Preschool teachers' use of ICTs: Towards a typology of practice

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Abstract
This study aimed to identify the ways in which information and communication technologies (ICT) are integrated in three preschools in south-western Sweden. The case study involved observations of and interviews with preschool teachers. The findings support claims that ICT can enhance preschool practices by providing a variety of complementary opportunities to enrich and transform existing curricula. The study shows that in the studied preschools ICTs have been appropriated in distinctive ways: as an object to enrich existing practices; as a cultural mediator; as a way to entertain young children; and as a communication and documentation tool. In addition, by addressing the teachers' values and attitudes to the role of ICT in early childhood, the paper also unpacks the stances of teachers who consider ICT to be unsuitable for early childhood education. The findings of this study may bring some clarity to the complexities that surround engagement with any innovation in preschool settings, and the adoption of new technologies in particular.

Keywords
Early childhood education, ICT, implementation, preschool teacher

Introduction

The rapid diffusion and uptake of information and communications technology (ICT) is one of the driving forces fuelling the growth of the 'information age' and a 'knowledge-based society' (Castells and Cardoso, 2006). Such a transformation can change the ways we live, work and learn. The objectives of the Lisbon Summit 2000 stipulate that, in order to meet the demands of a knowledge-based economy, all school-leavers should be digitally literate (Commission of the European Communities, 2000).

Preschools and schools across the globe, particularly in developed countries such as Sweden, are increasingly investing in ICT[1] as one possible solution to their educational dilemmas.

Research on early childhood education and ICT has shifted focus from whether or not ICT can enhance young children's learning to questions relating to how best to integrate ICT in preschools

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(Bowman et al., 2001; Gialamas and Nikolopoulou, 2010; Stephen and Plowman, 2008). Providing multi-dimensional learning tools and resources such as written text, pictures, animations, video and sound (Palfrey and Gasser, 2008; Preston and Mowbray, 2008), developing and offering a variety of representations (Kennewell and Beauchamp, 2003), and affording facilities to save and re-use learning resources (Goodwin, 2008), all of these technologies have made available to practitioners the affordances of a variety of possibilities.

The Swedish national curriculum for preschool (The Swedish National Agency for Education, 1998) underlines the importance of providing all children with equal access to ICT. Policy-makers have turned their attention to the provision of ICT for preschools. Similarly, a large number of Swedish schools and preschools[2] have invested in ICTs in the form of personal computers, tablets (e.g. Apple Computer iPads) and interactive whiteboards, as well as professional development activities designed to enhance the breadth and richness of educational practices in preschools (Preston and Mowbray, 2008; Sheridan and Pramling Samuelsson, 2003; Torff and Tirotta, 2010).

On their own, ICTs, however, cannot enhance preschool educational practices (McGarr, 2009). Preschool teachers need guidance in order to learn how to use these technologies to change educational practices for the better (O'Hara, 2004; O'Rourke and Harrison, 2004; Sheridan and Pramling Samuelsson, 2003). The pedagogical norms and experiences of preschool teachers invariably shape the ways in which ICTs are used in preschool settings (Sheridan and Pramling Samuelsson, 2003; Vanderlinde and van Braak, 2010).

Despite the enormous investments in and availability of ICT technologies in a large number of Swedish preschools (The Swedish Media Council, 2012), it seems that new affordances provided by ICT technologies have not been integrated into preschool pedagogies (see Hvit, 2010; Klerfelt, 2010; Ljung-Djärf, 2004). Fishman (2006) argues:

> Though technology is becoming a widespread presence, it is not for the most part central to the curriculum of schools. It is primarily used as an adjunct or add-on, broadly underutilized in terms of its potential, and certainly in terms of the investment. (Fishman, 2006: 1)

Furthermore, we have limited understanding of the ways in which preschool teachers use ICTs as part of their pedagogical practices (Vorkapić and Milovanović, 2012). The dominant form of ICT in preschools, the personal computer, is often being used as a documentation or display tool (McPake et al., 2012; Säljö and Linderoth, 2002), or as a 'babysitter', as Ljung-Djärf (2008) phrased it.

