Are we spinning or is it the board?

Young children’s interaction with an interactive whiteboard in preschool

Sara Hvit Lindstrand
Phd. Student, Jönköping University. School of Education and Communication
sara.hvit-lindstrand@ju.se

ABSTRACT

The present study explores young children’s interaction with an interactive whiteboard (IWB) in a Swedish preschool. Analyses of video recordings show how the children, through embodied and multi-directional interactions, interpret, explore and construct signs on the IWB. By relating children’s careful explorations to meaning-making and sign-making, interactions at the IWB can be looked upon as part of children’s initial literate explorations in multimodal text productions.

Keywords

preschool, interaction, information technology, interactive board, meaning-making, early literacy

INTRODUCTION

Children in contemporary Western society are embedded in information technology. All sorts of screens have become a natural part of everyday life for many families, and young children have a wide range of experiences with digital media. As a result of the increasing use of technology in homes, technology is also a common means of young children’s play, explorations and meaning-making. This increased presence of technology in children’s everyday lives has led to public debate. On the one hand, there is concern about young children’s use of technology and how it may affect childhood and children’s cognitive, emotional and social development in negative ways (Christakis, 2014; Plowman, McPake, & Stephen, 2010). On the other hand, technology is regarded as a positive feature influencing children’s play, learning, and the development of literacy (Johnson & Christie, 2009; Klerfelt, 2007a; Marsh, 2005).

The experiences of technology that many children bring to preschool challenge researchers’ and preschool educators’ perspectives on young children’s play, learning, and development of literacy. Children’s early literacy processes have traditionally been connected to their verbal language development, and for example the processes of reading aloud and verbalizing images in picture books (Flewitt, 2008). Young children’s familiarity with and experiences of technol-
ogy, screen-based texts and images in their homes and preschools challenge the connections between verbal language development and early literacy processes. In digital media, different modes of communication, such as words, sounds and images, are juxtaposed in complicated and multimodal ways (Flewitt, 2008; Marsh, 2003; Marsh & Singleton, 2009).

Aim of the study

Today, different technology devices, such as interactive whiteboards (IWB), are gaining in use and popularity in Swedish preschools. With IWB, different modes such as images, colors and sounds can be used by children in exploration, play, visual art and learning experiences (Morgan, 2010; Terreni, 2011). Seeing literacy as socially constructed, situated and always proceeding from interactional aspects (Gee, 2008), the present study explores the links between the embodied and multimodal ways in which young children make meaning with interactive whiteboards and early literacy processes.

YOUNG CHILDREN’S INTERACTIONS AS MEANING-MAKING

Research (Eckerman & Peterman, 2001; Monaco & Pontecorvo, 2010) concerning young children’s interactions with each other has shifted from viewing their interactions as spontaneous and randomly imitative to including symbolic qualities representing and conveying meaning. Toddlers interact when they want to negotiate, express, or explore something (Engdahl, 2011; Løkken, 2000, 2011; Monaco & Pontecorvo, 2010). According to this perspective, interaction is an event that occurs when young children want to explore and negotiate something with the intention of sharing meaning with each other. In New Literacy Studies, young children’s processes of meaning-making, such as making gestures and sounds to share meaning, are regarded as early processes of literacy (Lancaster, 2012). A premise is that the process of learning to read and write begins from birth in literate communities (Gee, 2008; Pahl & Rowsell, 2006). The present study is inspired by Olsson (2009), who uses concepts such as movement and experimentation in providing a wider perspective on young children’s interactions with each other and their surrounding environment. Olsson claims that it is more important for young children to construct than to solve problems and that, for them, «meaning and nonsense walk hand in hand» (2009, p. 5). She speaks of young children’s explorations in terms of desires, and views their bodily movements as part of creative problem-solving. Lind (2010) makes a similar claim, based on her study about young children’s scribbles. She claims that scribbles made with pen and paper by one – three years olds have elements of repetition and change. Scribbles are therefore not in fact meaningless markings, but had repeated elements, which she refers to as visual alliterations instead of the more common concept of scribbling. Using a concept as scribbling, young children’s early mark-making becomes random activity. Olsson (2009) and Lind (2010) argue that young
children consciously make small changes, i.e. construct problems, in their mark-making and explorations.

