, & Wartella, 2014; Ihmedieh, 2009; Jimoyiannis & Komis, 2007; Nikolopoulou & Gialamas, 2015). Furthermore, early childhood educators' beliefs in the context of ICT integration have so far been examined mainly through surveys (e.g., Aldhafeeri, Palaiologou, & Folorunsho, 2016; Dong, 2016; Gialamas & Nikolopoulou, 2010; Jimoyiannis & Komis, 2007; Nikolopoulou & Gialamas; 2015) or short-

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[3] Early childhood education is usually carried out in teams of teachers, nurses and (possibly) assistants (Van Laere, Peeters, & Vandenbroeck, 2012). In this paper, the term "educator" is used when the former literature or the results of the present study discuss findings based on data from more than one profession. The exact professional title is used on the data produced by members of a certain profession.

duration (max. 15 minutes) interviews (Aubrey & Dahl, 2014; Ihmedieh, 2009, and the need for more comprehensive approaches has been acknowledged (Blackwell et al., 2014).

Additionally, it appears that the discussion about teachers' pedagogical beliefs in ICT integration has concentrated on beliefs about how students learn and how they should be taught (e.g., Chai, 2010; Ertmer et al., 2014). However, former research suggests that teachers also have varying beliefs about what students should be taught, which here refers to beliefs about the pedagogical goals of institutional education. For instance, secondary school teachers in the study by Lasky (2005) reported that their job is to teach the "whole child", by which they meant that besides supporting students' academic performance, their professional task is also to take care of their students' socio-emotional well-being. In addition, teachers in the study by Estola, Erkkilä, & Syrjälä (2003) were "deeply involved in acting for the benefit of children and being responsible for them" (p. 250) in a manner that goes beyond supporting the learning of academic skills. Thus, in the present paper the concept of pedagogical beliefs is broadened to also include beliefs about pedagogical goals.

1.1. Purpose of the study and research questions

In this study, interview data from 17 preschool educators has been examined by focusing on the relationships between preschool educators' general and ICT-related positive pedagogical beliefs, and on the foundations of educators' positive ICT pedagogical beliefs. Beliefs are examined from the viewpoint of pedagogical goals and practices. Goals here refer to the ontological aspects of what educators believe preschool education is for, and what should be taught there. Practices, in turn, are understood as the means to achieve these goals. Following the same logic, ICT pedagogical beliefs are understood as beliefs concerning why (goals) and how (practices) ICT should be used in preschool education. The research questions are:

- How do preschool educators' general pedagogical beliefs (considering pedagogical goals and practices) and positive ICT pedagogical beliefs relate to each other?
- What are the foundations of preschool educators' positive ICT pedagogical beliefs?

2. EARLY CHILDHOOD EDUCATORS' GENERAL AND ICT-RELATED PEDAGOGICAL BELIEFS: A LITERATURE REVIEW

The review of research literature suggests that the majority of teachers in early childhood education believe that practicing socio-emotional skills is more important than practicing academic skills, which here are understood to consist of the three Rs: reading, writing, and arithmetic. For instance, 61% of

teachers in the study by Lee (2006) stated that promoting children's social development is important, and that they should not be hurried to learn academic subjects. In addition, teachers in the study by Kowalski, Pretti-Frontczak, and Johnson (2001) ranked learning socio-emotional skills significantly higher than the learning of language and literacy and early math (3.86, 2.97, and 2.92, on a five step scale, respectively).

Furthermore, 83% of the teachers in Lee's (2006) study stated that children need to be involved, engaged, and explorative in their learning. To attain a high level of engagement, educators are found to prefer small group activities over whole-class instructions (Lara-Cinisomo et al., 2009). According to Wasik (2008) small group activities offer greater opportunities for high-quality interaction between the children as well as between the children and the teacher when compared to whole-class activities, as children ask more questions and listen to others more carefully when working in small, teacher-mediated groups. Method-wise, early childhood educators are found to appreciate hands-on activities, namely direct and physical interaction with materials (Abu-Jaber, Al-Shawareb, & Gheith, 2010; Lara-Cinisomo et al., 2009; Parker & Neuharth-Pritchett, 2006). In addition, learning activities which involve movement are valued over sitting behind a desk (Lee, 2006).

However, while socio-emotional skills are highlighted in general pedagogical goal beliefs, ICT is specifically understood as a medium for learning academic skills (e.g., Blackwell, Lauricella, & Wartella, 2016; Dong & Newman, 2016; Ihmedieh, 2009), and only 24% of the teachers in a study by Palaiologou (2016) agreed with a statement that digital devices can facilitate play-based pedagogy as a cooperative tool. The literature offers no comprehensive account for why ICT is mostly seen as a tool for academic excellence, but one reason could be that teachers in early childhood education have been found to use technological affordances as the starting point for their ICT pedagogical planning (Dong & Newman, 2016; Hernwall, 2016), and analyses of educational mobile applications for young children show that the supply is dominated by apps advertised to promote the learning of literacy and mathematics (Highfield & Goodwind, 2013; Vaala, Ly & Levine, 2015).