There is relatively limited research into how ICT can effectively be embedded in preschool educational practices (Law, 2008; Lin, 2012; McPake et al., 2012). Pedagogical practices mediated by ICTs in preschools are largely dependent on teachers' perceptions and expectations. Thus, it is often argued that decisions about whether and how to use ICT in preschool must ultimately depend on preschool teachers' attitudes, knowledge and skills (Ertmer, 2005; Hew and Brush, 2007).

This study aims to identify the ways in which ICT is integrated in Swedish preschools. In particular, it tackles a timely and pertinent topic for practice development and one that can have implications for the development of theoretical thinking around professional practice in the early years. It must be declared at the outset that this small-scale study is not without limitations, and thus the findings of the study may not be extended beyond the context of the studied preschools. However, the findings may have implications for the development of theoretical thinking around professional practice in the early years.

Methodology

The research question, methods and analytic techniques employed in this study have been inspired by socio-cultural ways of thinking about learning and development; a perspective that emphasizes

the ways in which technological artefacts mediate learning, interactions and communicative practices (Vygotsky, 1978). Situated ways of acting with technological artefacts are central, including encounters between young children and preschool teachers, between learners and artefacts, and between teachers, learners and institutional practices.

Hedegaard (2009) argues that preschool practices are shaped by preschool teachers' values and norms. Previous studies (see McCarrick and Li, 2007; Plowman and Stephen, 2003) also show how preschool teachers' attitudes and skills shape their ICT use in preschool practices. Their attitudes, beliefs and ICT skills affect the way that ICT is or can be applied in preschool pedagogical practices (Lindahl and Folkesson, 2012; Tsitouridou and Vryzas, 2004). In preschools, these practices can reflect collectively-held norms and ways of acting that constitute discursive patterns (Säljö, 2005). In other words, teachers often shape their learning environments in alignment with the embedded discursive patterns of a preschool (Säljö, 2005). ICTs can reinforce dominant discourses and practices. By introducing new practices and perspectives, however, enrolling ICT can also challenge, disrupt and subvert dominant discourses and practices.

Empirical study

In recognition of the ways in which ICTs is being integrated, this case study (Yin, 2009) focused on preschool teachers' existing use within their real-life context as well as their thoughts and experiences regarding the integration of ICT in preschool practices. Unstructured thematic interviews with preschool teachers and observations of classroom practice with older groups of children, i.e. 4–5-year-olds, provided the primary data sources. It was assumed that interviews combined with observation of teachers' practices would provide insights into teachers' use of ICTs in general (Simons, 2009).

The researcher visited three preschools in the southwest of Sweden 15 times. The preschools involved ranged in their educational orientation, size and availability of resources. For instance, one of the studied preschools' practices was mainly based on Maria Montessori's educational methods. The researcher worked as an ethnographer by observing, discussing, interviewing and taking photographs as well as participating in the preschools' everyday lives. Four- to eight-hour-long daily classroom observations were conducted over three weeks to capture rich data… that provide[d] a full and revealing picture of preschool teachers' experiences in using ICTs in their pedagogical practices (Maxwell, 2005). Detailed field notes were also recorded when observations were made.

Observations focused on the positioning and the ways in which ICTs were used in the studied preschools. The observations were recorded using a combination of field notes and supplementary photographing of the same events. Most of the activities took place indoors. After the preschool visits, the participating preschool teachers were interviewed.

Six preschool teachers – two teachers from each of the three studied preschools – were interviewed. Semi-structured interviews provided the researcher with the opportunity to discuss the preschool teachers' thoughts and experiences relating to their use of ICTs and as a means of reasserting emerging interpretations placed on the observational data (Cohen et al., 2011). Since the studied preschools were very different in terms of size, pedagogical orientation and profile, the interviews focused on those features that were typical of the preschool, i.e. the use of ICT in their practices. Reflecting on observation data helped the researcher clarify some points and correct potential mistakes and misunderstandings in the field notes. To ensure the anonymity of the participants, preschool teachers' names were replaced with pseudonyms.

