APPKNapp

– POINT PLAY & LEARN IN PREESCHOOL

PhD Susanne Kjällander, department of Child and Youth Studies, Stockholm University

PROLOGUE

This text is a short summary of the theory, methods and results of the research project, aimed to support the AppKnapp research report film (www.appknapp.se) and suggest upcoming publications in different academic journals and further reading in research literature. The study has a multimodal design theoretical approach to learning and video observation as a method was employed. The unique and pioneer results about children's interaction with digital tablets in Swedish preschool are briefly presented organized in five selected key findings.

These are: 1) Preschoolers continually interact, cooperate and multitask; 2) Preschoolers' space of action is extended as they are deliberately interacting; 3) Preschoolers of different ages prefer to engage in different modes; 4) Virtual and physical activities inspire each other mutually and 5) Preschoolers challenge the preschool teacher's or the app's didactic design.

THE PROJECT "APPKNAPP – POINT, PLAY AND LEARN IN PRESCHOOL"

Botkyrka municipality, south of Stockholm, implemented the project *AppKnapp – point, play and learn in preschool* in 2011 and financed follow up research starting in 2012 and a year ahead. The project is based on writings of the Swedish preschool curriculum and highlights creativity and communication by different modes of expression such as image, song, music, rhythm, drama, dance and movements. Literacy as a content and method in preschool's realizations is foregrounded. All these different communicative signs are especially used and supported in a digital learning environment. The aims of the municipal project is to implement digital tablets in preschools everyday practice and to initiate use of digital learning environments as stimulating learning environments as well as to develop preschool teacher's ICT competence. Further the project aimed at stimulating children's learning by play and to amplify social interaction between preschool children as well as between home and preschool.

THE UNIQUE AND PIONEER RESULTS about children's interaction with digital tablets in Swedish preschool are briefly presented organized in five selected key findings.

Aims and research questions of follow up research

In this project 16 preschools in Botkyrka were offered to submit an application to join the research project. Most preschools sent an application and four were selected and included due to some criteria described in the methodological section of this report. During a year close observations were made. Focus of research was aimed at:

• the ICT competence of the preschool teachers
• preschool children's play and learning
• the social interaction in the child group
• contact between home and preschool

A contract between Botkyrka municipal and Stockholm University was authorized and some parameters to analyze from were designed. Children's interaction with digital tablets in everyday preschool group activities was video documented and transcribed multimodally. Parents were positive to the research project and a minority of the preschoolers had access to digital tablets at home. Preschool teachers were all interested but most of them new to digital tablets. They received in-service training once a month during this year.

Digital interface

The digital interface is in this study described as extended (Kjällander, 2011), as it is not restricted

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to the physical interface where the child interact with the tablet's touch screen. Instead the digital interface is extended to include everything of importance for preschoolers' interactions and learning, such as for example peers' comments, furniture, class rules and school norms. It is also extended by means of time and space to include leisure as well as excursions. The digital interface is allowing and inviting. There is no special read order, children can view the screen from different positions, several children can manipulate the screen simultaneously while playing and learning and the tablet is mobile and possible to use in any setting.

THEORETICAL VIEWPOINTS

Until recently the way to look at preschoolers learning has been to look at language as speech or writing (Kress et al., 2005), whereas other modes such as images, gestures, colours, sounds and music are seen as illustrative supports to language (Kress et al., 2001). Today there is a move from the dominance of writing to the dominance of image; along with a move from the dominance of the book to the dominance of the screen (Kress, 2003). The screen can now be understood as the dominant site of texts where preschoolers are communicating. Grounded in social semiotic theories and multimodality a new theoretical perspective on learning has been developed at Stockholm University in Susanne Kjällander's research group DidaktikDesign. Designs for Learning (Selander, 2008) focuses on the transformation process with concepts that can facilitate analysis of learning in for example preschools. It has been developed in order to meet the demands of a post-modern society where preschool teachers and children are supposed to didactically design the preschool environment on their own (Selander, 2009). Designs for learning provides with a set of conceptions that makes it possible to describe, analyze and understand preschoolers' interactions and meaning-making, as visualized in

action. From a design theoretical perspective there are two understandings of the design concept (Selander & Rostvall, 2008). The first understanding embraces the learners' design of her or his learning – design in learning. The second understanding focuses on the framing of the learning, including for example application (app) designer and the preschool teacher – design for learning. A theoretical and analytical model has been designed as a representation of the theory and introduces the most important notions that has been used as analytical tools in this study.

