



UMEÅ UNIVERSITY

DIGITAL PLAY IN PRESCHOOLS

Understandings from educational use
and professional learning

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To my dear children, Jolina & Hjalmar

*You have given me reasons to feel
happy, proud and grateful,
throughout the process
of writing this thesis.*

*I love you so much,
mummy too!*

Let's play!

*Work is
done!*



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Abstract

The purpose of this thesis is to improve knowledge on preschool teachers' educational use of digital play and their professional learning about it. The thesis is focused on three questions; How can preschool teacher educational use of digital play be understood? How can the professional learning context of preschool teachers using digital play for educational purposes be understood? And, How can preschool teacher knowledge needs concerning educational use of digital play be understood? The participants were preschool teachers who had started to introduce tablets and digital play in educational practice. Netnography, Self-report essays, and Interviews were used as methods for data collection. The data consist of 465 posts from online forums, ten self-report essays and eleven interviews with preschool teachers. Thematic analysis (Braun & Clarke, 2006) was used as a method for data analysis. The theoretical framework 'Learning in Working Life (Illeris, 2007), which examines the constituent parts of workers' professional learning context, was used to make sense of, and interpret the findings towards a synthesis and a deeper understanding of the informants' stated experiences from educational use of digital play and from professionally learning about it.

The results show that the participants' incentives for using digital play were linked to a user-friendly technology and to the perceived opportunities to support children's life-focused and school-focused learning. Moreover, the children's learning environment was perceived to be enhanced by digital play, as it enabled opportunities for variation, individual adaptation and innovation in the educational practice. The participants envisioned digital play in preschools to be: different from children's home use, purposeful, embedded in educational practice, secure, primarily collaborative and preferably used with teacher presence. Their professional learning context included reluctance from colleagues and guardians and limited time and opportunities to learn about digital play at work. In this situation, technology, like opportunities for knowledge exchange via Internet forums, became an enabler of professional learning. Some participants also explored digital play together with the children, to overcome the shortcomings of the professional learning context. The participants needed knowledge about topics in social discourse, technology and educational use of digital play. Dealing with children's access to tablets and how to enhance children's agency in digital play were issues that many participants worked to improve. Sometimes the envisioned educational use of digital play conflicted with the participants' experiences from the professional learning context, which can be interpreted as instances when the participants experienced the introduction of digital play as challenging.

Introduction

In 2010, tablet technology was made available on the market (Marsh, Plowman, Yamada-Rice, Bishop & Scott, 2016). This research project was initiated in 2012, when the educational use of digital technologies was a voluntary part of Swedish preschool teachers' work (Lpfö 98, 2010 revised). Then, young children's home use of digital technologies, and the Internet, had begun to increase (Swedish Media Council, 2019), and since then it also has become increasingly popular for use in preschools (European Commission, 2017). In an early report on this phenomenon, preschool teachers were encouraged to make use of social media networks to harness their collegial discussions about educational use of tablets (Hylén, 2013). It appeared as though formal arenas for teacher training, authors of books and researchers, had been caught somewhat off guard regarding the increased interest in using tablets in preschools. Courses, literature and research on the topic were scarce. The increase in interest among preschool teachers was interesting from a research point of view. Similarly, Mertala (2017) claims that it is important to study where preschool teachers' positive attitudes towards technology integration comes from.

Play is central to the way that preschools are supposed to support children's learning and development (Lpfö 18), and therefore the focus of this thesis is directed towards preschool teachers' educational use of, and professional learning about, digital play. Conducting a series of research studies of the perspective of participants who, by their use of tablets, already were actively involved in this digitalisation process became interesting. During the data collection period, 2014-2017, some preschool teachers went beyond curriculum expectations regarding the educational use of digital technologies. Most of the participants belonged to this group of preschool teachers, and they welcomed and explored the educational use of digital play in preschools. They have contributed important knowledge about the current state of the educational use of digital play in Swedish preschools and about preschool teachers' professional learning context and professional learning needs. The new formal demands to support children's digital competence (Lpfö 18) and the aim to increase the level of digital competence among preschool teachers (Ministry of Education and Research, 2017), has increased the value of such knowledge for a range of different stakeholders. Swedish preschools are now entering a phase where the use of digital technologies is supposed to be a part of their educational practice. The knowledge produced in this thesis may increase the understanding of how such an educational transformation can be approached and supported, without compromising already established, and well-functioning, educational practices.

Aim and research questions

This thesis aims to improve knowledge on preschool teachers' educational use of digital play and their professional learning about it.

The research questions are:

- How can preschool teacher educational use of digital play be understood?
- How can the professional learning context of preschool teachers using digital play for educational purposes be understood?
- How can preschool teacher knowledge needs concerning educational use of digital play be understood?

Definitions

Digital play

Digital play is a concept that, in this thesis, concern children's use of digital technologies for educational purposes. Arguments for the concept are found under the section Digital play as a concept, on page 11.

Professional learning context

Professional learning context is a concept that, in this thesis, points out that participants learned about educational use of digital play in a context that comprises: an individual dimension of learning, a social dimension of learning at work and a societal dimension of learning (Illeris, 2007).

Different types of learning in a work context

The concepts informal professional development, professional learning and workplace learning will, in this thesis, be treated as having the same meaning. That they are forms of learning that are characterised by a lesser degree of planning and organising when it comes to learning context, learning support, learning time and learning objectives (Kyndt, Gijbels, Grosemans, & Donche, 2016). Moreover, that the meaning of these concepts differs from the meaning of the concept professional development, which is a more systematic approach to supporting employee knowledge development (O'Brien & Jones, 2014).

Educational practice and Workplace practice

In this thesis the concepts educational practice and workplace practice will be treated as having the same meaning. This is further explained under the section Workplace practice, on page 31.

List of Papers

- I. Marklund, Leif. (2015). Preschool teachers' informal online professional development in relation to educational use of tablets in Swedish preschools [Förskollärares informella professionella utveckling på Internet gällande undervisning med surfplattor i svenska förskolor]. *Professional Development in Education*, 41(2), 236-253.
- II. Marklund, Leif., & Dunkels, Elza. (2016). Digital play as a means to develop children's literacy and power in the Swedish preschool [Digital lek som ett medel att stödja barns literacitet och makt inom svensk förskola]. *Early Years*, 36(3), 289-304.
- III. Marklund, Leif. (2019). Swedish preschool teachers' perceptions about digital play in a workplace-learning context [Svenska förskollärares uppfattningar om digital lek i förhållande till arbetsplatsens lärandekontext]. *Early Years*, doi:10.1080/09575146.2019.1658065
- IV. Marklund, Leif. (2020). Swedish preschool teachers' experiences from pedagogical use of digital play. [Svenska förskollärares erfarenheter från pedagogisk användning av digital lek]. *Journal of Early Childhood Education Research*, 9(1), 170-193.

Paper II was co-written with Elza Dunkels, my main supervisor. Beyond regular guidance, which is a part of her supervisor role, Elza was responsible for writing the background section of the Paper. I was responsible for the remaining parts of the paper. However, I carried out a pre-reading of the articles that were to be included in the background section of Paper II and I also came up with the idea of using a framework developed by Lafton (2012) to structure the presentation of the background section. The initiative to initiate the research project, to conduct the individual studies and to write the papers that are included in this thesis were all taken by me. The fruitful combination of regular supervision and the freedom and trust that was given by my supervisors during the research process make it possible to claim that I have owned the present research project from its very beginning to the end.

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The Research Field

Digital competence development: the Swedish context

The topic of digitalisation outside the preschool context will not be covered closely in this thesis. However, from a societal point of view, digitalisation is important. For example, Sweden is, according to OECD (2018), one of the leading countries in the diffusion and use of digital technologies. Moreover, the digital divide between citizens of different ages, educational background and income is narrower in Sweden compared to most other OECD countries. From a financial perspective, the same report links Sweden's capability to embrace digital transformation and its strong economic development in recent years. Another example is how the European Commission works with EU countries to support and reinforce the development of key competencies and basic skills for all, from an early age and throughout life (European Commission, 2019b). According to the commission, this work is necessary to ensure citizen's fulfilment and development, employability, social inclusion and active citizenship. Digital competence is listed as one of the eight key competencies for lifelong learning (European Commission, 2019b), and it is explained in the following way:

Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking. (p.9)

For anyone who wishes to estimate their level of digital competence, the European Commission provides a comprehensive checklist that includes knowledge, skills and attitudes linked to the concept of digital competence (European Commission, 2019a). These perspectives from OECD and the European Commission are examples of how digitalisation is a global phenomenon and examples of the importance that digital competence is ascribed in contemporary society. Nationally, the government established the Swedish National Digitalisation Council in 2017 (Swedish National Digitalisation Council, 2019), intending to make Sweden the strongest country in the world when it comes to utilising the opportunities created by digitisation. The Council's task is to support the implementation of government digitalisation strategy, which include five objectives; digital competence, digital security, digital innovation, digital leadership and digital infrastructure (Ministry of Enterprise and Innovation, 2017).

In Sweden, children interact with digital technologies and use the Internet from an early age. Statistics reveal that between 2010 and 2018 there was an increase from 8 to 66 percent in two-year-olds who used Internet a couple of times, or more, per week (Swedish Media Council, 2019). Forkosh Baruch & Erstad (2018) suggest that, when children become accustomed to technologies as a part of their upbringing, in play and learning, this will have implications for development and trajectories of their learning, and that one consequence is that children will become active and involved citizens of the world at an early age. These are developments Forkosh Baruch & Erstad (2018) claim will have an impact on policy and practice. For example, the challenge of creating an educational continuum and the challenge of bringing up children to become informed adults are listed as some of the key challenges in the digital era. The Government of Sweden also considers educational policy to be essential in the process of achieving the objectives of the national digitalisation strategy (Ministry of Education and Research, 2017), and have therefore developed such a strategy for the educational system, which comprise three areas of focus; digital competence for everyone within the educational system, equal access and use, and research and evaluation of opportunities in digitalisation. Hanell (2018) presents digital competence as a part of a globalised policy discourse, which conceptualises education as a necessity for staying competitive in the global competition between nations. Ljung-Djärf (2004) found that preschool teachers' motives for educational use of IT in preschools were linked to children's future well-being. She claims that the way we imagine and talk about the future, and the future society, works as discursive patterns. That such visions are present in the mind-set of preschool teachers, who hold the power to enable them to become a part of the educational practice. For instance, Gibbons (2016) critically reflects on the commonly used statement that we live in rapidly changing times, and calls for a critical view on such statements when early childhood settings are digitalised.

The Swedish preschool

This section will cover a brief introduction of the Swedish preschool, using research findings and descriptions of some of the developments that might have, or potentially may, influence preschool teachers' use of digital play.

The Swedish preschool is a non-obligatory part of the educational system for children from one to six. However, the children have the right to access a preschool within five months of the point in time the guardians apply to have their children enrolled (Pramling Samuelsson, Williams, Sheridan, & Hellman, 2016). The six-years-old children attend an educational practice called preschool-class which, since 2019, has turned into a mandatory part of the educational system (Swedish National Agency for Education, 2019). Even

though attending preschool is voluntary until children turn six, attendance rates are high, about 85 percent of all children aged one to five attend preschool (Swedish National Agency for Education, 2018). Preschool represents the first step in the Swedish educational system with a curriculum of its own since 1998 (Lpfö 98). This curriculum was later revised in 2010 (Lpfö 98, revised 2010), and the emphasis on educational and school preparation aspects of educational practice was strengthened. This change of focus in the profession attracted researchers' interest. For example, Jönsson, Sandell & Tallberg-Broman (2012) claimed that it was important to study and analyse how changes in policy documents affect the balance between education and care in the preschool learning environment. Sheridan, Williams, Sandberg & Vuorinen (2011) argued that these changes caused a need for preschool teachers to develop a shared understanding of what teacher competence means, and that this understanding will ultimately influence the preconditions for children's learning in preschools.

According to Sandberg & Arlemalm-Hagser (2011) Swedish preschool education is a combination of learning and play, care and fostering of fundamental values, for example democracy, individual freedom the equal value of all people, integrity, solidarity and gender equality. However, Löfdahl & Folke-Fichtelius (2015) could see that preschool teachers found it difficult to talk about and describe care, which made them use different professional strategies to avoid this challenge whereby they transformed care into children's learning and knowledge. Brodin & Renblad (2015) found that Swedish preschool teachers regarded the curriculum as a tool for improving the quality of preschool. Hedefalk, Almqvist, & Lundqvist (2015) found that the actions of preschool teachers do not look like teacher-centred teaching, where play and caring necessarily are ignored. Instead they directed children's attention in a certain direction in line with the curriculum and used this kind of teaching approach throughout the preschool day. Heikkilä & Mannila (2018) argue that Swedish preschools are very child centred and that children are encouraged to try and retry as a means of learning and developing. Broström et al. (2015) found that preschool teachers associated children's learning with their social interactions and development, and that they considered children's initiatives and active involvement to be crucial aspects of the learning process. Castro, Granlund, & Almqvist (2017) could see that the combination of the emotional tone used by the teachers and their instructional practices nurtured children's active participation, and also their academic achievement. They therefore stress the importance of teaching practices that can improve children's engagement levels. The connection between emergent literacy practices and children's engagement is confirmed by Norling, Sandberg, & Almqvist (2015), who claim that children's ability to express thoughts, ideas and needs is important for their full participation in a democratic society.

According to the curriculum (Lpfö 18), preschools should lay the foundation for a life long learning and that the educational practice should be enjoyable, secure and provide all children with rich opportunities for learning. Sweden has recently taken two formal steps that are in line with the above-mentioned international and national perspectives on the importance of digital competence development. The national digitalisation strategy for the educational system (Ministry of Education and Research, 2017), comprises three areas of focus: digital competence for all in the educational system, equal access and use, and research and evaluation of the opportunities that are generated by digitalisation. All areas include goals that are to be accomplished by 2022. Moreover, the recent curriculum changes (Lpfö 18) make it mandatory for Swedish preschool teachers to support children's digital competence. According to the curriculum, education should provide children with opportunities to develop digital skills by enabling children to develop an understanding of the digitalisation they encounter in everyday life. Children should also be given opportunities to develop a critical, responsible attitude towards digital technology so that eventually they can identify opportunities, understand risks and be able to evaluate information. Statistics reveal that Swedish preschools still have work to do when it comes to educational use of IT (Swedish National Agency for Education, 2016). For example, 64 percent of preschools have not developed formal plans for how IT is to be used, 50 percent of Swedish preschool teachers claim they need further training about the educational use of IT and 33 percent of preschools use IT together with their children less than once a week.

Digital play as a concept

Fleer (2018) directs attention to that the concept of digital play has only recently emerged, and to the fact that there is no clear consensus about what it is. However, Marsh et al. (2016) found that similar types of play were possible in digital contexts, and that children draw upon both the digital and non-digital properties of things in their contemporary play.

In relation to the concept play, Zosh et al. (2018) claim that play has puzzled researchers and philosophers for years, because of how the criterial features of play are difficult to pin down. In the Swedish curriculum for preschool (Lpfö 18), it is stated that play should be the foundation of children's development, learning and well-being. By its composition, this statement reveals that learning and play are concepts that are mutually intertwined, which also is asserted by Wallerstedt & Pramling (2012). It is also possible to use the curriculum statement to support the claim that any introduction of digital technologies into the educational practice of preschools is likely to be carried out in a playful manner, even though the goal might be to support children's learning. This line of reasoning makes it rational to use the concept digital play in this thesis.

Plowman and McPake (2013) support this description of the educational practice, when they argue that most early years specialist agree that the best educational experiences for pre-schooler are based on play. They also claim that the relationship between play and specific learning outcomes is difficult to establish, and they do not separate the concepts play and learning when they argue that children's experiences when playing and learning with technologies can contribute to children's learning.

Due to the difficulty in pinning down the criterial features of play, Zosh et al. (2018) suggest that play should be understood as a spectrum, ranging from free play through guided play to games and then playful direct instruction. Moreover, they claim that a single-minded focus on children's free play has had the consequence that researchers have been prevented from studying a wider range of experiences, which are constructed by adults but playful in essence. They used their spectrum of play and tried to establish relationships between the different forms of play on the spectrum and their respective potential in supporting children's learning. The outcome was that guided play, where adults help to structure the activity and where the activity is focused on a learning goal, produced the best potential to support children's learning. However, children's agency to direct activity was to be retained in guided play.

Danby (2013) explains that technology integration enables activities that can be played, created, watched, listened to and read, and that these different forms of activities are possible to integrate into traditional everyday practices. Similarly, Gultz et al. (2019, as cited in Kjällander & Riddersporre, 2019) claim that there is interplay between children's digital play and children's activities in the physical educational environment in preschool. They, therefore, argue that it should not be taken for granted that children's work with physical objects will decrease if, for instance, an app is introduced into educational practice. Yelland (2018) highlights that the main difference concerned with learning in the 21st century is not that it is digital, but rather that it is multimodal. Edwards (2014) describes how the context of children's lives can be understood as a digital-consumerist context. In this new kind of context, children are identified as a part of the consumer market, which influences children's preconditions for play. She claims that children in this context make use of the opportunities enabled by the convergence of various products, digital media and digital technologies in their play and that children's play can be observed on a continuum between digital and non-digital experiences. Therefore, she introduced children's contemporary play as an important topic of discussion in early years education.

Digital play in preschools

This section will first introduce possible origins of preschool teacher insecurities about digital play in preschools, secondly cover possible origins of preschool teacher appreciation of digital play in preschool. This division in the presentation of this section was made based on the knowledge that preschool teacher perceptions about the educational use of digital technologies influence how and the extent to which digital technologies are used in their educational practice (Blackwell, Lauricella, & Wartella, 2014; Kerckaert, Vanderlinde, & van Braak, 2015). The section ends with a paragraph that presents claims on how digital play may be approached in preschools.

Origins of preschool teacher insecurities about digital play

This section on preschool teacher insecurities will be organised on the basis of how the research findings imply that digital play may challenge preschool teachers professionally.

Digital play may challenge the professional role. Lynch & Redpath (2014) describes how IT has a long history of being described as an enabler of innovation and change. They also claim that the institutionalised roles, structures and processes of schooling seem to work against the implementation of digital technologies in the classroom as IT changes the roles and relationships adopted in institutionalised manners of teaching and learning. For example, preschool teacher concerns about how educational use will affect their role as teacher, may according to Flewitt, Messer, & Kucirkova (2015), turn into a scepticism towards the educational use of tablets. They claim that preschool teachers do not want to be reduced from professional educators to suppliers of repetitive content, which implies apps, and they therefore argue that successful tablet integration requires that preschool teachers are given enough time to plan their teaching.

Digital play may challenge the norms and traditions of the profession. Palaiologou (2016) found that some preschool teachers, who are digitally-competent in their personal lives, avoid the educational use of digital technologies in their work due to a dominant ideology of traditional, non-digitised play in the preschool learning environment. Hernwall (2016) could also see that some preschool teachers think of digital technologies as a threat to educational practice, and to the notion of real communication. Lindahl & Folkesson, (2012) found that some preschool teaching students regard new technologies as a threat to tradition. Also, Lillvist, Sandberg, Sheridan, & Williams (2014) found that preschool teaching students did not incorporate digital competence when they were asked to define preschool teacher competence. Lindahl & Folkesson (2012) brought attention to how the norms

that were present in the curriculum (Lpfö 98, revised 2010) could be used by preschool teachers to build arguments to resist or welcome the introduction of IT in preschools.

Digital play may also challenge the professional view of children. Lindahl & Folkesson (2012) could see that preschool teachers' ways of prioritising among the norms in the curriculum, and their views on children, impacted their decisions about the educational use of IT. If the preschool teachers viewed children as competent, the introduction of IT was less problematic. However, if the preschool teachers felt the need to instruct and supervise children, approaching IT in their work became more of a problem. Sandberg & Pramling (2003) show how some preschool teachers can perceive educational use of IT as a threat to an idealised view of childhood. Lafton (2012) claims that socially-constructed knowledge, preschool teachers' knowledge and the social discourse concerning digital technologies in children's lives can influence how preschool teachers construct their digital practices. Dunkels (2019) claims that the preschool context has often been an arena where a certain degree of media panic concerning children's use of digital technologies has flourished. Media panic is to be understood as an emotional, rather than rational, reaction to the introduction of new media (Drotner, 1999). Dunkels (2019) argues that this reluctance to adopting digital technologies can be linked to the fact that many adults find it difficult to relate to the combination of the soft human side and the hard technology side that appears when digital technologies are included in preschool practice.

Digital play may challenge the professional knowledge concerning play. Edwards (2016) argues that technology, digital media and popular culture form an important aspect of young children's life-worlds, and that preschool teachers are faced with the issue of how to integrate this into play-based learning in preschools. Lawrence (2018) links preschool teacher insecurities about digital play to the fact that existing literature rarely displays what children's digital play looks like. Aubrey & Dahl (2014) found that preschool teachers lacked awareness of how age-appropriate pedagogy, using IT, could be organised. Another example, is how preschool teachers are commonly worried that tablets will nurture children's antisocial behaviour (Ralph, 2018). In a time when it has been increasingly difficult to separate the digital from the analogue in children's play, Edwards (2016) argues that preschool teachers need conceptual tools that can help them to observe, plan and implement play-based learning experiences using digital technologies. She presents web-mapping as an opportunity that can help preschool teachers to understand children's individual meaning-making due to the fact that such a map can reveal what kind of activities and artefacts the child is usually interested in, and thereby can become a tool that can be used to identify the empty areas into which children's learning could be

broadened. Edwards (2014) claims that it is not known how children's changing patterns of play affect their development. In a similar way, the Swedish Media Council (2019) explains that the increasingly intensified use of digital media in children's lives is a new phenomenon, and they claim that the only thing we can know for certain, is that we do not know all the good and bad long-term effects of children's digital media use. Edwards & Bird (2017) claim that one problem of technology use in preschool settings is that little is known about how children learn to use technologies through play, and that this lack of knowledge makes it difficult for preschool teachers to observe and assess children's learning. Dunkels (2019) puts forward an alternative way of viewing technological integration i.e. that preschool teachers could focus on what the technology can offer, for example how it could enable opportunities for entertainment, learning, socialising, understanding, finding help, helping others, making imprints, and other opportunities for being creative. Huber, Highfield, & Kaufman (2018) also state that a simple displacement hypothesis that claims time spent with screens is less valuable than traditional activities falls short due to the fact that it fails to consider the potentially valuable play experiences that screen time can offer.

Johnston, Highfield, & Hadley (2018) focus attention on the fact that the kinds of insecurities that can arise regarding technology integration into preschools also apply to other stakeholders in addition to preschool teachers, for example the management and the children's families. They claim that technology within preschools need to be re-examined and reimagined by educators, service directors and management, and also by the families. Moreover, they argue that these stakeholders need to develop a shared understanding of why technology is important in children's lives, rather than just focusing on how to integrate it. Aubrey & Dahl (2014) also claim that a knowledge exchange between guardians and preschool staff would be helpful to promote and enhance children's learning and development in relation to use of IT.

Arnott (2016) presents three important points that may be used when preschool teachers try to understand the way that technologies shape and contribute to early childhood educational practice. These points could potentially resolve some of the origins behind preschool teacher insecurities about digital play. She first highlights the fact that technologies are not deterministic artefacts that direct, scaffold or teach children, especially not in relationship to children's social development and social experience. Secondly, she acknowledges that children's digital play is complex, but not entirely unique compared to other forms of play, especially if it is integrated into children's experiences as part of well-established playful pedagogies. Thirdly, she states that technologies form one element of a multifaceted and interconnected ecological preschool system, and that it is the interplay around the preschool system and across the digital play system that results in observable social experiences during digital play.

With these points she seems to wish to underline that preschool teachers themselves are, to a large extent, able to influence what digital play will become in the preschool context.

Origins of preschool teacher appreciation of digital play

This section provides an overview of some possible origins of preschool teacher appreciation of digital play in preschools. For example, Kerckaert et al. (2015) claim that an increasing number of researchers are convinced that IT in preschool settings provide multiple opportunities for young children. Mertala (2017) adds that preschool teacher interest in using IT in their work has increased over the last decade.

The appreciation of digital play can be linked to user-friendly technology. Merchant (2015) claims that tablets have removed some of the obstacles that were linked to computer use in preschools due to the fact that they are easier to operate for children with their tap, swipe and drag functionality. Marsh et al. (2016) explain that young children, with this technology, can engage with games, apps and websites in a relatively easy manner. Jack & Higgins (2019) found that preschool teachers had a broad view of educational technology which stretched beyond the use of computers and tablets, and Mertala (2017) partially linked preschool teacher positive feelings towards IT to promising devices and software, from an educational perspective.