Method-wise, teachers are found to prefer ICT-supported whole-class instruction (e.g., Kerckaert, Vanderlinde, & van Braak, 2015; Morgan, 2010), or encouraging the children to do individual exercises, i.e., play learning games (Blackwell et al., 2016). Educators also express that children's peer interaction disturbs the learning potential of ICT use and that their task is to protect the computer-using child from unnecessary interruption (Ljung-Djärf, Åberg-Bengtsson, & Ottosson, 2005). The reasoning behind this logic seems to be that child-computer interaction and interactive software itself are believed to be educational (see Plowman & McPacke, 2013), which appears to lead to practices

where the educator's role is understood to act as a reactive supervisor whose main tasks are monitoring turn-taking, resolving conflicts, and helping children with technical difficulties (Plowman & Stephen, 2005; see also Dong, 2016; Vangsnes & Økland, 2013).

3. METHOD

The data was collected from four preschool groups participating in a development project which was funded by the Finnish National Board of Education and conducted in a city in northern Finland.[4] Data collection took place in October 2013 during the orientation period, when children, their families and preschool educators were asked about ideas about the form and use of ICT before any new ICT devices were purchased (for children's ideas see Mertala, 2016). Data from the educators was collected via thematic interviews, which is considered to be an appropriate method for collecting data from phenomena that are impossible to observe (Patton 2002, 340-341). Such phenomena in this study were the educators' past experiences (foundations of beliefs) and their future intentions (what kind of ICT-enhanced pedagogy they would carry out).

A total of seventeen (17) educators (four directors, two vice directors, eight teachers, three nurses) were interviewed. All of them were women and all but four of them were over 40 years old.[5] Five teachers and one nurse had previously worked in centers that had had computers for children to use. Participants with experiences of using ICT with children are marked with an asterisk (*) in the Results section. None of the educators had had formal ICT pedagogical training, but six of them had attended in-service training or other venues that had partially dealt with using ICT with children. Nonetheless, all the participants described themselves as novices when it came to ICT pedagogy. Table 1 presents an overview of the participants, including the distribution of professions, types of interviews carried out, and the existing ICT equipment of the groups. Device-wise, the participating groups can be described as being typical Finnish preschool classes (Alasuutari, et al., 2014; Hujala et al., 2012).

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[4] There was a total of five groups participating in the project, but due to sudden staff changes one of the groups was unable to participate in the interviews.

[5] As the data was collected from a small-scale public development project, participants' backgrounds are not discussed in detail in order to protect their anonymity.

Table 1. Distribution of professions, interview types and the existing ICT devices by groups

Group	Informants and interview type	Existing ICT devices	Center type
A	Individual interviews: Director, Teacher 1, Teacher 2 and Nurse	Laptop and smartphone for staff; desktop for children (not in use due to technical problems)	Separate
B	Pair interviews: Director and Vice Director; Teacher 1 and Teacher 2	Laptop and smartphone for staff	Separate
C	Individual interviews: Director, Teacher 1, Teacher 2, Nurse	Laptop and smartphone for staff; interactive whiteboard (IWB) for staff and children (not in use due to technical problems)	Within a primary school
D	Pair interview: Director and Vice Director. Group interview: Teacher 1, Teacher 2 and Nurse	Laptop and smartphone for staff; IWB for staff and children	Within a primary school

3.1. Interview procedure

The interviews were conducted during the working day and took place on the premises of the participating units, i.e., in a meeting room or in an office. The place and form of the interview was left for the participants to decide on. All interviews were either audiotaped (individual interviews) or videoed (pair and group interviews). The length of individual interviews ranged from 13 minutes to 52 minutes. The brevity of the shortest one was caused by the tight schedule of the interviewed leader. All pair and group interviews lasted over 40 minutes, with the longest being 76 minutes. The interviews have been fully transcribed and the material comprises 102 pages.

The form of knowledge produced in research interviews is constructive by nature, and the knowledge is constructed between the interviewer and the interviewee (Kvale & Brinkmann, 2009, 2). Thus it is important to pay attention to who the respondents think the interviewer is, as the nature of the relationship can have a notable impact on their answers (McCracken, 1988, 25-26). In the context of this study, when introducing myself to the participants, I brought up my recent preschool teacher background in an attempt to create a collegial atmosphere, which I assumed would provide freer talk and discussion than what would be gained if I had been thought of solely as a scholar. Quotes like *"well surely you know what I'm talking about"* [6] (Teacher 1A) suggest that at least some of the educators felt they were talking with someone that they shared similar experiences and vocabulary with. In order for the interview situation to develop in a more conversational direction, no fixed questions were used, and the questions were worded spontaneously (see Patton, 2002, 343–344) based on an interview guide which is presented in Table 2. Probes – asking questions that follow up on the answers to previous questions (Keats, 2000, 39–40) – were used to obtain highly detailed data.