Modes and signs

A sign is when a semiotic resource is used for communicative purposes (van Leeuwen, 2005), such as nodding one's head to show approval or laugh at an animation in an app. From this perspective, meaning-making comes about in a transformation process (Selander, 2009) when signs are brought together to form meaningful entities. A sign can be seen as the conjunction between form and meaning (Kress, 2010) in a certain context or situation. Signs are thought to be organized in different modes. As modes are the results of a historical and social shaping of materials chosen for representation (Kress, 2003), the mode of, for example, reaching one's hand up in the air means something very specific in a preschool setting. Modes that are almost always present in the interaction between preschoolers are for example gestures, facial expressions, sounds and speech. As preschoolers are using digital learning resources in this study, a wide repertoire of representational and communicative modes are made available (Jewitt, 2006) such as colours, letters, images, notes, words, layout, music and sound effects (Kress, 2003; Kjällander, 2011). Studying all modes is a key to understanding meaning-making and learning when preschoolers use digital tablets.

Affordances and interests

Different modes offer different possibilities for meaning-making and there are always choices to make in an activity. There is not just one meaning but many possible meanings. The analysis focus is on the meaning potentials and limitations each mode has for communication. A notion that embraces

this reasoning is *affordance* (Gibson, 1979; Kress, 2009; Kress & van Leeuwen, 1996; Selander & Kress, 2010). Different preschoolers recognize and comprehend different affordances, which they explore and make use of according to their own interests. In an app there can be symbols appreciated as affordances by one child, whereas another child might appreciate the sounds as affordances to act upon.

Transformation process and signs of learning
Learning is in this study understood as a social sign-making activity. Learning is the result of a preschooler's transformative engagement with something that she or he notices that leads to a transformation of the person's semiotic or conceptual resources (Kress, 2010). Learning can be defined as an increased ability to use and elaborate an established set of signs within a certain domain in a meaningful way (Selander, 2009). Preschoolers learn about the world and design their own learning paths in the transformation process (Selander, 2009:21) all the time changing information and positioning themselves as producers rather than consumers and in their engagement signs of learning can be observed.

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Agency, identity and learning paths
Preschoolers actively orient themselves by means of accessible resources on the digital tablet, which influences communication as well as what parts stand out as interesting to engage in. Children form their own learning paths (Selander, 2009:24) by means of their agency (Kress et al., 2001) i.e. preschooler's participation and space of action (Selander & Kress, 2010) and their role in meaning-making (Jewitt & Kress, 2003). Learning involves a change of identities in a social context (Kress, 2010; Selander, 2008). A child must be understood by considering the environment where she or he acts (Bauman, 1991; Butler, 1999; Lyotard, 1984). Children's identities, behaviour and actions are interwoven with the preschool setting and didactic realizations are viewed as decisive for children's identity making (Nordin-Hultman, 2004). Identity is seen as an ongoing and for-

mative process in which preschoolers constantly interpret, negotiate and try out different identities (Selander & Aamotsbakken, 2009). Negotiation of identities is especially interesting in the digital environment since preschoolers are given yet another arena, platform or dimension to act upon as they are using digital tablets (cf. Moinian, 2007).

METHOLOGICAL ISSUES
All applications from Botkyrka preschools were considered and the below four were selected based on how they had described their ongoing projects with digital tablets along with some other criteria in order to create a valid and broad empirical material.

• 17 1-3 year old children, several different languages, 3 digital tablets
• 17 3-5 year old children, several different languages, 3 digital tablets
• 20 3-5 year old children, few languages, 1 digital tablet (interrupted project cooperation)
• 20 3-5 year old children, few languages, 1 digital tablets

In order to gather empirical material video observation is used in this study. All video observations were made by PhD Kjällander and a doctoral student from Uppsala University. With a design theoretical perspective it is important to document situated learning (Lave & Wenger, 1994) in the preschool setting in which the practice has its place – it is not interesting to document the digital tablets alone (Kress and Van Leeuwen, 2001) and it is also important to be able to document all different modes. Video recordings provide potentials for understanding multimodal interactions (Norris, 2002). A theoretical model for analysis, called a Learning Design Sequence – LDS – is used in this study (Selander, 2008) in order to understand preschoolers' learning and play.
Interaction in the digital interface was documented taking up all modes such as speech, pictures, gestures, screen activity and sounds. Field notes were taken along with drawings of the physical