Physical surroundings are always part of young children’s interactions and include the presence of diverse semiotic signs, such as material, verbal, and bodily resources or modes (Goodwin, 2000; Kress, 2010). Hence, young children’s interests motivate them to use «what is to hand» (Kress, 1997, p. 29) in the environment to express or explore something. In that moment, the «what is to hand» becomes a mode, that is, «a socially and culturally given semiotic resource for meaning making» (Kress, 2010, p. 79). Linking young children’s interactions to exploration, negotiation and questioning to elements in children’s literacy learning reflects a growing interest in the connection between materiality and children’s learning in early childhood education and care (Løkken & Moser, 2012).

In this study, young children’s verbal as well as nonverbal actions are viewed as expressions of meaning-making (Lancaster, 2001; Løkken, 2000). A particular focus is on the potential relationship between young children’s multimodal uses of their bodies and signs to the development of early literacy processes (Kress, 1997; Olsson, 2009). The study employs a framework that combines New Literacy Studies, which regard literacy as a social practice (Gee, 2008), and studies on multimodality which regard meaning-making through a multiplicity of modes (Kress, 1997; Pahl & Rowsell, 2006).

**YOUNG CHILDREN’S USE OF TECHNOLOGY IN PRESCHOOLS**

Research about children’s use of technology in school has mainly focused on older children’s learning with computers and how technology, mainly computer use, makes learning more efficient (Plowman et al., 2010; Sørensen, 2009). Burnett’s (2010) systematic review of literacy and technology research highlights the fact that there are very few studies examining the use of technology by pre-school age children. Of thirty-six articles reviewed, none focused on children under the age of three and only eleven studies included children under the age of five.

There is, however, a growing research interest in young children’s use of various technologies and software in preschools and childcare centers (McManis & Gunnewig, 2012; Savage, 2011). There are some studies in Swedish preschool settings concerning interaction when children play computer games (Björk-Willén, 2011; Ljung-Djärf, 2004), as well as of preschool children’s multimodal storytelling with computers (Klerfelt, 2004). These studies show that computer use supports children’s verbal language development, and it appears that children use their own experiences when they interact with computers and peers. The use of computers can thus, as a result of children’s use of their own personal experiences, become a bridge between media culture and educational practice (Björk-Willén, 2011; Klerfelt, 2004; Ljung-Djärf, 2004).
Klerfelt (2007a) shows how symbols are used as metaphors in gestures, verbal talk, and pictorial language by children and teachers in order to build common understandings of computer-based storytelling. Different modes of communication are used simultaneously, depending on what the interactions are directed toward. Klerfelt asserts that the computer itself, as a tool, «implies a changed communication» (Klerfelt, 2007b, p. 358). Björk-Willén’s (2011) study shows how children’s computer play encourages a more dynamic agency compared to book-reading. This agency consists of different semiotic resources such as gestures, visual fields, and verbal talk that act simultaneously. As a result of this, Björk-Willén (ibid) refers to children’s acting with computer games as intra-active. Savage’s study (2011) about children’s social interactions in «technology-rich» preschools in Scotland is consistent with the three examples from Swedish preschools above with regard to the complexity and multifaceted nature of the interactions between children and computers.

Previous research concerning the use of IWBs in preschool and primary classrooms demonstrates how the technology can both enable and constrain children’s activities. On the one hand, in play-oriented classrooms IWBs can facilitate smooth, speedy, innovative, and multimodal presentations (Gillen, Staarman, Littleton, Mercer, & Twiner, 2007; Morgan, 2010). On the other hand, IWBs can be deployed by teachers in ways that purposefully restrict the actions of children. Even if early childhood teachers describe teaching with an IWB as interactive, they tend to guide the children toward a preconceived idea, answer or activity. Morgan (2010) asserts that classrooms with an IWB, rather than enabling a holistic approach of creativity, play and interactivity, tend to support controlled and instructional approaches.

Children’s actions on their world, and through their bodies, leave traces of their interest that can be analyzed (Kress, 1997). Consequently, it is possible to study how children make meaning by studying the way that they organize resources in their interactions. The present study explore the links between early literacy processes, and the embodied and multimodal ways in which young children make meaning with interactive whiteboards. By providing a multimodal characterization of how children use IWBs, we can begin to situate «how literacy sits within a much wider communicative landscape» (Pahl & Rowsell, 2006. p. 8). To this end, this study seeks to address the following questions:

– How are children’s interactions with IWBs constructed?