The appreciation of digital play may be linked to the opportunity to support teaching and learning. Arnott (2016) explains that research is beginning to describe how technologies form one part of the complex ecological system of children's early learning. Jack & Higgins (2019) could see that technology use foremost aimed at supporting teaching and learning in preschools. Mertala (2017) found that preschool teachers' positive feeling towards using IT were linked to the opportunity to support children's development of socio-emotional skills, their learning of academic skills and the opportunity to use IT in a way that enhanced children's role as active learners. Moreover, that it was linked to their awareness that IT was important knowledge for use in the primary school context. Masoumi (2015) found that Swedish preschools used IT in five main ways; to enrich existing practices, as a cultural mediator, for entertainment and as a tool for communication and pedagogical documentation. Otterborn, Schönborn, & Hultén (2019) could see that tablets were primarily used to support school subject-related, social and generic skills. Similarly, Hernwall (2016) identified that IT was used to support specific competences. Kerckaert et al. (2015) identified two main ways that IT was used in preschools: to support children's basic IT skills and attitudes and to support contents and individual learning needs. Hooker (2019) identified that the use of ePortfolios made it

possible for children to recall, reconnect and restart their learning, and that their active participation in these processes made them become active contributors to their learning journeys, similar to a process of formative assessment. Regarding the social aspect of children's learning, Aubrey & Dahl (2014) found that preschool teachers were positive and actively promoted use of IT as a part of their ongoing socio-cultural practices. Arnott (2016) could see how children played collaboratively, that they used different ways of interacting with each other and that they showed varying degrees of social participation in digital play. Actions of prosocial behaviour in children's digital play were also identified in a case study by Ralph (2018) during a task when children collaborated on tablets. Similarly, Danby, Evaldsson, Melander, & Aarsand (2018) found that children's digital game play included the elements of instructing each other, monitoring each other's actions and problem solving, and identifying how a collaborative peer culture was maintained as the activity required that children took each other's perspective, shared digital devices and skills.

This appreciation of digital play can be linked to a perceived need to stay in coherence with society. Bølgan (2012) claims that implementation of IT in preschools is interesting because it can assist children in the experience of mastering, developing and creating coherence between preschool practices and the technology-rich life children experience at home. Heikkilä & Mannila (2018) link the need for introducing IT in preschools to societal changes that comes with digitalisation. They argue that children need to understand the underlying basics that are driving this change process and some of the opportunities and challenges it involves. Sandvik, Smørdal, & Østerud (2012) argue that children's interactions with tablets in preschool should be considered as literacy events, situations that make demands on children's literacy, and that traditional print literacy is no longer enough to understand articulation and meaning-making in contemporary society. They consider it impossible to separate written text, images, sounds and numbers in a society that is increasingly dependent on the ability to read screens. Kirova & Jamison (2018) could see that the availability of tablets, and children's encounters with them on a daily basis both individually and with teachers and peers, provided opportunities to learn new ways of using digital technology, ways which were not known or experienced by the children in their homes.

This appreciation can be linked to the opportunities to embed digital play into educational practice. Bølgan (2012) anticipated that innovative forms of play and learning would take place in educational environments where children could access digital technologies, and where the digital technologies were integrated with other activities and used as multifunctional tools. Flewitt et al. (2015) found that preschool teachers particularly valued how the tablets enabled

opportunities to deliver curriculum guidelines in new ways, and that it was possible to provide all the children with a chance to familiarise themselves with touch-screen technologies.

On how digital play can be approached in preschools

Several researchers claim that preschool teachers need to think about how they introduce digital play into their educational practices, and that a purposeful use will improve the chances of positive educational outcomes. Genlott & Grönlund (2016) argue that preschool teachers need to take on the responsibility to introduce and implement digital technologies in a proper manner if the use of digital technologies is to become a lever for children's learning. Similarly, Kjällander & Riddersporre (2019) claim that preschool teachers need to know what digital tools to use, when, how and why to use them. Moreover, they also need to know when it is not appropriate to use digital tools in their educational practices.

There appears to be some level of consensus that digital play should be embedded into educational practice. Morgan, Morgan, Johansson & Ruud (2016) claim that digitalisation generally will have only minor positive effects on learning, but they argue that learning outcomes can be improved if digital technologies are implemented with clear goals and if they are implemented as a part of the education provided. Arnott (2016) argues that preschool teachers need to carefully construct playful experiences that position technologies as contributory tools, that may enhance the play, rather than viewing digital play as a central activity in and of itself. She also highlights that it is the process that is important to consider regarding children's learning, rather than the outcome of the digital play episode. Yelland (2018) argues that a pedagogy of multiliteracies, where new technologies are used as resources that compliment and are based on other resources and real-world experiences, can enable educators to provide the most responsive learning ecologies for all children.

The value of teachers' presence in digital play and the value of digital play that is collaborative has also been reported in multiple studies. Walldén Hillström (2014) claim that the level of digital competence training depends on the collective work of the participants in digital play activities. Similarly, Kirova & Jamison (2018) claim that more capable teachers and peers can act as important support in young children's multiliteracy experiences in preschools. Lawrence (2018) argues that preschool teachers should aim to use digital play in a collaborative and non-competitive way and that monitoring of peer play is necessary to assure such educational use. Several research findings support the argument for teacher presence. Kjällander & Moinian (2014), could see that children do not always use apps according to the apps intended didactical

design, which suggests that teacher presence is important in order to guide the activity. Nilsen, Lundin, Wallerstedt, & Pramling (2018) found that children's use of a digital and an analogue memory game turned into different activities from a pedagogical perspective, which suggests that preschool teachers need to be present to be able to reflect on the outcome of the kind of digital play activity that is introduced. The findings of Palmér (2015), that apps can influence teacher interaction with children and the children's degree of participation and dialogue with the teachers in different ways, suggest that preschool teachers need to be present and reflect on how the communication and children's level of participation are influenced by different apps. Lindahl & Folkesson (2012) argue that preschool teachers need to develop strategies to present open-ended learning activities, and increase their ability to observe and respond to children's initiatives when IT is used. Lafton (2012) could also see how preschool teachers had come to an unspoken understanding among themselves that games are an arena which is exclusive to children. In their educational practices, this resulted in adult absence when the children played digital games. Kearney, Schuck, Burden & Aubusson (2012) claim that mobile technologies, such as tablets, need to be used authentically in a manner that enables opportunities for personalised learning and collaboration. Danby et al. (2018) argue that collaboration is an important aspect of social activity that can be linked to young children's digital gameplay. In relation to tablets, Flewitt et al. (2015) found that, in well planned tablet activities, children's motivation and concentration was stimulated, and that the activities offered rich opportunities for communication, collaborative interaction, independent learning and for children the achievement of high levels of accomplishment.

Some studies have highlighted the opportunity to support children's digital competence with a form of play that does not require the use of digital technologies. Bird (2019) brings up play with imaginative technologies as an alternative. The findings showed that imaginative technologies can provide opportunities to address ideas around digital citizenship and technological behaviour with the children. She also found that educators were more comfortable in supporting children in this type of play as they recognised it as being real play. Similarly, Heikkilä & Mannila (2018) compared programmable robots and the use of clothing cards, and found that both the digital and the analogue approach could be used to improve children's level of understanding of elementary programming by using the task to debug programs.

Apps for educational use

Some studies have shown that apps do not often possess qualities that would make them useful in preschool settings (Falloon, 2013; Merchant, 2015). However, Kjällander et al. (2019) claim that the market concerning qualitative apps for preschool use has matured, which should increase preschool teacher

opportunities to choose what kind of digital tools they would like to use. Marsh, Plowman, Yamada-Rice, Bishop, Lahmar & Scott (2018) claim that the potential of high-quality apps to promote children's play and creativity is a reason for preschool teachers to consider the use of tablets in their educational practice. Huber et al. (2018) claim that preschool teachers can make the most of new technologies, such as tablets, by selecting high-quality, well-designed apps that can encourage different forms of play. Falloon (2013), draws attention to how apps should match children's ability level. This is confirmed by Marsh et al. (2018) who could see that, at home, children aged 0-5 years sometimes used apps that were not aimed at their age range, and that this sometimes inhibited their play and creativity.

Some of the following findings regarding apps are closely linked to the issue of supporting children's agency, or active participation in digital play. According to Palmér (2015), apps can influence the degree of children's participation and dialogue differently and preschool teachers might also interact differently depending on the app being used. Lynch & Redpath (2014) distinguish between open-ended and closed apps, and argue that closed apps will make children consumers of knowledge and open-ended apps will make children producers of knowledge. Kjällander et al. (2019) claim that both preschool teachers and children prefer to use open-ended apps that include many possible solutions and will enable exploration and include opportunities to make several attempts to find solutions. Petersen (2015) studied preschool teacher interaction with apps and found that apps that enable auditive, visual or corporeal modes of communication will enhance children's agency. Lawrence (2018) argues that the use of apps, that do not have the extrinsic rewards of game-like apps, can stimulate a play behaviour which is similar to traditional play. Danby et al. (2018) claim that children's strategies, when they are involved in the process of advancing in digital game play, are examples of how children use their agency in learning that occurs in social interaction and gameplay.

Teacher professional learning

This section will foremost cover research about teacher professional learning in general, but to some extent also research that examines the professional learning of preschool teachers in particular. Regarding the concept professional learning, O'Brien & Jones (2014) claim that there is a significant difference between the systematic career progression which is linked to professional development and the broader, more critically reflective and less performative approach to engaging in professional learning. They stress that professional learning is a term that better reflects the characteristics of a reflective educational practice, which includes critical evaluation and continuous learning. The preschool is such an educational practice, and Sheridan et al. (2011) state

that preschool teacher competence needs to be continuously reconstructed along with changes in curricula and along with changes in society. Johnston et al. (2018) claim there is a need for professional discussion, professional learning and critical reflection opportunities in order to enhance preschool teacher understanding of technology as being socially, culturally and pedagogically relevant to young children.

Avalos (2011) presents teacher professional learning as a complex process that involves the cognitive and emotional involvement of individuals and of the collective of teachers. She further claims that professional development initiatives are unlikely to be experienced as relevant by all teachers, and that both informal and formal forms of professional development may be purposeful if these approaches are in line with teacher and student objectives and needs. Dede, Jass Ketelhut, Whitehouse, Breit & McCloskey (2009) draws attention to how teachers can experience formal professional development initiatives as ineffectual and time-consuming in their already busy work schedules. Turner (2006) states that inexperienced teacher learning should ideally be self-directed and oriented towards educational issues that are close to their needs, and that access to mentors would enhance their learning.

Regarding online communities for professional learning purposes, Barab, Makinster & Scheckler (2013) draw attention to the difficulty of finding a fruitful balance between designing online communities and allowing them to develop from the agendas and needs of the participants. Similarly, Olofsson (2010) claims that top-down initiatives experience difficulties in becoming effective, successful and sustainable over time, and that the lack of ownership of the professional learning process is an influential part of this fact. In addition, Schlager and Fusco (2003) question the value of creating larger online communities because they do not often consider the local communities of teachers in their design processes. Instead they claim that the Internet provides a greater potential to support local communities of teachers. According to Dede et al. (2009) local communities of teachers need a form for professional development that fits with their busy schedules, that include powerful resources and that can provide real-time, ongoing, work-embedded support. Similarly, Brandenburg & Ellinger (2003) express that the expectation of "just-in-time learning" in the workplace is growing. Prestridge (2010) could see how such an online forum for professional development contained collegial discussions, which were important for the development and maintenance of the forum, and critical discussions that had the potential to change teacher beliefs. Johannessen (2011) could see that secondary teachers did not seem to critique each other's practices within online forums, and that they instead used the online communication to share ideas and practical ways of using digital resources in their work. Duncan-Howell (2010) claims that professional

development is a circular process, where teachers should be allowed to change in subtle, iterative and self-determined ways, and that online communities have the potential to support such a process of knowledge development. However, maintaining online communities over time requires awareness of the purpose the community serves, the participants' needs, knowledge about how to sustain it and what kind of actions will help to support learning (Zygouris-Coe & Swan, 2010). The outcome of teachers' online discussions was studied by Olofsson (2010), who found that half of the teachers thought that the online discussions had contributed to their professional development over time, in the sense that their understandings of the teaching profession and their understanding of how they could work had improved. Similarly, Hollingsworth & Lim (2015) found that preschool teachers who could access web-based modules in their training thought them to be effective and to some extent they preferred web-based modules over traditional instruction. Nasiopoulou, Williams, Sheridan, & Yang Hansen (2019) claim that preschool teacher professional profiles include transformative change due to the fact that the interaction between their personal characteristics, the immediate environment which contain roles, norms and rules and the societal landscape shape preschool teacher development as professionals. They identified two subgroups of preschool teachers, those educated prior to 1998 and those educated after, and their study indicated that all Swedish preschool teachers need continuous professional development, but of different types. Nolan & Molla, (2018) has on the basis of their research results, presented four c's which they claim are essential to effective professional learning for early childhood teachers; *content*, explained as the association between individual aspirations and systemic requirements, *collegiality*, described as the positioning and importance of collegial relationships *criticality*, explained as critical deliberation in 'safe' learning environments and *change*, which is to acknowledge that teacher learning takes place in the domains of professional dispositions, pedagogical knowledge and social capital.

Theoretical Points of Departure

Application of frameworks

This section will present how and why theoretical frameworks were used in the analysis in Papers I, II, III.

As a researcher, and as a teacher, I possess a socio-cultural perspective on learning which means that I recognise that people learn in social interactions (Vygotskij, 1978). Säljö (2018) explains that individuals acquire knowledge and experiences by participating in and contributing to social communities, which means that language becomes a fundamental aspect of human learning, due to the fact that language mediates the world for us. It becomes a tool for thinking and for social interaction. Moreover, Säljö (2018) underlines that the social-cultural perspective acknowledges that learning and development are something that is ongoing throughout individual's life span. This made it relevant to search for theoretical frameworks that were aligned with the socio-cultural perspective on learning.

In Paper I, the purpose was to examine the questions and information preschool teachers ask and share regarding educational use of tablets in preschools within online social network discussions.

The Technological Pedagogical Content Knowledge Framework (Koehler & Mishra, 2009), TPACK, describes three kinds of knowledge; Technological Knowledge, Technological Pedagogical Knowledge and Technological Content Knowledge (See Figure 1). In the overlap between these forms of knowledge the Technological Pedagogical Content Knowledge is found, which represent the knowledge a teacher needs in order to be able to implement technology efficiently in a specific educational context. This framework was applied with the purpose of categorising participant questions based on the kind of knowledge need the question represented i.e. whether the questions were technological, pedagogical or content-focused.

TK is described as:

Knowledge about certain ways of thinking about, and working with technology, tools and resources. (Koehler, 2012)

TCK is described as:

Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology – or vice versa. (Koehler and Mishra, 2009, p.65)

TPK is described as:

...knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinary and developmentally appropriate pedagogical designs and strategies (Koehler and Mishra, 2009, p.65)

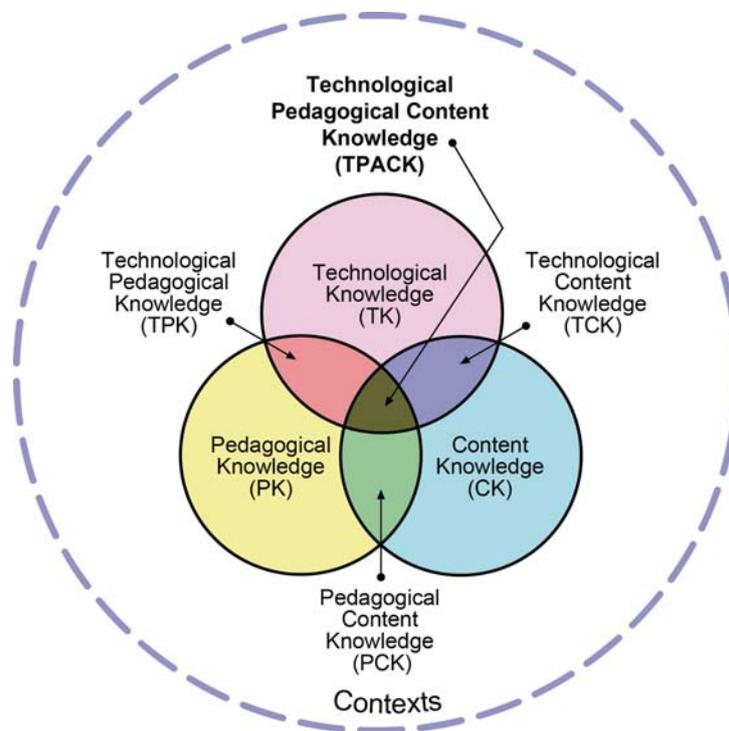


Figure 1. TPACK framework

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In Paper II, the purpose was to examine Swedish preschool teachers' online discussions regarding how they intended to use tablets and digital play in order to support children's literacy development.

The TPACK framework was applied with the same purpose as described in relation to Paper I. Moreover, the Caring, Nurturing and Teaching Framework (Ljung-Djärf, 2004) was used with the purpose of further analysing the questions within two of the categories, Technological Pedagogical Knowledge and Technological Content Knowledge. The questions in these categories revealed information about how the participants intended to use tablets. This made it possible to use the Caring, Nurturing and Teaching Framework to categorise the questions further on the basis of their intent, or rationality, from an educational perspective. That is, if the participant who had asked the question had the intention of using the tablet for caring, nurturing or teaching purposes.

In Marklund & Dunkels (2016) the categories of the Caring, Nurturing and Teaching Framework were explained in the following manner:

- Caring rationality: A characteristic of caring rationality is to perceive contemporary media as a leisure activity and a threat to other activities (Ljung-Djärf, 2004)
- Nurturing rationality: A characteristic of nurturing rationality is to perceive the computer as an available option among others (Ljung-Djärf, 2004)
- Teaching rationality: A characteristic of teaching rationality is to perceive the computer as a tool for teaching and learning and, according to Ljung-Djärf (2004) computer use is regarded as an essential learning activity where the main aims are to fulfil political visions and goals regarding equal conditions for learning.

Note that the frameworks applied in Papers I and II only permitted a teacher-centred form of analysis, which made it possible to increase knowledge about individual teachers' questions and educational intentions.

In Paper III, the purpose was to increase the understanding of how preschool teachers perceive opportunities and challenges associated with digital play.

For this purpose, I needed to find a framework that captured the context in which the participants learned, and which also included elements that could potentially influence the way participants used digital play for educational purposes and how they learned about it professionally.

The Learning in Working Life Framework (Illeris, 2007) was found to meet these needs. It displays the elements of a work learning context, and it was applied in the analysis in Paper III with the purpose of linking participant-

perceived opportunities and challenges to the elements of their professional learning context. Opportunities and challenges were interpreted as potential *incentives*, which could provide participants with reasons to use or reasons to resist the educational use of digital play in preschools. By using this framework, it was possible to analyse how participant perceptions concerning opportunities and challenges were linked to the other elements of the framework: the *societal level*, the *technical-organisational learning environment*, *workplace practice*, the *social-cultural learning environment* or to the *content* of digital play itself. Thereby the framework permitted a contextualised form of analysis. The opportunity of using this framework for this kind of contextualised analysis is also the main reason the Learning in Working Life Framework was used in this thesis to make sense of, and interpret, the findings towards a synthesis and a deeper understanding of informants' stated experiences from the educational use of digital play and from learning about it professionally.

The Learning in Working Life Framework

The following properties of the Learning in Working Life Framework (Illeris, 2007) made it interesting. First, the framework illustrates the constituent elements of a worker's professional learning context which may influence how workers learn new *content* in their profession, and how this new *content* is incorporated into their *workplace practice*. The fact that digital play can be understood as new *content* in preschools thereby matched this central aspect of the framework. The framework also incorporated the participant learning context as adult learners within a profession. For example, Illeris (2007) claims the Framework (See Figure 2) acknowledges the fact that the primary objective in working life is not to learn, it is to produce products or provide services.

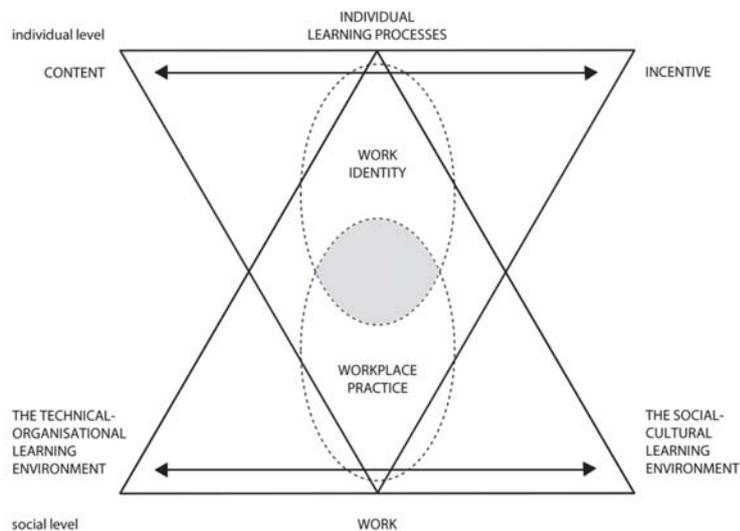


Figure 2. Learning in Working Life Framework (Illeris, 2007, p. 223)

The Learning in Working Life Framework needs further explanation. Illeris (2011) highlights that workplace learning is special due to the fact that it happens in a specific learning space. However, he underlines that the opportunities for work-related learning also exist in contexts outside of the physical workplace, for example via courses, networks and in contact with customers. He uses the term workplace learning, which includes work-related learning in all such work-related connections, and he acknowledges the fact that the opportunities for individuals to engage in work-related learning may deviate between different professions. Workplace learning is something that, according to Illeris (2011), takes place in the encounter between the learning environment and the learning potential of the employees, that is between the *social level* and the *individual level* of learning in working life. He explains that on one side of the *social level* we find the production aspect of work, *the technical-organisational learning environment*, and on the other side we find the community aspect of work, *the social-cultural learning environment*. Illeris (2011) claims that workplace learning takes place in a dynamic relationship between learner learning potential on the *individual level* and the production and community elements of the workplace learning environment on the *social level*. Moreover, he highlights that:

... workplace learning, like any other type of learning, is fundamentally an individual process, and a smaller or larger group of workers or employees will undergo the same learning only to the extent that there is a corresponding

homogeneity in the learners' situations, positions, backgrounds, experiences and mental structures. (Illeris, 2011, p. 30)

Individual level

Along the *individual level* of learning in working life we find *content, incentive and work identity* (Illeris, 2007), which are elements of the framework that will be further explained in the following paragraphs.

Content

The *content* is what is to be learned, and Illeris (2011) lists the following examples of what this might be: factual knowledge, skills, attitudes, qualifications, sensibilities, preparedness, modes of perception, forms of consciousness, identity, ways of acting and reacting, relations or strategies. He also states that learning is what makes it possible to develop certain competencies. Regarding competence, Illeris (2013) claims it is something that makes you able to act in relation to specific known, unknown and unpredictable situations. To be able to deal with the contexts you are involved in regardless of age, gender, education, profession or position. He also explains that competencies are something that contributes to individuals' personal profile, and that it in this respect becomes important to develop competence in a personal manner. Illeris (2011) also lists four types of learning; cumulative learning, assimilative learning, accommodative learning and transformative learning. Where cumulative learning takes place when the content is isolated, and not connected to anything at all. That it can be learned but not understood. Illeris (2011) mentions the task of learning a pin-code, as an example of cumulative learning. Assimilative learning is explained as when the learner encounters new impressions and adds these to what previously has been learned in the area of focus. Accommodative learning takes place when we are experiencing something we cannot relate to on the basis of our previous developed knowledge schemes, and Illeris (2011) claims that such situations require that we decompose and reconstruct the schemes we have. Moreover, he highlights that this kind of learning is experienced as more demanding than assimilative learning and claims that learners often tend to avoid this kind of learning by blocking out the situation or by distorting it so that it fits the existing schemes. Illeris (2011) brings up prejudice as an example, that we see what want to see instead of what is actually happening. Illeris (2011) presents transformative learning as an even more demanding and extensive form of learning. This kind of learning involves the decomposition of several schemes in a coherent process and turning them into a new understanding in relation to one or more significant areas of life (Illeris, 2011). He claims that this process is experienced as demanding, almost like a personal crisis, because it often involves the identity of the learner or the process of establishing a

fundamentally new understanding. The ever-changing and unstable nature of modern existence is something that Illeris (2011) claims often places workers in a position where they need to engage in transformative learning and he claims that the four different types of learning are used in the process of striving to understand, give meaning to and become able to function in our existence and environment.

Incentive

Illeris (2011) explains that everything we learn also has an emotional side to it, and that the *content* and the *incentive* dimensions are always in close interaction and that they are involved in the learning process and the learning outcome. Illeris (2011) explains that knowledge that has been attained in learning situations that is enjoyable can become easier to recall in similar situations and that the learners then are also more likely to apply the knowledge in new situations. He also claims that reluctance and lack of interest in learning might have the effect that the learning outcomes are forgotten, or that it is only possible to recall the learning outcomes in situations that resemble the situation in which it was first learned. Moreover, he claims that in schools there is a tendency to disregard the emotional side which has the effect that it is often the materials and the skills to be learned that move into focus.

Work identity

Illeris (2004) presents identity as two-sided and explains that individuals have an individual, biographical identity and also a social, societal identity. Illeris (2011) claims that a professional identity is a partial identity which is concerned with our experience of ourselves as working individuals, and as a part of a working community. He explains that a *work identity* is typically developed from vocational education and work. Moreover, he claims that individuals, in times when production and work organisation undergo rapid changes, are often faced with the challenge of reorienting themselves in relation to the *work identity* they have built up, and they become involved in a transformative learning process. Technological development is mentioned as one example of such changes that can challenge individual *work identity*:

Technological development removes the basis of certain professions and trades and radically alters the content of others. (Illeris, 2011, p.40)

According to Illeris (2007) the *work identity* is a result of employee learning processes, which concern: '... the employees' consciousness and socialisation background, situation and future perspectives and covers work experience, education and social background.' (p.223). Illeris (2011) argues that on the *individual level* of learning in working life, the *work identity* is the most central aspect that contributes to making workplace learning complex.