environment. There was an aim to take the role of the complete observer's role but preschoolers sometimes interacted with the camera or the documenter (Denzin & Lincoln, 1994) – those sequences have not been analyzed. In some preschools direct contact with parents were made and in all settings children were informed and asked to agree before documentation took place, thus the researcher's role was clear to them. The time spent in the setting before the actual data collection has varied due to agreements with the preschools. The video camera documented preschoolers and preschool teacher gestures, facial expressions, positions and movements. The setting, with furniture, pictures and images, whether they are presented on the tablet or projector screen and preschool children's and preschool teachers audio modes such as discussions, oral presentations, sighs and laughter were all documented. A small handheld video camera was used in order to be mobile and follow children wherever they went. Short sections of the video material, critical incidents (Flanagan, 1959; Tripp, 1993), have been selected for transcription and broken down into meaningful units of analysis that are possible to handle (Rosenstein, 2002) and understand. A transcription chart was designed with different columns corresponding to modes such as sounds, movements and screen activity.

ETHICAL ISSUES

The study is thoroughly designed according to research ethics (Vetenskapsrådet, 2004; Vetenskapsrådet, 2005), meaning that information letters with an authority was sent to and signed by all parents of children included in the study; all personal information is coded; all images made unidentified and the empirical material is only used by the research team and kept locked in a safe. All visual material on the project's website and at other arenas is not research material, but Botkyrka municipal´s own material. Such material can be found on www.appknapp.se.

IN SHORT: FIVE SELECTED KEY FINDINGS

The results of the research projected have already been and will continue to be published at different arenas such as academic journals, at conferences, in books and in media. There have been many inquiries and a growing demand on research re-

sults about digital tablets in preschool. In the following five key findings, those are discussed and illustrated in the research report film, will be briefly presented. Links to coming thorough and elaborated research results will continuously be published on the project's website (www.appknapp.se).

The selected five findings are;
• Preschoolers continually interact, cooperate and multitask
• Preschoolers' space of action is extended as they are deliberately interacting
• Preschoolers of different ages prefer to engage in different modes
• Virtual and physical activities inspire each other mutually
• Preschoolers challenge the preschool teacher's or the app's didactic design
Following is an extended description of above paragraphs.

Preschoolers continually interact, cooperate and multitask

The observed preschoolers cooperate continually around the digital tablets. Children are at all times helpful and supportive to each other, in words, gestures and other modes. They encourage each other and give each other compliments. They often have bodily contact but seldom eye contact. There are no preschools in this study (or elsewhere in Sweden) that have invested, or have plans for, investing in one tablet per child. Instead a common scenario is 1-3 tablets per 15-20 preschoolers. Preschool sections often borrow each other's tablets to delimit the amount of children around each tablet. Preschool teachers often didactically design for cooperative work by placing preschoolers in groups of three to five around a digital tablet. Even at the few occasions where there were two children with one tablet each, they still cooperated on the two tablets si-

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multaneously. When the tablets were first introduced at the preschools hourglasses were used in taking turns, but along with becoming accustomed to the tablet children began to finish an activity and then hand the tablet over to the peer sitting next. There have been many discussions on turn taking, but children solve this problem on their own – often creatively. The analysis show that children not wanting to use the tablet participated in the social interaction too, by modes such as speech or gestures. Another result indicates how preschoolers are continuously multitasking in the digital interface.

Preschoolers' space of action is extended as they are deliberately interacting

Earlier research indicates that young children are engaging randomly in the digital interface. This study illustrates the opposite: preschoolers of all ages, even the 1-year-olds, are viewed to have clear aims with their activities with the digital tablet. Preschoolers' agency when using digital tablets is highlighted long before they can talk, read or write. This study also indicate that children's space of action is extended in the digital environment, not only due to them being digitally advanced (and sometimes referred to as digital natives) and having digital experiences from home, but also due to preschool teachers positioning themselves as explorative following children's interests and engagement in the digital interface, something that is highly valued in preschools curriculum in Sweden. Preschool teachers become didactic designers together with their preschool children. The study shows how relations between adults and children are flattened and sometimes swapped – they explore the digital interface together and they learn from each other. The empirical material supports the value of recognizing, respecting and including children´s agency as conditions for their meaning-making, play and learning in preschool.