– How do children use different modes in their interactions with an IWB?

Given the focus of this study on exploring the interaction between children’s bodily and verbal actions and the material resources in the environment, video analyses of these interactions were guided by Kress’ social-semiotic approach (Kress, 2010). Interactions subjected to this framework are evaluated with respect to the following questions: «Whose interest and agency is at work here
in the making of meaning?’, ‘What meaning is being made here?’, ‘How is meaning being made?’; ‘With what resources, in what social environment?’» (Kress, 2010 p. 57).

METHOD

The present study is part of a larger longitudinal research project entitled «Pre-school as children’s language environment» with an overall aim to investigate common aspects of the social and physical language environment in Swedish preschools (Björck-Åkesson et al, 2014). Focus was on the dimensions that constitute the language environment, variations of language environments, and on how children’s language interaction with each other were related to the language environment in preschool. In the larger study, the language environment was studied in 55 preschool units, and 185 preschool educators participated in the study, which was based on observations, questionnaires and focus groups. The larger study evoked questions that needed more detailed analyses, which resulted in four new studies using qualitative research methods.

In the present study, a special focus was on analyzing how technology devices (IWBs) enable interaction and use of language in preschool. The construction of data is based on video recorded observations in a preschool group with fifteen children aged one to three years, and four preschool teachers. The material as a whole consists of four hours and thirty seconds of video recordings collected over a period of six months. The educators, some of the children, and the researcher were acquainted with each other because the preschool was participating in the abovementioned research project about the language environment in Swedish preschools. The use of video-based fieldwork captures natural occurring interactions. It provides a material that is possible to revisit and analyze with different foci. It further enables a fine-grained material that captures multimodal interaction in its context. This allows for an explorative approach and careful reexamination of the material.

Ethical considerations

The project was approved by the Regional Ethical Review Board in Linköping, Sweden. Prior to the video recordings, informed consent was obtained from the children’s parents for their children to participate in the study. The children were asked, on each occasion, if they wanted to participate in the recordings, and the researcher was sensitive to how the children acted and related to both the camera and the researcher. This was a way to actively involve the children in the research situation and to work for their assent even though they had not reached the age of formal consent (Flewitt, 2006; James, Jenks, & Prout, 1998).

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An ongoing dialogue with parents, teachers and researchers enabled an ethical stance and a dialogue about the interpretations and findings. In this way, the study has strived to avoid being situated merely in its own context (Arminen, 2005; Flewitt, 2006). Excerpts containing photographs and text were for example shown to the parents together with a repeated request for the parents’ consent to use the material. The video recordings were also shown to the preschool educators creating a dialogue about the findings. Researchers at the university were involved through discussing the video recordings in relation to the research questions posed. The internal validity of the study is shown in the transparency of how the excerpts are treated and the possibility for the reader to follow the interpretations of those events.

Setting the scene

The video camera was directed toward the IWB, which was placed in a large open room, adjacent to the preschool entrance. Initially a tripod was used, but when the children showed curiosity and shyness toward the tripod, a change was made to hand-held video recording.

During the data collection period, the room was composed of the following: a stage, an IWB, computers, a couch, books, wooden blocks, a real boat, large cardboard rolls, and a dining area. The IWB was placed on the wall above the stage. It was attached to and used in the same way as a computer, except that the whiteboard covered a good portion of one wall (159 by 129 cm), and it had a heat-sensitive touch screen instead of a mouse. The preschool used a variety of software programs during this period, such as writing, drawing, photo, and video programs. The preschool also used online games, educational games, and the web camera.

Logging and transcribing the video data

First, the four hours and thirty seconds of video recordings covering the children interacting with the IWB were studied and transcribed as a whole. The material was then sorted into sequences showing close interaction when children approached or played with the IWB (Arminen, 2005). Selected episodes, that showed interaction related to specific affordances of the IWB, were then cut into short clips (of 20–120 seconds), that were analyzed in detail (Goodwin, 2000). This process moved constantly between the recordings and the transcriptions. The next step, which aimed to search for patterns in those sequences, was based on the following questions: “Whose interest and agency is at work here in the making of meaning?”, “What meaning is being made here?”, “How is meaning being made?”, “With what resources, in what social environment?” (Kress, 2010 p. 57). Two excerpts were selected to describe interactions that provide answers to the research questions posed. The first excerpt is from an event when the children are using a web camera. The second excerpt is from an event when one child is using a painting program. Special attention should be given to the fact that the activities in those excerpts cannot
be performed without the use of technology, which offers insight into potentials provided by the new technology.