All of the collected data including transcribed interviews, field notes and supplementary photographs taken were analysed to explore underlying themes using Marshall and Rossman (2006) data analysis strategies. In such an approach, the researcher 'engages the text naively, without a

Table 1. Technological resources in the studied preschools.[3]

	Preschool 1	Preschool 2	Preschool 3
Desktop computers	Yes	Yes	Yes
Digital camera	Yes	Yes	Yes
Digital photo frame	Yes	Yes	Yes
Tablet (e.g. iPad)	Yes	Yes	Yes
Laptop computer	Yes		
Interactive whiteboard			Yes

template, searching for segments of text to generate and illustrate categories of meaning' (Marshall and Rossman, 2006: 208). The first stage in the analysis involved sorting and organizing the collected data, including transcribing interview tapes and making contemporaneous notes. The analysis centred on ways of acting in terms of: (a) preschool teachers' actions; (b) key interventions in using technology; and/or (c) technology-enhancing pedagogical practices. This was followed by re-examining and analysing the collected data, i.e. coding and generating categories, themes and patterns of ICT use to obtain a deeper understanding of the ways in which ICT is being integrated into preschools practice (Cohen et al., 2011). The data were then categorized to allow subsequent readings focusing on emerging thematic concerns.

Results

The analysis of preschool teachers' accounts of ICT use have been appropriated in distinctive ways. Each of the ways that emerged will be discussed in turn:

1. Using ICT to enrich and transform existing curriculum and practices;
2. Using ICT to enhance children's cultural literacy and narrowing the gap for young immigrant children;
3. Using ICT to keep children busy;
4. Communicating and documenting preschool practices;
5. ICT is not important in preschool educational practices.

Technological resources in preschools

According to the empirical data, a variety of digital technologies were being used in Swedish preschools. As illustrated in Table 1, there was at least one desktop computer, digital camera, digital photo frame and iPad available in each of the studied preschools. Access to other ICT technologies such as interactive whiteboards and laptop computers varied across the studied preschools.

According to the teachers interviewed, they were rarely constrained by the accessibility of ICT technologies.

1. Using ICT to enrich and transform existing curriculum and practices. New technologies provide a wide range of opportunities to examine and transform the existing curriculum and practices. The collected data supports the belief that ICTs can enrich preschool practices. This was reflected in teachers' practices and their rationale for using ICT in preschool practices.

ICT is an extra learning tool. Traditionally, for instance, I cut and paste paper to make a triangle, now I can do it on a digital screen! Obviously one can do more, but you need to know what and in which ways. (Ulla, 26 November 2012)

The teachers interviewed also commented on the areas where ICTs facilitated their pedagogical practice. In the following excerpt, Ingrid (an interviewed teacher) exemplifies the opportunities that ICT affords.

Mainly I see ICT more as a tool; an extra educational tool/artefact like pen and paper… For instance sometimes I use word puzzles or animal puzzles on an iPad. In these apps children are encouraged to fill in the right letters in the blank space/s in the puzzle. Children are encouraged to work together to find the right answer. (Ingrid, 9 December 2012)

As reflected in Ulla's and Ingrid's comments, ICT is seen as a complementary artefact to enrich teachers' practices. In both excerpts ICTs are perceived as extra tools for extending preschool teachers' existing practices. Ingrid's remark suggests that technologies such as the iPad are used to introduce new concepts and skills. Similarly, Reza illustrates another instance of ICT use in her practice.

I often search for interesting issues, pictures and video clips… to elaborate and express the given issues in concrete ways…. It is very helpful to use online resources…. In some cases, I download the applications (gadgets)…. They are very useful. It is a bit difficult to know which app one should install though! (Reza, 2 December 2012)

This excerpt suggests that the internet provides a wealth of learning resources for all practitioners, including preschool teachers. Teachers also commented on the significance of the particular applications and programs in enhancing the quality of teaching and learning activities. Similarly, observations supported the idea that the teachers used ICT to acquire knowledge and resources. On several occasions, for example, teachers employed search engines (e.g. Google) to find pedagogical resources such as images and videos.