Preschoolers of different ages prefer to engage in different modes

The study indicate that the digital tablet´s digital interface – with modes such as images, colours and sounds rather than text – is apt for young children that are not able to read or write yet. The affordance of text is not often appreciated by preschoolers. Further the research results illustrate a slight difference in engagement between different ages. The youngest children in preschool seem to take a larger interest in audio signs systems. The youngest sometimes cannot, or does not want to, make meaning of the visual modes, instead they try to transform the setting and objects into something that makes sense and is meaningful to them: which often is sound effects such as music, beeps or other kinds of signals. Sound is, in this study, proven to be the most prominent mode to toddlers and the sounds are appreciated as affordances, prompting the youngest to take some kind of action in the digital interface – such as clicking a symbol or an image to create sounds. They are focused on making meaning of the information presented on the digital tablet by *producing* modes of sounds. The analysis of the empirical material in this study indicates that the older preschoolers are more likely to appreciate image based modes as affordances in the digital interface. Given the choice they prefer to engage in images, drawings, photos, videos and animations and they put immense effort in creating their own images, taking their own photographs and making their own films. They are focused on making meaning of the information presented on the digital tablet by *producing* modes of image.

FURTHER THE RESEARCH results illustrate a slight difference in engagement between different ages. The youngest children in preschool seem to take a larger interest in audio signs systems.

Virtual and physical activities inspire each other mutually

A recurring phenomenon in the studied preschools is the outspoken and practiced interest for drawing parallels between the physical and virtual environments. This interest is shared by children and adults. If children are using an app at the digital tablet that is about rolling a ball through a labyrinth for example, preschoolers and preschool teachers are likely to try to find an old wooden game with the same purpose and then use both games simultaneously. Likewise, when using real clay in the studio someone is like-

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ly to try to find a clay app at the digital tablet to use. The apps that children engage in are appreciated as affordances for aesthetic expressions such as dance, art, movement, singing, music and drama but also for play. This is valid also for the built-in tools such as magnifier, hourglass and camera. Photos taken are often printed, drawn on with physical crayons, photographed again and then manipulated in funny face apps or in paint programs. Related to this phenomenon is the reversed thought that the virtual world can be appreciated as more important than the physical world – it is possible that events in the everyday preschool environment takes place in order for it to be digitally documented and presented at digital platforms.

Preschoolers challenge the preschool teacher's or the app's didactic design

A child must be understood by considering the environment or setting he or she acts in and preschoolers in this study seem to interpret the didactic design as allowing and informal and therefore position themselves in charge of their own learning. Most apps afford both learning and play opportunities and children alter between positioning themselves as learners and as players. The digital interface interaction is driven by children's interests, lust and urges. Sometimes the child can be interested in doing the assignment as presented by the preschool teacher or by the app, but sometimes they are more interested in playing around having fun. Irrespectively, in their interaction children tend to challenge the didactic design by the preschool teacher or the digital tablet. A recurring event is when preschool children deliberately make incorrect answers to check out the tablet´s response. Play & learn programs have often been criticized for inhibit creativity, but this study illustrate how children are very creative when using apps for other than the intended and

use the available modes to make new meanings. Many apps also respond in different ways to this creativity. Preschoolers constantly challenge didactic design and position themselves as didactic designers.

Sum up

To sum up, the research project is accomplished and has contributed with new and critically important knowledge answering to the four aims of the project. It has contributed with knowledge about the *ICT competence of preschool teachers* illustrating for example how they position themselves as explorative in the digital interface, following children's interest and encouraging children's extended space of action which is aligned writings in the preschool's curriculum. The research project has produced unique knowledge about *preschool children's play and learning* exemplifying how children of different ages are deliberately using different modes creatively to play and learn what they are interested in. It also shows how preschoolers transform and challenge the applications on the digital tablet and the preschool teacher's didactic design. New and interesting research results have also been presented concerning the *social interaction in the child group.* Here a picture of toddlers socially interacting and helping each other is presented. Young children that are not able to speak yet still support each other, giving compliments and design their own structures for turn taking. The research project has not yet contributed with knowledge on *the contact between home and preschool.* Some concerns about children losing their own voice when the digital documentation take place digitally between the preschool teachers and the parents are here lifted. This concern stand as a contrast to the preschool teachers own testimony on the digital documentation as an affordance for deepened communication between home and preschool. This must be observed and studied further. So far, this qualitative research invites to a unique picture of what occurs when digital tablets are introduced in preschool everyday life. This picture will be elaborated, problematized and discussed in forthcoming publications by Susanne Kjällander and presented on the website www.appknapp.se.

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