EVENTS AT AN INTERACTIVE WHITEBOARD

The interactions that occur in the space between the children and the IWB are constructed by visual signs, sounds, and effects from the interactive board, and a variety of expressions, or modes, such as bodily gestures and verbal language from the children. To illustrate how the interactions were constructed the excerpts are presented with photos and detailed transcriptions from the video recordings, followed by an analysis.

Children’s visual, bodily and verbal explorations  
– Are we spinning or is it the board?

At one occasion during the period of data collection, the web camera was used on the IWB. The web camera was placed in the upper right corner of the IWB so that it mirrored the room and the children standing in a particular area in front of the board. The preschool teacher has added an effect to the web camera that makes the image on the board spin (see line 1).

In this free play situation, many children are moving around and playing in the room with different materials. In the recorded sequence of forty seconds, two of the children, Joel and Sofia, and one preschool teacher, Anna, are visible in the recorded area. The children can see themselves and their activities on the board as in a large mirror. Unlike a mirror, it is not the board itself that mirrors the activity. While a mirror will reflect a person who walks right up to it, one has to stand a certain distance from the board to be captured by the small camera and become visible on the board. Below follows a sequence in which Joel and Sofia stand turned toward the board, following the spinning circle with their bodies. In the following lines, they move their bodies back and forth in the same rhythm as the board. The preschool teacher is initially turned to the board (1–4) and then turns to face a passing child (5–23). She is not visible in the video recordings or in the clips that make up the last lines below.

Excerpt 1. Line 1–23

1 Joel: leans his upper body to the left
2 Sofia: gazes toward the board
3 ?
4 The board: Displays the children leaning to the left
5 Joel:

6 Sofia:

7 The board:

8 Preschool teacher:

9 Joel:

10 Sofia:

11 The board:

12 Joel:

13 Sofia:

14 The board:

15 Joel:

16 Sofia:
Joel and Sofia’s upper bodies are leaning left and right in the same rhythm as the board’s circular movements. In lines 1–8, their upper bodies lean in the same direction; in lines 9–11, their upper bodies move in separate directions. Sofia jumps, while Joel’s upper body is balancing from right to left (12–14). Their different choices, jumping and balancing the bodies, can be understood as a combination of Sofia’s and Joel’s different experiences of the visualization, differently movements in order to continually adapt to the changing orientation and constructions of new bodily signs. The bodily movements can be seen as part of the process of meaning-making that is created by the logic of three-dimensional space, technological functions, and the children’s own acti-
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vity and interest. It seems that they are exploring the space and connections between their own bodies and how they are displayed on the screen. In line 11, the IWB displays Joel and Sofia leaning to the left when they are actually leaning to the right. Joel and Sofia might have noticed this, and they explore this in two different ways. Joel explores what happens if he leans his upper body in the opposite direction. Sofia uses another strategy: She starts pushing her upper body more and more to the right (lines 16, 18 and 20) and in line 21 she bends her knees to push her body even further to the right. She also uses verbal language for the first and only time in this excerpt; she calls for the teacher’s attention by saying her name, «Anna, Anna» (line 21). Verbal language is used sparingly in the excerpts, aside from the phonological expressions «Whooaaaa» (line 3), and «Anna, Anna» (line 21). There are differences between how the children use those verbal expressions. While «Whooaaaa» can be understood as an expression that serves to balance the body in the spinning situation, «Anna, Anna,» can be understood as a verbal sign used to elicit attention.

The children’s interactions with the IWB combine bodily movements and verbal expressions. When Sofia leans her upper body more and more to the right (lines 16, 18, and 20), her body is stretched as far as possible, almost to the point at which the meeting of gravity and bodily limitations would result in falling. We can interpret this as Sofia exploring the boundaries of her body. This gives her agency. The physical material, the gravity and the images at the board, play a role in the interaction demanding bodily movements by Sofia, placing her personal interests and agency into a continuous flow that is reshaped in the interaction.

