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Events of potential learning: how preschoolers produce curriculum at the computer during free play periods

Bevemyr, Mats: Lecturer, Department of Behavioural Sciences and Learning.devision of Education, Teaching and Learning, Linköping University, Sweeden. E-mail: mats.bevemyr@liu.se
Björk-Willén, Polly: Senior Lecturer in Educational Practice, Department of Social and Welfare Studies (ISV), Linköping University, Sweeden. E: mail: polly.bjork-willen@liu.se

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Abstract: The Swedish preschool curriculum emphasizes children's learning through play. This means that children's learning in everyday practice is accomplished through a complex mixture of teacher-led activities and activities the children themselves initiate. When learning is viewed as situated and constituted through social interaction (Lave & Wenger, 1991), almost all social events have learning potential. Consequently, from an educational and a curriculum point of view it is important to raise the question of *how* children's learning can be made visible, and determine what kind of learning children's own initiated (play) activities imply. The focus of the paper is on children's (aged 3-5 years) "*communities of practice*" at the computer during "free play" period in two various Swedish preschools settings. Events of peer interaction are analyzed in detail to illustrate what kind of learning activities are going on at the computer, and to discuss these events of potential learning in relation to the curriculum goals and the educational practice. From a curriculum point of view, the analyses show that the children's activities at the computer involve a variety of events that might provides for learning that can be viewed as goal-oriented. From the children's point of view, the project of socialization seems to be the most prominent goal. A crucial point for educational success, however, is to understand not only what the object of learning is, rather what motivates children's *play apprenticeship* in their own "communities of practice".

Keywords: events of potential learning, preschool, social interaction, computer use

Introduction and aim

It is not an easy task to define what kind of situations provide for children's learning on the whole. Neither is children's learning easy to capture, especially in a Swedish preschool[1] environment. The Swedish preschool curriculum is namely built on a combination of teacher-led activities, such as circle time and project work, and activities the children initiate themselves during "free play" periods, which requires that teachers are able to pick up on the children's own interest and learning, and elaborate it into an educational issue. The present paper is based on a view of *learning as situated and constituted through social interaction.* This perspective on learning originates from Vygotsky's (1986) work on the relationships between language and the development of learning and thinking. However, this view highlights the social rather than the cognitive nature of learning, and regards learning (and cognition) as something that takes place between people rather than inside the individual mind (Lave and Wenger 1991; Macbeth 2000; Mehan 1979; Rogoff 2003; Säljö, 2000). When Lave and Wenger (1991) formulate a theory on learning, it is about learning as a dimension of social practices. They call the process of learning a *legitimate peripheral participation*, the use of which they describe as:

"Legitimate peripheral participation" provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice (Lave & Wenger, 1991 p. 29)

Even if almost all social events have learning potential, it is very difficult to capture the learning process analytically. Viewing learning as *changing participation* (Lave, 1993) gives the analyst the possibility to make the learning process visible by empirically demonstrating how talk and action may change over time (see Martin, 2009; for further discussion on trajectories of learning, see also Melander, 2009). In the present paper, however, we aim to study children's social interaction as separate events at the computer, seeing these activities as a kind of "play apprenticeship" (Björk-Willén & Aronsson, 2014, p 327). In these spontaneous *communities of practice* (Lave & Wenger, 1991), involving children with various experiences and knowledge, learning probably takes place. Therefore, in this paper we have chosen to talk about *events of potential learning* instead of learning per se.

The overall aim of the paper is to explore preschoolers' interaction at the computer during free play period in Swedish preschool classrooms. More specifically, it aims to investigate what kind of (potential) learning events go on at the computer and make it visible through detailed analysis of how the children orient towards various learning issues. Finally, we aim to discuss these events of potential learning in relation to the goals of the curriculum and to children's own interest and play apprenticeship.

Play as a learning device in the Swedish preschool curriculum

To get an understanding of the Swedish preschool curriculum, we intend to point out some central issues regarding how children's play and learning are expressed in the curriculum document. There the concepts of learning as well as play are frequently used; however, they are not obviously theoretically based or problematized but are rather taken for granted. The following passage refers to the way learning (and play) is used and emphasized in the text of the curriculum.