In one instance, one of the teachers took pictures of trees and flowers in the preschool yard in different months. The pictures were printed and hung up on the wall; thus, the changes in trees and flowers in different sessions could be followed and discussed. These practices, and any parallel practices observed, as teachers worked with young children, were characterized by reference to how ICT can promote preschool teachers' practices and how they were in alignment with the existing curriculum.

2. Using ICT to enhance children's cultural literacy and narrowing the gap for young immigrant children. ICT can offer young children a glimpse of children's lives in other cultures and allow them to draw upon multimedia resources from across the world. The following excerpt reflects a teacher's experience of the ways in which ICT can make cultural diversities more visible.

…since a large number of children in this preschool are immigrants and coming from different cultures, using ICT provides children [with the] means to introduce their countries, culture and languages… it is very challenging for children to know their classmates' land, language and so on. I use interactive whiteboards to search [for] relevant maps, pictures and clips to familiarize children with other children's lives, cultures and countries. (Reza, 2 December 2012)

By providing a glimpse of other peoples' lives and cultures, as suggested in the excerpt above, new technologies may enhance children's cultural awareness. As reflected in the Swedish national

curriculum, ICT can enrich the preschool environment to react to the young children's social needs for intercultural and multilingual approaches in the context of the multicultural realities of Sweden (Norberg, 2000; Skolverket, 2010).

Observations demonstrated that teachers were willing to explore new opportunities to present others way of living, writing and talking. In one instance, one of the observed teachers in preschool 3 was using an interactive whiteboard to position each one of the immigrant children's home countries on Google Maps. He encouraged young children to guess their languages. Then, he disclosed their ethnic or national dress (e.g. Arab national dress). By showing music videos of those nationalities (i.e. Chinese and Arabic music) on YouTube, the teacher encouraged children to dance with different kinds of music.

In another instance in 24 November 2012, one of the teachers (a second-language teacher for four immigrant children) used an iPad application to teach the Arabic alphabet and the way it is written from right to left. Ghadir (a five-year-old immigrant boy), when talking to the other children said, 'hey, look here, I can write in Arabic'. Other children with a great interest had a chance to see and listen to a foreign language. Apart from enhancing children's cultural awareness, ICT helps teachers to concretely exemplify the cultural and ethical differences and also any similarities. This signifies that the infusion of ICT in educational settings has provided preschool teachers with greater opportunities to promote children's cultural awareness and democratic values (Liu and Hannafin, 2010). Providing such opportunities may enhance young children's understanding and appreciation of cultural diversities, and thus reduce 'social stratification and therefore increasing social inclusion' (Thurston, 2004: 166).

In addition, ICT can enhance immigrant children's language learning. According to data from the 2012 Statistics Sweden (Statistiska centralbyrån), immigrant children make up about 18 percent of the under-six age group; the figure rises to 60 to 70 percent in some geographical areas (Findahl, 2013). These children are more likely than their Swedish counterparts to confront risks, such as low family income and low parental education, combined with language barriers, which can put immigrant children at risk of developmental delay and poor academic performance. Reflecting on her own experience, another interviewed teacher indicated that using ICT can minimize obstacles such as language barriers:

> For sure, digital technologies facilitate immigrant children's language learning. Considering that even math education is dependent on children's language competences.… So, we put more emphasis on children's language learning by reading stories, showing films (e.g. animations) and so on. I also use several iPad applications in order to teach animals and fruit. Children press the animals and fruit pictures and listen to each of their names as they are being touched. (Ulla, 26 November 2012)

Ulla argues that ICT can narrow down the immigrant–native children's language gap. These technologies can provide a wide range of opportunities and recourses to promote immigrant children's language leaning. One preschool teacher's reflection on her experiences with small groups is as follows:

> Some of the young children, particularly immigrant children, are very silent and are less engaged in preschool practices. So, we usually encourage them to engage in practices in different ways.