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[6] Some "narrative smoothing" (Polkinghorne, 1995), i.e., taking out hesitations, unnecessary repetitions and breaks, has been made to the extracts presented in this paper.

Table 2. Interview guide for teachers and nurses[7]

Background information and warm-up
How long have you worked in early childhood education/in this unit/in this group
Profession
• Initial education
• Prior ICT pedagogical training
Personal experiences and relationship with ICT
• What do you use, how do you use it, why do you use it, when do you use it
Theme 1: Motives and wishes for the development project
Why did you apply to take part in the project?
• How was the process of application conducted?
What do you expect from the project?
• As concrete a level as possible → devices, software, training, support and resources for planning
What would be A) the best and B) the worst outcome for the project?
• How could A be reached and B be avoided?
Theme 2: Beliefs about ICT-enhanced pedagogy in preschool education
What do you understand by ICT?
What do you understand by ICT-enhanced pedagogy?
• What is important to take into account when using ICT in preschool?
Are ICT-enhanced practices carried out in your current or former groups?
• Why are/were these kinds of practices carried out?
Theme 3: Beliefs about children's ICT use during their free time
What do you think children do with ICT in their free time?
• What devices, how, why, where?
• How do you know this?
What methods, contents and devices do you believe children would prefer to have in preschool?
Theme 4: Beliefs about children's parents/guardians' views of ICT-enhanced pedagogy in preschool education
What methods, contents and devices do you believe children's parents or guardians would like their children to have in preschool?
• Why?
Theme 5: Beliefs about the nature of preschool education
What themes, topics and methods do you think are the most important in preschool education?
• Why?
What have you done with the children this week?
• How could ICT be integrated into these themes and methods?

3.2. Analysis

The data was analyzed by means of Constant Comparative Analysis Method (CCA), which is often considered to be synonymous with grounded theory research (Fram, 2013). However, as pointed out by O'Connor, Netting and Thomas (2008), "constant comparison, the data analysis method, does not in and of itself constitute a grounded theory design" (p. 41). Indeed, there is a growing body of research literature which suggests that CCA can be treated as "a set of procedures and techniques for gathering and analyzing the data" (Straus & Corbin, 1998, p. 3), without aiming to constitute a substantive theory, which is the aim in grounded theory research (O'Connor et al., 2008; for studies carried out in the context of ICT integration, see e.g., Chai, 2010; Ottenbreit-Leftwich et al., 2010).

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[7] The interview guide for directors was identical except for the fact that it included a question about how teachers' and nurses' opportunities for on-the-job learning can be taken into account in the project.

It appears that in these studies researchers take a rather pragmatic stance toward CCA, meaning that it is the research questions asked (Fram, 2013) and the kind of material involved (Boeje, 2002) that determine the number of steps taken and the types of comparisons done during the analysis process. In the context of the present paper, the comparison comprised three different levels:

1. comparison between theory and data,
2. comparison between the data from different participants,
3. comparison within the data from individual participants.

By comparison between theory and data I mean that while no strict deductive analysis was applied in this study, previous research has still acted as a "theoretical thread" in the analysis process (see Grönfors, 2011). In the context of the current paper, the main theoretical thread was the notion that while early childhood educators in general value the learning of social skills over the learning of academic skills (Kowalski et al., 2001; Lee, 2006), the importance of learning academic skills is more prominent in educators' ICT-related beliefs (e.g., Blackwell et al., 2016; Dong & Newman, 2016; Hernwall, 2016; Ihmedieh, 2009; Palaiologou, 2016). Another thread was that in the research literature about early childhood educators' general pedagogical beliefs, student-centered/constructivist practices are held in high esteem (Abu-Jaber, Al-Shawareb, & Gheith, 2010; Lara-Cinisomo et al., 2009; Parker & Neuharth-Pritchett, 2006), but in the research literature about early childhood educators, ICT-related beliefs, teacher-centered/traditional practices are prominent (Blackwell et al., 2016; Kerckaert et al., 2015; Morgan, 2010) (see section 2).

Nevertheless, as early childhood educators' general and ICT-related pedagogical beliefs have not been studied within a single research project, it is not known whether these inconsistencies take place between the educators or within the educators. What I mean by this is that it is possible that there are either (at least) two kinds of educators – those with traditional/teacher-centered general pedagogical beliefs who also have traditional/teacher-centered ICT-related beliefs, and those with constructivist/student-centered general pedagogical beliefs who also have constructivist/student-centered ICT-related beliefs – or that there are inconsistencies between individual educators' general and ICT-related pedagogical beliefs. Therefore, a comparison between the data from different participants was carried out in order to discover whether there are distinguishable educator profiles, and comparison within the data from individual participants was carried out to identify any possible internal inconsistencies (see Boeije, 2002).