The social level

Along the *social level* of learning in working life we find *the technical-organisational* and *the social-cultural learning environment* as well as *workplace practice* (Illeris, 2007), which will be further explained in the following paragraphs. Illeris (2004) highlights that on the *social level*, there is a constant mixing of the two types of environments. He also underlines that a separation between these environments can only be made analytically, as the individual worker will experience the influence from both simultaneously.

The technical-organisational learning environment

The technical-organisational learning environment is referred to by Illeris (2011) as the production element of the workplace learning environment. Illeris (2007) explains that it includes how the work content is defined for the employee, for example the formal requirements of the work, the division of labour between employees at work, the opportunities for the employees to make autonomous decisions, to use their qualifications, be involved in social interaction at work and the extent to which the work give rise to stress and strain for the employees.

The social-cultural learning environment

The social-cultural learning environment is referred to by Illeris (2011) as the community element of the workplace learning environment. He explains that a workplace is a community of the people who work there, and that subcommunities of various kinds will exist in workplaces that have more than a few employees. These communities may, according to Illeris (2011), exert an impact on what is learned and not learned, how it is learned, and on learner attitudes and feelings towards learning outcomes. Moreover, he claims that traditions, norms and values in the informal communities at the workplace are of great importance for learning possibilities, learning processes and learning outcome. And furthermore, highlights the fact that communities of work are created around the performance of common work tasks, and that different types of workplace communities can exist in parallel, they can deal with different aspects of working life, enjoy different status and be of a more or less formal or informal kind. In relation to learning, these communities aim to become better and more efficient at the job, to produce higher work-quality. He also draws attention to the fact that:

If the workers do not experience the work as meaningful, they have no reason to become engaged and involve themselves in any improvement, and in such case their learning may just be about how to be involved as little as possible. (Illeris, 2011, p.37)

Workplace practice

According to Illeris (2011) the *workplace practice* integrates the influences from production, *the technical-organisational learning environment* and the community, *the social-cultural learning environment* sides of the workplace learning environment. He describes it as the central aspect of workplace learning conditions on the *social level* because of how the employees experience that they are participating as learners in the practical daily work, and because of how *workplace practice* in this respect constitutes the outer framework of their social learning conditions. Moreover, he explains that *workplace practice* includes:

... everything that has to do with the workplace and working life as a social and societal learning space. (Illeris, 2011, p.43)

In the case of this thesis, the focus is not on *workplace practice* in general, it is focused on a *workplace practice* which is an educational practice. Carr (2007) describes an educational practice as a:

... social practice whose meaning and significance is constituted and sustained through the routine, everyday activities of the community of educational practitioners and endemic to the institutionalised culture within which these activities take place. In other words, an educational practice is a discursively formed and socially situated practice that can only be learned by acquiring the largely unarticulated and usually tacit body of practical knowledge and understanding endemic to the social context with which educational practices are conducted." (p.276)

The societal level

This framework is to be understood as having a surrounding *societal level* to it, and Illeris (2004) explains:

In the same way as learning in the workplace must be understood as a dynamic relationship between the different elements in the model, the elements are in turn dependant on a number of matters at the societal level. (Illeris, 2004, p.432)

The overlap between work identity and workplace practice

Illeris (2004) explains that a central aspect of the Framework is how it both attempts to distinguish between and connect the *individual* and *social levels* of learning in working life. This is what Illeris (2011) refers to as the interaction dimension of learning which is presented as the interaction process between the learner and the *social* and *societal* environment. He claims that the *content* and the emotional impulses of learning, the *incentives*, are always mediated in this

process. He also explains that everything in the world today, one way or another, reflects social and societal influence. Consequently, workers are influenced from the *social level* at work and from the *societal level* when they approach a new *content*. Illeris (2004) presents the overlap between the *workplace practice* of the organisation and the *work identities* of the employees as the central area for important workplace learning, and claims:

Whenever learning takes place at the workplace it is inevitably, directly or indirectly, influenced by the fundamental way in which working life is organised and functions in society. (Illeris, 2004, p.433)

Methodological Points of Departure

Research design

Research interest in a cultural phenomenon, educational use of digital play and the research focus on the perspective of a particular cultural group - Swedish preschool teachers - made it relevant to apply ethnographical research methods. Cohen, Manion & Morrison (2011) explain that the focus of an ethnographic study is on the perceptions and views of the participants, and that the purpose is to describe, understand and explain a specific situation. Early on in the research process, it became evident that the phenomenon of interest was discussed in contexts outside Swedish preschools, on the Internet. The decision to use online forums as a site for data collection would also make it possible to describe the research project as a multi-sited ethnography which, according to Pierides (2010), is a type of research approach that has become important in contemporary society in which our lives are characterised by partial connections and where our world is not always organised by close proximity and unity. One overall aim of the research approach was to gradually develop an understanding of the phenomenon at hand, to allow the first study to provide some answers as well as reasons to conduct further studies.

Netnography – Papers I and II

The first data collection, for Papers I and II, applied a method inspired by netnography, which Kozinets (2010) describes as participant-observational research, based in online fieldwork, that may generate an ethnographic understanding of a cultural or communal phenomenon. Data collection was performed from two discussion groups within an online social network. The groups were devoted to discussions about the educational use of tablets in Swedish preschools. In 2012 these groups were entered with the purpose of viewing the topics that were addressed in online conversations. While participating, as a non-participant observer, an interest in conducting a study focused on the communication in these groups, developed. Before data collection was conducted, literature about ethics in online research were studied and the ethical board at Umeå University was consulted to assure that the planned study was ethically sound. When this was confirmed, the internal search engine in the online social network was used to identify suitable discussion groups. The two groups selected were the only groups who strictly devoted their discussions to the topic of tablets in Swedish preschools. Considering the main research purpose of Paper I i.e. to examine the questions and information preschool teachers ask and share regarding educational use of tablets in preschools within online social network discussions, collecting all posts was not relevant. The posts that had initiated discussions, either by a

question or by sharing information, were copied and placed in a text document, where they could be further analysed. All such posts that had been posted since the groups were created became a part of the data set, a total of 465 posts, 239 questions and 226 posts of informative nature. These online discussions had been ongoing for about two years.

The decision to conduct initial data collection in these online environments finds support in research. Dutton (2013) writes about how Internet use has increased, foremost in informal learning situations, and Bowler (2010) explains how this means that Internet has become an important site for research. Similarly, Parker Webster & Marques Da Silva (2013) argue that online ethnographical studies have become relevant because of how the borders of offline and online presence are mixed and blurred in our daily lives. Landri (2013) argues that new technologies for teaching and learning make it important to complement the usual contexts for educational ethnography, schools and classrooms, with this kind of research in technology-mediated environments. He also draws attention to an aspect of vital importance to ethnography, the aspect of being on site in the educational context, and how this becomes possible for researchers in what he refers to as the new technologised setting of learning. James & Busher (2013) draw attention to how contemporary communication technologies have made people more flexible in how they can express themselves through different modes such as written text, voice, language, moving image and video, and that researchers need to become literate in the different media in order to select the best tools for making sense of the interactions that take place within communities. They argue that, if educational ethnographers can work in these hybrid communities where people interact in different ways both online and offline, then educational ethnography can remain immersive and situated.

Self-report essay study – Paper III

In Paper III the purpose was to study how Swedish preschool teachers perceive opportunities and challenges associated with pedagogical use of digital play. Written self-report essays (Fejes and Thornberg, 2009) was considered a suitable method for gaining insight to preschool teacher perceptions. The sample of 16 preschool teachers asked to participate in the study had participated in a previous questionnaire study conducted by the author in 2009 on a similar topic - use of video games in preschools - during their preschool teacher education. The sample of participants had graduated from preschool teacher education about the same time as tablets began to be introduced into Swedish preschools, which made them suitable as potential participants for the study. The 16 preschool teachers were contacted by mail and invited to participate in the study. Ten decided to participate and the remaining six

explained that they, for various reasons, had not acquired enough work experience to be able to contribute to the study.

A summary of their responses from 2009 was used to stimulate their memories regarding how they used to think about the educational use of video games. This stimulated-recall approach (Vesterinen, Toom, & Patrikainen, 2010) was aimed at making it easier for the participants to write a self-report essay on the topic of digital play in preschool. The idea was that the participants could more easily reflect on why they had reached their current perceptions about digital play if they were given a chance to recall how they used to think about a similar topic. Moreover, the task of writing the self-report essays would become more interesting for the participants using such an approach, as they would have a unique opportunity to reflect on how their perceptions had changed since 2009.

When the participants wrote their self-report essays, they were guided by open-ended questions (See Appendix 1), which were focused on their current perceptions, why they had reached these perceptions, how they perceived children's needs for encountering digital play, the professional knowledge they needed and the formal or informal ways they had learned about digital play. Finally, they were asked about how they currently used digital play and how they predicted that their use of digital play would develop in the future. The participants wrote their self-report essays online, in a questionnaire software. The software also made it possible to remind the participants to complete their essays, a feature that was used three times during the data collection process, which ended February 2017.

Interview study – Paper IV

The purpose of Paper IV was to improve knowledge about preschool teacher experience of pedagogical use of digital play. The method of data collection was interviews and the participants were preschool teachers. In order to enable geographical spread of participants from several municipalities, telephone interviews were used. All free-standing and municipal preschools in one region of Sweden were invited to participate. Preschool managers were used as gatekeepers (Crowhurst & Kennedy-Macfoy, 2013). In most cases it was possible to contact the preschool managers directly via email or telephone. In one municipality an IT executive was informed, who promised to pass on the information about the study to the preschool managers. In total, 11 participants agreed to participate in the study, and altogether they represented six different municipalities. The interview guide (See Appendix 2) was semi-structured (Kvale, 2014), in the sense that follow-up questions were added in relation to interesting topics that arose during the interviews. The interviews were about 40 minutes long and were recorded on a dictaphone. After the eleven interviews

had been conducted, a satisfying level of saturation had been reached (Mason, 2010). The eleven interviews were transcribed verbatim by the author.

Analysis

Thematic analysis (Braun & Clarke, 2006) has been used throughout this research project. Thematic analysis is best described as an umbrella term for a number of approaches to analysing qualitative data that focus on identifying, analysing and reporting patterns in the data (themes). For example, Nowell, Norris, White & Moules (2017) claim that thematic analysis is a process used by many qualitative methods, and they therefore wish to describe it as something to be used to assist researchers' in analysis, rather than a separate method. A theme is explained in the following manner:

A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set. (Braun & Clarke, 2006, p.82)

Braun & Clarke (2006) highlight that thematic analysis is a method where the researcher is actively involved in the task of identifying patterns, selecting which are of interest and reporting them to the readers. Similarly, Nowell et al. (2017) claim that the researcher becomes the instrument for analysis, by making judgements about coding, theming, decontextualising and recontextualising the data. One of the advantages of the method, according to Braun & Clarke (2006), is its detachment from pre-existing theoretical frameworks which means that it can be applied within different theoretical frameworks. Nowell et al. (2017) draw attention to how the process of thematic analysis can be fairly easily grasped by researchers who are relatively unfamiliar with qualitative approaches, which makes this form of analysis accessible for those early in their research career. A potential disadvantage, according to Holloway & Todres (2003) is that the flexibility, that is built into the process of analysis, can lead to inconsistency and a lack of coherence when developing themes derived from research data. Nowell et al. (2017) draw attention to the following criteria, originally introduced by Lincoln & Guba (1985): credibility, transferability, dependability, comformability and audit trails, that are linked to the process of establishing trustworthiness in qualitative research. Nowell et al. (2017) explain that *credibility* is reached when co-researchers or readers are confronted with the presented experience, and can recognise it. That it can be considered to be the match between the participants' views and the researcher's representation of them. Regarding *transferability*, which they explain regards the generalisability of the inquiry, the researcher must provide thick descriptions, so that reserachers who want to transfer the findings to their own site of inquiry can make judgements about if, and to the extent, this is possible. *Dependability* is

according to Nowell et al. (2007) achieved if a researcher can ensure that the research process is logical, traceable and clearly documented. *Confirmability* is explained as being able to establish that the researcher's interpretations and findings are clearly derived from the data. Finally, *audit trails*, regards providing readers with evidence and choices made by the researcher regarding theoretical and methodological issues throughout the study. The idea is that another researcher with the same data, perspective and situation should be able to arrive at the same or a comparable, but not contradictory, conclusions.

According to Braun & Clarke (2006) it is important to decide if the outcome of the analysis will become a rich description of the whole data set, or a more detailed and nuanced analysis that is focused on merely one or a few themes found in the data set. They also claim the first alternative, rich description of the whole data set, is particularly useful when studying an under-researched area, or if participant views on the topic are unknown.

In the case of this thesis, in all papers, the findings from the analysis were reported as rich descriptions of the entire data sets.

According to Vaismoradi, Turunen, & Bondas (2013) thematic analysis is associated with two modalities: inductive and deductive analysis. Using an inductive approach, the data is coded and the codes are then arranged into themes. When using a deductive approach, a theoretical framework is initially used to organise the data into different categories of the theoretical framework used, and then themes are located within the data that has been associated with each category.

Analysis Paper I

In Paper I, the purpose was to examine the questions and information preschool teachers asked and shared regarding educational use of tablets in preschools within online social network discussions.

First, two main categories of posts were identified in the online forums, either questions or containing information. These two categories of posts were placed in separate documents as a first step in the analysis. Regarding the informative posts, no relevant framework was found that could help categorise them, consequently an inductive approach to thematic analysis was used. Regarding the questions, it made sense to apply a framework that could help categorise the questions on the basis of what knowledge did they indicate was needed. Thereby the thematic analysis in Paper I combined a deductive and an inductive approach to thematic analysis.

In the deductive part of the analysis, the questions were initially structured depending on if they concerned Technological Knowledge (TK), Technological Content Knowledge (TCK) or Technological Pedagogical Knowledge (TPK). At this stage, there was a need to carefully consider how the categories of the framework were described and to figure out the focus of the questions posed, in order to be able to place them in the correct category. It took several iterations of reading and making notations in relation to the posts before that part of the analysis was completed. Then thematic analysis (Braun & Clarke, 2006) was used to further examine the data within each framework-related category. The question posts within each category were coded and arranged into themes that could present the variation of questions that had been posted in the online forums. The inductive part of the analysis focused on posts that contained information only. The limited length and richness of information in the posts made it fairly straight forward to review the posts, apply codes and structure them into themes on the basis of the intention the posts served.

Analysis Paper II

In Paper II, the purpose was to examine Swedish preschool teacher online discussions regarding how they intended to use tablets and digital play in order to support children's literacy development.

During the analysis for Paper I, it had become clear that the questions that had been structured into the categories Technological Pedagogical Knowledge and Technological Content Knowledge also contained information about how the participant who had posted the question intended to use the tablet in their educational practice. In the analysis for Paper II, the Caring, Nurturing and Teaching Framework was used to organise these questions based on the rationality that could be linked to them. Then thematic analysis was used in relation to each rationality category in order to identify themes that could deepen the understanding of the intended literacy practices using tablets and digital play.

Analysis Paper III

In Paper III, the purpose was to improve understanding of how preschool teachers perceive opportunities and challenges associated with digital play.

The data analysed for Paper III was the participants' self-report essays on the topic of digital play in preschools. In the analysis, the Learning in Working Life Framework (Illeris, 2007) was used deductively in the sense that the participants' written statements about digital play were linked to the different parts of their professional learning context. This step of the analysis was performed by reading the essays and considering the content in relation to the

elements of the Framework. Framework-linked codes were assigned to different segments of the content in the essays and then the content that had been assigned the same code was merged. Then the data within the framework-related categories were further analysed to identify the variation of opportunities and challenges the participants had identified within each category of the Learning in Working Life Framework.

Analysis Paper IV

In Paper IV, the purpose was to increase knowledge about preschool teacher experiences from pedagogical use of digital play.

In Paper IV an inductive approach to thematic analysis was used. In the first reading of the transcribed interviews, statements that were linked to the pedagogical use of digital play were placed in a separate document, which was then repeatedly read and coded. The codes were condensed interpretations of what the participants talked about, and they were also placed in visual presentation software where it was possible to begin the process of arranging the codes into themes and subthemes. Then an additional document was created that contained a table for each theme. The data was processed once more and copied into the corresponding theme table which provided an overview of each theme and made it possible to ensure that the themes illustrated participant statements properly.

Ethical considerations

The ethical research guidelines (Swedish Research Council, 2017) were followed at all stages of data collection. All participants were informed about the study, use of data, and that participation was voluntary and that they could withdraw their participation at any time without further explanation. The participants were also informed that the data collected would be treated confidentiality and that it would be presented so that individual participants could not be identified. In the interview study, the participants gave their consent for the interviews to be recorded and used for the research purpose described. The participants in the self-report essay study also gave consent for their shared information to be used for research purposes.

The ethical considerations of the netnography study need further explanation. Larsen & Glud (2013) stress that ethical considerations accompany experimental approaches in qualitative research that are enabled by the mobility of new media and its omnipresence. Sveningsson (2009) brings up the extent of participation and the extent of openness a researcher may use when entering a field. How the Internet brings opportunities for the researcher to truly be a fly on the wall in the online environments, and thereby exert no influence on the

participants of the study. However, ethically, due to the information requirement, she mentions how people have the right to know that they are participating in a research situation and therefore should be informed. She further draws attention to how there are often too many people in online environments to inform them one by one, which makes it challenging for the researcher to make contact with them. She also mentions an alternative i.e. to ask for permission on behalf of the moderators, however questions whether they can represent all participants. Consequently, she argues that efforts should be made to inform the participants.

In the case of the netnography included in this thesis, the moderators, two in each group, were used as gatekeepers (Crowhurst & Kennedy-Macfoy, 2013), and they gave their consent that the posts in the discussion groups could be used for research purposes. The participants in both online discussion groups also received information about the study, consequently an attempt was made to make them aware that they were participating in a research situation and to give them the opportunity to withdraw from the study.

Sveningsson (2009) also wonders how a researcher can obtain people's informed consent to use the information they previously left on the Internet for research purposes. She writes that it can be important to wait to ask for informed consent until the researcher has established a level of familiarity with the data, as such a delay will help the researcher to formulate the research purpose. According to Sveningsson (2009), a well-formulated research purpose will make it easier for the researcher to explain to the participants what part of the data they are interested in when they ask for their consent to the planned study.

In the case of the netnography study, I first entered the discussion groups as a non-participant observer and at that time I did not know if I would conduct a study. The insight into these forums over time, about one year, made it possible to formulate a research purpose. The moderators and the participants were informed that only certain posts in the discussions were going to be used for research purposes.

McKee (2009) promotes a method of determining if consent is necessary for online studies by providing some continuums to consider in relation to a planned study. Initially, the researcher can reflect on whether the Internet is being used as a space or a place. This is similar to what Buchanan & Zimmer (2018) suggest, that a distinction in Internet research can be made between if the Internet is being used as a research tool or as a research venue. In the netnography, it was used as a place or venue, because preschool teachers met in these discussion groups to help each other out, and therefore their security

needed to be considered. Then, McKee (2009) suggests that the researcher should reflect upon if the research is text or person-based. The netnography study was text-based, in the sense that the pieces of text information that had been shared within the groups were analysed with the content of the posts in mind. Moreover, they claim it is important to consider if the data is private or public, if there is high or low topic sensitivity, a high degree of interaction in the forum or lower degree of interaction and if participant vulnerability is high or low.

If these continuums are considered in relation to the netnography study, the data in the online forums were somewhere in-between public and private, because the discussion groups were somewhere between private and public. In order to become a participant, you had to send a request to the moderators. However, no counter questions were posed by the moderators when the request was made. In addition, there were as many as 3 000 participants in total who had been included as participants in the two online discussion groups. In this respect it would be possible to argue that anyone could access the information, and that it was in fact public. Regarding the remaining continuums, topic sensitivity and participant vulnerability were low as it is hard to see how participant writings about digital play could put them in harm's way. The degree of interaction in the forums was somewhere between high and low, but still seemed to be high enough to make it impossible to obtain all participants' informed consent. Therefore, the continuums of McKee (2009) could have been used to justify that informed consent was not necessary in the netnography.

However, efforts were made to increase the ethical standards of the study. The moderators of the online discussion groups gave their informed consent that the intended study could be conducted. Moreover, the participants of the forums were informed about the intended study via a post in both discussion groups. In the information it was clearly stated that anyone could have their posts excluded from the study if they did not wish to participate. However, none of the participants made this request so it is not possible to know if the information reached all of them. As a final step to ensuring that the study would meet ethical requirements, the ethical vetting committee at Umeå University was consulted. Their response was that ethical vetting was not necessary because the participants were adults and they were discussing a non-sensitive subject that could not lead to any harm for the participants.

Summary of Papers

Paper I. Preschool teachers' informal online professional development in relation to educational use of tablets in Swedish preschools [Förskollärares informella professionella utveckling på Internet gällande undervisning med surfplattor i svenska förskolor]

This paper was focused on Swedish preschool teachers' use of online forums to discuss the educational use of tablets in preschools. The purpose was to examine the questions and information preschool teachers ask and share regarding the educational use of tablets within such forums. The data set consisted of posts that had initiated discussions in two online forums devoted to discussions about the educational use of tablets in preschools. The applied research method was inspired by netnography, which Kozinets (2010) describes as participant-observational research based in online fieldwork that can provide understandings of cultural or communal phenomena. The posts were analysed with the purpose of understanding the online communications from a professional development perspective and to increase understanding of what kind of questions the introduction of tablets gives rise to among Swedish preschool teachers. The posts collected for analysis were either questions or posts of informative nature. In the analysis of the questions, the Technological Pedagogical Content framework, TPACK (Koehler & Mishra, 2009) was used deductively, in the sense that the questions were initially structured into the three categories of the framework; Technological Knowledge, Technological Pedagogical Knowledge and Technological Content Knowledge. Then thematic analysis (Braun & Clarke, 2006) was used to further develop an understanding of the questions within each category. Thematic analysis was also used to improve the understanding of the remaining informative posts.

Results showed that all the Technological Knowledge-related questions were posed with the purpose of solving issues of technical nature that had interfered with pedagogical intentions. Questions in this category also concerned the challenge of choosing technology, hardware or software to purchase for educational use. Among the Technological Content Knowledge-related questions it was common that the preschool teachers had articulated the educational content they were to address, but they needed guidance with regard to the kind of apps that could enhance their teaching. Some were also searching for guidance on how to find apps that could be used to support children with special educational needs, for example apps that could bridge language barriers between teachers and children. Others searched for information on how traditional teaching content such as values and emotions could be addressed using tablets, or how school subject-related skills could be supported by using

tablets. The questions within the Technological Pedagogical Knowledge category provided insight to the novelty of tablets in educational practice and the questions in this category indicated a lack of professional development, literature and research about the educational use of digital play in preschool settings. Other questions concerned apps' pedagogical affordances and constraints. Even though most participants in the online forums seemed convinced that digital play belonged in educational practice, there were also questions of a critical nature. For example, whether it was right or wrong when children left traditional play and spend time with the tablets. The informative posts foremost promoted web resources, services and products. A few posts shared information about research. Some posts were merely announcements of experiences, for example some participants mentioned how the media had shown an interest in how they were using tablets. Other posts had the intention of establishing contact between different actors, for example employers who were looking for teachers with knowledge of digital play, or app developers who promoted products for preschool use.

The paper consequently presents an informal arena in which preschool teachers' professional learning about tablets takes place, and highlights the online forum's advantages and potential disadvantages. One advantage was how the online forums provided the opportunity for nation-wide collegial conversations, and rapid support, regarding educational use of tablets. A potential disadvantage was how different actors, with an financial interest in the phenomenon of digital play in preschools, posted information that served their purposes, and that the information shared was therefore not objective.

Paper II. Digital play as a means of developing children's literacy and power in the Swedish preschool. [Digital lek som ett medel att stödja barns literacitet och makt inom svensk förskola]

This paper was focused on Swedish preschool teachers' intended pedagogical use of tablets, and also elaborated on the importance of discussing children's need for literacy when preschool teachers make decisions about how digital play should be used for educational purposes. The same data set as in Paper I was used, posts from the online discussions about the pedagogical use of tablets in preschool, so the study can also be described as a netnography (Kozinets, 2010). The purpose was to examine Swedish preschool teacher online discussions regarding how they intended to use tablets and digital play to support children's literacy development. This was possible since the question posts that had been arranged under the categories Technological Content Knowledge and Technological Pedagogical Knowledge of the TPACK Framework (Koehler & Mishra, 2009), contained pieces of information that revealed the participants' pedagogical intentions. The Caring, Nurturing and Teaching Framework (Ljung-

Djärf, 2004) was used to further structure these posts. This is a framework developed in relation to the educational use of computers in preschools. The central aspect of the Framework is that preschool teachers may use different rationalities behind their use of digital technologies and the outcome of the activities may, for this reason, be different from a pedagogical perspective. The results indicated that the participants' rationality behind the educational use of tablets was more oriented towards teaching in comparison to what Ljung-Djärf (2004) had concluded regarding the use of computers in preschools. However, from the study it was not possible to determine if this apparent shift in rationality can be linked to the educational properties of the new tablet technology. Perhaps it was linked to a changed curriculum (Lpfö 98, revised 2010), which increased emphasis on school preparatory teaching in Swedish preschools, or perhaps a combination of these plausible reasons. The study also addressed how the participants devoted to digital play, in their online discussions, quite frequently mentioned that their colleagues showed a lack of professional interest in digital play. Such statements in the discussion forums made it appear as it was difficult for preschool teachers to meet in collegial discussions about digital play. Literacy development can be understood as a social practice that needs to develop along with changes in society's demands on its citizens. For this reason, a 'literacy and power' perspective was presented, which possibly could help preschool teachers' shift their focus onto what kind of literacy children will need during their upbringing, schooling and life in a digitised society. Considering the diverse interest in digital play among preschool teachers indicated by this and other studies, such a perspective could potentially function as a middle-ground when preschool teachers meet in discussions about how digital play can be implemented in the educational practice.