On 7 December 2012 one of the teachers motivated a five-year old withdrawn/quiet immigrant boy to create and present a story for a small group (five children) using a tablet application, Create Your Own Fairy Tale.[4] The teacher initially showed how the application worked. It was a process of trial and error to learn the application: 'press that one, then that one, then take images from there,

then click that one…' The child was then encouraged and supported by the teacher and other children to create his own story. In this process, the child was encouraged to discuss the activity and share his ideas.

Integrating such applications can help teachers to create an early child environment that encourages and supports withdrawn/quiet immigrant children to express their imaginations, creativity and a sense of wonder and thus engage actively in preschool practices.

> In our preschool, nearly 50 percent of the children are immigrants. This implies that those children are learning the Swedish language in the preschool. We use computers, iPads and interactive whiteboards to teach children new concepts such as mathematical concepts, exemplifying abstract issues and so on.… I usually encourage children to sit together at the computer. In most cases, other children gather around and talk about the given activity. For instance, I encourage children to take pictures and then use Photo Story to create a multimedia presentation (with voice and music). I often ask them, 'how we should do this? Which pictures we should use?' etc. and encourage children to share their discoveries with each other. This can be done in order to introduce different concepts, mathematical notions and functions. (Ingrid, 9 December 2012)

Ingrid's remark suggests another interesting aspect of how ICT can afford space for young children learning through multimedia ICT technologies. Using ICT can enhance young immigrant children's oral language through collaborative tasks. As Ingrid indicated, a number of applications and/ or programs can offer rich environments for children's language development. In this case, the teacher motivates the children to collaborate and discuss creations for a Photo Story presentation.

During an observation on 25 November 2012, two children were using an iPad. The nature of the technology afforded the teachers the opportunity to motivate children to collaborate, discuss and learn from each other. The following excerpt shows how the use of ICTs, in this case an iPad, can expand the child's experience.

> Lisa and Jasmine (two four-year-old immigrant girls) are playing with an iPad in the corner of the room on the carpet.
>
> Teacher: Lisa and Jasmine, what are you doing there?
>
> Lisa: We are playing!
>
> Teacher: What do you do in the game?
>
> Lisa: I cut Santa's hair, but I'm scared to cut his ear!
>
> Jasmine: I helped her! I showed her how to do it!
>
> Teacher: Let's see!
>
> Groups of children gathered around the iPad to see how Jasmine cut Santa's hair! They watch and ask if they can have a turn.

As reflected in in this example, the iPad as a technological artefact mediates and encourages longer, more complex talk, and can enhance young immigrant children's language fluency. Children are often very curious to explore new things such as new gadgets/programs and show their new discoveries to other children.

Such instances, further, suggest that ICT can offer teachers greater opportunities to motivate and enhance young children's collaborations and social interactions. In other words, embedding ICT heralds great opportunities for young children to *learn* how to get along with each other, i.e. peer learning.

3. Using ICT to keep children busy. Leisure applications of ICT at preschool are highly emphasized by the interviewed teachers. In many respects, ICTs were conceived as a way to *keep kids busy* that may not have any defined relevance to the designated curriculum. Reflecting on her own experience, one preschool teacher stated:

> In afternoons, and after 'afternoon snack' [Swedish: mellanmål], we often don't have special pre-planned activities. So, I sometimes show animations from SVTPLAY BARN.[5] It keeps children busy and quiet. The children sit in front of the screen and watch the given cartoons and films. It is fun to watch cartoons together and they like it very much…. Children are also allowed to play games with an iPad, as well as online games on a personal computer. (Sara, 26 November 2012)

The above-mentioned situation is not uncommon in preschools, particularly after the normal preschool hours. Young children tend to enjoy watching cartoons and films with their peers. For example, on one occasion, a small group of children (four four- to five-year-olds) were observed during an online game *The Thieves' Christmas* [Swedish: Tjuvarnas jul[6]]. During this activity, a group of children were trying to help a boy add to a simple sequence using the buttons to take the treasures without facing the police. They smiled together when encountering funny or humorous scenes. This keep them occupied and created a 'feel good' factor. However, it was far from clear what they were learning.