The analysis process itself consists of four phases: In the first phase, the focus was on the data that discussed educators' general pedagogical beliefs, and concentrated on the data that discussed "why"

(goals) and "how" (practices) preschool education should be implemented in general. In the second phase, the focus was on the data that discussed "why" and "how" ICT should be used in preschool. During the third phase, the interpretations made during phases one and two were compared with each other to examine the similarities and differences between educators' general pedagogical beliefs and those that are ICT-related. In each of these three stages, comparisons between the data from different participants and within the data from individual participants were performed. In the fourth and final stage, the focus was on the foundations of educators' ICT pedagogical beliefs.

Next, I will clarify the analysis process and the interpretations made by using data examples from one participant, Teacher 1B*. The reason for using extracts from a single participant here is that no distinguishable belief profiles between the participants were found, but all the educators were identified as having similar internal inconsistencies between their general and ICT-related pedagogical beliefs. More extracts from the data are presented in the Results section to improve the reliability and clarity of the research.

Table 3. Data examples from Teacher 1B*

Goal-related pedagogical beliefs	
General	*ICT*
"Social skills, learning how to be in a group and how to take others into account, it is perhaps the most important thing in preschool education"	"[I would use] ICT for literacy and math. It would support the learning of those areas"
Code: preschool education is about socio-emotional skills	Code: ICT is about academic skills
Practice-related pedagogical beliefs	
General	*ICT*
"[Preschool education] should include versatile activities. I think it is quite activity-based what we do here, and pen and paper exercises are just a small thing"	"A document camera made it possible to show teacher's materials to the children while they sit in their places"
Code: constructivist/student-centered beliefs	Code: traditional/teacher-centered beliefs

As can be seen from Table 3, there were incoherencies between Teacher 1B*'s general and ICT-related pedagogical beliefs. She, for instance, expressed that preschool education should be "activity-based" (*toiminnallista*), which in Finnish discourse refers to student-centered practices in which children have an active role in their learning, and in which embodied and tactile methods are used instead of sitting at a desk doing pen and paper exercises. Thus this extract was understood to refer to constructivist/student-centered beliefs. Conversely, in her description of how ICT should and could be used, she referred to a teacher-centered practice where children sit at their desks. This extract was understood to refer to traditional/teacher-centered beliefs. Furthermore, as can be seen from the extract about the use of the document camera, Teacher 1B* used the past tense when she described

the use of a document camera. Here she was referring to experiences she had had when her preschool class was temporarily located on the school premises, and she was able to use the classroom ICT. This was understood to refer to the foundations of her pedagogical beliefs. In this particular case, the extract was interpreted to reflect the effect of the ICT culture in primary school education.

4. RESULTS

The results are presented in two main sections. The first discusses the (incoherent) relationships between educators' general pedagogical beliefs and their positive ICT pedagogical beliefs. The second section examines the foundations of educators' positive ICT pedagogical beliefs.

4.1. The relationships between educators' general and ICT pedagogical beliefs

Educators' general and ICT pedagogical beliefs are discussed using three "buts," which refer to the identified incoherencies between the beliefs. The first section represents the incoherencies considering pedagogical goals, while the second and the third have their focus on beliefs considering pedagogical methods.

4.1.1. Preschool is about socio-emotional skills, but ICT is about academic skills

Educators in this study emphasized that the learning of social-emotional skills is the core goal of preschool education, and several educators made it clear that there is a clear order of precedence between the learning of socio-emotional skills and the learning of academic skills:

> *From a pedagogical perspective, more important than letters and mathematics is that they [children] have the courage to speak, and express their opinions, and to have an opinion in the first place… numbers and letters are the last one in the list*. (Teacher 1A)

This hierarchy was also visible in educators' comments about preschool exercise books, which in the Finnish context mainly concentrate on printed literacy, fine motor pen exercises, and mathematics (Myöhänen, 2011, 83): exercise books were said to be things that are "*only a small part of preschool education*" (Teacher 1B*) and should not be used "*at the cost of more important things*" (Teacher 2A*). According to the participants, these "more important things" were:

> *Social skills, learning how to be in a group and how to take others into account, it is perhaps the most important thing in preschool education* (Teacher 1B*),

However, only two educators expressed that one of the goals of ICT use could be the development of children's social skills by creating meaningful interactional situations around ICT. According to one:

> *As some of these children need [to practice] social relationships, it would be nice if children could do something together with a friend with the computer. So they would have to discuss and find a common line there.* (Teacher 2A*)

In general, ICT was believed to be a tool to support children's academic skills, namely literacy and mathematics (see Table 3). This was explicitly mentioned by twelve (12) educators, and usually meant having children play learning games. Also, even though exercise books were seen as secondary learning tools, six (6) educators said that one of the biggest benefits of ICT would be having access to digital resources in the exercise books.