Paper III. Swedish preschool teachers' perceptions about digital play in a workplace-learning context. [Svenska förskollärares uppfattningar om digital lek i förhållande till arbetsplatsens lärandekontext]

This paper was focused on how Swedish preschool teachers perceive opportunities and challenges associated with pedagogical use of digital play. It is based on the findings of a self-report essay study (Fejes & Thornberg, 2009), in which the participants wrote essays about digital play in preschool. The participants had previously participated in a questionnaire study, on a similar topic, during their preschool teacher education. To help participants to reflect on their current thoughts about digital play while writing the essays, they were given a summary of how they had responded to the questionnaire. Consequently, stimulated recall methodology (Vesterinen et al., 2010) was used in the study. Regardless of this approach, the study from 2016 should be considered as a free-standing study. In order to direct the focus of the essays,

the participants were given pre-defined open-ended questions to reflect on (Appendix 1). The data material that Paper I and Paper II was based on had been limited in the sense that the short pieces of text, shared in the online forums, did not provide rich descriptions of digital play. The purpose was therefore to increase understanding of how preschool teachers perceive opportunities and challenges in association with digital play. In the analysis, participant perceptions about digital play were initially arranged in relation to the Learning in Working Life Framework (Illeris, 2007). The framework illustrates the constituent parts of a employees' professional learning context, which can potentially influence how they learn new content in their profession, and how this new content is incorporated into *workplace practice*. Using the Framework in relation to the data from the essays provided insights into how participant perceptions about digital play were associated with different aspects of their professional learning context. The result showed that the challenges when introducing digital play into preschools include too little time and reluctant parents and colleagues. Opportunities can be summed up as helping to prepare children for the future and enriching their upbringing and learning.

Paper IV. Swedish preschool teachers' experiences from pedagogical use of digital play [Svenska förskollärares erfarenheter från pedagogisk användning av digital lek]

This paper reports on the findings of a telephone interview study (Appendix 2) in which eleven preschool teachers were given the opportunity to talk about their experiences with approaching digital play. In the study, most participants had used digital play for pedagogical purposes over a longer period of time, but a few were at an earlier stage of this digitalisation process. The purpose was to increase knowledge about preschool teachers' experiences from pedagogical use of digital play. An inductive approach to thematic analysis (Braun & Clarke, 2006) was used in this analysis. The transcribed interviews were read repeatedly and coded, which means that condensed interpretations of what the participants had talked about were attached to different segments of the text. The codes were also entered into software which made it possible to group the codes into themes, and then test these themes out in relation to the data set. The results showed that the participants perceived that digital play provided more opportunities for children's creative work, better pedagogical documentation, access to the Internet as a source of information, access to more pedagogical material and opportunities to create new pedagogical activities. Teaching in preparation for school and life in contemporary society were the two main teaching objectives. The participants wanted to increase children's access to tablets and agency in digital play activities. Moreover, they wanted to increase their pedagogical knowledge about digital play and they wanted to be in control of the digital play activities they included in their educational practice. For

example, they reflected critically on apps' pedagogical quality, limited the number of apps used to those they were familiar with from a teaching or learning perspective, and they used different strategies to make tablets more equal to other kinds of material in their educational practice.

Findings

This section presents the findings of the thesis. The theoretical framework 'Learning in Working Life' (Illeris, 2007) will be used as a theoretical lens to develop deeper understanding concerning participants' stated experiences from educational use of digital play and from professionally learning about it.

The participants in this thesis had access to tablets for educational use, they explored and welcomed the educational use of digital play in preschool. In several cases they considered the educational use of digital play to be an essential part of their *work identity*. For example, as a final question in the interview study the participants were asked about how they would react if they could no longer use tablets and digital play in their educational practice. Most expressed, in different ways, that they would lose a lot of their joy of their profession if that happened. It appears they would primarily miss the development and exploration of a new kind of *workplace practice* that includes digital play.

While reading this section, please keep in mind that the findings represent the perspectives of this particular sub-group of preschool teachers, and not the entire population of Swedish preschool teachers. From now on the framework-linked concept *content*, will be exchanged for *digital play*.

Interpretation of elements in the theoretical framework

The following list aims to provide an overview of how the elements included in the Learning in Working Life Framework (Illeris, 2007) were interpreted:

- *Content*: Educational use of digital play in preschools.
- *Incentive*: Participant motives to use or resist the use of digital play for educational purposes.
- *Work identity*: Participant ways of relating to educational use of digital play from a professional point of view.
- *Workplace practice*: The educational practice as a whole in which the participants were actively involved in the process of introducing educational use of digital play.
- The overlap between *Work identity* and *Workplace practice*: This overlap is, in this study, interpreted as the examples showing when participants made efforts to adapt digital play so that it would become valuable in the preschool context.

- *The technical-organisational learning environment*: The preconditions in the participants' work that influenced their opportunities to engage in professional learning about digital play.
- *The social-cultural learning environment*: The people that the participants encountered in their work who could influence their educational use of digital play or their professional learning about it.

The educational use of digital play envisioned

This section presents participant envisioned use of digital play. It was not always obvious if their statements regarded their actual use, or if the participants presented more of an envisioned use based on their experiences. For this reason, the themes should be interpreted as participant envisioned use. The way the participants envisioned the use of digital play can, through the lens of Illeris (2007), be regarded as the overlap between participant *work identity* and *workplace practice*. Despite participants' generally positive view of digital play, they needed to adjust educational use so that it would move into line with *workplace practice* as a whole. In educational implementation, it was important for participants that digital play would show the properties displayed in the following themes:

Different from home usage

Several of the participants argued that digital play needed to be essentially different from the digital play that children encounter in their home environment. One wrote:

The preschool should be a complement to the home, also in digital play.

Some argued that children used digital play foremost for entertainment purposes in their homes and that preschools' application of digital play should differ from such activities. A few also drew attention to the fact that children's access to digital play in their homes cannot be taken for granted, for example:

Digital play, the educational alternative, should always be present [in preschool]. In the home, I believe that entertainment is the dominating form of use. In addition, everyone might not have access to digital play at home.

This envisioned separation between the home use, which can be linked to a *societal level*, and preschools use of digital play made several participants unwilling to include digital games in their *workplace practice*. One participant expressed such a view, in spite of an awareness that some games have educational potential:

My view is that the tablet should be used for things other than games. [...] The preschool should be a complement to the home. I should perhaps not assume that all children play games on their tablets, but I can imagine that many do. Then my thought is, how can we use the tablet in other ways?

However, for a few of the participants, digital games were a natural, and an unproblematic, part of their educational use. One stated:

Games, it is almost too obvious to mention, of course we use games.

Regarding the intention to differentiate preschool use from home use, it is worth noticing that the concept play and the concept game were largely absent in participant online conversations about educational use of tablets. Instead, they used the concept app in questions, and the participants often declared their teaching or learning objectives with the app they were looking for.

Purposeful

Most participants wanted to maintain a high level of professionalism when digital play was introduced into their *workplace practice*, and they wanted the use to be purposeful. One claimed:

The most important aspect of digital play in preschool is, as with everything else, that it should be used with a clear purpose.

A common purpose was to support children's learning and development towards curriculum objectives. As the curriculum is the guidelines for the profession, this aim was linked to *the technological-organisational learning environment*. Another participant wrote:

I am looking for good language apps and apps for the other central areas of the curriculum, suitable for younger preschool children.

A third participant highlighted that the main aim was to approach teaching content, not to support children's learning about digital technologies. Technological developments on a *societal level* had thereby influenced this participants' *workplace practice*:

The tablet should bring something more than merely being interesting as a technology. I would like to see more content.

A fourth participant explained how a purposeful use of digital play could potentially make a difference to the children later on in life, which is a statement linked to *the societal level*:

I believe that the preschool can lay the foundation for children's future learning when it comes to mastering digital tools, and their critical thinking.

Embedded in educational practice

Many of the participants wanted the use of digital play to be embedded in *workplace practice*, but simultaneously thought this ambition included some challenges. There seemed to be a tension between this ambition and the extent to which some participants perceived that it was possible to achieve this in *workplace practice*. One said:

I would like to develop the work so that the tablet becomes a natural part of the daily activities. [...] To make it become a tool among others, that is probably the biggest challenge.

The following questions, posted in an online forum, may work as examples of efforts to embed the use of digital play in *workplace practice*:

How have you used IT during children's introduction to preschool?

Or:

Those of you who have initiated theme-oriented projects, how have you connected IT to your work?

Another participant claimed that preschool teachers should make digital play accessible to children and that preschool teachers should consider if and how digital play can contribute in different kind of activities:

Digital play should always be available as an option in preschool, both as a free choice and in planned activities.

Secure

A few of the participants touched upon child security in their statements about digital play, which were concerns linked to *the societal level*. These participants wanted to avoid improper content and any potential risks that could be linked to children's digital play. Some participants selected apps partly based on the criteria that they should be age-appropriate and harmless. Regarding the enhanced access to information that tablets enable, via Internet access, one participant stated:

There are certain things we want to protect them from, for example things that can appear on YouTube. So, we can make the decision to restrict the access to that app or exclude the app from the tablet.

The safe storage and circulation of data was also a concern for some of the participants, which were concerns linked to *the technical-organisational learning environment* due to the fact that the participants wondered how they were allowed to work with digital play. One participant posted a message in an online forum that drew attention to the legislation that apply to preschool use of cloud services:

I wonder if anyone knows if it is legal to use cloud services in preschool practice (iCloud, Google and such)? I believe it is illegal [...], but when I saw in this forum that some preschool teachers use it, I started to wonder.

Another participant alerted that it was time to update the OS on the tablets, due to the risk of having data accessed and stolen from tablets.

Update your tablets! Hackers can enter your tablet due to a serious error.

Primarily collaborative

Most participants preferred the collaborative use of digital play in *workplace practice*, and one stated:

The idea is not that one child should use it. All learning takes place in a context, and there is a lot of collaboration and communication around a tablet.

Some of the participant inquiries in online forums aimed at identifying apps that supported collaboration, for example:

Can anyone suggest apps in which it is possible to play together?

A few participants stated that the children usually started out their work on the tablet individually, but as the activity attracted a lot of attention, it usually ended up as a collaborative activity. Other participants mentioned that they had certain apps which children used individually and other apps that were intended for collaborative use. One participant felt it was difficult to nurture collaboration around tablets:

Collaborative learning between children is most difficult to achieve. Small children seem to get tunnel vision in front of a screen.

Preferably with teacher presence

The majority of the participants preferred to be present, or nearby, when children engaged in digital play activities. Some of the participants said that when new digital play activities were introduced to the children, teacher presence was expected. They were also of the opinion that all new activities

require teacher guidance. A few wanted to be present to ensure that the children's digital play was safe. Others thought their presence was important for children's focus and joy during tablet-supported activities. Similarly, a few claimed that their presence was important to assure that the digital play activity became educational. However, several of the participants highlighted that the opportunities to be present were limited, which were statements linked to *the technical-organisational learning environment*. One participant said:

You cannot be present everywhere, and if a child is working with a pencil and paper perhaps I need to be present there as well, to ensure the educational aspect of that activity.

The same participant argued that theme-oriented projects made it more natural for teachers to become actively involved in children's work on the tablets. Several participants expressed that they needed to adjust their ambitions to be present in children's digital play because of conditions that can arise in *workplace practice*:

If someone from the staff is absent, and the other staff need a break, you can end up alone [with the children]. Then you can occasionally use the tablet to gather a group of children in front of a movie. But that is not how it is intended to be used.

Similarly, another participant wrote:

Unfortunately, I can rarely find opportunities to sit down with one or two children and engage in digital play.

The incentives behind educational use of digital play

This section presents participant *incentives* for using digital play in preschools. These participants with a *work identity* that welcomed digital play in preschool, identified *incentives* for its educational use in three main directions which will be covered by the following themes.

Technology usability

The tablet technology was important for participant willingness to approach digital play in their *workplace practice*, and thereby technological development on a *societal level* had influenced its educational use. One participant wondered why participants in the online forums were so enthusiastic about tablets:

How do you reflect upon your work with tablets in preschool? What makes you choose tablets as a tool over other alternatives?

Another stated:

The tablets changed how the use of digital play was regarded in preschools. This was a new tool that opened up our eyes to the fact that the children can learn through digital play.

The tablets' contribution, from a child perspective, was explained by yet another participant:

They have made a huge difference, by their format and by not needing a mouse or a keyboard to navigate them.

Other participants mentioned how most children have learned to use tablets in their homes, and one participant claimed that the goal of merely learning how to operate the technology had become outdated, due to the user-friendliness of the technology:

If you get one of those in your hands at age 14, you quickly learn how to operate it just perhaps by watching somebody else. In that respect, learning how to operate a tablet is not valuable from my point of view.

To summarise, the perceived user-friendly tablet technology made it possible for some Swedish preschool teachers to identify educational potential in digital play. Technology development is something that happens outside of preschool which Illeris (2007) refers to as the *societal level* of learning in working life. This theme shows how technological developments on a *societal level* can work as *incentives* for digital play in *workplace practice*. It also indicates that if the technology is perceived to be user friendly, the focus in *workplace practice* can be turned towards teaching content instead of using learning how to handle the technology.

Enhancement of educational practice

This section presents how the participants experienced that digital play enhanced *workplace practice* in preschools.

Variation

Many of the participants considered digital play as a complement that could enable variation. Digital play provided access to more educational material that could be used to present children to teaching content in another form. This opportunity was perceived to enhance *workplace practice* for the children and also for the preschool teachers. Regarding children's digital play, one participant stated:

Digital play is a language full of creativity and fantasy. The preschool should provide children with multiple means of expression, and digital tools are a part of that.

Many participants were willing to approach digital play broadly and find ways to address traditional teaching content in an alternative way, for example:

I think that digital play can make it fun again, it adds variation and, as they say, variety is the spice of life. Playing a memory game on a tablet can be a thousand times more fun than in real life

Another participant wrote a response to a series of posts in an online forum, which contained reflections about teacher presence during child digital play activities:

I have a question ... many seem to be afraid that the tablet will become a babysitter. Are building blocks a better babysitter? Is not all educational material in preschool there to complement each other, and we know the children are interested in different kinds of materials ... why then, are we so afraid that the tablet could become a babysitter if we are not present? I believe the problem lies in our values and the way we perceive technological development. If we are competent preschool teachers, we make our learning environment educational, varying and inspiring for our children.

Applying Illeris (2007), this post reveals that using digital play as an alternative within *workplace practice* is something that some preschool teachers struggle with. However, for many of these participants, who had a *work identity* that welcomed digital play, the opportunity to enable variation worked as an *incentive* for the use of digital play.

Innovation

Digital play enabled innovative educational activities in *workplace practice*. Tablets were used for pedagogical documentation, by children and by the preschool teachers which enabled enhanced opportunities for communication and reflection about children's development or about the teaching content at hand. Pedagogical documentation, enhanced by the use of tablets, was presented by several participants as valuable for the preschool teachers, the children and their guardians. A few participants presented pedagogical documentation as teacher responsibility, but many participants aimed to make children increasingly involved in this work. For example, some of the participant questions online referred to apps that had the potential to enhance children's active participation in pedagogical documentation:

Are there any free apps that children can use for documentation? Where children can add photos and record sound?

Innovative educational activities, such as green-screen or stop motion movies, were introduced by some of the participants. To explain these concepts, making movies using stop-motion technique makes it possible to take a series of photos of, for example, Lego characters and then move the characters between shots. This technique enables the creation of movie clips with movement. Using a green-screen technique makes it possible to replace the background of the movie and display the Lego characters, or the preschool children, in any kind of context in the movie. A few of the participants used projectors in innovative ways to project environments or weather phenomena onto walls or inside physical boxes, which the children could enter and become more emerged. One participant stated:

We would like to purchase more projectors which we can use in combination with the tablet in order to increase opportunities to create completely different kinds of learning situations.

One participant wanted to increase guardian insights into the children's daily activities by making the digital documentation more accessible. The fact that there was no digital screen in the hallway called for an innovative solution, using QR codes. Note, that even though the following example might appear to be disconnected with children's digital play, it is still likely that the child is present, or even participates, when the QR code is being scanned. Thereby this situation holds opportunities to, in a playful manner, enhance children's level of understanding of how digital technologies can be used:

My idea is to continue to document using paper and photos and to supplement this with QR codes, to link to digital documentation. That is, QR codes that the guardians can scan with their mobile phones.

Another value of using tablets was that they provided enhanced access to information via the Internet-connected tablets. Some participants expressed that it became possible to search for information in a new way, and one participant said:

If we work with insects, and they [the children] want to look at a picture of an ant or if they want to know what an ant eats, we can just as well search Youtube, and look at a movie, instead of finding a photo in a library book.

Adaptation

Digital play enhanced opportunities to make different forms of educational adaptations in *workplace practice*. Some participants used digital play to

support communication between preschool teachers and children with multicultural backgrounds. Consequently, digital play was used to address the fact that Sweden, *on a societal level*, is multicultural.

We have many children who speak Swedish as their second language, and for these children, the tablets have been invaluable. We have, for example, used apps where they can listen and see numbers in their first language, and then we say it in Swedish. [...] In a small place, without access to an interpreter, different apps have formed important support. Everything from supporting language development, maths and interpreting has been done on the tablet.

Some participants raised questions about how digital play could be used to support children of different ages or genders. Other participants drew attention to the fact that children's individual interest and needs vary. The participants aimed to adapt digital play to match such intrinsic aspects of *workplace practice*. One participant said:

It makes it possible to meet all children. I think that all children are different, they need different things. Some children might feel and learn better if they get to meet it [the teaching content] via digital technologies. [...] It is all about the opportunity to make adaptations and I believe digital technologies can assist in that.

A few participants mentioned that the digital play was sometimes used by teachers in order to cope with demanding situations in their learning environment, which through the lens of Illeris (2007) can be linked to *the technical-organisational learning environment*, and one wrote:

It feels like the tablet is brought forward when things get messy and the teachers want the children to sit down, to calm things down, so that the teachers can help the younger children [in another activity]. It becomes like additional personnel, as many children are drawn towards the tablet. But if the personnel resources are scarce you must use any opportunity available as a teacher.

Children's learning

This section presents two main directions in which the participants aimed to support children's learning, learning for life and learning for school. Both these objectives are linked to contexts beyond *workplace practice* in preschool, and thereby these *incentives* for digital play were linked to a *societal level* of the participants' professional learning context.

Life-focused learning

This theme illustrates how the ongoing digitalisation on a *societal level* was a strong reason behind most participants' willingness to approach educational use of digital play. They aimed to support children's learning for life in society and therefore acknowledged that children need to get familiar with digital technologies in the preschool context. One participant wrote:

The children must learn to use technology when they live in a society which demands that you are able to use a smartphone or a computer in order to function in school or at work.

A few participants mentioned the opportunity to even out differences in children's upbringing by introducing digital play in preschools, and one stated:

It becomes increasingly important to encounter the digital world. It is important to be able to use digital tools in order to become a citizen who is able to access information and create knowledge about our society and in our society. We need to reach out to the children that do not encounter this world in their homes.

Some participants thought digital play brought opportunities to discuss topics of importance in a digitised world, as one said:

The creation of photos and videos raises important ethical issues. It is important that it is agreed upon, that you ask your friends if it is okay to make a video of them just now. It is important they get this perspective, because opportunities to take photos and videos are everywhere, and they need to learn some critical thinking and ethics, how to do it in a proper manner.

Similarly, other participants claimed that it was easier to address contemporary phenomena when digital play had been introduced into educational practice, one participant said:

I have shown them what stop-motion movies are and this creates a completely different level of understanding about how movie-making works. [...] These kinds of understanding can be hard to attain using the traditional toys we have.

Another participant emphasised the phenomena of information seeking on the Internet:

I'm thinking, that the tablet should also be considered as a tool that children can use to search for information because that is the way they will use it in the future.

School-focused learning

Most, if not all, participants identified that digital play can prepare children for the school context. A few participants mentioned the fact that children will encounter digital technologies in the upcoming school context, and some participants argued that digital play was of most importance in multi-cultural communities, where children's knowledge about digital technologies varied. One participant stated:

We should also consider the connection from preschool to the school context. What can we do here? Well, we can make children familiar with digital technologies. Because they will be there in the school context. It is a matter of finding a balance.

Most participants prepared the children for the school context by supporting school subject-related knowledge development. This was apparent when participants asked about apps:

I am working at a preschool where we recently purchased a tablet, I would be grateful for any suggestions on good apps about language, mathematics, natural science, technology and other areas in children's (1-5 years-old's) learning.

One participant stated:

The opportunities are endless, there are so much that can be included, you can work with maths, language or communication.

Digital play was also used by many of the participants to support the children's development of soft skills that can be linked to school readiness, for example collaborative skills, social skills, empathic ability and how to behave in conflicts. This may be illustrated by a question that one participant asked online:

We want to work on emotions with children aged 3-6 years old at the preschool using IT, any suggestions?

The professional learning context in relation to digital play

This section covers how participants perceived their professional learning context when they approached digital play in their work.

Limited time and opportunities to learn

Most participants experienced that they had limited time and opportunities to learn about digital play, which in the Illeris (2007) view are shortcomings that are linked to the *technical-organisational learning environment*. A few stated

that they had received a certain level of professional training that felt sufficient, but it seemed as though these participants' personal drive to learn, their *work identity*, was an important factor behind that feeling. One participant wrote:

We have received training within this field, and I am fairly confident in my ability to address the challenges. I keep myself updated. [...] by further training within my work and personal use of IT, social media and social network discussion groups.

However, for most of the participants, time and opportunities to learn about digital play were perceived as limited. Another participant wrote about how opportunities for knowledge exchange within the preschool teacher *social-cultural learning environment* were limited, due to limitations linked to the *technical-organisational learning environment*:

There are many framework factors in educational practice which make it difficult to enable cooperative learning [between preschool teachers].

Another participant provided an example of how limited time and resources, linked to *the technological-organisational learning environment* affects digital play implementation in *workplace practice*:

There are often too few teachers and too many children to be able to keep continuity. I have gained the insight that time is limited and that there are sometimes just not enough teachers to enable any fruitful form of digital play.

Yet another participant reflected on how her limited interest in digital technologies increased her need of more structured opportunities to learn about digital play, which indicates that preschool teachers who have different *work identities* in relation to digital play also need to be supported in different ways in order to learn:

I am not that interested in digital technologies, so I have the feeling that I need to "work harder" to learn apps and ways of working. I recognise that I need to learn as I consider IT a good tool for me and the children. However, I wish I could attend more courses about use of digital technologies so I could become more knowledgeable and inspired to use it.

One participant mentioned that the limited training they had received, which is linked to *the technological-organisational learning environment*, failed to meet their professional learning needs and other participants mentioned that they primarily achieved their professional learning within *workplace practice* together with the children, which suggests that children can be regarded as a

part of the preschool teacher *social-cultural learning environment* when digital play is used for educational purposes. One participant wrote:

I mainly explore digital play together with the children.

Similarly, another participant said:

I think it is important that you are open-minded and that you explore and can stay curious together with the children. I consider it important to show them that I am interested too.

A few participants also touched on the fact that access to technology, which is linked to *the technical-organisational learning environment*, also affected their opportunities to learn:

It is difficult to turn this into a project that can extend over a longer period of time because we have a shortage of equipment and a limited number of personnel who have the ability or interest.

Several participants who had suitable access to technology agreed that it was valuable to have one tablet devoted to teacher use and one tablet that could be used with the children. This made it easier to plan digital play activities, and it also had the effect that children's digital play was not disturbed whenever a teacher needed to use the tablet for other purposes.

Reluctance from colleagues and guardians

Many participants were confronted with the challenge of tackling colleagues' divergent opinions about digital play within *the social-cultural learning environment*. One participant said:

I believe it will be a challenge to get all preschool teachers to share a common ground on how to perceive digital play in preschool.

This perceived difference in *work identity* in relation to digital play was presented by some participants as linked to the fact that some preschool teachers are older, and perhaps less receptive towards the change that accompanies digitalisation. One participant wrote:

Another challenge is to get everyone in a team of preschool teachers to follow this development. I sense that older colleagues are more sceptical towards digital play.

Other participants linked colleagues' reluctance to the fact that some preschool teachers have limited knowledge about digital play and claimed this made it intimidating for them to approach digital play in their *workplace practice*. Another participant wrote:

I have many colleagues who have very limited knowledge of this field and they do not want to learn how to use digital tools. [...] According to my opinion, they are not following modern development and considering the future. This becomes a challenge for the preschool teachers who want to make use of it.

Many of the participants who, in their *work identity*, had taken on the role of being the driving force behind the educational exploration of digital play at their respective preschools, experienced this, often self-assigned task, as tiring and lonely. The same participant continued:

I am the one who has had the strongest interest in working with tablets. It would feel better if more colleagues had the same interest so that we could support each other.

Some participants touched upon the educational fragility that preschool teachers' diverse views, and diverse level of knowledge about digital play, can cause in *workplace practice*. One participant said:

Last term we had a lot of absence among the staff due to illness. Now when I returned, and we have a smaller group of children and a stable group of teachers, we need to start all over again. The things we had established earlier [concerning digital play], that work structure had got a bit lost.