The description above shows that the visual modes on the board, the displayed image, and the children’s gestures, along with their explorations, construct the interaction. The interests that govern the children’s actions occur in the meeting of different modes, that is, what they see on the board affects the next step in the activity. The interaction creates a meeting in which different modes and their special possibilities for action are operating simultaneously. Moreover, the modes that are in use here are not yet codified. The children are experimenting with the options of the different modes in an ongoing meaning-making process. To understand which meaning the children are exploring in this excerpt requires thinking about the broader context beyond the interactional details. The situation when Sofia uses verbal talk to communicate her experience can for example be understood in various ways. It is, however, a moment when verbal language is not seen as separated from other modes.

**Bodily alliterations and sign-making**

The following excerpt of fifty seconds shows how Vera is using a painting software on the IWB it shows interaction between one child and the IWB in a free play situation.

1 makes circles by pressing her right index finger at the board
her gaze follows her arm

2 lifts the right index finger from the board
follows the shadow with her gaze

3 moves the right index finger so far down that the shadow dissapears
  gaze follows her right hand
  left hand is lifted
In the first three lines, Vera moves her fingers in circles on the board, an action that makes circles visible on the board. She then lifts her finger from the board and moves her arm downward. In the moving arm downward action that is visible in line 3 it appears that Vera is exploring how the shadow relates to her body. Her gaze is directed toward the right hand, and the left hand is not yet active. In line 4, she makes a circle on the board, a repetition of the action in lines 1 and 2. The circle is more marked here, as if it is now more deliberate. Vera now appears to be transitioning from exploring the connection between her body and the shadow to exploring how light and shadow can be used to make markings on the wall. In line 5, her gaze moves from her right to her left hand, as if she discovers the shadow of her left hand. The spread fingers call her attention. Vera’s gaze is focused on the lines on the board (line 1); the shadow (lines 2–3 and 5); and the connection between her own body, the shadow, and the board (lines 4 and 8). The body interacts as a response to what is visible for her at the board, as in line 4, where her left-hand fingers are spread as a response to what she sees happen with the shadow of her right-hand fingers.

Vera’s explorations are revealed by the interplay between her body and the environment. She does not use verbal language, and the explorations seem to
be directed toward the boundaries between her body, the shadow, and the marked lines on the board. The explorations are shaped in the meetings of different modes and they are constantly reshaped by how the technology responds.

Excerpt 2b. Line 6–9.

6 both hands are lifted from the board
gaze is toward the right

7 fingers on both hands spread and twist
gaze is directed towards the right hand

8 right finger touches and makes a line on the board
fingers on the left hand spread
gaze is directed towards the right
The repeated movements of Vera’s hands when they are lifted from the board in lines 6, 7 and 9 resemble a choreographed dance. Her hands are moving, her fingers are spread out, and her gaze is concentrated on the field to the right. Her left hand moves with the same intensity as her right. When her right hand rapidly touches the board and makes a line (line 8), it is, in a way, a repeated action, with the difference that the marking on the board takes the form of a line instead of a circle. The way Vera uses her arms and fingers can be interpreted as repetitive: she moves her arms in large circles and she spreads her fingers. However, a closer reading of the excerpt reveals differences in how her arms and fingers are lifted from the board. Her arms and fingers are moved so far down that the shadow disappears (line 3); the fingers spread and twist (line 7), draw a line (line 8), spread (line 10), and are finally placed flat on the board. The movements are precise, slow and concentrated. Vera meets and carefully explores the visual, multimodal and changing picture consisting of light, shadow, marked lines, and her own body. As soon as she detects the changes that her movements have on the visual display, she proceeds to repeat these movements.