4.1.2. Good learning is active, but good learning with ICT is inactive

The term "active" refers here to two things: First, it refers to a child's active role in his/her own learning, and second, it refers to the nature of pedagogical practices. From the first viewpoint, educators in this study described good pedagogy to be an adult-mediated activity, with plenty of room for children's voices. Knowledge was understood to be something that is constructed in the interaction between the participants. In the words of one teacher:

> *We have gotten rid of the culture that we adults are the ones with all the answers – I devote a lot of time to discussions, [and] I ask things from children… they are very clever, and asking questions is a good way to have them become aware of things.* (Teacher 1A)

However, in educators' descriptions of good ICT pedagogy, the child's role was represented quite differently. While there were three educators who said that children could use computers to produce their own texts, and thus have an active role in ICT-enhanced learning, significantly more common were views in which ICT was used as a medium for knowledge transition. This theme was most prominent in the data regarding (digital) learning games, which were believed to motivate children. A common belief among the participants was that:

> *Children love it when they have a chance to play games a little* (Teacher 1C), *because they are pretty rewarding and fun* (Director D), *but they have the idea of learning in the background* (Teacher 1B*).

The extracts above imply that children's awareness of the purpose of playing games in preschool was not seen to be that important, and one teacher said frankly that with games "*we can cheat children a little so that they don't realize that while they are gaming, they are also learning*". (Teacher 1D*). The view of children as passive learners who are unaware of the purpose of their activities is not only

contradictory to educators' general pedagogical beliefs, but is also at variance with the alignments of the Finnish early years curricula, as they name the development of learning skills as one of the key tasks (FNBoE, 2014, 2016).

Practice-wise, educators in this study valued embodied and tactile methods over traditional classroom activities, i.e., the use of exercise books. As stated by one of the teachers,

> *We have a "hands-on" preschool. We use the exercise books only once a week, and instead we have a lot of concrete activities. We practice hyphenation by jumping. We also throw a dice and look for letters I have spread in the corridor. If the dice shows an "A" then we look for it, and then there [back of the letter] is a physical exercise instruction and we jump up like ten times, and then return to throwing the dice.* (Teacher 2A*)

Nonetheless, educators' descriptions of good ICT pedagogy were dominated by examples where children either sit still around ICT (i.e., playing learning games) or follow teachers' ICT-enhanced whole-class instructions while sitting in their places. This incoherency was highly prominent in the data from teachers in Group B. During the interview, both emphasized how preschool is a place for active and hands-on learning, but at one point they began to think back to how, a few years earlier, they had temporarily had their preschool group on the school premises. During that period, they were able to use the classroom ICT which consisted of a staff computer, projector, document camera and canvas. According to them,

> *It was great! The document camera made it possible to show the teacher's material to the children while they sat in their places.* (Teacher 1B*)

The "greatness" of presentation technology refers explicitly to whole-class instruction, as they said that such ICT is good for teaching things to large groups of children. At that moment they had only a staff computer to use, and they found the lack of a projector and canvas frustrating:

> *Today we studied reflectors, and we watched short video clips about them. Now we had to watch the videos from the screen in small groups.* (Teacher 2B*)

4.1.3. Good learning is social, but good learning with ICT is independent

The educators in this study highlighted the importance of intersubjective aspects of learning. As discussed in the previous section, teacher-mediated discussions and open-ended questions were held in high esteem. Another thing which illustrates beliefs about the importance of the intersubjective and social nature of learning is small group pedagogy, which was described as being an essential part of

the educators' everyday practices. One teacher commented that "*we do everything in small groups*" (Teacher 2A*), and also others made it clear that small group activities are a crucial part of their pedagogy.

> *First thing in the morning we had free play. Then we teachers began to work with our own groups. My group did mushroom paintings and read a book about them to find out what mushrooms really are, are they animals or plants or what.* (Teacher 1C)

While early childhood educators have been criticized for not paying enough attention to how small groups are formed (Wasik, 2008), in this context of the present study the situation appeared to be different. Children's age, gender, mother tongue, special educational needs, and how familiar the educator was with the children and their parents/guardians (i.e., has one of the teachers taught their older siblings) were some of the aspects that educators considered to be important when composing home groups. Besides home groups, other types of small groups were designed based on, e.g., children's existing skills and developmental needs. Furthermore, one teacher said that homogenous small groups are sometimes needed in order to prevent low-achieving children from constantly feeling worse than others. To sum up, small group pedagogy was believed to support children's learning in socio-emotional and academic areas.

