DIGITAL TECHNOLOGIES IN PRESCHOOL TEACHER WORK TEAMS' USE OF SHARED ACTIVE SCREEN

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Abstract

This paper explores the possibilities and challenges related to the use of Shared Active Screen (SAS), from the preschool teacher work team perspective. Using learning reflections, seven work teams reflected upon the possibilities and challenges related to the use of SASs. The work teams saw challenges related to accessibility, time and professional development. Possibilities were the use of SASs in curriculum-based teaching activities and involving the children in collaborative learning activities. How preschool teacher work teams develop the use of SASs over time in their teaching activities with preschool children will be important for supporting children's learning with digital technologies.

Introduction

Information and Communication Technology (ICT) for teaching and learning continues to increase in schools. This is also true in the preschool context in Sweden, where tablet use in preschools for small children continues to rise (Fridberg, Thulin & Redfors, 2017; Marklund & Dunkels, 2016; Otterborn, Schönborn & Hultén, 2018). The Organisation for Economic Co-operation and Development [OECD] (2017) has high intentions for ICT regarding early childhood education and providing foundations for skills, development, well-being and learning. This is in line with Swedish preschool curriculum development since 2010, in which technology use is strengthened (Swedish National Agency for Education, 2016). In July 2019, a revised version of the preschool curriculum with an increased emphasis on understanding digitalization will be implemented (National Agency for Education, 2018). This involves increased focus on and expectations for preschool teachers' use of digital tools in general (Strawhacker, Lee, & Bers, 2017).

Sweden is seen as having a high level of access to ICT, including access to the Internet of 96.4% of the overall population in 2015 (Internet World Stats Usage and Population Statistics, 2018). Even very young children have a high level of Internet access and use. For example, 79 % of 2-year olds, 93% of 3-year olds and 96% of 4-year olds have access to the Internet (Statista, 2018). This high level of access and use could be expected to be related to access and use in the home and therefore is acknowledged in preschool (Palaiologou, 2014). Although ICT access has increased significantly in Sweden during the last few years, efforts are not as evident in learning and teaching activities (National Agency of Education, 2016).

Use remains at the same level, and teachers lack ICT support, equipment and professional development (National Agency for Education, 2016). This has led to recent changes in the curriculum to meet the need for digital competence in schools among students, teachers and school leaders (National Agency for Education, 2016).

One of the most important tasks for preschools is compensating for socio-economic differences that may impact children's development and learning. Equality of access to digital technologies has also been a concern (Sherlidan & Samuelsson, 2003). In the school context, digital inequity has been difficult to address, and there are differences within schools and between schools (Håkansson Lindqvist, 2015; Grönlund, 2014. One reason has been issues related to implementing digital technologies in teaching and learning activities (Samuelsson, 2014). At the same time, there appears to be a gap between accessibility and teachers' use of digital technologies in teaching and learning activities (National Agency for Education, 2016a).

Digital Technologies in the Preschool Context

The use of digital technologies in preschools appears to be a relatively new phenomenon (Hernwall, 2016). Parents and teachers are optimistic regarding children's use of digital technologies (Sandvik, Smørdal, & Østerud, 2012; Mertala, 2017) and see possibilities for learning (Björk Guðmundsdóttir & Hardersen, 2012; Moinian, 2011). Digital technologies may be supportive for children with special needs (Burke & Hughes, 2017) and for children with memory difficulties (Drigas, Kokkalia, & Lytras, 2015). Tablets can, for example, create a good environment for play, exploration and experimentation (Moore & Keys Adair, 2015). The inclusion of ICT with ICT-adapted teaching approaches may also support literacy (Bajovic, 2018; Neumann & Neumann, 2014), mathematics (Sandvik, Smørdal & Østerud, 2012; Vernadakis Avgerinos, Tsitskari, &, Zachopoulou, 2005) and social activities (Lawrence, 2018). Lindahl and Folkesson (2012) observe that ICT is considered useful in preschool for supporting children in becoming democratic citizens, as well as becoming active and competent citizens. Further, many parents feel that introducing ICT in preschool is useful for preparing children for the future (Plowman, Stevenson, Stephen, & McPake, 2012). Plowman and Stephen (2007) suggest that ICT could be used for children's independent play-based learning (Beschorner & Hutchison, 2013), but this appears to be difficult to achieve. Other researchers note that ICT may hinder social interaction between peers (Cordes & Miller, 2000). Thus, collaborative work is of importance in working with technology as an educational tool (Drigas et al., 2015; Mertala, 2017). Teachers' perceptions of ICT and confidence in using ICT are also seen to be important (Nikolopoulou & Gialamas, 2015). Although preschool teachers play an important role in teaching children with the use of tablets, teachers and children may have different intentions and aims (Nilsen, 2014), for example didactics or entertainment (Petersen, 2015).