This explorative process of repetition and change between Vera’s body and the board can be linked to the concept of visual alliteration, that Lind (2010) uses in her research about young children’s scribbles. Alliteration ordinarily refers to verbal or written repetition of the same sound at the beginning of each word in a series. In the following excerpt, however, the alliteration is bodily. Vera makes hand motions that contain repeated elements as well as slight deviations from these element. The small changes in the repetitions also exhibits what Olsson (2009) claims is a desire to construct problems. In the same moment that something becomes familiar, in for example Vera’s exploration about the shadow having something to do with her body, it can be problematized, tested and questioned.
The event seems to come to a close in lines 9–11. Vera’s hands are flat against the board, and her gaze has moved from the shadow to the teacher. Regarding the IWB as a medium that offers different modes such as images, colors, writing and drawing, the analysis above explored how these different modes cooperated simultaneously with Vera’s discoveries and embodied investigation. Vera’s interest and agency is at work: she is utilizing different modes – she uses
DISCUSSION

This study explored how the interaction between the children and the IWB is embodied and directed in multiple directions. It considered specifically how the children visually interpreted the movement of the different modes, for example images, colors, sounds, lines, shades and shadows on the IWB. The children carefully explored the boundaries between their own bodies, «me,» and the materiality, «outside.» In this explorative process, the children used their bodies together with the special affordances of the IWB to make gestural and visual signs. In what follows, the children’s interactions with the IWB will be discussed in relation to embodied interactions, processes of meaning-making and visual meanings related to early literacy.

BODILY INTERACTIONS IN MULTIPLE DIRECTIONS

The interactions between the children and the IWB are embodied: Joel, Sofia and Vera are jumping, bending their knees, leaning, laying still, moving their arms, spreading and twisting their fingers, all the while maintaining their gazes directed toward the IWB where the «results» of their actions are being projected. When they perceive changes in the images displayed, they correspondingly make adjustments with their bodies that serve as a kind of «answer» to these visual shifts. The interactions can thus be understood as an emerging product of the combination of the children’s interests and the possibilities created by the interaction with the IWB. It is the relationship between the functions of the IWB and interests of the children that affords the emergent interactions. The embodied interactions are repeated, as in Vera’s spreading fingers, as well as changed and tested, as when Vera twists her spreading fingers. This could be related to the repetition and changes as in Olsson’s (2009) approach to young children’s interaction. She claims that young children actively construct problems, and she views their bodily movements as «the art of constructing a problem» (p.182).

Gestures as means for expressions are important in young children’s processes of early literacy (Lancaster, 2012). Vygotsky (1978) claimed that young children’s gestures are writing in the air and that: «the gesture is the initial visual sign that contains the child’s future writing as an acorn contains a future oak» (p.107). The bodily gestures in the excerpts above seem to be turned in multiple directions and in multiple layers. They represent examples of actions that can help us to better understand young children’s literacy processes and use their bodies to encode, appropriate, negotiate and express meanings in technology-rich environments.
The embodied interactions also affect and expand the visual screen. In excerpt 2a, for example, Vera spreads her fingers while watching the visual field with the shadow and lines that occurs when she spreads her fingers. The interactions between the children and the IWB are thus directed in multiple ways, in multiple layers, and give responses in multiple directions simultaneously. This understanding challenges the concept of social interaction and could be linked to the growing research on the material meaning to human interaction (Løkken & Moser, 2012). In this view, materiality is included as a natural participant in the interaction, that is, a participant that contributes to interaction without first being separated and categorized as an object for humans to use in interaction (Latour, 2005).

**MEANING-MAKING – CAREFUL MEETINGS AND EXPLORATIONS OF MODES**

In this study, the children use and explore different modes that occur and change when they interact with the IWB. In excerpt 1, for example, Sofia jumps and stretches her body as far as possible while watching the visual changes at the IWB. This is one example of the exploration of boundaries between herself («me») and materiality. Sofia and her gestures is the manifestation of «me,» while materiality becomes «the spinning image of me.» When Sofia leans her body to the left, the IWB shows her body leaning to the right (lines 10–11). In this situation, the IWB produces visual representations that are counterintuitive: a body that leans to the left should under normal circumstances result in a representation of a body leaning to the left. Drawing on Kress’ (2012) differentiation between adults’ and young children’s processes of meaning-making, Sofia, as a young child, is oriented to what her senses tell her is the truth. According to Kress, when meaning-making is orientated to what the senses tell us is the truth, as for a young child, it leads to careful explorations «given what is at hand for making the meaning that they wish to make» (Ibid. p. 330). This is evident when Sofia begins to push her body more and more to the right, simultaneously using verbal communication calling for the teacher’s attention, saying, «Anna Anna.» The different modes cooperate in what Kress (2010) claims is a multimodal ensemble. Viewing this event from a social-semiotic view of multimodality, it can be understood as a process constructed by modes, interests, sign-making, and materiality (Kress, 2010). The above sequence, where Sofia explores the boundaries between herself and materiality, shows orchestration of different modes, each of them composing of its own possibilities. Image, for example, is based on the logic of location in space and «size, color, lines and shape» (Kress, 2010, p. 82). The logic of gestures is instead, according to Kress (2010), a combination of time and place: «There is a sequence in time through movement in arms and hands […] as well as their presence against the stable spatial frame» (p. 81).
MAKING VISUAL MEANINGS