In addition to handling reluctance from colleagues, some participants also mentioned that guardians occasionally needed to be reassured that the preschool teachers' use of digital play was sound. This reluctance, or scepticism, towards digital play from the guardian side of the participants' *social-cultural learning environment* appeared to trigger some of the participants to carefully consider didactical issues in relation to their *workplace practice* with digital play. One participant said:

In the beginning it was fairly difficult. Three years back, a lot of guardians would say: No, no, no, my child should not be playing on a tablet here! At preschool, they [the children] should do other things. So, we really needed to think about why we used it, and what we are offering the children. So, we could explain the goals and purpose of using a tablet [to the guardians]. Why do we have it in preschool? How does it benefit the children? [...] We needed to dive deep into the purpose of this. What do we do? What are we offering the children? And why?

The issue of convincing guardians was mentioned in online discussion forums, where one participant wrote:

I work at an independent preschool which is run by the guardians, and now we would like to purchase a tablet. The guardians are a bit hesitant towards this, so we need strong arguments. I need assistance in this issue and I also would like to read more about how others use tablets in preschool.

Technology as an enabler of professional learning

Several participants mentioned how access to tablets enabled opportunities for professional learning. One mentioned how tablets were used to document their own actions in their *workplace practice* in order to improve as teachers. The tablets' portability had enhanced such opportunities, as they no longer needed to go through the complex process of rigging a camera for such purposes:

Making a video and watching yourself is also possible. Sometimes during an activity, we put up the tablet and make a video, and then you watch it and learn how you interact. Do some of the children get more attention than others? Are there any of the children who I do not interact with at all?

Other participants used the Internet to expand their knowledge about traditional and digital play activities that can be used in preschool. Such Internet-based inquiries were an important part of most participants' professional learning about digital play. The fact that many participants used online forums to discuss the educational use of tablets is a good example of this. One participant from the forums had launched a website aimed at supporting teachers in the choice of apps for educational purposes. She posted the following information, which may be regarded as an indication of how important the Internet has become to preschool teachers who, for example, want to learn about apps:

Time to summarise the past year, and what a year it has been! In 2013 we have reviewed more than 150 apps; the website has had more than 200 000 unique visitors and about 1.4 million visited pages.

Another website moderator drew attention to the fact that preschool teachers could contribute valuable information to the website that could be helpful to preschool teachers who want to approach digital play:

Are you working with apps in preschool? Send me your ten best apps to moderator@website.se and we will publish a summary. Also, please write a short motivation to each of your suggested apps.

A striking aspect of the online discussions, was that most of the participants in these forums had similar opinions about the educational use of tablets, and that they needed to get in contact with other preschool teachers who had introduced tablets into their educational practice. For example, one participant, who was at an early stage of this digitalisation process, wanted to learn from more experienced colleagues within the extended *social-cultural learning environment* online:

Tomorrow we start to prepare the introduction of tablets at our preschool by assigning a workforce to deal with this issue. Suggestions on articles, literature, websites, and more would be appreciated!

They seemed convinced that digital play should become a natural part of the preschool learning environment and they were eager to explore tablets' educational potential. Using the Illeris (2007) lens, all of them appeared to have a similar *work identity* in relation to digital play. This can be exemplified by a question which drew attention to strong conviction about digital play's educational value that could be observed in these online forums:

A small reflection ... Can you identify anything that is negative about using tablets in preschool? What would that be?

The impression was that participants needed this online expansion of their *social-cultural learning environment* due to the fact that many of their preschool-based colleagues lacked a professional interest in discussing digital play. For example, the previously-mentioned issue of how to convince colleagues was also discussed online. It was also noticeable how participant questions in online discussions often concerned how to overcome technologically-related hurdles that stood in the way of their educational intentions. This kind of knowledge was quickly obtained online, and forums seemed therefore to help the participants to overcome some of the challenges to learning that originated from *the technical-organisational learning environment*. Thus, activity in the forums can be described as both confirmation and knowledge-sharing. The questions in the online forums covered three different orientations, they were technological, content or pedagogically-related. One example of a technologically-focused question was:

I heard that it is possible to lock the software the children work with so that they cannot switch between applications. Can anyone explain how?

An example of a content-focused question was:

Does anyone have suggestions for good applications to help us in our work with values and emotions?

And an example of a pedagogically-focused question was:

I think a lot about if it is about right or wrong when children leave traditional play for the tablets ... how should we relate to that? What are your thoughts?

Through the lens of Illeris (2007), these findings show how technology, which comes from a *societal level*, has enabled professional learning in *workplace practice* of preschool teachers. However, the participants in the online forums were not solely preschool teachers. Some participated with the intention of promoting courses on tablets, searching for digitally-competent personnel, promoting websites, blogs, social network groups, conferences, educational events, apps, research or literature. It was quite common that the participants who posted informative posts could gain personally from disseminating the information. Consequently, it appeared that the introduction of tablets had made it possible for some actors to explore the market potential in preschools, and these online forums were used to promote their products or services. According to Illeris (2007), digital play had opened up the *workplace practice* of preschools to financial interests at a *society level*. This may be considered a potential drawback of these informally-created and maintained online forums, as the information shared was not always objective. Due to the fact that underlying intentions were sometimes more about making a profit than producing qualitative apps that can help to enhance preschool teachers' work. For example, one actor in the forums wrote:

App X is a creative, educational and funny app that makes it easy to make up stories. Perfect at home or in school. Check out our video of how the app will function and what it looks like. Sign up on the interest list and we will contact you when the app is available for download.

The professional knowledge needs concerning digital play

This section covers participant-experienced limitations in knowledge about digital play. Three types of knowledge needs were identified; knowledge about social discourse, technology and educational use and these will be examined under the following themes.

Knowledge about social discourse

Regarding social discourse, which is linked to the *societal level* of the preschool teacher professional learning context. The participants, with a *work identity* that welcomed digital play, seemed to have a level of knowledge about digital play that made it possible for them to see past most of the media panic discourse that can surface when children's use of digital technologies is discussed. Instead, they seemed focused on exploring what positive effects

digital play could have in their *workplace practice*. One example of a situation when the participants needed to be knowledgeable about topics in social discourse was, as previously mentioned, in their daily encounters with guardians who were concerned about their children's learning, development and welfare. It should be noted that the participants were knowledge-wise quite confident, which may possibly explain why this theme was not very prominent in terms of data. However, a few statements about digital play revealed that social discourse had influenced thoughts about digital play, and possibly the way that digital play had been implemented in *their workplace practice*. One participant had picked up on the topic of children's exposure to radiation in front of digital screens and seemed to have taken it for a scientific fact that children's health could be jeopardised by extensive exposure to tablet-screen radiation. In an online forum, another participant wrote:

We are about to receive a bunch of tablets, beyond the one tablet per department which we already have. But there is widespread fear regarding everything from radiation to the concern that children will end up with a tablet in their knees or that the preschool teachers will work on documentation instead of being actively involved with the children.

Another example is how the topic of children's screen-time, which is a common topic in social discourse, was present in some of participant statements. For example, some people wondered if they treated children's screen-time properly in their *workplace practice*, and others wondered if they should limit children's access to tablets because of their belief that most children already do a lot of screen-time in their homes. A third example is a participant who primarily worked to enable children's physical movement through the educational use of the tablet because she was concerned that the children would become passive and unhealthy.

Knowledge about technology

Many of the participants needed more knowledge about how to handle technology. Regarding apps, some participants felt it was challenging to assess the quality of apps and to make decisions on what apps to introduce into their work. For example, questions in online forums often contained a clearly-described pedagogical idea, but the participants needed guidance regarding what app to choose:

We are going to work thematically during the spring, and the topic is water. Can anyone suggest apps suitable for children aged 1-5 years old?

Some participants felt overwhelmed by the scale of the app market, on a *societal level*, and by the difficulty in identifying qualitative apps that were worth

including in their *workplace practice*. One participant claimed this had a negative effect as it further stressed the preconditions of *the technical-organisational learning environment*, the perceived shortage of time to learn:

There are a lot of poorly-designed apps, and it takes a lot of time from the children and from my planning time before we find something that is worth using.

Another participant wrote the following statement which can be linked to a *societal level* in the sense that the growing market of apps makes it important to stay critical:

I need to learn how to be selective among the range of apps and to learn to adopt a critical view.

This could possibly explain the extensive exposure that websites, aiming to make teachers' selections of apps easier, received in the online forums. For example, one participant wrote:

My suggestion is website-X, available as a blog and on [this social network]. Tremendously valuable in my work as a teacher with my responsibilities to support the IT integration in preschool and in my role as a guardian. By far the best website when it comes to suggestions on specific apps.

Regarding hardware, some participants thought it was difficult to select and purchase technology for educational use, which are challenges that also can be linked to the *societal level*. One participant asked:

Are there any pros or cons of tablet version 4 in comparison to tablet version 2 and 3?

Similarly, many participants needed knowledge about how to operate the technology so that they would be able to make proper educational use of it in *workplace practice*. One actor in an online forum, who was a preschool manager, asked a question on this issue:

I need to get in contact with a preschool teacher who can educate my preschool teachers in how to use the tablet and the computer. We have worked six months with tablets and now we need to get computers, tablets and preschool teachers more synchronised. We are familiar with the basics, but we want to utilise all pieces of the puzzle in full.

Another participant asked a question that exemplifies the breadth of technological know-how that preschool teachers need in order to establish a technological foundation for educational use:

Finally, my preschool will get some tablets. I have brought my own for a whole year. I am curious about how you administer your tablets, for example accounts, updates, wireless networks, purchase apps and how you manage to deal with several tablets?

A third participant provided further examples:

I am required to know how to use the camera, computer, tablet and the projector in a proper manner.

A few participants drew attention to how technology is in constant development on a *societal level*, and how this fact can be perceived as challenging when digital play is to be implemented in workplace practice. One participant wrote:

One major challenge is rapid technological and digital development, the personnel just become familiar with digital tools before they become outdated.

Knowledge about educational use

Many participants needed knowledge about the educational use of digital play, and knowledge about how this can affect children's learning. One wrote about the diversity of knowledge levels in *the social-cultural learning environment*:

The varying experience and knowledge among the personnel is also a limitation when it comes to digital play. I consider this to be a greater challenge than the digital tools themselves. There are vast variations and limitations in the personnel's knowledge about the [educational] use of digital tools.

Another participant wrote about the challenge of developing meaningful *workplace practice*, partly due to perceived time constraints linked to *the technical-organisational learning environment*:

It is also about developing knowledge about the tools, so that you are able to use them properly from a pedagogical perspective towards the children. [...] To find the time to develop a knowledge that will make the use of digital tools meaningful for myself and the children.

A statement by a third participant, who was in the early phase of the digital play implementation, may work as an example of how *workplace practice* can

potentially suffer if preschool teachers' knowledge about digital play remains limited:

Currently we have these educational games, but I would also like to use it [the tablet] more in daily practice. For example, if we are working on mathematical skills, we can bring in an app in for that purpose. Because now the children primarily use the games.

A fourth participant drew attention to how the perceived hurdle of professionally coming to terms with digital play can have the effect that the more traditional educational methods prevails in *workplace practice*:

My knowledge has increased and I have started to use it more and more. But I think I have a lot to learn about digital play before I can use it without the feeling that it is difficult. It is easy to end up using methods that you are familiar with.

Knowledge about access and agency

Regarding participant need for knowledge about educational use of digital play, a strong sub-theme concerned the challenge of handling children's access to tablets and agency in digital play activities. Many participants expressed that they would like to use tablets and digital play activities in the same way as they made use of other materials and opportunities in their *workplace practice*. One participant said:

It is difficult when some teachers still think that digital technologies are things that should occasionally be brought out for educational use, instead of considering them as any other material that should always be accessible to the children.

Another participant expressed it in the following way:

I would like them [the children] to get increased access to them. Because it is still one of these things that the teacher hands out, so to speak. I guess it is one of these cliché ideas that it should be like other kinds of mediums, pens and paper and such. But we are not quite there yet.

The same participant continued:

The objective must be that it is something that the children can have access to, and that they get to know how to make use of it. Not that it is only brought out for entertainment purposes.

Many of the participants experienced a challenge in increasing children's access to tablets and as access to tablets is inherently linked to children's chances to

exert agency, children's agency in digital play was also a common concern. One participant said:

We are working on the issue of giving children ownership of the tablet. That it should be their tool, to document each other and their things. Now they more frequently say, I have built this and I am about to tear it down, can I take a photo of it first? [...] That the children should have increased ownership of it, both in the indoor and outdoor environments. [...] It is exciting to let go of the app-centred work.

Another participant provided additional examples of what children's agency may look like in digital play:

On the tablets, we have the apps ordered based on children's age, and the children can access these apps freely, to play, watch or listen. The apps support children's language development, mathematical skills and ability to be a good friend. The children can listen to a book when they feel they need to rest awhile, and the children can use the tablet to take photos and make their own documentation.

One central aspect of the dilemma experienced in giving children increased access to tablets was to maintain a balance between traditional play and the newly- introduced digital play activities in *workplace practice*. The overall concern seemed to be that a failure to establish such a balance would influence children's learning negatively. Using the lens of Illeris (2007), it was difficult for the participants to know how digital play would affect their *workplace practice*, and this turned into *incentives* to progress slowly when digital play was introduced. One wrote:

It is impossible to ignore that digital play is the future, and of course we need to increasingly work with the digital together with the children. But I also think that regular learning cannot be forgotten, where I can see a great benefit for children's future learning. You need to find a balance that works for you as a teacher.

Another participant thought that maintaining this balance was related to the issue of safeguarding children's opportunities to engage in free play:

I think it should be present in the practice because it reflects the times we live in. However, I do not want it to take over, they [the children] should be able to play freely and develop their imagination, and not be steered by a game or a tablet.

A third participant wanted to establish a balance in the variation between different kinds of activities in *workplace practice*:

We believe everyone benefits from trying different activities, regardless if it is building in the sandbox, building Lego or playing on a tablet.

Similarly, some participants, that were in the earlier phase of introducing digital play, were concerned that the tablets would become too popular among the children and that this could have a negative impact on *workplace practice* as a whole, one said:

They [the tablets] do have a certain effect on children, and on adults as well for that matter, you can get caught up in them. I don't want them [the children] to have free access if the end result will be that that is the only thing they do. I don't know if this concern of mine is valid, cause maybe this is not what would happen if they had access. Maybe it would only apply to the first weeks of the use.

For a few participants, the difficulty of handling children's access was also linked to the fact that tablets are fragile and expensive.

Some participants mentioned insights they gained about digital play, decisions they had taken about digital play and strategies they had developed in use of digital play which had helped them to overcome the perceived difficulty in handling children's access to tablets and agency in digital play. Applying the lens of Illeris (2007), this may be interpreted as the overlap between participant *work identity* and *workplace practice*, as it exemplifies that participants had given thought to how digital play could be implemented in a functional manner in their *workplace practice*.

One strategy was to monitor children's time at digital play. Some participants used an alarm-clock and decided a time-limit for how long the children could spend with the tablet. Others used a weekly schedule, in combination with an approach to monitoring the time. A few participants mentioned a form of ticket-based system, where children had a fixed number of digital play tickets which they could distribute freely over each week. Even though these kinds of approaches were used, they generally seemed to be disliked by the participants. The main reason was that most participants were not accustomed to monitoring children's play and activities with other kinds of materials in such a manner. It seemed to contrast with their view of how children's learning should be supported in educational practice. In this respect, this form of application of digital play conflicted with participant *workplace practice* and their *work identity* as preschool teachers. One participant wrote:

Some have worked with time, setting a clock and deciding that twenty minutes is the limit for working with the tablet. This is something I really struggle with. We do not set a clock when children play with Lego. After twenty minutes you

need to leave your Lego creation. That is not a proper way of working. You work until you are finished. [...] In this issue the teachers' views have differed.

Most participants thought three or four children in front of a tablet was the upper limit of how many that could be involved in a digital play activity. As previously mentioned, the participants generally encouraged collaboration in front of the tablets. One participant mentioned that they had given thought to where the children could use the tablet in the physical learning environment, to make it easier for more children to join the digital play activities:

If a child sits with the tablet up against a wall, and another child wants to watch or collaborate, it becomes difficult. [...] It becomes almost like when somebody sits with a book, not many others can participate. Now we work with a round carpet, the children have to sit down on the carpet when they work on the tablet. Then you can have eight children around, commenting, watching or learning. The environment is of great importance. You have to find a way for them not to own the tablet.

Some participants had started to use a projector in combination with the tablet so that more children could take part in digital play activities, by observing or actively participating, and one said:

There could be an app that somebody is working on, but if you connect the tablet to a projector, then twenty children can watch and participate, even though one is working on the tablet. We use it a lot like that.

Other participants had gained the insight that children's access to digital play to some extent was naturally controlled by the shifting phases of the preschool day, or by the fact that that the sheer number of children naturally controlled the time children could engage in digital play. A few participants mentioned that they primarily used tablets during certain parts of the day, while others made educational use of the tablets throughout the day. One participant said:

There are also natural transitions between different activities. For example, we have routines between lunch and afternoon snack. Thereby it is a limit to how long they can sit [with the tablet].

Another participant concluded:

We have one tablet in a department of 17 children, so it is impossible for one child to use it all the time.

A third participant also touched upon the issue of age, that the children's access to tablets and agency in digital play should naturally progress as children get older:

The older the children get, the more responsibility they get for using them [the tablets]. They get access to more apps and such. It is like with everything else in our environment, that when you get older, it becomes more and more challenging.

Some participants had suppressed their initial concerns that digital play would overtake other important aspects of *workplace practice*, and they had established ways in which the children's access to tablets could be increased, and controlled with subtle measures. Put differently, by using subtle measures to control digital play activities, they had managed to turn tablets and digital play into a material and an activity more like others in their *workplace practice*. One approach was to limit children's access to one app at every digital play event. One participant explained:

Restricted access to apps is the best feature of the tablet. That I [the teacher] can control what we work with. You see, some children constantly switch in between apps otherwise. [...] That I can present the children with one app at the time, and if the children do not want to work with it, there are other things they can do in the preschool learning environment.

The issue of restricting children's access to apps also appeared several times in online forums, where one participant asked:

How can I restrict software so that the children cannot switch between different apps?

Another strategy was to present the children with similar digital play and traditional play activities when the tablet was used in theme-oriented projects. A few participants experienced that this had the effect that the children were drawn towards trying both alternatives or both ways of learning. The outcome was that participants could increase children's access to the tablets and that they could enable a higher degree of child agency in digital play activities. One participant said:

Working with double presentation of material has been really awarding. We can see how it is possible to create an interest among children who have never been interested in drawing or using scissors. After a period of using the tablet, they also become interested in the physical material. This way they can be drawn towards things they perhaps normally would not have been interested in.

A reflection made by a few of the participants who had used these kinds of approaches was that the tablets had become more like other kinds of material, in the sense that the tablets' initial popularity had faded. One participant said:

Yes, it draws a lot of interest, but only in the beginning. We sometimes say it is the same as when we introduce a new bun, everybody wants it. But when we have introduced it, and had it in the environment a while, their interest fades. But it is still popular.

The same participant continued:

It is a periodical interest. Sometimes it [the tablet] can be unpopular for two months and then it suddenly becomes very popular.

Another participant mentioned how the saturation of technology on a *societal level* also had likely contributed to the perceived decrease in tablet popularity among the children in *workplace practice*:

In the beginning, four years ago, when it was a novelty and children perhaps did not have the access to tablets in their homes, the urge to use it was strong. The only thing they wanted was to sit with the tablet, and in such a situation you feel a need to limit use. But then we learned that the more accessible it [the tablet] became the less single-minded the children became about it being the only thing they wanted to do. They know it is one opportunity among many others in preschool.

A question that was posed in an online forum during the early phase of tablet introduction into Swedish preschools makes it clear how the above-mentioned insights regarding increased access to tablets represent an important breakthrough when it comes to how digital play can be handled in *workplace practice*. In fact, the above-mentioned insights might very well be part of the answers to the question posted:

We find that the children stop playing when we bring out our tablets. We have decided that a small group of children, maximum 4, can sometimes "work" on the tablets. And then it is the teachers who decide what they can do, and we are nearby. Has anyone else experienced that the creative, social play gets interrupted? That children walk around, waiting for their time on the tablet. That their play no longer becomes important. How do you deal with this?

Participant choices concerning apps for educational use can also be considered as a way for them to maintain an educational balance in their *workplace practice*, and a perceived proper direction for children's digital play. Most participants aimed to provide children access to apps of good educational quality. The preferences regarding app characteristics shared similarities with

participant-envisioned educational use, which in this study has been interpreted as the overlap between participant *work identity* and *workplace practice*, where Illeris (2007) claims that important workplace learning takes place. Most participants expressed that the use of apps needed to be purposeful, in the sense that the use was to support specific learning goals linked to curriculum objectives. The preschool teachers seemed to prefer apps in Swedish, but apps that supported communication between preschool teachers and children of multicultural backgrounds were also appreciated. A few participants mentioned that apps were to be safe, age-appropriate and harmless. As previously mentioned, some of the participants had made the decision to exclude game apps, due to their understanding that most children already played a lot of games in their homes. Their aim was to differentiate digital play in preschool from home use, while others thought games were natural to use in the preschool setting. One central aspect of the apps that participants introduced into their practice was they left room for children's exploration and children's own reflections, which are properties that can be linked to the issue of child agency in digital play. Several participants expressed that the apps for preschool use should not be too obvious about what actions or what choices are right and wrong. One participant said:

I try to think about whether this app could be more fruitful. You know how these puzzle apps can be designed to make a beep if you place a piece in the wrong place. It should not be that obvious what is right and wrong, the children have to get a chance to find their way without the app telling them it is wrong.

Many of the participants discarded commercial games, apps that involved characters known from child-oriented media, free apps with advertisements and apps with an in-app purchasing feature. One participant said:

We have not downloaded Candy Crush or similar apps.

Another participant said:

We would not even look at an app with Barbie or Donald Duck.

A third participant said:

There should be no commercial material popping up.

Initially, during the early phase of the tablet era in Swedish preschools, free apps were paid a lot of attention in online discussions. However, from viewing the latest data collection, the interview study, many participants had concluded

that it was best to purchase apps in order to avoid, for example, adds and the in-app purchasing feature that usually comes with free apps. Some of the participants worked to limit the number of apps, which made it easier to become familiar with them from a teaching and learning perspective, and one said:

Right now, we have a lot of apps on our tablet, but around Christmas time, when we had fewer children, I sat down and cleaned it up. You do now have apps that resemble each other, so you aim to choose the best of the apps that resemble each other.

Apps that were reviewed in preschool-focused magazines, recommended by colleagues or reviewed on websites aimed at making teachers' choice of apps easier, were generally trusted. For example, one of the participants said:

I usually visit website-X, which I think is great. I usually download my apps via that website and read about recommended apps.

Understandings from educational use of digital play

This section presents a summary of the findings that are linked to the educational use of digital play, and by using the concepts in the Learning in Working Life Framework (Illeris, 2007), the intention is to display a deeper level of understanding of these findings.

Regarding research question one, the understandings from participant statements concerning educational use of digital play show that these participants, who had a *work identity* that welcomed digital play in preschools, identified *incentives* for their educational use from three main directions. The first direction was associated to *society level*, in the sense that the technological development of tablets had made it easier to identify the educational potential in using digital play in *workplace practice*. The second direction was linked to a perceived enhancement of *workplace practice* when digital play was used. The participants perceived that digital play enabled opportunities for variation, individual adaptation and innovation in their *workplace practice*, which in turn was perceived to enhance children's learning environment. The third direction was linked to a *society level* as the participants aimed to support children's learning in preparation for life and in preparation for school, which are contexts beyond preschool *workplace practice*. The participants needed more than these *incentives* to introduce digital play into their *workplace practice*, even though their *work identity* welcomed digital play. Digital play needed to be adapted to their *workplace practice*. By applying the lens of Illeris (2007), this can be identified as the overlap between participant *work identity* and *workplace practice*, where important for professional learning takes place. During

implementation in *workplace practice*, it was important for most participants that digital play would be: different from children's home use, purposeful, embedded in educational practice, secure, primarily collaborative, and the participants preferred to be present when children engaged in digital play activities.

Understandings from professional learning about digital play

This section presents a summary of the findings linked to professional learning about digital play, and by using the concepts of the Learning in Working Life Framework (Illeris, 2007), the intention is to display a deeper level of understanding of these findings.

Regarding research question two, the understandings from participant statements concerning their professional learning context show that the professional learning context was such that most of them had limited time, opportunities and resources to learn about digital play, which are experiences linked to *the technical-organisational learning environment*. Where resources in this case refer to access to personnel or technology. A variation, regarding professional learning needs, was found between participants who had *work identities* that deviated from each other in relation to digital play. Some participants had a strong personal drive to learn, and this seemed to have contributed to their feeling that their level of training about digital play had been sufficient. Those who had not identified *incentives* to learn about digital play to the same extent, expressed that they needed more structured forms of training in order to learn. Some argued that the training they had received did not meet their professional knowledge needs. The shortcomings of *the technical-organisational learning environment* also influenced some participants' opportunities to introduce digital play into their *workplace practice*, for example due to limited personnel resources. In order to find a way forward, despite the challenges that were associated with *the technical-organisational learning environment*, several participants preferred to explore digital play in their *workplace practice* together with the children, who thereby became a part of the participants' *social-cultural learning environment* when digital play was explored.