A digital tool that supports collaborative work and cooperation is the Shared Active Screen (SAS). The SAS is an oversized, portable tablet with which a teacher works together with a small group of children. Teaching activities with SASs provides opportunities to support collaborative work with children (Travers & Fefer, 2017) and appear to enhance individual work, offering guidance "by providing a dynamic digital environment where users can interact with content and each other in tandem" (Travers & Fefer, 2017, p. 52). With the increased use of tablets in the preschool context in Sweden (Nilsen, 2014; Petersen, 2015), there is a need for research on how teachers work to implement digital technologies such as SASs, developing and designing their teaching and learning activities and learning collaboratively to support children's learning. Preschool teachers' teaching methods and design for supporting small children's use of technology appear to be important (Kjällander & Moinian, 2014; Selander & Kress, 2010). This also involves developing ways to reflect upon practice (Marklund & Dunkels, 2016).

Otterborn, Schönborn, and Hultén (2018) report results that show a high level of engagement with digital tablets in preschools in a variety of teaching and learning activities, such as subject-related activities, programming and problem solving. These researchers mean that opportunities for meaningful teaching and learning activities are evident, despite challenges such as increasing expectations and a lack of digital skills. When asked to give recommendations, the teachers provide recommendations regarding clearer curriculum guidelines for use and the need for professional development (Otterborn, Schönborn, & Hultén, 2018; cf. Håkansson Lindqvist 2015; Vrasidas, 2015 in the school context).

Purpose and Aims

The aim of this paper is to explore, describe and analyze the possibilities and challenges related to use of digital technologies, more specifically SASs, in the preschool context from the preschool teacher work team perspective. The following research questions are hereby put forward: a) how can the work with SASs in the preschool teacher teams be described?; b) what possibilities and challenges do the preschool teacher work teams perceive in the work with SASs?; and c) using the Ecology of Resources Model (Luckin, 2010) and the theoretical concept of filters, how can these possibilities and challenges be understood as teaching, learning and collaborative professional development activities? This paper aims to contribute new insights in the use of SASs in the preschool context, as the initial study in a research project studying the use of SASs and the conditions for collegial learning and professional development for preschool teachers, preschool teacher work teams and preschools as organizations.

Theoretical Framework

The Ecology of Resources Model (Luckin, 2010) will be used as a theoretical framework. The possibilities and challenges that preschool teachers in work teams

perceive regarding SASs will be analyzed using the resource elements *Environment*, *Knowledge and skills*, and *Tools and people* and the theoretical concept of *filters* (Luckin, 2010). The model illustrates how learners have access to these resources and how filters may restrain or impede the learners' access to the resource elements. Therefore, by identifying filters, it is possible to alleviate the filters and widen access to the resources to a greater extent. In this paper, the "learners" are seen as members of the preschool teacher work teams on an aggregated level.

Method

In order to study preschool teacher work teams' perceptions of the work with SASs, data were gathered from learning reflections inspired by Moon's (2006) method of learning journals. In the learning reflections, the preschool teacher work teams were asked to reflect upon the work with SASs at present and their thoughts on how to develop the work with SASs through project work. They were also asked to reflect upon the possibilities and challenges with this work as well as the support they expected would be necessary in order to advance the work with SASs. The learning reflections were completed during a planning day for the preschool in August, 2018. The preschool is located in a smaller city in the northern part of Sweden. At the preschool, there are approximately 155 children. Prioritized work areas at the preschool during 2018-2019 are teaching and the new curriculum; ICT; and creating a safe and beneficial learning environment. The preschool is organized into three departments with seven preschool teacher work teams, and 3-6 teachers per work team. In this study, the learning reflections are presented and identified within seven work teams (WT1-WT7). In the analysis, data in the form of free text comments were coded and categorized (Hjerm & Lindgren, 2010). Thereafter, the codes were analyzed and placed into broader categories. These categories were analyzed using the Ecology of Resources Model (Luckin, 2010).