It can be argued that ICT is also viewed as a way to entertain and keep children busy. Nevertheless, it is difficult to define the boundaries between pedagogical practice and entertaining practice in early childhood education (Plowman and Stephen, 2003). For instance, showing cartoons can motivate children to develop their fantasies, language skills and collaboration (Bazalgette, 2010).

4. Communicating and documenting preschool practices. The most frequent use of ICT in the studied preschools was for documentation purposes and constructing personal portfolios as well for communicative and supplemental purposes. Preschool teachers employ computers and other technologies (e.g. iPads and digital cameras) to document children's activities, communicate with parents and maintain electronic records of preschool activities. Making portfolios (in some cases an e-portfolio) and sharing these portfolios are regarded as a crucial part of the preschool teachers' duties. For example, Sara remarks:

> I usually take an iPad on our weekly excursion. I take pictures from children's activities so I can document the children's progress. Sometimes I take short notes on Evernote[7] about interesting incidents. (Sara, 26 November 2012)

The excerpt suggests one way in which a teacher uses an iPad to document and reflect on young children's learning journeys. Further, it hints at some of the ways that social media, like Evernote, can be used to share the children's personal learning journeys with parents.

On 25 November in one of the studied preschools, one of the preschool teachers enrolled in a learning management system (LMS) to facilitate communication with home and also give an account of children's learning's activities. By addressing her experiences, Ingrid remarks:

> Every week, I write a report about our group's activities and children's progress. This report with pictures and sometimes with short video clips is published on the net (http://hjarntorget.se/) and children's parents can read and see their children's activities. This report and information are also sent to their parent's email. It works very well! (Ingrid, 9 December 2012)

Similarly, in one instance six young children in a small group were encouraged to write their names both on the paper and on a webpage. The teacher took pictures of the children writing

their names. The children's scripts were put on the LMS along with the pictures of children writing their names.

> We will also use our blog to continuously post information about events at the preschool and our weekly newsletter.

The portfolios often include drawings, photos and, occasionally, video clips. They provide a detailed and holistic account of children's progress and achievements over time. Through documentation and portfolio making of practices of this kind, teachers can develop a rich description of a child's learning journey that can be shared and thus used to strengthen the connections between a child, family members and teachers.

5. ICT is not important in preschool educational practices. By stating that, 'ICT is unnecessary and difficult to use in preschool planned (usual) activities', Rose-Mari underlines another approach to ICT use in preschools. In such an approach, ICTs are seen as a threat to more traditional and 'authentic' playful learning activities.

> In preschool, children should learn in a natural context, play REAL games, paint on real paper and participate in traditional preschool activities.… Most of the children access different types of technologies such as PCs and smartphones at home. So, we should use authentic resources in our educational activities such as Montessori material that often children do not access at home… (Rose-Mari, 2 December 2012)

Here, ICT is viewed, not only as unnecessary but also as *unsuitable* for early-years education. Instead, these teachers emphasized the significance of first-hand experiences, play and peer interactions. Another preschool teacher commented, 'ICT is not something that should be in preschool pedagogical practices'. This argument is oriented to the possible risks of: 'stunting children's intelligence and social skills and of damaging their health' (O'Hara, 2008: 30). Similarly, a number of studies suggest that ICTs position children as passive recipients and prevent children from learning authentically (see Ertmer, 2005; Hew and Brush, 2007; Stephen and Plowman, 2003).

One of the interviewed teachers raised another justification for non-use of ICT in their practices:

> To be honest, I am not so good at computer and other digital technologies.