The professional learning context also involved reluctance from colleagues and children's guardians within the participants' *social-cultural learning environment*. Collegial reluctance was perceived by the participants to be linked to limited knowledge about digital play or to age, in the sense that the older generation of preschool teachers were perceived to be less open-minded towards using digital play in their workplace practice, and towards learning about it. Several participants who possessed a *work identity* that promoted the use of

digital play in *workplace practice* thought this task was tiresome and lonely. Digital play appeared to be a fragile element of *workplace practice* that was dependent on one or a few preschool teachers possessing a *work identity* which included an interest in including digital play in *workplace practice*. Some guardians thought their children should do other things than to be involved in digital play during their time in preschool, and this type of reluctance in *the social-cultural learning environment* triggered many participants to carefully think through the didactical issues concerning digital play in their *workplace practice*. However, several participants mentioned that guardians' reluctance had become less frequent and less of a challenge once they had been informed about the educational use and the intentions behind digital play.

In this professional learning context, which comprised reluctance from *the social-cultural learning environment* and shortcomings of *the technical-organisational learning environment*, technology enabled professional learning for these participants. Some participants used tablets to document and reflect on the way they interacted with children in their *workplace practice*. Online forums became an extension of *the social-cultural learning environment* which provided participants with confirmation from, and knowledge exchange with, peers who had a similar *work identity* in relation to digital play. The questions that the participants posted in the online forums often aimed at dissolving technology-linked hurdles that interfered with their educational intentions, and it appears as though the participants needed this flexible and direct access to professional learning when they introduced digital play in their *workplace practice*. However, online forums were also used by actors from a *societal level* with financial interests in preschool digitalisation which may be perceived as a potential drawback as the information shared was not always objective. For some, the Internet also worked as a source of information for how *workplace practice* could be enhanced by digital play and by traditional activities.

Regarding research question three, the understandings from participant statements about professional knowledge needs in relation to digital play, show that they needed professional knowledge about digital play from three main directions; knowledge about social discourse, technology and educational use. Social discourse is naturally linked to the *societal level* of the participants' professional learning context, and some participants needed to increase their knowledge about topics discussed in social discourse to become more confident in their *workplace practice* using digital play. They needed this knowledge to be able to respond to reluctance from colleagues and guardians in the *social-cultural learning environment*, and to be able to make educational decisions about *workplace practice* based on scientific facts.

Many participants stated a need for more knowledge about technology which is produced on a *societal level* and is introduced into *workplace practice* of preschools. Some thought it was difficult to assess the quality of apps and to make decisions on what apps to include in their *workplace practice*. The scale of the app market, on a *societal level*, was perceived by some participants as challenging. It demanded that the participants possess a level of knowledge that enabled a critical view. For a few, the challenge of choosing between the range of apps seemed to turn into *incentives* to avoid digital play in their *workplace practice*. Choosing and purchasing hardware for educational use, and knowing how to operate it, was also mentioned as challenging. A few participants stated that the continuous technological development on a *societal level* was challenging in the sense that digital technologies often became outdated before they had the time to become familiar with them from a teaching and learning point of view.

Most participants needed more knowledge about how digital play could be used for educational purposes in *workplace practice*, and how it could influence children's learning. Regarding educational use, a prominent dilemma which most participants touched upon in their statements was how to handle children's access to tablets and agency in digital play. The participants' ambition to embed digital play into their *workplace practice* was what generated this dilemma. They wanted to use tablets and digital play activities in the same way as they used other materials and opportunities in their *workplace practice*, but they struggled to achieve this. For a few participants the issue of access was linked to tablet fragility and cost. Other participants perceived that digital play challenged *workplace practice* in the sense that they were uncertain about the effects increased child access to tablets might have. The issue of establishing a balance in *workplace practice* between traditional and digital play were a central concern for many participants, and the impression was that they were worried that a failure to establish such a balance would influence the children's learning environment negatively. For example, that children's time and opportunity to engage in free play would become compromised. Consequently, participants used different methods to monitor children's time in digital play. These methods were generally disliked due to the fact that they conflicted with participant *work identity* as preschool teachers and their conceptions of how children's learning should be supported in *workplace practice*. Other participants had realised that children's access to digital play was naturally controlled by the shifting phases of the preschool day, or by the fact that the sheer number of children controlled how long each child could be engaged in digital play. Some participants had developed strategies for how children's access to tablets could be controlled with subtle measures, which had the effect of increasing children's access to tablets and agency in digital play. One strategy was to restrict access to one, teacher-selected, app at every digital play event,

which had the effect of children growing tired of digital play in the same way as they would with other kinds of activities. Another approach was to present children with similar traditional and digital play activities, which had the effect that children were drawn towards trying both activities, or both ways of learning. Participant purposeful choice of apps was also a way for them to maintain proper direction in children's digital play, and thereby a balance in *workplace practice*. Several participants had not developed satisfactory strategies to handle children's access to tablets and agency in digital play activities, so this kind of knowledge appears to be something that preschool teachers need when they approach digital play.

Discussion

This thesis aims to improve knowledge about preschool teacher educational use of digital play in preschools and their professional learning about it.

Discussion on the educational use of digital play

The first main finding was the participant-envisioned use of digital play. The second main finding was participant *incentives* behind the educational use of digital play.

Regarding envisioned use, the participants needed to adapt digital play to their *workplace practice*. They envisioned the educational use to be different from children's home use, purposeful, embedded in educational practice, secure, primarily collaborative and preferably used with teacher presence. These themes are now discussed individually in the following paragraphs.

The participants intended the educational use of digital play to be essentially different from children's home use of digital play. For example, many were of the opinion that children's home was focused on entertainment and that it involved playing digital games. They wanted digital play in preschools to broaden children's horizons about what digital technologies are and how they can be used. My interpretation of this finding is that the participants were aware that they were in control over how digital play would be manifested in their educational practice. This finding is thereby in line with the claim by Arnott (2016) that technologies should not be considered to be deterministic artifacts in the preschool context. Regarding participant ambition to broaden children's knowledge about digital technologies, this ambition is in line with the findings of Kirova & Jamison (2018) who also could see that the availability of tablets, and children's encounters with them on a daily basis both individually and with teachers and peers, provided opportunities to learn new ways of using digital technology which was not known or experienced by the children in their homes. One consequence of participant ambition to differentiate educational use from children's home use was that some of the participants had difficulties in relating to the use of digital games in educational practice because of how they linked them to children's home use of digital play. Lafton (2012) could also see similar tendencies, that preschool teachers had an unspoken understanding among themselves that games are an arena which is exclusively for children, and that this resulted in adult absence when the children played digital games. Lawrence (2018) argues that apps, without the extrinsic awards of game-like apps, can stimulate a play behavior which is similar to traditional play which could be one explanation to why games were rarely mentioned by the participants in online

discussions about the educational use of tablets and that they seemed to prefer to use the concept apps instead of games. However, for some participants, digital games were considered a natural element of digital play in preschool.

Participants wanted the use of digital play to be purposeful and linked to curriculum objectives. It was important for many participants to approach digital play in a professional manner, which previously have been reported by Hernwall (2016). This ambition can be understood as the participants took on the responsibility of introducing and implementing digital play in a proper manner, which is important according to Genlott & Grönlund (2016). Similarly, Morgan et al. (2016) argue that learning outcomes can be improved if digital technologies are implemented with clear goals which reflects the way that the participants approached educational use of digital play. Kjällander & Riddersporre (2019) describe what purposeful use of digital play can mean in the preschool context. That preschool teachers need to know what digital tools to use, when, how and why to use them, and that they also need to know when not to use the digital tools.

The participants wanted digital play to be embedded in educational practice. This way of implementing digital play is in line with the claim of Kearney et al. (2012) that mobile technologies, such as tablets, need to be used authentically. For example, many participants were to be open towards the broad implementation of digital play in which tablets were used for a range of different purposes throughout the preschool day. Danby (2013) confirms that technology can be integrated into traditional everyday practices, and that this can enable activities that can be played, created, watched, listened to and read. Participant ambition to embed digital play can also be understood as though they wanted to maintain their educational practice and that they, in this respect, wanted to enhance educational practice by introducing digital play. This way of introducing digital play is in line with the argument by Arnott (2016) that preschool teachers need to carefully construct playful experiences that position technologies as contributory tools that may enhance the play, rather than viewing digital play a central activity in and of itself.

Participants wanted to ensure children's security in digital play. This is in line with the preschools' main task, to stimulate children's learning and development in a secure environment (Lpfö 18). For example, some participants had begun to reflect upon issues such as if hackers could access sensitive content on tablets or in apps. Other participants were cautious when they used apps in which they could not fully control the type kind of content appearing on the screen. For example, when using Youtube they were concerned that children would come across content that was not age-appropriate. This kind of technology-related safety reflection is, according to the European Commission

(2019b) one aspect of digital competence as they present security as digital well-being and competences related to cybersecurity.

Participants wanted digital play to be primarily collaborative. This is in line with the finding of Aubrey & Dahl (2014) who could see that teachers were positive and actively promoted the use of IT as a part of their ongoing socio-cultural practices.

Finally, participants preferred digital play with teacher presence. This is in line with the claim of Lawrence (2018), that preschool teachers should aim to use digital play in a collaborative and non-competitive manner, and that monitoring of peer play is necessary to assure such educational use.

The following paragraphs present the second main finding, participant *incentives* behind the use of digital play.

One *incentive* behind participant use of digital play in preschools was linked to the technological development of tablets, which is a development that can be linked to the *societal level* of the participants' professional learning context. The participants perceived that it had become easier to identify an educational potential in digital play, compared to when computers were used in preschools. This can be understood as the user-friendly properties of the tablets was important for participant willingness to approach digital play. This is in line with the claim of Merchant (2015) that tablets, due to their tap, swipe and drag functionality, remove some operational barriers. It is also in line with the claim of Marsh et al. (2016) that this makes it possible for children to engage in games, apps and websites in a relatively easy manner. In addition, Mertala (2017) could also see that preschool teachers' positive beliefs about IT in preschool settings were linked to perceived educational opportunities with certain promising devices and software.

Another *incentive* behind participant use of digital play in preschools was linked to a perceived enhancement of *workplace practice* in the sense that digital play was perceived to enable variation, individual adaptation and innovation which in turn was perceived to enhance children's learning environment. This was also identified by Masoumi (2015) who found that Swedish preschools used IT to enrich existing practices. The perceived value of variation was also identified by Flewitt et al. (2015) who could see that preschool teachers particularly valued the opportunity to deliver curriculum guidelines in new ways, using tablets. Regarding adaptation, participants had identified the opportunity to adapt educational practice to children's individual needs. For example, they used digital play to support the learning and development of children from a multicultural background. This had previously been identified by Masoumi

(2015) who argued that IT fulfilled the function of a cultural mediator. Kucirkova & Flewitt (2018) describes this type of opportunity to adapt teaching and learning to children's individual needs as personalisation, which they claim is a frequent feature of learning that is mediated by mobile technologies. Kerckaert et al. (2015) also observed that IT was used by preschool teachers to support children's individual learning needs. Regarding innovation, digital play was perceived to enhance opportunities to create new kinds of learning activities in *workplace practice*. For instance, some participants had introduced the creation of green-screen or stop-motion movies into their educational practice. This finding is in line with the predictions of Bølgan (2012) who anticipated that innovative forms of play and learning would take place in educational environments where children could access digital technologies, and where the digital technologies were integrated with other activities and used as multifunctional tools.

A third *incentive* behind participant use of digital play in preschools was linked to *the societal level*, as participants aimed to support children's learning in preparation for life in a digital society and learning in preparation for school.

Regarding the *incentive* to prepare children for life in a digital society, participants acknowledged the importance of children encountering digital technologies in preschool and thereby having the chance to develop their level of understanding of the important role this technology plays in our lives in contemporary digitalised society. This is something that several researchers have reported. Sandvik et al. (2012) drew attention to the learning potential in digital play with their argument that children's interactions with tablets in preschool should be considered as literacy events, situations that make demands on children's literacy, and that traditional print literacy is no longer enough to understand articulation and meaning-making in contemporary society. They consider it impossible to separate written text, images, sounds and numbers in a society that is increasingly dependent on the ability to read screens. Bølgan (2012) also acknowledges that implementation of IT in preschools is interesting, and claims that it can assist children in the experience of mastering, developing and creating coherence between preschool practices and the technology-rich life children experience at home. Similarly, Heikkilä & Mannila (2018) link the need of introducing IT in preschools to societal changes that come with digitalisation. My interpretation of this finding is that the participants had picked up on the social discourse on the importance of developing digital competence as participant ambition to support children's learning in preparation for life is in line with the weight that digital competence is awarded in the contemporary world (European Commission, 2019b; OECD, 2018; Swedish National Digitalisation Council, 2017) and in the curriculum (Lpfö 18). Ljung-Djärf (2004) could also see that the arguments for educational use of

IT in preschools were linked to children's future wellbeing. She claims that the way we imagine and talk about the future, and future society, works as discursive patterns. That such visions are present in the mind-set of preschool teachers who hold the power to enable them to become a part of their educational practice.

Concerning the *incentive* to prepare children for the upcoming school context, this is in line with the findings of Jack & Higgins (2019) who could see that technologies were primarily used to support teaching and learning in preschools, and the findings of Otterborn et al. (2019) that tablets were mostly used to support school subject-related, social and generic skills. Participants used digital play to support soft skills, which are important for school readiness. This finding is in line with the statement by Sandberg & Arlemalm-Hagser (2011) that one aspect of the Swedish preschool education is to foster fundamental values such as like democracy, individual freedom, the equal value of all people, integrity, solidarity and gender equity. Mertala (2017) could also see that preschool teacher positive feelings towards using IT were linked to the opportunity to support children's development of socio-emotional skills. Most participants had identified the opportunity to support school-subject oriented skills such as children's language development and mathematical skills. This was also identified by Hernwall (2016) who could see that IT was used to support specific competences. And by Mertala (2017) who asserted that IT was used to support children's learning of academic skills. This school-oriented manner of using digital play was expected since, for a longer period, the curriculum has emphasised the educational and school preparatory aspects of educational practice (Lpfö 98, revised 2010). Many participants made statements that indicated an awareness of the fact that digital technologies will continue to be a part of the school context, and that they therefore wanted to lay a foundation for children's future learning using digital technologies. This can be interpreted as the participants were aware of the importance of creating an educational continuum for the children, which is something that Forkosh Baruch & Erstad (2018) state is an important challenge to address when children encounter and use digital technologies from an early age.

Discussion concerning professional learning about digital play

This section first focuses on the participant professional learning context, and secondly on participant professional knowledge needs. Towards the end, some identified tensions between the participant-envisioned educational use of digital play and the professional learning context will be taken up for discussion.

The third main finding was how the participants perceived their professional learning context as including limited time and opportunities to learn, reluctance

from colleagues and the children's guardians, and technology as an enabler of professional learning.

Regarding participant-perceived limited time and opportunities to learn about digital play, this can be linked to *the technical-organisational learning environment* of the professional learning context. These shortcomings made it challenging for some participants to learn about digital play and to introduce digital play as a part of their *workplace practice*. This finding reflects, in the understanding of Illeris (2007), that the primary objective in working life is not to learn it is to produce products or provide services. This finding is also in line with the claim by Flewitt et al. (2015) that successful tablet integration is dependent on whether preschool teachers are given enough time to plan for their teaching, and the claim of Highfield & Hadley (2018), that there is a need for opportunities where preschool teachers can discuss, learn and reflect upon how technology is socially, culturally and pedagogically relevant in young children's lives. In a similar manner, Dede et al. (2009) draw attention to the fact that the busy schedules of teachers demand that professional development be carefully planned as otherwise it is likely to be perceived as ineffectual and time consuming. One finding was that participants with different *work identities* in relation to digital play seemed to perceive their professional learning context in different ways. The participants who had identified strong *incentives* to learn about digital play, actively tried to access professional learning and they also seemed to be more satisfied with the degree of training that they had received. The participants who could not identify such *incentives* to the same degree, expressed that they needed more structured forms of training in order for them to learn. This finding resembles the findings of other studies that have shown that preschool teacher perceptions can affect how and to which extent digital technologies are used in educational practice (Blackwell et al., 2014; Kerckaert, et al., 2015). Avalos (2011) also presents teacher professional learning as a complex process that involves cognitive and emotional involvement both for individuals and for the collective of teachers. In addition, Illeris (2011) claims that the *work identity* is what makes learning in working life challenging, and that technological development is one thing that can challenge workers to reorient themselves in relation to the *work identity* that they have built up. The fact that the participants perceived their professional learning process in relation to digital play in different ways may possibly be linked to that some participants perceived the learning as transformative, which Illeris (2011) explain is the most demanding form of learning, in which people need to deconstruct several knowledge schemes in a coherent process and turn them into a new understanding in relation to one or more significant areas of life. Nasiopoulou et al., (2019) claim that preschool teacher professional profiles include transformative change due to the fact that the interaction between their personal characteristics, the immediate

environment which contains roles, norms and rules and the societal landscape shape preschool teacher development as professionals. They too, identified two subgroups of preschool teachers, those who qualified prior to 1998 and those who graduated after that date and they concluded that all Swedish preschool teachers need continuous professional development, but of different kinds.

Reluctance was perceived from guardians and colleagues, from within *the social-cultural learning environment* of the professional learning context. This discussion will not deal closely with reluctance by the guardians, but most participants seemed to be of the opinion that guardian reluctance was linked to limited knowledge about how preschool teachers approach digital play in their work. An interesting finding regarding guardian reluctance was how it triggered some participants to carefully think through the didactical issues in relation to their educational use of digital play. Consequently, the guardians played an influential part in *the social-cultural learning environment* (Illeris, 2007). Regarding reluctance from colleagues, participants linked their reluctance to either lack of knowledge about digital play or to age, in the sense that the older generation of preschool teachers was perceived to be less receptive towards including digital play in *workplace practice*. This is in line with the findings of Nasiopoulou et al. (2019) that Swedish preschool teachers need different types of professional development. Different potential reasons for this kind of reluctance have been reported. According to Flewitt et al. (2015) this reluctance could be linked to a concern regarding how digital technologies, like tablets, will affect the teaching role. They claim that preschool teachers do not want to be reduced from professional educators to suppliers of repetitive content, that is, apps. Similarly, Lynch & Redpath (2014) claim that institutionalised roles, structures and processes of schooling can work against implementation of digital technologies in classrooms because IT changes the roles and relationships adopted in institutionalised methods of teaching and learning. Another potential source of the reluctance may, according to Ralph (2018), be that preschool teachers are worried that tablets will nurture children's antisocial behaviour. Lawrence (2018) partly explains this reluctance by the fact that existing literature rarely displays what children's digital play looks like, and Sandberg & Pramling (2003) claim that some preschool teachers may perceive the educational use of IT as a threat to an idealised view of childhood. In addition, several studies have reported on how traditions and norms in the educational practice of preschools can work against the introduction of digital technologies (Palaiologou, 2016; Hernwall, 2016; Lindahl & Folkesson, 2012). Illeris (2011) claim that traditions, norms and values in the informal communities at the workplace can influence learning possibilities, learning processes and learning outcome. This thesis uses only a secondary source of information about reluctance towards digital play, and therefore it is not possible to pinpoint any of these potential underlying reasons as more or less

influential than another. However, from participant statements it seems as if many of these potential reasons behind the reluctance interplay and contribute to the difficulty of introducing digital play into educational practice in preschools. Perhaps play with imaginative technologies, which Bird (2019) draws attention to, have the potential to work as an initial step when reluctant preschool teachers approach digital play in educational practice.

In this professional learning context, where the participant-perceived shortcomings of *the technical-organisational learning environment* and reluctance from *the social-cultural learning environment*, technology on a *societal level* of the professional learning context becomes an enabler for professional learning. Some participants talked about how Internet enquiries provided them with information that could help them improve both traditional and digital play activities, and that such inquiries could also help them respond to children's complex questions. In this manner, Internet appeared to work as an enabler of "just in time learning" which is a form of learning that Brandenburg & Ellinger (2003) claim have become increasingly important in working life. This kind of learning also worked with the participants' busy schedules, which Dede et al., (2009) claim is important when teacher professional learning is to be supported. Online forums provided confirmation and knowledge exchange with peers who possessed a similar *work identity* in relation to digital play. These online forum discussions had been ongoing for about two years when the data was collected and had initially been created by individuals with a personal interest in the educational use of tablets in preschool, who also maintained them. The forums' success, in terms of the duration of the discussions, may possibly be linked to the fact that they were not a top-down initiative for professional development or to the fact that the moderators and participants in these forums possessed a high degree of ownership over the professional learning process, which are features that Olofsson (2010) states can contribute to online forum maintenance over time. Barab et al. (2013) also highlight the difficulty of finding a fruitful balance between designing online communities and allowing them to develop based on the agendas and needs of the participants. The critical element of participant discussions in the online forums was not that explicit. For example, only a few of the questions posed were of a more critical nature. Prestridge (2010) could see that collegial discussions in online forums contributed to forums maintenance over time, and that critical discussions had the potential to change teacher beliefs. Consequently, there seems to be potential to increase the professional learning effect of preschool teachers' discussions in online forums, if more critical discussions could be incorporated. Johannessen (2011), also found that teachers did not critique each other's practices within online forums. How much the participants of the online forums actually learned is not possible to tell from this thesis, however there are other findings that suggest that

teachers' participation in online forums over time can contribute to their professional learning (Olofsson, 2010). The participants in the online forums possessed different levels of experience of using tablets in preschools, but many seemed quite inexperienced when it comes to using tablets for educational purposes. Turner (2006) states that inexperienced teacher learning ideally should be self-directed and oriented towards educational issues that are close to their needs, and that access to mentors would enhance their learning. This appears to match participant experiences from the online forums, because via them participants could get into contact with more knowledgeable colleagues, or mentors, and they could direct attention to issues that they struggled with regarding the educational use of tablets. Hollingsworth & Lim (2015) found that preschool teachers who could access web-based modules in their training thought them to be effective and to some extent they preferred web-based modules to traditional instruction. Duncan-Howell (2010) also highlights that professional development is a circular process, where teachers should be allowed to change in subtle, iterative and self-determined ways, and claims that online communities have the potential to support such processes of knowledge development.

The following paragraphs present the fourth main finding, the participant-perceived professional knowledge needs concerning digital play. Professional knowledge needs included: knowledge about social discourse, knowledge about technology and knowledge about educational use. These themes are presented in the following paragraphs.

Participants needed knowledge about topics in the social discourse, which is naturally linked to the *societal level* of the professional learning context. The participants needed this knowledge to be able to handle reluctance from within *their social-cultural learning environment*, from colleagues and guardians, and in order to be able to make decisions about *workplace practice* concerning digital play that is based on scientific facts. This finding is in line with the claim by Lafton (2012) that socially-constructed knowledge and social discourse on digital technologies in children's lives have the potential to influence preschool teacher digital practices. It is also in line with the claim by Sandberg & Pramling (2003) that digital technologies can be perceived as a threat to an idealised view of childhood. In addition, Dunkels (2019) claims that many adults find it difficult to relate to the combination of the soft human side and the hard technology side that appears when digital technologies are included in preschool practice. My interpretation is that some of the participants had difficulties in distinguishing scientific facts from claims concerning children's digital play, claims that flourish in the social discourse, and for this reason it seems important that preschool teachers have the chance to discuss and develop their knowledge about relevant topics.

Participants also needed professional knowledge about technology, which is produced on a *societal level*. The ambition that preschool teachers should have equal access to technology seems to be an important step towards improving their technology-linked knowledge (Ministry of Education and Research, 2017). The scale of the app range imposed demands on participant ability to critically assess apps for educational use, and some participants also perceived it difficult to choose hardware, and to learn how to operate it. A few participants highlighted the fact that technological development is constantly ongoing on a *societal level*, and that this becomes a challenge in *workplace practice* due to the fact that technologies can become outdated before preschool teachers have had the chance to get familiar with them from a teaching and learning point of view. Gibbons (2016) calls for a critical stance towards statements that imply that we are living in rapidly-changing times, but it seems as some of the participants thought that this was the case, at least from an educational practice perspective.

Finally, the participants needed professional knowledge about the educational use of digital play which is knowledge linked to *workplace practice*. This is in line with the claim by Edwards (2016) that preschool teachers are faced with the issue of how to integrate technology, digital media and popular culture into play-based learning in preschools. Many participants wanted improved knowledge about how to use digital play and how this use could influence children's learning. This is similar to the findings of Aubrey & Dahl (2014) that preschool teachers lacked awareness about how age-appropriate pedagogy, using IT could be arranged, and the argument by Kjällander & Riddersporre (2019) that preschool teachers need to know what digital tools to use, when, how and why to use them. Most participants brought up the difficulty of managing children's access to tablets and children's agency in their statements about digital play. Similarly, Broström et al. (2015) found that preschool teachers associated children's learning with their social interaction and development, and that they considered children's initiatives and active involvement to be crucial aspects of the learning process. Castro et al. (2017) also stress the importance of teaching practices that can improve children's engagement levels, because they found this had a positive effect on the children's academic achievement. Similarly, Zosh et al. (2018) also found that children's agency was important in play, even though they also found that guided play, where teachers help to structure the activity and guide it towards specific learning goals, showed the best learning outcomes. Several studies have reported on issues that concern agency. For example, Palmér (2015) found that apps can influence children's degree of participation and dialogue in different ways. Petersen (2015) found that apps that enable auditive, visual or corporeal modes of communication will enhance children's agency in digital play.