Results

In this section, the results of this initial, qualitative study are presented according to the following categories: *state of the work with SASs at present; developing the work with SASs; possibilities* and *challenges*. Work team comments have been translated by the author into English from the original Swedish.

State of the work with SASs at present

When asked to reflect upon the state of the work at present, the work teams report different levels of use as well as a wide variety of uses of SASs to support pedagogical activities. One work team states that it had "had the SAS only a few times" (WT1). Another work team connects this to access: "Since the accessibility has been limited, we have only used it a few times" (WT6). Other work teams appear to use the SASs more frequently: "We use it more continuously, as a natural part of our work" (WT1), while use in other work teams was limited:

"Right now, we are not working with SAS" (WT6). The use of SASs to support pedagogical activities appears to be widespread. One work team reports using SASs "in our Christmas calendar, parent meeting and as a projector" (WT1). Other work teams report other activities: "The children have drawn on it in pairs and practiced collaboration. In the theme about me, we used feeling apps and the children did different tasks" (WT3); "In gatherings, we have explored content together with the children" (WT4); "We watch instructional videos and have used Activinspire, have listened to music and movement play" (WT5); and "To vote, show things, take attendance, teaching" (WT7). Overall, the work teams describe using SASs as a "supplement to computers and tablets" (A5) and that it is "fun but difficult, more input is needed" (WT6). At this initial stage, one work team sees opportunities: "SASs can have unlimited possibilities with the right conditions and perquisites" (WT4).

Concerning help and support, the teacher teams report the need for technology that works: "The right equipment and equipment that works" (WT1). The work teams also report needing time for testing and trials: "Time to test things by ourselves and to learn different programs" (WT1) and "Time for the work team to test how we can use it [SAS]" (WT6). Support is needed both in more training and in skills: "Supervision and education" (WT3), but also in actual use "To be able to use the SAS more often" (WT2). One work team reflects upon the need for a person who is in charge of the SASs: "We need someone who is responsible who can help, support, present ideas and suggestions" (WT5). One work team reflects on the importance of having someone in charge "who can add new materials… the children are not interested if we always are work with the same things. Then, the risk is that the SAS is used as a very expensive drawing tablet or a dance-screen" (WT4). Other support involved allowing one work team to work more specifically with SASs to inspire and support the work with SASs: "A SAS work team, education and inspiration" (WT7).

Developing the work with SASs

When asked to reflect upon how the work teams could develop the work with SAS, accessibility appears to be key. Here, one work team reports: "We would like every work team to have their own SAS to be able to work with it more often" (WT2). This reflection is confirmed by other work teams: "It [The SAS] has been difficult to book, which is why we are happy that we have our own SAS in the work team" (WT3) and "It [SAS] has to be close by and accessible. This is why it is difficult to use it spontaneously" (WT6). Professional development also appears to be necessary, both for individual teachers and for work teams: "More education and more time to teach ourselves and the work team" (WT5).

For developing the work with SAS, the work teams provide a wide range of development projects, some of which are more in general and some of which are more specific. Some work teams describe opportunities to increase their own knowledge: "We want to increase our knowledge and find more ideas and inspiration about how we can use SAS" (WT2). Other work teams saw

development projects as a way to combine SASs and curriculum goals: “The material must be accessible and in themes according to the goals in the curriculum” (WT4). It is also important to follow the work with SASs over time: “To use the SAS every day to see what happens” (WT7). The work teams also see opportunities in more specific development projects with SASs by “involving SASs in our pedagogical theme – our senses. We start with sounds: listen, create our own sounds, etc.” (WT1); “We would like to use the children’s pickids in SAS. We want to use it in gatherings, with singing, exercise and stories” (WT3); “To be able to draw a 3D-drawing” (WT5); and "We want to use it [SAS] with mathematics. Swedish, collaboration, exercise and even for singing and movement” (WT2).