The Swedish preschool curriculum, revised in 2010, is *goal-oriented*. This means that its goals specify the orientation of the work at the preschool. The curriculum emphasizes that "the preschool should lay the foundations for lifelong learning", whereby "care, socialization and learning together

[1] T The Swedish preschool is a type of school for children between 1-5 years old that combines (day) care and education.

form a coherent whole" (Skolverket, 2010 p. 4). Consequently, children's learning is incorporated into all the activities at preschool. The importance of *peer teaching* and *learning* is also underlined, and *play* is pointed out as highly crucial for preschool children's development and *learning*. The curriculum specifies that:

> "Conscious use of play to promote the development and learning of each individual child should always be present in preschool activities. Play and enjoyment in learning in all its various forms stimulate the imagination, insight, communication and the ability to think symbolically, as well as the ability to co-operate and solve problems. Through creative and gestalt play, the child is given opportunities to express and work through his or her experiences and feelings" (Skolverket, 2010, p. 6).

Besides the focus on play and learning, the revised curriculum elucidates and stresses goals that concern the introduction of mathematics, literacy, science and technology for preschoolers. It also emphasizes that *playful learning* at preschool has a positive impact on children's *further learning* at school. In the curriculum play is highlighted more as a learning tool than as an activity in its own right, even if it is defined as an activity that is spontaneous, pleasurable and voluntary. Moreover, the curriculum stresses that play cannot be separated from learning, as play and learning are viewed as two sides of the same coin. For example, children's experience of mathematics at preschool could be seen as both the goal and the means of learning. According to these lines of argument, children's spontaneous activities and play can result in events of learning, which can be transformed into more formalized and planned learning activities if the teacher pays attention and picks up the "object of learning" (Pramling Samuelsson & Asplund Carlsson, 2008 pp. 627-628). Below we will further highlight how the relationship between play and learning is emphasized in some other sources and studies.

Playful learning

The notion of play-based learning originates from Friedrich Froebel's thinking about learning and play. Manning (2005) points out that Froebel's philosophy revolves around three main ideas: "the unity of creations, respect for children as individuals, and the importance of play in children's education" (p. 372). However, Froebel highlighted that the kindergarten teacher has a powerful role in guiding the children through activities, and asserted that the teacher should find the balance within the curriculum for the child to express him or herself freely and develop his or her own space (Manning, 2005). On the importance of play in learning, Froebel (1887/1974) further wrote:

> "Play is the highest phase of children's development – of human development at this period. Play is the purest most spiritual activity of a man at this stage, and at the same time, typical of human life as a whole – of inner hidden natural life in a man and all things. It gives, therefore, joy, freedom, contentment, inner and outer rest, peace with the world. It holds the sources of all that is good" (pp. 54-55).

Froebel's thoughts and work still exist and influence the Swedish preschool curriculum. The Swedish preschool practice has long been to emphasize play in work with children, and even if play and learning activities traditionally used to be scheduled separately, today play is seen as an important educational tool. A play-based curriculum highly values children's play, regarding it as an essential instrument in connection with children's development and learning. However, play can be viewed from a range of different perspectives. For example, sociological and educational studies of play often view play activities as a breeding ground for peer socialization (Corsaro, 1985; Cromdal, 2006;

Schwartzman, 1978; Thorell, 1998). Development-oriented researchers, on their part, often view play as an arena where children explore concepts and language, and develop a whole range of mental as well as social skills (e.g. Garvey, 1980). Even if the phenomenon of play has many interpretations, as mentioned above play is still today an important part of the Swedish preschool curriculum. Hence, almost every preschool schedules a *free play* period on a daily basis. This means that children are free to choose any activity they wish without interference from the adults. However, even if free play periods mean that children are free to choose play activities themselves, the teachers initially have prepared the environment, chosen the play artifacts and set up the framework of the play, such as the number of children taking part in each activity or, as in this study, what kind of computer games are available. Besides the impact of Froebel's ideas, free play period is also influenced by both Jean Piagét's (1896-1980) and Erik Homburger Erikson's (1902-1994) views on play. Whereas the Piagét child was to explore the world through his or her own driving force, the Ericsson child was not to be interrupted during play, as the child processes his or her experiences and feelings while playing.

As the Swedish preschool has a very long tradition of being a place for *playful learning*, there are also a number of studies that explore preschoolers' learning from such perspectives (see for example Sutton-Smith, 1979; Lindahl & Pramling Samuelsson, 2002; Björklund, 2010). However, some research projects more clearly investigate the relationship between play and learning; for example, Pramling Samuelsson and Johansson (2006) found similarities between the separate phenomena, considering what is characteristic of the two. In play and learning, joy, creativity and creation of meaning were all dimensions that seemed possible and important, as well as children's possibilities to control and form goals. In line with the curriculum, Pramling Samuelsson and Asplund Carlsson (2008) argue that learning and play cannot be separated, as there are dimensions of play within learning and vice versa. They also emphasize that the perspective of goal orientation when guiding the *playing learning* child is a challenge for preschool teachers. This challenge means that teachers have to simultaneously be child-oriented and directed toward the object of learning. Learning events can also occur the other way around. A study of children's language use in a bilingual preschool environment shows how bilingual preschool children enact previously experienced second language-oriented educational activities during "free play" by transforming a set of educational routines for their own purposes within the current activity. That means that during free play children transform the social and educational order into their play, positioning themselves as teacher or pupil(s) (Björk-Willén & Cromdal, 2009; see also Ginsburg, 2006).