Educators who had used ICT with children reported that children were keen on using computers in pairs or small groups. However, besides the two educators with ideas about using ICT to support the development of children's social skills, there were no examples of these pairs or small groups being intentionally organized, or that interaction around ICT has much pedagogical value in the first place. Conversely, children's collaborative ICT use was believed to be a potential disturber for learning (see Ljung-Djärf et al., 2005). According to one teacher:

> *Usually there were two or three children there [around the computer] at a time. The freedom of choice was quite big, and there were many different options and routes to choose, so it became quite chaotic when three of them waffled to each other and fool around with the game… Some children do like systematic work with it, so it's just kind of goofing. In a sense they just play around.* (T2D*)

With ICT, learning was believed to happen when children worked individually and independently. For instance, the game that was most mentioned was the GraphoGame, a technology-enhanced learning environment for those learning to read, where the use of headphones is required as the player needs an undisturbed opportunity to concentrate fully on the sounds presented to them (Richardson & Lyytinen, 2014). Furthermore, educators who had either used the GraphoGame or other learning

games, or were planning to do so, said that a number of rules need to be set to ensure that children can use the computer without interference.

> *We had lists on the wall, and the computer time was 10 minutes per child.* (Teacher 2B*)

> *We used an alarm clock. It was 20 minutes' game-time for each child per day, and we kept records of who had their turn and who didn't.* (Teacher 2D*)

> *There could be quite a fight about whose turn it was when we got the computer and started to play games. I think we need to have some kind of rotation and schedule for it.* (Nurse A)

The extracts above also give an insight into participants' views about the role of the educator in ICT-enhanced activities, other than giving whole-class instructions. Unlike the educators' general pedagogical beliefs, in these examples the educator is not a mediator or a collaborator, but a reactive supervisor whose main tasks are monitoring turn-taking, solving conflicts and helping children with technical difficulties (see Plowman & Stephen, 2005).

4.2. Foundations of educators' positive ICT pedagogical beliefs

The foundations of educators' ICT pedagogical beliefs are discussed in three sections. The first one presents beliefs based on the perceived educational affordances of ICT. The second one is about the impact of primary school education, and the third is about how outside experts have influenced educators' beliefs.

4.2.1. Promises of ICT

By using the term "promises of ICT," I mean an underlying belief that digital technologies are capable of improving education (see Selwyn, 2011). Such beliefs were expressed by twelve (12) educators. One illustrative example is that while educators in this study were critical about using exercise books in preschool, they were interested in having access to the digital resources of the books (see section 4.1.1). This notion implies that educators believed that there is "extra value" in the digital material compared to the printed book. Another example is interactive whiteboards (IWB), which are said to be useful tools as they exhibit features which promote interactivity, collaboration, flexibility, efficiency, and easy access (Morgan, 2010). These promises were recognized by one of the directors. She had previously bought an IWB for the preschool group because children could "*act and move together and do many kinds of things with it*" (Director D). However, the experiences of the teachers and the nurse were somewhat different, and according to the nurse:

>*We have 26 children and one IWB which should be used in alternation, but the children don't remember it and every time two children touch the IWB at the same time it freezes*. (Nurse D*)

Beliefs about the educational value of ICT were also visible in educators' views considering the use of educational games. As discussed in section 4.1.2, educational games were believed to have high value in terms of engagement and motivation, and none of the participants questioned their learning value. Besides games, multimedia presentations were also believed to be attractive and educational (see Dong & Newman, 2016). For instance, teachers from Group B said that at the time when they had ICT in their class, they had stopped going to the theater with children because they were able to show them videos via the projector. They justified this by saying that the combination of music and video made the presentation "*lifelike*" and that the experience was probably *"new for the children too"* (Teacher 2B*). Nonetheless, going to a theater to see a play, or having a group perform the play on their premises, is more than just watching a play: It is attending a unique form of a cultural, social and artistic event. This is not a statement that theater has a greater pedagogical, cultural, or artistic value over movies or other kinds of video presentations. What I mean is that as they are two different forms of art, neither can be used to replace the other. Also, this rationale ignores the fact that the homes of young Finnish children are usually rich in technology, and by the time they reach their preschool year, children have had lots of experiences of watching programs on screens (Suoninen, 2014).

4.2.2. Influence of primary school education

The second influential factor was the influence of primary school education. This theme was present in the data from six (6) educators. The ICT culture in primary school education was described as being more advanced than ICT culture in preschool, and thus worth paying attention to. According to one teacher, "*the things they have done in primary school can be applied in preschool*" (Teacher 1B*).