Challenges

For the work teams, the challenges are seen in technical problems, “technical troubles” (WT1) and access to the technology: “A prerequisite is that we have more than one laptop in order to be able to use SAS” (WT6). The issue of access to technology, according to one work team, is a challenge for the work with SASs longer term: “Accessibility is necessary in order for SASs to be a natural part of our work” (WT1). Time is also an important aspect. One work team describes this as: “To have time to prepare and carry out activities when we have many children and too few teachers” (WT3). This involves time for collaboration, planning and reflection: “we must have the time to work together” (WT1) as well as to “have the opportunity to reflect and plan (WT2). Another work team notes a challenge in the need for skills: “We do not have sufficient education” (WT6). Other challenges noted by the work teams are related to the pedagogical challenges: “Finding the right level for children who are 1-2 years old. That they are given challenges based on their age and level” (WT2). Another challenge was seeing, being aware of, identifying and documenting pedagogical processes: “To see different approaches… that we see different processes” (WT5).

Possibilities

In the learning reflections, the preschool teacher work teams report possibilities related to the work with SASs. These possibilities are seen in making teaching activities more transparent and provided possibilities for collaboration: “The activities become clear – visible for all the children and cooperation” (WT1). Another work team expands this idea: “[SAS] makes what we work with much clearer. Stronger effect when you work together with the children and you can see what you are working with” (WT6). SASs as a tool is also seen as a possibility, through learning with the use of an additional tool: “Using different tool to reach the same result” (WT5) and “If it is easily accessible, we see strong possibilities with [SAS] as a digital tool in children’s learning” (WT6). Another work team sees continuous use over time as a way to increase the possibilities to create new uses: “If we can learn how to work continuously with SASs, we will see possibilities for more areas of use” (WT2). Other work teams summed up the

possibilities: "[SAS] increases competences for both children and adults" (WT7) and "That we as pedagogues can develop together with the children" (WT6). For the children the preschool teacher work teams report possibilities in SASs through: interest, "Strong interest among the children – engaging" (WT1); and fun, "Fun learning where everyone can see everything at the same time" (WT3) and the children work with "new technology" (WT7). One work team describes this as the possibility to "capture the children through the SAS" (WT2). The work with SASs provides possibilities for the work team to use the SAS as "a tool for the children in their education" (WT2) as well as "an introduction in ICT" (WT5). One work team sees the possibility to provide a pedagogical shift to involve the children: "The children become producers" (WT7). Further, the work with SAS: "Can be connected to the curriculum already in SAS" (WT4). Overall, collaboration between teacher and children is noted: "Increased possibilities for problem-solving, collaboration, cooperation between the children and the pedagogues" (WT6).

For the preschool teacher work teams, possibilities are seen in collegial learning. Beyond describing the work with SASs as "fun" (WT7), the work teams report possibilities in the work with SASs to "Go further in thought and competence" (WT7). This involves new skills in the work team: "Everyone in the work team will learn more about digital technology" (WT3). These skills, in turn, provide beneficial conditions to strengthen the work with SASs in the work team and with the children: "The more comfortable and competent we are the more we can share with/teach the children" (WT1).

Discussion

The aim of this paper is to explore, describe and analyze the possibilities and challenges related to use of digital technologies, more specifically SASs, in the preschool context from the preschool teacher work team perspective. In answering the first research question, the preschool teacher teams describe the work as stimulating, fun and developmental. Different work teams work with SASs to different extents, with some work teams using SASs often, while other work teams are in the initial stages of their work. Overall, the work teams provide an optimistic description of the work at present as well as the work to come. The challenges seen are access to technology, time for planning, preparation, testing and trials. The work teams see possibilities in professional development for themselves and in collaborative work with the children. The possibilities for the children's learning are seen in collaboration, transparency, and curriculum-based work with the SAS, as well as what the work teams in this study describe as fun work with new technology.