Computers at preschool

The use of computers[2] as part of the pedagogical environment in preschool is another example of how learning is incooperated in play. Computer games produced for young children are often based on immediate interaction between child and computer, and frequently have the nature of "edutainment", a concept that intends to combine entertainment and learning (Ito, 2009). Preschool children are currently a growing group of digital game consumers. The fact that commercial interests position children as potential consumers is well known (Cook, 2004; Cross, 1997; Seiter, 1993). In public opinion consumerism has often been, and still is, considered unhealthy for or even damaging to children (Buckingham, 2007). Perhaps this is why many preschool teachers persist to regard children's use of computers in preschool as highly controversial, as they often relate children's computer use to static and reproducing activities compared to children's creativity in play (Ljung-Djärf & Tullgren, 2009). Several studies also show that many teachers are still uncomfortable with digital media. However, other studies highlight the educational potential of the computer, and show how it offers

[2] Here computers also include iPads, touch boards and similar devices. The present data, however, derive from the use of ordinary computers, which are still besides iPads common ICT devices in Swedish preschools.

children possibilities for social interaction as well as cooperation and learning (Klerfelt, 2004; Gee, 2006). The curriculum outlines that stress the importance to document the preschool practice has however improved the educator's IT knowledge, because digital devices are often used as tools for the documentation.

It is important to add that even if most computer games are designed for a single user, in preschools two or more children are usually simultaneously sitting or standing in front of the screen. This in turn constitutes a breeding ground for children to collaborate and negotiate with each other. It is also notable that the computer is an actor itself that the children have to take into consideration (see Björk-Willén, 2012). We assert that children's computer use is of special interest to study, because the activity around the screen offers an interesting intersection between co-play and learning whereby the relationship between newcomers, old-timers and artifacts is crucial - a community of practice at the computer.

Method

Participants and the Setting

This paper draws on data from two studies on children´s interactional practices at the computer[3]. In both studies, children's computer use in preschool settings during free play periods, have been video-recorded. The first study draws on data from *two* preschool classrooms, with the total corpus of data covering ten hours of video recordings. Each preschool classroom housed up to 20 children, both boys and girls, and three educators (preschool teachers and child minders[4]). Many of the children had Swedish as their second language. The second study draws on data from *one* preschool and four hours of video recordings. 22 children participated and three educators. In both studies, girls and boys, aged three to five, took part in the computer activities recorded. Both preschools were located in a medium-sized town in Sweden.

Recordings and analysis

All data from the children's free play activity at the computer were digitalized and indexed with respect to various interactional patterns that were found. In a first step, the recordings were looked through with an ambition to find interactional patterns that stood out. In a second step, we looked more closely for interactional patterns that could be related to the goal of the curriculum and to the children's way of participating. In all we identified two recurrent patterns of interaction at the computer, which we named *peer teaching* and *everyday mathematics*. The following excerpts are examples taken from these two areas.

Transcriptions were prepared using conversation analysis notation (cf. Hutchby & Wooffitt, 1998); see Appendix A, below, for the transcription key. The theoretical framework of the analyses was influenced by ethnomethodological work on social action, focusing particularly on the

[3] The first study is a part of a larger project funded by the Swedish Research Council and led by Prof. Karin Aronsson. The project (VR no. 2007-3208) deals with the way children and young people draw on interactional and aesthetic resources in their computer gaming in naturalistic everyday settings, including preschools. The second study is a part of a PhD project whose overall aim is to give a broader understanding of what constitutes mathematics in preschool, and how mathematical concepts can emerge in the play of children aged three to five years as they interact with computer games designed to teach early mathematics.

[4] In Sweden most preschool teams consist of staff from two different professions, preschool teachers and child minders. The preschool teachers receive three and a half years of university education, and the child minders have a secondary school degree. The teachers hold the primary responsibility in carrying out the educational practice, even if the child minders generally do the same work.

participants' methodical ways of accomplishing and making sense of social activities. In brief, the children's practical accomplishment of everyday interaction at the computer in preschool is analyzed in detail from a participant-oriented perspective on interactional conduct (Schegloff, 1999). To fully understand participants' methods of making sense other aspects of the interaction must be taken into account, for example nonverbal actions, the organization of free play, social norms, artifacts (the computer equipment) and so on. Goodwin (2000) argues that: "Theory of action must come to terms with both the details of language use and the way in which the social, cultural, material and sequential structure of the environment where actions occurs, figure into its organization" (p. 1491).