She was not alone in her belief. One teacher from Group C said that the decision to buy IWBs for all their preschool classes was partially inspired by the fact that the primary school that was located on the same premises had similar IWBs. The director of the center went on to say that they could also turn to the more experienced primary school teachers to get help and ideas. Furthermore, one director said that ICT should be used in preschool because:

>*When children start in primary school, ICT wouldn't be a new thing for them… as they use smartphones and iPads a lot in the school* (Director D)

Her choice of words implies that the importance of equipping preschool with ICT lies with the more frequent ICT use in primary school, and the ICT in preschool should be similar to that in primary school so that children could learn to master it during the preschool year. Locating within a primary school or hands-on experiences with classroom technology were not necessary for preschool educators to become inspired by the ICT pedagogy of primary education. For example, one teacher said that during school visits she had seen a Grade 1 teacher use the projector and whiteboard to give children whole-class instructions, and that similar equipment would be useful in preschool as well.

4.2.3. Guidance from outside experts

Five (5) teachers had attended in-service training or other venues that were not entirely about ICT-enhanced pedagogy but had contained examples of ICT use. One teacher had attended an event held by a publishing company. She was impressed by the digital material presented to her, and said that "*I was like wow! One could [practice] all the letters and everything else with it* (Teacher 1B*p). However, as there was an extra charge for getting access to the digital material, she had not had a chance to actually try out the material. Similarly, another teacher stated that she had attended a lecture which was about the computer-assisted writing to read method (WTR). According to her "*it seemed like a good thing*" (Teacher 2C), but she also had not had an opportunity to test the method because she had no computers in her class. The third teacher, in turn, told me about a literacy education training event where one sub-topic had been the GraphoGame, which she had found to be an interesting learning tool with lots of potential. At the time she had no computers for the children to use, but she decided to find out if she would be able to get a computer for her class. Obtaining the computer took over three years and a lot of effort, and when it was eventually provided, the GraphoGame did not work due to problems with the internet connection firewall. By the time of the interview they had had the computer for eight months but it had not been used once.

It appears that as the training the teachers had attended had focused on a single method or tool (WTR, GraphoGame, and commercial digital material of one publishing company), they have been provided with a rather restricted view of what pedagogical ICT use in preschool can be. This is most prominent in the GraphoGame case, where the classroom computer was left unused because of the firewall problem. The lack of an internet connection would not have prevented the use of the word processor, drawing programs, or photo and video editors, but as the computer was represented only as a device for playing the GraphoGame in the training – and the teacher had had no other ICT-related training – these issues were not visible to her.

5. DISCUSSION

This study has addressed the relationships of preschool educators' general and ICT-related pedagogical beliefs and the foundations of educators' positive ICT pedagogical beliefs. In the context of the present study, beliefs were examined in a twofold manner: As beliefs about pedagogical goals, and as beliefs about pedagogical practices. On a general level, the educators in this study valued the learning of socio-emotional skills over academic skills, which is congruent with previous research (Kowalski et al., 2001; Lee, 2006). The educators in this study also emphasized that learning is something that happens interpersonally, and that children must have an active role as meaning-makers in the learning process. Method-wise, small group pedagogy and embodied activities were valued. Again, these findings are supported by previous research (Abu-Jaber, et al., 2010; Lara-Cinisomo et al., 2009; Lee, 2006; Parker & Neuharth-Pritchett, 2006). However, when the focus was shifted to ICT pedagogical beliefs, the educators in this study expressed that the main goal behind ICT use is supporting the development of children's academic skills. As positive methods they described giving ICT-supported whole-class instructions, and having children perform individual game-based drill-and-practice exercises. Similar findings regarding ICT pedagogy have also been discovered in previous research (e.g., Blackwell et al., 2016; Kerckaert et al., 2015; Morgan, 2010).

It appears that with regards to practice-related beliefs, educators' general pedagogical beliefs were mainly constructivist/student-centered, but their ICT pedagogical beliefs were mainly traditional/teacher-centered. In the interviews, the educators expressed explicit references to practices where children act as knowledge constructors (see section 4.1.2), but also the educators' effort in forming functional small groups can be understood to describe a constructivist belief about learning: If learning is something that happens in interaction with others, then the quality of the interactions is the key factor in learning and is thus the place where pedagogical effort needs to be targeted. Conversely, when discussing good ICT pedagogy, the educators in this study argued that ICT is to be used to reinforce learning with methods which are congruent with the traditional/teacher-centered concept of learning.

While it is not unprecedented for educators to have varying and conflicting beliefs (e.g., Chen, 2008; Parker & Neuharth-Pritchett, 2006; Tondeur et al., 2008), the notable contrariety between educators' general and ICT pedagogical beliefs, and the significant role of outside influences in educators' ICT pedagogical beliefs, are phenomena worth paying attention to. In my interpretation, these outcomes imply the presence of a "wag the dog" phenomenon. By this I mean that the educators' beliefs of what is good ICT-enhanced pedagogy was not based on their beliefs about the pedagogical core of preschool education, but it was either the technology itself or the model and guidance received from others that shaped their ICT pedagogical beliefs the most. As the "theater versus projector" example

in section 4.2.1 implies, this incongruous base can lead to practices that weaken the quality of education.