The possibilities and challenges as perceived by the preschool teacher work teams can be analyzed using the Ecology of Resources Model (Luckin, 2010) and the theoretical concept of filters within the resource elements *Environment, Knowledge and Skills* and *Tools and People*. In their teaching and learning

activities it will be necessary for the preschool teacher work teams to support and expand the use of SASs in their work with the children (*Environment*), promote own skills in SASs *(Knowledge and Skills*) as well as increasing their own use and work with SASs with the children (*Tools and People*).

In the resource element *Environment*, the need for the preschool teacher work teams to support the use of SASs could be said to manifest a filter. While the work teams see many possibilities in the work with SASs for themselves and the children, it will be important that they have continuous access to the technology, in order to create an environment where they advance the use of SASs and their own skills (Håkansson Lindqvist, 2015; Grönlund, 2014). How preschool teachers collaborate and create opportunities to share learning experiences will be of importance for the environment and the work teams' use of SASs for themselves and the children (Drigas et al., 2015; Mertala, 2017). In this resource element, time manifests a filter in several aspects. The preschool teachers as work teams will need time to use and advance the use of SASs in their teaching activities with the children as well as to find, test and evaluate SASs and creating an environment and other digital tools as pedagogical tools (Samuelsson, 2003) for teaching and for play (Moore & Keys Adair, 2015).

In the resource element *Knowledge and Skills*, professional development in ICT as well as SASs will be important (Håkansson Lindqvist, 2015; Grönlund, 2014; Otterborn et al., 2018) in order for SASs to become a natural part of the work with the children. This involves making the use of SASs continuously, in order to test and explore new uses, according the teachers in this study. In this resource element, the knowledge and skills relate to the use of SASs as well the possibilities to link the use of SASs to the preschool curriculum could be said to manifest a filter. Teachers need time to learn and increase their skills, perceptions and confidence in using SASs in order to support the children's learning (Nikolopoulou & Gialamas, 2015). As reported by one work team, this may take place both individually and in collaboration with other teachers. In this study, a large variation between use and skills in SASs in the work teams can be seen. Therefore, preschool teachers' skills as collective knowledge can also be said to manifest a filter in this resource element. This involves supporting the skills in the work teams in the balance between technology and pedagogy, if the use of SAS, as reported by one work team, is to go beyond using the SAS as a tablet or dance-screen, and the teachers can utilize their knowledge and skills to balance their different aims in use (Nilsen, 2014). Increasing teachers' own use of SASs will most likely provide possibilities to increase children's use as well as increasing the use of SASs in the work team and in the preschool. In this resource element, the exchange of skills and experiences with SASs could be said to be an additional filter. If the work teams are given the opportunity to share their skills and experiences, through different channels such as online forums, planning and meetings to share these experiences, the use of SASs will most likely be supported.

The technical challenge of not having access to SASs or laptops can be considered to manifest a filter in the resource element *Tools and People*. In this resource element, accessibility is the most important challenge that can be said to manifest a filter. Access to SASs will be important if the technology is to become implemented, integrated and accessible for all (Samuelsson, 2014; Sherlidan & Samuelsson, 2003). Beyond technical challenges, the preschool teacher work teams in this study see the need for a work team that focusses on SAS, or the need for an expert. How these support functions are solved can also be seen as a filter (People). These support functions will most likely be important in supporting the work with SASs by efficiently providing new information about SASs and pedagogical activities with SASs, as well as providing the inspiration to work with SASs. This support will most likely involve design (Kjällander & Moinian, 2014; Selander & Kress, 2010) and reflection upon the use of these tools in practice (Marklund & Dunkels, 2016).

One of the most interesting findings in this study is the preschool teacher work teams' perceptions of the possibilities for future work with SASs. Despite challenges regarding technical issues, accessibility and lack of time, there appears to be both the interest and initiative to continue and expand the work with SASs with the children. Developing the work with SASs, according to the preschool teacher work teams in this study, could promote beneficial conditions for digital skills, curriculum-based teaching activities and collaboration among the children. How beneficial conditions for preschool teacher work teams work with SASs can be created to support children's learning will be of importance to study from the perspective of digital equity.

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