In order to address the issue of children's access to tablets and children's agency in digital play, some participants had developed promising strategies that provided children with increased level of access to tablets and agency in digital play, by using subtle measures of control. One strategy was to limit children's access to one, often teacher-selected, app at a time. This had the effect that children grew tired of the digital play activity in a similar way as they would when engaging with other forms of activities. Consequently, the participants who used this strategy, did not need to monitor children's time at digital play in order to maintain a perceived proper balance in educational practice. Other participants had begun to present similar traditional and digital play activities simultaneously, which had the effect that children were attracted to trying out both ways to learn. This also had the effect that the participants perceived that a proper balance could be maintained in their educational practice. Another way in which participants maintained a balance, and a proper direction, in children's digital play was by carefully selecting apps for educational use. One common preference was apps that allowed children to explore and opportunities for their own reflections. These apps were not to be too obvious about what was right or wrong. This is in line with the claim by Kjällander et al. (2019) that preschool teachers and children prefer to use open-ended apps that include many possible solutions and will enable exploration and opportunities to make several attempts to find solutions. Similarly, Lynch & Redpath (2014) distinguish between open-ended apps that will make children producers of knowledge, and closed apps that will make children consumers of knowledge. Regarding participant ambition to maintain a balance between digital play and traditional activities in their educational practice, Gultz et al (2019) argue that there is an interplay between children's digital play and children's activities in the physical educational environment in preschool, and that it should not be taken for granted that children's work with physical objects will decrease when digital technologies are introduced. Similarly, Edwards (2014) claims that the context of children's life can be understood as a digital-consumerist context, where children are identified as a part of the consumer market which influences their preconditions for play. Children in fact make use of the opportunities enabled by the convergence between various products, digital media and digital technologies in their play, which can be observed on a continuum between digital and non-digital experiences. However, both Edwards (2014) and the Swedish Media Council (2019) assert that the long-term effects of children's changed play behaviour is not known, which are claims that support the participants' reflective manner when approaching digital play in their *workplace practice*.

Now, some tensions identified between participant-envisioned use of digital play and experience from the professional learning context will be taken up for discussion. First, the participants were accustomed to providing children with a

high degree of access to material and a high level of agency in their *workplace practice*. This is in line with the claim by Heikkilä & Manilla (2018) that Swedish preschools are very child-centred and that children are encouraged to try and retry as a means of learning and development. When participants perceived a need to monitor children's time at digital play by using timers, schedules or ticket systems, this approach conflicted with their conceptions of how children's learning should be supported in their *workplace practice* and it consequently also conflicted with their *work identity* as preschool teachers. Secondly, many participants believed that children played digital games at home. Participant ambition was to differentiate preschool use and children's other use which made it difficult for some participants to approach digital games for educational use. Thirdly, participant ambition to be present at children's digital play conflicted with the perceived limited time, linked to *the technical-organisational learning environment*. And finally, for a few participants, the ambition to make digital play collaborative conflicted with their *workplace practice* observations that some children stop interacting with their peers when working in front of a screen. However, most participants held the opposite view - that digital play enabled opportunities for collaboration and social interaction between children. This finding can either be understood as the children stop interacting in front of the screens, or it could potentially be understood as the preschool teachers' ability to observe and guide children's digital play needs to be improved. For example, Edwards (2016) argues that preschool teachers need conceptual tools that can help them to observe, plan and implement play-based learning experiences using digital technologies.

Finally, when data collection for this thesis was carried out, educational use of digital technologies was a voluntary part of the preschool teacher profession (Lpfö 98, revised 2010). Today the support of children's digital competence has become a mandatory part of the profession (Lpfö 18). Brodin & Renblad (2015) found that Swedish preschool teachers regarded the curriculum as a tool for improving the quality of preschool. This may indicate that the findings regarding how some preschool teachers are reluctant to using digital play in preschools may change in the near future. However, persistent influencing factors such as norms and traditions in the profession, may potentially hinder, or delay, such a development (Hernwall, 2016; Lindahl & Folkesson, 2012; Palailogou, 2016).

Methodological discussion

Regarding the selection of participants for the different studies, non-probability sampling was used in all three data collections, where non-probability sampling is explained as sampling when the entire population do not have the same chance to be included in the study (Cohen et al., 2011). This pragmatic approach

was used, as factors such as expense, time and accessibility had to be taken into consideration when the research studies were designed. Cohen et al. (2011) explain that non-probability samples are often used in small-scale research, and that they can prove to be perfectly adequate when researchers do not intend to generalise their findings beyond the sample in question. As the research project was to be a qualitative study, and as the purpose was not to generalise but to increase the understanding of participant experiences from educational use of digital play and their experiences from professional learning about it, non-probability sampling made sense. Cohen et al. (2011) also list a number of different kinds of non-probability samples. The netnography and the self-report essay study can be described as examples of convenience sampling. In the online forums, the data of interest was already there, online, and in the case of the self-report essay study, approaching former students was a convenient way of selecting a sample. The interview study can be described as volunteer sampling, as the gatekeepers were to choose participants who were willing to participate in an interview about digital play.

According to Cohen et al. (2010) purposive sampling is a key feature of qualitative research, and they describe that this kind of sampling is often carried out with the purpose of accessing 'knowledgeable people', that is those who possess in-depth knowledge about particular issues, for example by virtue of their professional role. In this respect all sampling methods applied can also be described as purposive samplings. They targeted preschool teachers who worked with tablets and digital play in their educational practice, and who therefore could be considered more knowledgeable about digital play in preschools than the preschool teachers who had not embarked on this digitalisation process. Given the methods used for sampling, the findings of this thesis cannot be generalised to the whole population of Swedish preschool teachers, and not even to the sub-group of preschool teachers who have a similar *work identity* to the participants of the studies. Cohen et al. (2011) explain that the selectivity which is built into a non-probability sample comes from the fact that the researcher is targeting a particular group and knows it does not represent the wider population, that it simply represents itself. Agius (2018) explains the aim of qualitative research in the following manner, which also explains the potential value of the research studies that have been conducted as a part of this thesis:

Its general aim is to develop concepts which help us to understand social phenomena in, wherever possible, natural rather than experimental settings, to gain an understanding of the experiences, perceptions and/or behaviours of individuals, and the meanings attached to them. (p.204)

Thereby, the value that the findings of this thesis bring lies in the descriptions that may increase understanding of Swedish preschool teachers' experiences, perceptions and stated behaviours that are linked to the phenomenon of digital play in preschools. Also, in the descriptions' potential to increase understanding of how preschool teachers perceive their professional learning and what knowledge needs they have when approaching digital play. Potentially the findings may also provide preschool teachers with a vocabulary which they can use when they discuss and reflect on the educational use of digital play and their professional development.

According to Cohen et al. (2011), validity in qualitative data can be linked to the honesty, depth, richness and scope of the data collected, the participants approached, the extent of triangulation and the objectivity of the researcher. The participants in the three studies seemed to share similar work identities in relation to educational use of digital play, and thus there was a certain homogeneity which indicates that the selection of participants had been successful. Regarding triangulation, three different methods were used for data collection and the results presented in all four papers share resemblance to each other, and point in the same direction, which adds to the validity of this thesis. The data showed different degree of richness in the three studies, where the data in the netnography had the lowest and the interviews had the highest degree of richness and in combination with each other they all contributed to the understandings of the phenomenon at hand. Cohen et al. (2011) explains that internal validity concerns how the findings must accurately describe the phenomena that is being researched. As the topic of digital play in preschool can be considered a non-sensitive topic, it is likely that the participants provided honest statements. In addition, careful attention was paid to the analytical process so that the themes would be accurate in relation to the data sets. This aspect regards reliability i.e. if another researcher would be able to find similar themes from the same data sets. The analytical work was done without the help of other researchers. However, the supervisors were involved in the process of critically reflecting on the themes produced in the analysis, which adds to reliability. The limitations of this thesis are that there are a limited number of participants in total, and that the participants represent a sub-group of all Swedish preschool teachers who welcomed digital play in preschools. This means that the perspective of all preschool teachers who have a different view on the matter of digital play in preschools is not presented. However, as previously indicated, the aim was not to generalise but to increase understanding of the phenomenon at hand.

Conclusions

From this thesis it can be concluded that participant *incentives* behind the use of digital play related to three dimensions: on a *society level* participants connected their *incentives* to children's learning for school and life in society, and to the technological development of tablets. On a *workplace practice level*, the *incentives* were linked to the perceived enhancement of educational practice. Digital play is regarded as enabling opportunities for variation, individual adaptation and innovation that in turn were perceived as enhancing the children's learning environment. The participants needed to adapt digital play to *workplace practice*, and for digital play to be introduced it needed to be: different from children's home usage, purposeful, embedded in educational practice, secure, primarily collaborative and preferably used with teacher presence. Participant professional learning context included reluctance from colleagues and guardians, from within *the social-cultural learning environment*. Participants reported limitations of time, opportunities and resources linked to *the technical-organisational* dimensions of the learning environment, which negatively influenced their opportunities to learn about digital play and to integrate it as *workplace practice*. In this situation, technology, which is linked to the *societal level* of the preschool teacher professional learning context, enabled professional learning. For example, online forums worked as an extension of the teachers' *social-cultural learning environment*. A potential drawback of these forums was that different actors had a financial interest and promoted services and products, and consequently the information shared was not always objective.

The professional knowledge needs concerning digital play were, on a *society-level*, linked to a range of social issues in connection to knowledge about topics that circulate in social discourses, and the need of knowledge about technology for educational use. On a *workplace practice level*, there was a need for more knowledge about the educational use of digital play, its influence on children's learning, and the issue of how to handle children's access to tablets and enhance children's agency in digital play activities.

Tensions that influenced participant use of digital play and professional learning about it were identified. The ambition was to embed digital play into *workplace practice*. The participants were accustomed to providing children with a high degree of agency and access to materials, but some perceived a need to monitor children's digital playtime, to maintain a balance in *workplace practice*. In this respect, digital play conflicted with participant *work identity* and conceptions of how children's learning should be supported in *workplace practice*. Many participants believed children used digital games at home. Their ambition to differentiate preschool use from children's home use made it

difficult for some participants to approach digital games for educational purposes. The participants' ambition to be present for digital play conflicted with the perceived limited time, linked to *the technical-organisational learning environment*. This made it difficult for some to explore digital play in their *workplace practice*. For a few participants the ambition was to make digital play collaborative which conflicted with their *workplace practice*-based observations, that some children stop interacting with peers when working in front of a screen. However, the majority of participants held the opposite view, that digital play enabled opportunities for collaboration.

Contributions

Empirical contributions

This thesis has contributed an overview of the phenomenon of digital play in Swedish preschools. This overview has improved knowledge about educational use of digital play in preschools, preschool teacher professional learning context and professional knowledge needs when digital play is approached in educational practice. This type of overarching presentation of the phenomenon is necessary to complement studies that focus on the finer details of digital play in preschools.

This thesis has also contributed improved knowledge about how preschool teachers perceive opportunities and challenges in relation to educational use of digital play in preschool. Moreover, it has provided insights into the thoughts of preschool teachers, and their *incentives* to engage in this digitalisation process. The perceived opportunities and challenges have, in this thesis, also been linked to the constituent parts of the preschool teacher professional learning context, and has thereby increased level of understanding of how these parts are related and interact with each other in order to form the preconditions for educational use and professional learning. Furthermore, this thesis has drawn attention to online forums' potential to serve as sites for professional learning, and also to their shortcomings. In addition, that technology generally played an important role in these participants' professional learning in a situation where they encountered reluctance from colleagues and limited time and opportunities to learn about digital play at work.

Methodological contributions

This thesis has indicated a largely unexploited opportunity to conduct research studies within the field of early childhood education research in the decision to conduct the netnography study.

Implications and further studies

This thesis has provided insight to the perspective of preschool teachers who welcomed and explored digital play in their educational practice. From their statements we have learned that not all Swedish preschool teachers possess the same level of interest and knowledge about digital play. Some participants even presented digital play as a fragile, or inconsistent, part of educational practice due to the fact that there were few colleagues who were interested. The time and opportunities to learn at work were limited. In this situation, the preschool teachers who have a degree of experience and knowledge about using digital play for educational purposes form a resource that could be used in preschools to support the process of enhancing preschool teacher digital competence. Collaboration and communication concerning the educational use of digital play, online and in educational practice, are naturally important parts of preschool teacher knowledge development. To some extent, this thesis has provided conceptual tools, or a vocabulary, that could be used when the matter of digital play is discussed among preschool teachers or communicated to children's guardians who are curious about how digital play is used in preschools. Regarding further studies, the recent curriculum changes (Lpfö 18) and the national digitalisation strategy (Ministry of Education and Research, 2017) makes it interesting to continue to follow the educational use of digital play in Swedish preschools and preschool teacher professional learning about it. For example, it will be interesting to see how an enhancement of preschool teacher digital competence will influence the role of digital play in the educational practice of preschools.

Concluding remarks

During the period of data collection for this thesis, the educational use of digital technologies was optional in Swedish preschool teachers' work. However recent curriculum changes (Lpfö 18) have made it a mandatory part of the profession in order to support children's digital competence. This thesis is thereby more timely than I would have expected when I started out, and I am hoping that it may have the potential to be informative concerning the educational transformation and professional learning that awaits all Swedish preschool teachers in the years to come. The participants in this thesis were able to avoid looking upon digital play in preschools in a black and white way, and therefore they had been able to explore and identify some of the shades of grey, the affordances and constraints of digital play from an educational perspective. Developing an understanding of these shades of grey is an ongoing process in which individual preschool teachers, the collective of preschool teachers and researchers all play important roles. The birds-eye view kinds of understandings in this thesis regarding the educational use of digital play, and preschool teacher professional learning about it, form one contribution to that process. One of the participants made a statement that captures their level of openness towards exploring digital play while still maintaining a critical stance towards the activity:

There are many ways in which digital play can be used, we just need to figure out the best way forward!

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Swedish Summary

Syftet med denna avhandling är att förbättra kunskapen om förskollärares pedagogiska användning av digital lek och deras professionella lärande om detta.

Avhandlingen fokuserar på tre frågor: Hur kan förskollärares pedagogiska användning av digital lek förstås? Hur kan den professionella lärandekontexten för förskollärare som använder digital lek för pedagogiska syften förstås? Och, Hur kan förskollärares professionella kunskapsbehov gällande digital lek förstås?

Metoderna som använts vid datainsamling är Netnografi, Självrapporter i form av uppsatser, och Intervjuer. Insamlade datamaterialet består av 465 poster från förskollärares diskussioner inom diskussionsgrupper på Internet, tio självrapporter i form av förskollärares uppsatser om digital lek, och elva intervjuer med förskollärare. Deltagare var förskollärare som välkomnade, och inom sitt arbete utforskade, de pedagogiska möjligheterna med digital lek i förskolans kontext. Begreppet digital lek används i denna avhandling eftersom leken är central för hur barns lärande och utveckling stöds i förskolan. Därmed är det sannolikt att introduktion av digital teknik sker på ett lekfullt och utforskande sätt i förskolans kontext. Begreppet digital lek används även i internationella forskningssammanhang där man försöker förstå fenomenet med ökad användning av digital teknik i förskolans kontext, och vad denna användning leder fram till.

Metoden som använts vid analysen av datamaterialet har genomgående varit tematisk analys (Braun & Clarke, 2006). Tematisk analys kan genomföras med deduktiv eller induktiv ansats, vilket innebär att det i analysförfarandet är möjligt att använda teoretiska ramverk som utgångspunkt eller att man utifrån den insamlad data systematiskt letar fram teman, eller mönster som hjälper till att beskriva fenomenet som undersöks. Gällande denna avhandling har både deduktiv och induktiv ansats använts i analysarbetet.

Totalt fyra artiklar, eller delstudier har genomförts inom ramen för forskningsprojektet, och samtliga är publicerade i internationella tidskrifter.

Artikel I, Förskollärares informella professionella utveckling på Internet gällande pedagogisk användning av surfplattor i svenska förskolor, hade syftet att undersöka vilka frågor och vilken information förskollärare ställer och delar gällande pedagogisk användning av surfplattor i förskolor.

Artikel II, Digital lek som ett medel att utveckla barns litteracitet och makt inom svensk förskola, hade syftet att undersöka svenska förskollärares diskussioner i forum på Internet, gällande hur de avsåg att använda surfplattor och digital lek för att stödja barns utveckling av litteracitet.

Artikel III, Svenska förskollärares uppfattningar om digital lek i förhållande till arbetsplatsens lärandekontext, hade syftet att öka förståelsen för hur förskollärare uppfattar möjligheter och utmaningar med digital lek.

Artikel IV, Svenska förskollärares erfarenheter från pedagogisk användning av digital lek, hade syftet att öka kunskapen om förskollärares erfarenheter från pedagogisk användning av digital lek.

Det teoretiska ramverket Learning in working life [Lärande i arbetslivet] (Illeris, 2007), användes för att kunna presentera resultaten på ett samlat sätt och för att kunna presentera hur resultaten stod i förbindelse med deltagarnas professionella lärandekontext. Detta i sin tur gjorde det möjligt att öka graden av förståelse gällande förskollärares pedagogiska användning av digital lek och deras professionella lärande om detta, vilket är det övergripande syftet med avhandlingen.

Resultaten visar att incitamenten bakom deltagarnas pedagogiska användning av digital lek, på en samhällsnivå var kopplade till upplevda möjligheter att kunna stödja barnens lärande inför skolan och inför livet i ett digitaliserat samhälle. Även utveckling av ny teknik där surfplattor i stora drag kommit att ersätta datorer i förskolan, verkade som ett incitament för pedagogisk användning av digital lek. På en verksamhetsnivå var incitamenten knutna till en upplevelse av att barnens lärandemiljö kunde förstärkas genom inslag av digital lek. Deltagarna upplevde att den digitala leken möjliggjorde variation i pedagogiska verksamheten, att det genom inslag av digital lek fanns möjligheter att göra individuella anpassningar utifrån barnens individuella lärandebehov samt att den digitala leken möjliggjorde innovativa, eller nyskapande, lärandeaktiviteter för barnen.

Resultaten visade även att deltagarna föreställde sig att den pedagogiska användningen av digital lek i förskolan skulle: särskilja sig från barns användning av digital lek i hemmet, vara målinriktad, införlivad i den övriga verksamheten, och framförallt samarbetsfokuserad och om möjligt genomföras med lärarnärvaro.

Deltagarnas professionella lärandekontext innefattade, inom den socio-kulturella lärandemiljön, motsträviga kollegor och till viss del även motsträviga vårdnadshavare. Deltagarna förknippade motsträvigheten huvudsakligen

kopplad till bristande kunskap om digital lek. Inom den teknisk-organisatoriska lärandemiljön, upplevde deltagarna en brist på tid, möjligheter och till viss del även resurser, vilket bidrog till upplevda svårigheter att introducera pedagogisk användning av digital lek och att kunna lära sig om detta. I denna situation, med motsträvighet inom den socio-kulturella lärandemiljön och upplevda begränsningar inom den teknisk-organisatoriska lärandemiljön, blev teknik, exempelvis Internet, en källa till professionellt lärande för de deltagare som såg positivt på de digitala möjligheterna. Exempelvis fungerade diskussionsforum på Internet som en extension av deltagarnas socio-kulturella lärandemiljö. I dessa forum kunde deltagarna möta kollegor om hade en likartad positiv inställning till digital lek i förskolan och därmed gav forumen möjlighet till både bekräftelse och kunskapsutbyte för deltagarna. Samlärande med barnen nämndes också av vissa deltagare som ett sätt att hantera bristen på tid och möjligheter att fortbilda sig gällande digital lek inom ramen för arbetet.

Resultaten visade även att deltagarna behövde kunskap om ämnen gällande barns digitala lek som ofta är föremål för diskussioner i samhället, de behövde även kunskap om teknik som kan användas för pedagogiska syften. Vidare behövde de kunskap om den pedagogiska användningen av digital lek i förskolan. Gällande den pedagogiska användningen så var många deltagare osäkra hur de skulle hantera barns tillgång till surfplattor och hur barnens handlingsutrymme, eller agens, i den digitala leken kunde förstärkas.

Slutligen kunde spänningar identifieras mellan hur deltagarna föreställde sig att digitala leken skulle användas i förskolan och deltagarnas erfarenheter från den professionella lärandekontexten. Dessa spänningar föreföll kunna påverka hur deltagarna använde digital lek i det pedagogiska arbetet och deras möjligheter att lära sig om detta. Deltagarna var vana att kunna ge barnen hög grad av tillgång till olika sorters material i förskolan, och de var även vana ge barnen stort handlingsutrymme. När deltagarna upplevde ett behov av att kontrollera eller begränsa barnens digitala lek, exempelvis genom att använda en alarmklocka, ett schema eller ett biljettsystem, för att bibehålla en balans mellan traditionella leken och den digitala leken, så kontrasterade detta arbetssätt med hur de inom sin yrkesidentitet och inom sin verksamhet ansåg att barnens lärande och utveckling skulle stödjas. Ambitionen att särskilja förskolans digitala lek från hemmets gav för vissa deltagare upphov till en osäkerhet hur de skulle förhålla sig till användningen av digitala spel i förskolan, då de förknippade spelande med barns digitala lek i hemmet. Ambitionen att vara närvarande som förskollärare i barns digitala lek blev en utmaning för många deltagare på grund av den upplevda tidsbristen, relaterat till den teknisk-organisatoriska aspekten av professionella lärandekontexten. När det var svårt att vara närvarande så blev det även svårt att introducera digital lek i arbetet, och lära sig om det. För några deltagare blev det en konflikt mellan ambitionen

att den digitala leken skulle vara kollaborativ och deras observationer av den digitala leken i verksamheten, där de uppmärksammat att vissa barn slutade att interagera med andra barn när de arbetade framför en skärm. Dock var majoriteten av deltagarna av motsatta uppfattningen, att den digitala leken gjorde det möjligt att träna på samarbete och att mycket social interaktion äger rum runt en surfplatta.

References

- Agius, S. J. (2013). Qualitative research: Its value and applicability. *Psychiatrist*, 37(6), 204–206.
- Arnott, L. (2016). An ecological exploration of young children's digital play: framing children's social experiences with technologies in early childhood. *Early Years*, 36(3), 271–288.
- Aubrey, C., & Dahl, S. (2014). The confidence and competence in information and communication technologies of practitioners, parents and young children in the Early Years Foundation Stage. *Early Years*, 34(1), 94–108.
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and teacher education: an international journal of research and studies*, 27(1), 10-20.
- Barab, S. A., Makinster, J. G., & Scheckler, R. (2003). Designing System Dualities: Characterizing a Web-Supported Professional Development Community. *The Information Society*, 19(3), 237–256.
- Bird, J. (2019). "You need a phone and camera in your bag before you go out!": Children's play with imaginative technologies. *British Journal of Educational Technology*, 51(1), 166-176.
- Blackwell, C. K., Lauricella, A. R., & Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers and Education*, 77, 82–90.
- Bowler Jr., G. M. (2010). Netnography: A method specifically designed to study cultures and communities online. *Qualitative Report*, 15(5), 1270–1275.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brandenburg, D. C., & Ellinger, A. D. (2003). The Future: Just-in-Time Learning Expectations and Potential Implications for Human Resource Development. *Advances in Developing Human Resources*, 5(3), 308–320.
- Brodin, J., & Renblad, K. (2015). Early Childhood Educators' Perspectives of the Swedish National Curriculum for Preschool and Quality Work. *Early Childhood Education Journal*, 43(5), 347–355.
- Broström, S., Sandberg, A., Johansson, I., Margetts, K., Nyland, B., Frøkjær, T., ... Vrinioti, K. (2015). Preschool teachers' views on children's learning: an international perspective. *Early Child Development and Care*, 185(5),

824–847.

- Buchanan, E., & Zimmer, M. (2020, 02, 29). Stanford Encyclopedia of Philosophy. Retrieved from <https://plato.stanford.edu/entries/computational-complexity/>
- Bølgan, N. (2012). From IT to Tablet: Current Use and Future Needs in Kindergartens. *Nordic Journal of Digital Literacy*, 7(3), 154–171.
- Carr, W. (2007). Educational research as a practical science. *International Journal of Research & Method in Education*, 30(3), 271–286.
- Castro, S., Granlund, M., & Almqvist, L. (2017). The relationship between classroom quality-related variables and engagement levels in Swedish preschool classrooms: a longitudinal study. *European Early Childhood Education Research Journal*, 25(1), 122–135.
- Cohen, L., Manion, L. & Morrison, K. (2011). *Research methods in education*. (7th. ed.). New York : Routledge.
- Crowhurst, I., & Kennedy-Macfoy, M. (2013). Troubling gatekeepers: methodological considerations for social research. *International Journal of Social Research Methodology*, 16(6), 457–462.
- Danby, Susan. (2013). Going online: Young children and teachers accessing knowledge through web interactions. *Educating Young Children: Learning and Teaching in the Early Childhood Years*, 19(3), 30–32.
- Danby, S., Evaldsson, A., Melander, H., & Aarsand, P. (2018). Situated collaboration and problem solving in young children's digital gameplay. *British Journal of Educational Technology*, 49(5), 959–972.
- Dede, C., Jass Ketelhut, D., Whitehouse, P., Breit, L., & Mccloskey, E. M. (2009). A Research Agenda for Online Teacher Professional Development. *Journal of Teacher Education*, 60(1), 8–19.
- Drotner, K. (1999). Dangerous Media? Panic Discourses and Dilemmas of Modernity. *Paedagogica Historica*, 35(3), 593–619.
- Duncan-Howell, J. (2010). Teachers making connections: Online communities as a source of professional learning. *British Journal of Educational Technology*, 41(2), 324–340.
- Dunkels, E. (2019). I mediepanikens fotspår: barns rätt till digital kompetens och säkerhet på nätet. [In the footsteps of media panic: children's right to digital competence and security on the Internet.] in S. Kjällander & B. Riddersporre (Ed.), *Digitalisering i förskolan: på vetenskaplig grund*.