Pointing to her colleague, Saga contends,

> she is the one who is responsible for ICT and ICT use in our preschool. She attends an ICT in-service course… (Saga, 2 December 2012)

Similarly, in one of the studied preschools, the use of an interactive whiteboard was mainly limited to one of the teachers (the ICT coordinator). Other teachers were afraid to touch the interactive whiteboard. Interestingly, teachers working with other groups were not seen using an interactive whiteboard, and it was not placed in their classrooms; though the aim was that it was to be shared with their groups.

Discussion

This case study outlined some key means through which ICTs have been appropriated in preschool settings. For most, ICT is viewed as a tool for documentation and as an educational object to enrich and transform preschools' existing practices. It is also seen as a cultural mediator that mediates

young children's cultural literacy. Finally, ICT is experienced as an object for entertaining young children and keeping them busy. With reference to ideological approaches to the role of ICT in early childhood, the findings also identify teachers' stances on the non-use of ICT in preschool.

Although most of the participating preschool teachers praised the usefulness of ICT and employed ICT in their practices in multiple ways, others either use ICT as an 'extra' object or do not use it at all as part of their pedagogical practices. Classroom observations and interviews revealed that ICT was viewed 'as a supplement' to existing practices and activities – as a way of doing the same things that have always been done – rather than making ICT an integral part of the curriculum. Interactive whiteboards, for example, were often used as display tools for presenting video clips, images and texts without any exploitation of their interactive functionalities. It can be argued that ICTs seem to be 'bolted onto existing educational practices' (Siraj-Blatchford and Siraj-Blatchford, 2006: 39) instead of being used to extend learning and/or change preschools' practices.

Today ICT forms part of young children's everyday experiences in preschools. The integration of ICT in preschool pedagogical practices, however, has been perplexing (Lin, 2012; Ljung-Djärf, 2008; O'Hara, 2008); and a number of studies (Lindahl and Folkesson, 2012; Scrimshaw, 2004; Tan and Subramaniam, 2009) have sought to examine the obstacles preventing ICT integration in preschool pedagogical practices. Factors such as children's individual needs, the complexity of each preschool context (traditions and embedded norms) and the uniqueness of every preschool teacher have made it difficult to find a satisfactory solution.

Existing discourses and traditions as well as teachers' pedagogical values are a constitutive factor in ICT integration in preschools (Lindahl and Folkesson, 2012; Tan and Subramaniam, 2009; Tsitouridou and Vryzas, 2004). The question why teachers use ICT the way they use it needs further investigation. Preschool teachers' ICT use might depend, to a large degree, on their existing values, technical expertise and pedagogical experience. This lends weight to other studies (see Koehler and Mishra, 2009; Mishra and Koehler, 2006) that the integration of ICTs into preschool pedagogical practices involves a complex coupling between technical knowledge and pedagogical expertise. Following the same line of thought, Lindahl and Folkesson (2012) contend that re-interpreting existing traditions and values can be an important factor for the integration of ICT into preschool practices.

Finally, by exploring the types of ICT integration in preschools that are informed by the preschools' existing working methods, the findings of this study can bring some clarity to the complexities that surround engagement with any innovation in preschool settings and, in particular, the adoption of new technologies.

Acknowledgement

Funding

Notes

1. A broad definition of ICT is adopted in this study that encompasses a variety of technologies including audiovisual resources, computers and smart objects.
2. A majority of Swedish municipalities (more than 220 municipalities at early 2013) have implemented some form of one-to-one project, i.e. one computer for each student in schools and one tablet for each child in preschools.

3. Since the adoption and ownership of smartphones among Swedish adults has risen over the past years, smartphones are not considered to be institutional ICT resources. In one of the preschools, though, teachers have been given an iPhone for communication and documentation.
4. Create Your Own Fairy Tale (Gör din egen saga) developed by Duck Duck Moose, Partnership.
5. The Children's Channel (in Swedish).
6. An online game based on a popular Swedish television show.
7. Evernote is a suite of software and services, designed for notetaking and archiving, located in Redwood City, California.

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