One problematic feature is that critical reflection of how observed or suggested practices would fit in the context of preschool education was practically nonexistent. For instance, even though the educators sometimes said that they "apply" the practices they observe from primary education, the examples used were rather direct copies with no re-contextualization to meet the needs of the younger children. Plowman and Stephen (2005) have suggested that the lack of criticism is due to the low level of practitioner confidence, which is at least partially due to insufficient training. All the educators in this study were certified early childhood educators, but none of them had any formal training for pedagogical ICT use, which is common in national (OAJ, 2016) and international contexts (e.g., Aubrey & Dahl, 2014; Hernwall, 2016; Palaiologou, 2016). Thus it is understandable that educators who feel insecure about their ICT pedagogical competence model the practices of those they consider to be more competent. However, following the example or advice of those whose background is not in early childhood education can lead to pedagogically problematic beliefs and practices. This is not to say that early childhood education should be prevented from interacting with other fields of education, and the continuum between early childhood education and primary school education is emphasized in curriculum documents (FNBoE, 2014, 2016). Nonetheless, simply copying ICT infrastructures and practices from primary education does not equal a dialogical relationship between children's current and future learning environments.

Furthermore, none of the educators problematized the commercial intentions behind the learning games or other digital materials (i.e., digital resources of exercise books, see section 4.2.3) (see also Dong & Newman, 2016). Nevertheless, designers' commercial interests can be in conflict with pedagogical ones, and as argued by Linderoth (2012), in order to avoid players from getting frustrated (and disliking the game), games offer players hints which allow them to progress without actually solving the problem they have faced. Strong faith in the educational potential of ICT use, namely the playing of learning games, can also be one explanation for why many educators in this study as well as in previous ones (Ljung-Djärf et al., 2005; Plowman & Stephen, 2005; Vangsnes & Økland, 2013) were found to take the role of reactive supervisor rather than that of mediator in ICT-enhanced practices.

5.1. Implications for in-service and pre-service training

While beliefs have appeared to be difficult to change (Pajares, 1992), the findings of the present paper imply that as early childhood educators' ICT pedagogical beliefs are often based on fragmented

observations, they can be subjected to change when new perspectives (which are grounded in the pedagogy of early childhood education) are presented to them (see Angeli, 2004). For instance, the teacher talking about the GraphoGame, presented in section 4.2.3, quickly became aware of her one-sided thinking. When asked if she had:

> *… done anything else with it* [the computer]*? Say, used the word processor, drawing program or photo editor*? (Researcher)

she replied that:

> *… perhaps I have been too keen on getting the GraphoGame while not be able to do anything else with it* [the computer]. (Teacher 1A)

Furthermore, these findings challenge teacher educators and policy makers to find ways to support pre-service and in-service early childhood educators' professional development in becoming competent ICT pedagogues. Naturally, one key question is what is meant by "competence." The incoherence of educators' general pedagogical beliefs and ICT pedagogical beliefs (and its relation to lack of confidence) as well as the possibility of educators' low self-confidence as ICT pedagogues imply that there is a need for training approaches that are built on the cornerstones of early childhood education's pedagogical goals (i.e., socio-emotional skills) and practices (i.e., small group activities, embodied activities), as this way ICT pedagogical competence becomes an extension of educators' existing proficiency rather than being a new and peripheral area of expertise.

5.2. Limitations of the study

As interviews were conducted at the beginning of a development project to which groups had applied on their own accord, it is justifiable to expect that their attitudes and beliefs toward the use of ICT with children are more positive than how they may be in general. Also, the context may have guided informants to remain silent about their doubts concerning the use of ICT with children in order not to appear as challenging partners in the project by "serving up" what they thought was wanted of them (see McCracken, 1988, 27). Indeed, participants found it difficult to discuss any possible shortcomings of the project, i.e., when asked about the threats that need to be taken into account (see Table 2), answers like "*you mean something negative? Well, I think that this is a good thing and I have an open mind and positive feelings about this*" (Director A,) and "*I don't see anything negative in this*" (Director C) were typical. However, this possible distortion has been taken into account in research questions which only address the positive beliefs.

In terms or validity and reproducibility, it is evident that the small number of participants and geographically homogenous data do not allow for generalizations of the findings. In addition, we should bear in mind that the participants in this study do not represent the entire field of early childhood education, but they were all working with children who were about to start primary school education the following year. Thus it is possible that the ICT culture of primary school education could be more influential for them than for those who work with younger children, because regular collaboration between preschool educators and first grade teachers (including school visits) is required in order to facilitate children's transition to school.

6. FUNDING SOURCES

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