- [Digitalisation in preschool: on a scientific basis.] (pp. 283-299). Stockholm: Natur & Kultur.
- Dutton, W. H. (Ed.). (2013). *The Oxford handbook of Internet studies*. Oxford : Oxford University Press.
- Edwards, S. (2014). Towards contemporary play: Sociocultural theory and the digital-consumerist context. *Journal of Early Childhood Research*, 12(3), 219–233.
- Edwards, S. (2016). New concepts of play and the problem of technology, digital media and popular-culture integration with play-based learning in early childhood education. *Technology, Pedagogy and Education*, 25(4), 513–532.
- Edwards, S, & Bird, J. (2017). Observing and assessing young children's digital play in the early years: Using the Digital Play Framework. *Journal of Early Childhood Research*, 15(2), 158–173.
- European Commission. (2017). *Europe's Digital Progress Report (EDPR) 2017 Country Profile Sweden*. Retrieved from <https://ec.europa.eu/digital-single-market/en/news/europes-digital-progress-report-2017>
- European Commission. (2019a). *European Digital Competence Framework for Citizens (DigComp)*. Retrieved from <https://ec.europa.eu/social/main.jsp?catId=1315&langId=en>
- European Commission. (2019b). *Key competencies for lifelong learning*. Retrieved from https://ec.europa.eu/education/policies/school/key-competences-and-basic-skills_en
- Falloon, G. (2013). Young students using iPads: App design and content influences on their learning pathways. *Computers & Education*, 68, 505–521.
- Fejes, A., & Thornberg, R. (2009). *Handbok i kvalitativ analys. [Handbook of qualitative analysis]*. Stockholm : Liber.
- Fleer, M. (2018). Digital animation: New conditions for children's development in play-based setting. *British Journal of Educational Technology*, 49(5), 943–958.
- Flewitt, R., Messer, D., & Kucirkova, N. (2015). New directions for early literacy in a digital age: The iPad. *Journal of Early Childhood Literacy*, 15(3)
- Forkosh Baruch, A., & Erstad, O. (2018). Upbringing in a Digital World: Opportunities and Possibilities. *Technology, Knowledge and Learning*,

23(3), 377–390.

- Genlott, A. A., & Grönlund, Å. (2016). Closing the gaps – Improving literacy and mathematics by ict-enhanced collaboration. *Computers & Education, 99*, 68–80.
- Gibbons, A. (2016). Do ‘we’ really live in rapidly changing times? Questions concerning time, childhood, technology and education. *Contemporary Issues in Early Childhood, 17*(4), 367–376.
- Hanell, F. (2018). What is the ‘problem’ that digital competence in Swedish teacher education is meant to solve? *Nordic Journal Of Digital Literacy, 13*(3), 137–151.
- Hedefalk, M., Almqvist, J., & Lundqvist, E. (2015). Teaching in preschool. *Nordic Studies in Education, 35*(1), 20–36.
- Heikkilä, M., & Mannila, L. (2018). Debugging in Programming as a Multimodal Practice in Early Childhood Education Settings. *Multimodal Technologies and Interaction, 2*(3), 42.
- Hernwall, P. (2016). ‘We have to be professional’ – Swedish preschool teachers’ conceptualisation of digital media. *Nordic Journal of Digital Literacy, 11*(1), 5–23.
- Hollingsworth, H., & Lim, C.-I. (2015). Instruction Via Web-Based Modules in Early Childhood Personnel Preparation: A Mixed-Methods Study of Effectiveness and Learner Perspectives. *Early Childhood Education Journal, 43*(2), 77–88.
- Holloway, I., & Todres, L. (2003). The status of method: Flexibility, consistency and coherence. *Qualitative Research, 3*, 345-357.
- Hooker, T. (2019). Using ePortfolios in early childhood education: Recalling, reconnecting, restarting and learning. *Journal of Early Childhood Research, 17*(4), 376–391.
- Huber, B., Highfield, K., & Kaufman, J. (2018). Detailing the digital experience: Parent reports of children’s media use in the home learning environment. *British Journal of Educational Technology, 49*(5), 821–833.
- Hylén, J. (2013). *Utvärdering av Ipad-satsning i Stockholms stad juni 2013*. [Evaluation of Ipad-investments in Stockholm June 2013]. Retrieved from http://educationanalytics.se/wp-content/uploads/2013/08/Ipad-satsning_final.pdf
- Illeris, K. (2004). A Model for Learning in Working Life. *Journal of Workplace*

Learning, 16(8), 431–441.

- Illeris, K. (2007). *How we learn: learning and non-learning in school and beyond*. London: Routledge.
- Illeris, K. (2011). *The fundamentals of workplace learning: understanding how people learn in working life* (1st ed.). New York : Routledge.
- Illeris, Knud. (2013). *Kompetens : vad, varför, hur. [Competence: what, why, how]*. (1st ed.). Lund : Studentlitteratur.
- Jack, C., & Higgins, S. (2019). What is educational technology and how is it being used to support teaching and learning in the early years? *International Journal of Early Years Education*, 27(3), 222–237.
- James, N., & Busher, H. (2013). Researching hybrid learning communities in the digital age through educational ethnography. *Ethnography and Education*, 8(2), 194–209.
- Johannessen, R.E. (2011). Lærere sin bruk av sosial web. "Del&bruk" - en møteplass for profesjonell utvikling? [Teachers' use of the social web – a meeting-place for professional development?]. Master thesis in Pedagogics. The University of Bergen.
- Johnston, K., Highfield, K., & Hadley, F. (2018). Supporting young children as digital citizens: The importance of shared understandings of technology to support integration in play-based learning. *British Journal of Educational Technology*, 49(5), 896–910.
- Jönsson, I., Sandell, A., & Tallberg-Broman, I. (2012). Change or paradigm shift in the swedish preschool? *Sociologia, Problemas e Praticas*, 69, 47–61.
- Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing Mobile Learning from a Pedagogical Perspective. *Research in Learning Technology*, 20(1), 17.
- Kerckaert, S., Vanderlinde, R., & van Braak, J. (2015). The role of ICT in early childhood education: Scale development and research on ICT use and influencing factors. *European Early Childhood Education Research Journal*, 23(2), 183–199.
- Kirova, A., & Jamison, N. M. (2018). Peer scaffolding techniques and approaches in preschool children's multiliteracy practices with iPads. *Journal of Early Childhood Research*, 16(3), 245–257.
- Kjällander, S., & Moinian, F. (2014). Digital tablets and applications in preschool – Preschoolers' creative transformation of didactic design.

Designs for Learning, 7(1), 10–33.

- Kjällander, S., & Riddersporre, B. (2019). *Digitalisering i förskolan: på vetenskaplig grund. [Digitalisation in Preschool: On a scientific basis]*. Stockholm : Natur & Kultur.
- Koehler, M. J., & Mishra, P. (2009). What is Technological Pedagogical Content Knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9, 60–70.
- Koehler, M. J. (2012). TPACK Explained. Retrieved from <http://matt-koehler.com/tpack2/tpack-explained/>
- Kozinets, R. V. (2010). *Netnography: doing ethnographic research online*. Los Angeles, Calif. : SAGE.
- Kucirkova, N., & Flewitt, R. (2018). The future-gazing potential of digital personalization in young children's reading: views from education professionals and app designers. *Early Child Development and Care*, 190(2), 1–15.
- Kvale, S. (2014). *Den kvalitativa forskningsintervjun. [The qualitative research interview]*. Lund : Studentlitteratur.
- Kyndt, E., Gijbels, D., Grosemans, I., & Donche, V. (2016). Teachers' Everyday Professional Development: Mapping Informal Learning Activities, Antecedents, and Learning Outcomes. *Review of Educational Research*, 86(4), 1111–1150.
- Lafton, T. (2012). How Early Childhood Practitioners Build, Shape, and Construct Their Digital Practices: The Search for an Analytical Space. *Nordic Journal of Digital Literacy*, 7(3), 172–186.
- Landri, P. (2013). Mobilising Ethnographers Investigating Technologised Learning. *Ethnography and Education*, 8(2), 239–254.
- Larsen, M., & Glud, L. (2013). Nye medier, nye metoder, nye etiske utfordringer. [New media, new methods, new ethical considerations]. *Metode and Forskningsdesign* 1(1).
- Lawrence, S. M. (2018). Preschool Children and iPads: Observations of Social Interactions During Digital Play. *Early Education and Development*, 29(2), 207–228.
- Lincoln, Y., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Lillvist, A., Sandberg, A., Sheridan, S., & Williams, P. (2014). Preschool teacher

- competence viewed from the perspective of students in early childhood teacher education. *Journal of Education for Teaching*, 40(1), 3–19.
- Lindahl, M. G., & Folkesson, A.-M. (2012). ICT in preschool: friend or foe? The significance of norms in a changing practice. *International Journal of Early Years Education*, 20(4), 422–436.
- Ljung-Djärf, A. (2004). *Spelet runt datorn: datoranvändande som meningsskapande praktik i förskolan*. [The Game around the computer: computer use as a meaning making practice in preschool.] (Doctoral dissertation). Malmö : Lärarytbildningen, Malmö högskola.
- Lpfö 98. Curriculum for the Preschool Lpfö 98. Stockholm: Skolverket [Swedish National Agency for Education].
- Lpfö 98, revised 2010. *Curriculum for the preschool Lpfö 98*. Stockholm: Skolverket [Swedish National Agency for Education].
- Lpfö 18. *Curriculum for the Preschool: Lpfö 18*. Stockholm: Skolverket [Swedish National Agency for Education].
- Löfdahl, A., & Folke-Fichtelius, M. (2015). Preschool's new suit: care in terms of learning and knowledge. *Early Years*, 35(3), 260–272.
- Lynch, J., & Redpath, T. (2014). "Smart" technologies in early years literacy education: A meta-narrative of paradigmatic tensions in iPad use in an Australian preparatory classroom. *Journal of Early Childhood Literacy*, 14(2), 147–174.
- Marklund, L., & Dunkels, E. (2016). Digital play as a means to develop children's literacy and power in the Swedish preschool, *Early Years* 36(3), 289–304.
- Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J., & Scott, F. (2016). Digital Play: A New Classification. *Early Years: An International Journal of Research and Development*, 36(3), 242–253.
- Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J., Lahmar, J., & Scott, F. (2018). Play and creativity in young children's use of apps. *British Journal of Educational Technology*, 49(5), 870–882.
- Mason, M. (2010). Sample size and saturation in PHD studies using qualitative interviews. *Forum Qualitative Social Research*, 11(3).
- Masoumi, D. (2015). Preschool teachers' use of ICTs: Towards a typology of practice. *Contemporary Issues in Early Childhood*, 16(1), 5–17.

- McKee, H. (2009). *The ethics of Internet research: a rhetorical, case-based process*. New York: Peter Lang
- Merchant, G. (2015). Keep taking the tablets: iPads, story apps and early literacy. *Australian Journal of Language & Literacy*, 38(1), 3–11.
- Mertala, P. (2017). Wag the dog – The nature and foundations of preschool educators' positive ICT pedagogical beliefs. *Computers in Human Behavior*, 69, 197–206.
- Ministry of Education and Research. (2017). *Nationell digitaliseringsstrategi för skolväsendet*. [National digitalisation strategy for education]. Stockholm: Utbildningsdepartementet [Ministry of Education and Research].
- Ministry of Enterprise and Innovation. (2017). *För ett hållbart digitaliserat Sverige – en digitaliseringsstrategi*. [For a sustainable digitalised Sweden – a digitalisation strategy]. Retrieved from <https://www.regeringen.se/informationsmaterial/2017/05/for-ett-hallbart-digitaliserat-sverige---en-digitaliseringsstrategi/>
- Morgan, K., Morgan, M., Johansson, L., & Ruud, E. (2016). *A systematic mapping of the effects of ICT on learning outcomes*. Oslo.
- Nasiopoulou, P., Williams, P., Sheridan, S., & Yang Hansen, K. (2019). Exploring preschool teachers' professional profiles in Swedish preschool: a latent class analysis. *Early Child Development and Care*, 189(8), 1306–1324.
- Nilsen, M., Lundin, M., Wallerstedt, C., & Pramling, N. (2018). Evolving and remediated activities when preschool children play analogue and digital Memory games. *Early Years*, 1–16. doi: 10.1080/09575146.2018.1460803
- Nolan, A., & Molla, T. (2018). Teacher professional learning in Early Childhood education: insights from a mentoring program. *Early Years*, 38(3), 258–270.
- Norling, M., Sandberg, A., & Almqvist, L. (2015). Engagement and emergent literacy practices in Swedish preschools. *European Early Childhood Education Research Journal*, 23(5), 619–634.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017) Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, 16(1).
- O'Brien, J., & Jones, K. (2014). Professional learning or professional development? Or continuing professional learning and development?

Changing terminology, policy and practice. *Professional Development in Education*, 40(5), 683–687.
<https://doi.org/10.1080/19415257.2014.960688>

- OECD. (2018). *OECD Reviews of Digital Transformation: Going Digital in Sweden*. Retrieved from <https://www.oecd.org/sweden/going-digital-in-sweden.pdf>
- Olofsson, A. D. (2010). Discussions in Online Learning Community Forums - Do They Facilitate Teachers Professional Development? *Research Review*, 3(2), 54–68.
- Otterborn, A., Schönborn, K., & Hultén, M. (2019). Surveying preschool teachers' use of digital tablets: general and technology education related findings. *International Journal of Technology and Design Education*, 29(4), 717-737.
- Palaiologou, I. (2016). Teachers' dispositions towards the role of digital devices in play-based pedagogy in early childhood education. *Early Years*, 36(3), 305–321.
- Palmér, H. (2015). Using tablet computers in preschool: How does the design of applications influence participation, interaction and dialogues? *International Journal of Early Years Education*, 23(4), 365-381.
- Parker Webster, J., & Marques Da Silva, S. (2013). Doing educational ethnography in an online world: methodological challenges, choices and innovations. *Ethnography and Education*, 8(2), 123–130.
- Petersen, P. (2015). *Appar och agency: Barns interaktion med pekplattor i förskolan*. [Apps and agency: Children's interactions with tablets in preschool.] (Licenciate thesis). Uppsala University, Sweden.
- Pierides, D. (2010). Multi-Sited Ethnography and the Field of Educational Research. *Critical Studies in Education*, 51(2), 179–195.
- Plowman, L., & Mcpake, J. (2013). Seven Myths About Young Children and Technology. *Childhood Education*, 89(1), 27-33.
- Pramling Samuelsson, I., Williams, P., Sheridan, S., & Hellman, A. (2016). Swedish preschool teachers' ideas of the ideal preschool group. *Journal of Early Childhood Research*, 14(4), 444–460.
- Prestridge, S. (2010). ICT professional development for teachers in online forums: Analysing the role of discussion. *Teaching and Teacher Education*, 26(2), 252–258.

- Ralph, R. (2018). Media and Technology in Preschool Classrooms: Manifesting Prosocial Sharing Behaviours When Using iPads. *Technology, Knowledge and Learning*, 23(2), 199–221.
- Säljö, R. (2018). Lärande, utveckling och undervisning-ett sociokulturellt perspektiv. In E. Insulander & S. Selander (Eds.), *Att Bli Lärare*. [Becoming a teacher] (pp. 119-123) Stockholm: Liber.
- Sandberg, A, & Pramling, I. (2003). Preschool teachers' play experiences - then and now. *Early Childhood Research and Practice*, 5(1).
- Sandberg, Anette, & Arlemalm-Hagser, E. (2011). The Swedish National Curriculum: Play and Learning with Fundamental Values in Focus. *Australasian Journal of Early Childhood*, 36(1), 44–50.
- Sandvik, M., Smørdal, O., & Østerud, S. (2012). Exploring iPads in practitioners' repertoires for language learning and literacy practices in kindergarten. *Nordic Journal of Digital Literacy*, 2012(3), 204–220.
- Schlager, M. S., & Fusco, J. (2003). Teacher Professional Development, Technology, and Communities of Practice: Are We Putting the Cart Before the Horse? *The Information Society*, 19(3), 203–220.
- Sheridan, S., Williams, P., Sandberg, A., & Vuorinen, T. (2011). Preschool teaching in Sweden – a profession in change. *Educational Research*, 53(4), 415–437.
- Sveningsson, M. (2009). How do various notions of privacy influence decisions in qualitative internet research? In A. Markham & N. Baym (Eds.) *Internet Inquiry: Dialogue Among Researchers* (pp. 69–87). London: SAGE Publications
- Swedish Media Council. (2019). Småungar och medier 2019. [Little kids and media 2019]. Retrieved from <https://statensmedierad.se/>
- Swedish National Agency for Education. (2016). IT-användning och IT-kompetens i skolan Skolverkets IT-uppföljning 2015, O(115), 115. Retrieved from <http://www.skolverket.se/publikationer?id=3617>
- Swedish National Agency for Education. (2018). *Barn och personal i förskolan per 15 oktober 2018*. [Children and personell in preschools the 15th of October 2018.] Retrieved from <https://www.skolverket.se/publikationsserier/beskrivande-statistik/2019/pm---barn-och-personal-i-forskolan-per-den-15-oktober-2018?id=4068>
- Swedish National Agency for Education. (2019). *Obligatorisk förskoleklass*.

- [Mandatory preschool-class.] Retrieved from <https://www.skolverket.se/regler-och-ansvar/ansvar-i-skolfragor/obligatorisk-forskoleklass>
- Swedish National Digitalisation Council (2017). Digitaliseringsrådet [Swedish National Digitalisation Council] Retrieved from <https://digitaliseringsradet.se/om-webbplatsen/english/>
- Swedish Research Council. (2017). *Good Research Practice*. Stockholm: Swedish Research Council.
- Turner, C. (2006). Informal learning and its relevance to the early professional development of teachers in secondary schools in England and Wales. *Journal of In-Service Education*, 32(3), 301–319.
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, 15(3), 398–405.
- Vesterinen, O., Toom, A., & Patrikainen, S. (2010). The stimulated recall method and ICTs in research on the reasoning of teachers. *International Journal of Research & Method in Education*, 33(2), 183–197.
- Vygotskij, L. S. (1978). *Mind in society: the development of higher psychological processes*. (M. Cole, Ed.). Cambridge, Mass. Harvard U.P.
- Walldén Hillström, K. (2014). *I samspel med surfplattor : om barns digitala kompetenser och tillträde till digitala aktiviteter i förskolan*. [In interplay with tablets: children's competences and access to digital activities in preschool]. Dissertation in Education. Uppsala: Inst. Pedagogik, didaktik och utbildningsstudier, Uppsala universitet.
- Wallerstedt, C., & Pramling, N. (2012). Learning to play in a goal-directed practice. *Early Years*, 32(1), 5–15.
- Yelland, N. J. (2018). A pedagogy of multiliteracies: Young children and multimodal learning with tablets. *British Journal of Educational Technology*, 49(5), 847–858.
- Zosh, J. M., Hirsh-Pasek, K., Hopkins, E. J., Jensen, H., Liu, C., Neale, D., ... Whitebread, D. (2018). Accessing the Inaccessible: Redefining Play as a Spectrum. *Frontiers In Psychology*, 9, 1124.
- Zygouris-Coe, V. I., & Swan, B. (2010). Challenges of Online Teacher Professional Development Communities: A Statewide Case Study in the United States. In J. Lindberg, & A. Olofsson (Eds.), *Online Learning Communities and Teacher Professional Development: Methods for*

Improved Education Delivery (pp. 114-133). Hershey, PA: IGI Global.

Appendix 1. Self-report Essay Questions

1a. What do you currently think about pedagogical opportunities provided by using digital play in preschools?

1b. How have your thoughts developed regarding the pedagogical opportunities provided by using digital play in preschools during the period 2009-2016? Could you explain why?

2a. How do you currently think about the pedagogical challenges created by using digital play in preschools?

2b. How have your thoughts about the pedagogical challenges created by using digital play in preschools developed during the period 2009-2016? Could you explain why?

3a. What do you currently think about children's needs to encounter digital play in preschools?

3b. How have your thoughts about children's needs to encounter digital play in preschools developed during the period 2009-2016? Could you explain why?

4a. What kind of knowledge about digital play in preschools do you currently need?

4b. How has your need for knowledge about digital play in preschools developed during the period 2009-2016? Could you explain why?

5. What kind of informal and formal opportunities for professional learning about the pedagogical use of digital play in preschools have you made use of during the period 2009-2016?

6a. How do you currently use digital play for pedagogical purposes?

6b. How have your methods of using digital play for pedagogical purposes developed during the period 2009-2016? Could you explain why?

7. How do you predict your future use of digital play for pedagogical purposes in preschool will be? Could you explain why?

Appendix 2. Interview Guide

Initial information

My name is Leif Marklund and I am a PhD student at Umeå University. This interview will focus on the topic of tablets and digital play in preschools, and it is your perspective as a preschool teacher I am interested in.

In my questions I will sometimes use the concept "digital play", which in this study refer to children's use of digital technologies for educational purposes. Such activities may range from free play to activities where teachers arrange activities in a specific way to achieve desired outcomes. The interview will take about 30-45 minutes. If you have handsfree functionality on your phone, I recommend that you use it. I do not want you to get a neck strain from this.

I also wish to say that the information you share during the interview will be treated in confidential manners and that no information about you as a person will be published. In other words, it will not be possible to connect the published information to your person when the results of the study are published. The information you share during the interview will be processed and stored in a secure manner.

If you think about the information I have just shared about the study, can you give your consent that I use the information that you share during this interview for research purposes?

Background information

- (1) Before we begin talking about tablets and digital play, I would like to know a little bit more about you and your preschool.
 - Name?
 - Age?
 - Year of preschool teacher degree?
 - Years of work-life experience since graduation?
 - In what town and area of Sweden do you live?
 - Name of the preschool and the unit where you work?
 - Does the preschool have any specific pedagogical profile?
 - Number of staff on the unit?
 - Number of children?
 - How old are the children?
 - Access to tablets?

How preschool teachers relate to children's need to encounter play and learning that is supported by the use of tablets in preschools

- (2) Can you tell me about the time you started using tablets at your preschool?
 - Who took the initiative to make tablets a part of the pedagogical work at your preschool?
 - What year was this?
 - Do you know why tablets were first introduced?
 - Do you remember how you, at that time, thought about this initiative?

- (3) Have you, at your preschool, agreed on a method through which children will encounter or use tablets and digital play?
 - What have you agreed on?
 - How did you develop these guidelines?
 - Do you think the guidelines need further improvement?
 - Is there a need to develop a mutual way of thinking about, and using, tablets among the preschool teachers at your preschool?
 - To what extent do the preschool teachers at your preschool share a common view upon how children should encounter tablets and digital play in their educational practice?

- (4) What is your opinion about how children should encounter tablets and digital play in preschools?

- (5) Does children's digital play with tablets add something that traditional play cannot provide?

Preschool teacher descriptions of their pedagogical use of tablets in preschools

- (6) Can you describe how you make use of the tablet in your profession as a preschool teacher?
 - For what purposes do you use the tablets?
 - Are there occasions or periods during the day when the tablet becomes extra useful in your work?

- (7) Can you tell me about how the children at your unit encounter tablets and digital play in educational practice?
 - How often is the tablet in use?
 - For how long can children use the tablet?

- Are there any rules that children need to consider when they use the tablet, and if so, how are these rules described?
 - If time is mentioned ... do you also measure children's time for other activities? If not, why is there a need to monitor the time children spend using the tablet?
 - Do you currently aim to change, or develop, the way you now allow children use the tablet in educational practice?
- (8) What do you think is important to consider when planning an activity in which children can use the tablet?
- (9) Have you experienced a need to apply specific rules regarding the tablet that you do not use in relation to other kinds of material in preschool?
- (10) Who selects the apps that are included on the tablet?
- How are apps selected?
 - What is considered when this selection is made?
 - Are there any apps that you choose not to include on the tablets?
- (11) What opportunities have you experienced in your work from using the tablet?
- (12) What challenges have you experienced in your work from using the tablet?
- (13) What emotions do you experience when you think about the use of tablets in preschools?
- Do you think the emotional aspect can influence preschool teacher thoughts about tablets, and the value of digital play in preschools?
- (14) How do you inform the children's guardians about your work with tablets and digital play?
- What do you inform them about? Why is that important?
 - Are the guardians informed in a similar manner about other kinds of material that you make use of?
 - What kind of response do you receive from the guardians?
 - Do the guardians' opinions influence the way that you work with tablets and digital play?

Preschool teacher descriptions of their knowledge about pedagogical use of digital play

(15) In your work using tablets in preschool, is there anything in particular that is of value that you have learned during your preschool teacher education.

(16) Have you used any other ways to learn about how tablets can be used in preschools?

- Have you received any training?
- What has the focus of that training been?
- How has the training been of value in your work?

(17) What are your needs for knowledge in relation to the use of tablets in preschool?

- How do you try to overcome the knowledge needs you are experiencing?

(18) Do you discuss the use of tablets at your preschool?

- What do you discuss?
- Are these discussions of value in your work?
- How often do you participate in discussions about tablets?
- Would you like more discussions about tablets?

(19) Finally, if you consider your knowledge and your experience, how would your work be affected if a decision was taken that you could no longer use tablets and digital play in preschool?

Now I have received your answers to all my questions, would you like to add anything or make any clarifications?

Thank you, I will contact you if I need anything clarified but I believe this interview will be sufficient.