Finally, there follows a discussion of the important role that gaze and visual representations played in the construction of the interactions explored above. When we attend to the children’s gaze in these interactions, we see that each child is carefully tracking the images produced by the IWB, as well as the shadows cast by their bodies on the IWB screen. What the children have in common is that they interact, interpret, make discoveries and make new actions, or signs, in processes that are basic for communication and also important aspects in early literacy processes (Lancaster, 2012). Vera’s making a circle action in excerpt 2a can be linked to Lancaster’s (2001) study of young children’s mark-making. Lancaster’s study shows how children under the age of two develop their own system of coding in their mark-making and that their marks represent distinct meanings that they are clear about. In the excerpt of Vera’s interaction, however, Vera does not say that she is reading or writing. What is visible is that she repeats her making of circles with different levels of intensity. However, from a NLS and multimodal approach, she is a reader and writer in that she participates in visual communication, and makes meaning using materials that are immediately available (Kress, 1997).

The interaction in the sequences: Children’s visual, bodily and verbal explorations – Are we spinning or is it the board? and Bodily alliterations and sign-making are, according to Kress (1997; 2010), part of children’s literate explorations in multimodal text production. Beyond any complete written text are social occasions in which people are interacting, listening, talking, exploring and playing. Accordingly, experiencing and learning about social occasions related to explorations of signs in different modes are part of literacy for young children. Young children, unlike adults, are not interested in the distinctions between language, letters and social practices. Neither are they interested in distinctions of special possibilities of technology. A text for young children, then, is far from two-dimensional. Rather, in accordance with Freire’s (1987) famous book of literacy education subtitled Reading the word and the world, a text should be understood as the world.

THEORETICAL CONTRIBUTIONS

The observations presented here are situated at the intersection between NLS and studies of multimodality. On the one hand, the detailed excerpts of the children’s multi-modal uses of the IWB provide insight regarding how young children explore «how the world operates» (Lankshear & Knobel, 2006, p. 9). Furthermore, the examples discussed highlight the ways in which children’s sign-making supports exploration (Kress, 2003), and how children continuously identify and evaluate new problems through these explorations. These observations can represent a new opening in developing a dynamic language theory at the intersection between NLS and studies of multimodality. This theory is of special importance for Swedish preschool, which has a governmental curriculum with goals directed towards young children’s (aged 1–6) literacy processes.
DIDACTICAL IMPLICATIONS FOR PRESCHOOL

The results in this study can support preschool educators in developing a conscious approach to the use of new technology, exemplified by the IWB, and literacy. The use of new technology in preschool creates a challenge for working with children’s meaning-making and initial literacy processes.

The foundation of the educational activities in Swedish preschool should focus on activities that contribute to children’s understanding of themselves and the surrounding world. It should be characterized by a sense of exploration, curiosity and a desire to learn (The Swedish National Agency for Education, 2010). This study shows that young children use a multitude of modes in exploring and understanding themselves and their surroundings using new technology. For preschool educators, new technologies may offer new ways of enhancing children’s meaning-making, play and learning. In order to help preschool educators leverage this potential of new technologies, it is critical to provide them with a theoretical framework for conceptualizing the different literacies that preschool children are engaged in. Preschool educators need to understand theories about multimodal interaction and communication (Kress, 1997; 2010) and early literacy (Gee, 2008; Lancaster, 2012), in order to comprehend the didactic challenges related to the use of new technology, and to develop practices that include the new technologies. The theories are needed to understand children’s complex use of social and material modes in play, interaction and communication. This understanding of children’s competence may result in preschool teachers avoiding controlled and instructional approaches to the IWB (Morgan, 2010), and instead experiencing the IWB and new technology as a means for children’s creativity, play and learning (Gillen et al. 2007).

REFERENCES