In excerpts 2 and 4, the nonverbal action in the children's interaction is of special importance for the analyses. Therefore, the nonverbal turns are treated in their own right (Goodwin, 2000, 2003), and are presented in italics in the transcripts (our own addition to the standard transcription conventions). All names of persons and places have been changed to preserve the participants' anonymity.

Communities of practice at the computer

At the studied preschools, the children on a daily basis used the computer during the free play period. Only one computer in each classroom causes problems that the preschools have solved in various ways. For example, at one of the preschools the teachers have arranged a timetable for the children. The children's usage time at the computer was also limited, and to keep track of the time an egg timer was used in one of the classrooms. The teachers also declared different goals for the computer use. At one of the preschools they maintained that the children's computer use supports their cooperation with peers, but that also is a democratic project in that it gives all children the possibility to learn to handle a computer (excerpts 1 and 2). At the other preschool, the teachers emphasized the benefit of educational computer games (excerpts 3 and 4).

Peer teaching and "learning" in cooperation

In an early study, Williams (2001) shed light on children's spontaneous learning from each other at preschool. In her study, she highlighted everyday routine activities as a hotbed for children to learn from each other to be part of their peer culture. One can say that peer teaching and learning form a crucial part of children's everyday interaction and socialization. In the analyses we do not treat play and game as separated entities (Vygotsky, 1996), but as situated activities in children's peer cultures (Evaldsson & Corsaro, 1998; Evaldsson, 2009).

In the first set of computer gaming data, there was a range of examples of peer collaboration and children learning from each other. Below we will use two separate examples to illustrate how peer teaching at the computer is accomplished.

Word recycling

In the first excerpt, three children are sitting at the computer. George, five years old, is handling the computer mouse and to his left sits Bill, three years old, in a highchair (to reach the level of the computer). Another child, not active in this excerpt, sits to George's right. George is playing a computer memory game. When we enter the activity, the interaction between George and Bill has been in progress for a brief period.

Excerpt 1 (2008-11-24). Participants: George (five years old) and Bill (three years old).

1	Bill:	**what's here *points at the screen***
		va finns här

2	George:	**tiger**=
		tiger=
3	Bill:	=**tiger**
		=tiger
4	Bill:	**what's this *points at the screen* what's this**
		va de här va de här
5	George:	**hamburger**
		hamburgare
6	Computer:	**egg**=
		ägg=
7	George:	=**egg**
		=ägg
8	Computer:	**ice cream**=
		glass=
9	George:	=**ice cream**=
		=glass=
10	Bill:	=**ice cream**
		=glass

In the apparently simple word recycling illustrated above, some interesting interactional phenomena can be discovered. The young child, Bill, is very active and eager to know what's on the screen, and on line 3 repeats the word George has just verbalized. Bill continues to ask, "what's this", and George responds (line 5). In the next line, when George has produced a new picture on the screen, representing an egg, it is the computer voice that begins to speak and that names the egg. George produces an immediate response, repeating the word "egg". When the next picture is displayed and the voice again verbalizes a new concept, George repeats the word and Bill follows the trajectory of word recycling.

Here the function of the memory game has more similarities with a children's picture book than a memory game. This is because George does not play the game as its creator intended; he simply makes different pictures display. His simplifying of the game can be interpreted as his doing so to suit his younger peer, which also implies that he positions himself as an *old-timer* (Lave & Wenger, 1991; Macbeth, 2000). His responses to Bill's questioning are namely displayed in a way that can be recognized as a teaching manner (Seedhouse, 2004). On line 6, however, the computer voice suddenly turns up and takes over the teaching position, naming the pictures, and the children follow suit; however, George still takes the leading position and initiates the activity of word recycling.

This example can be seen as a situation that gives Bill the opportunity to learn (new) concepts/words, especially as Swedish is not Bill's native language. The recycling of words also has similarities with a method common in language classrooms known as a "language drill" (cf. Cekaite and Aronsson, 2005). In the present situation, however, the computer voice also participates and this means that the children have to consider a third participant as a mediator of words. The excerpt shows how the children smoothly intertwine the computer voice into their ongoing interaction. This resembles a study, from the same data, that investigates preschoolers' animation of computer characters; it is shown how the children respond to directives demanded by the game character, or recycles the game characters' moves, partly modeling their conversation on the characters' ways of speaking (Björk-Willén & Aronsson, 2014). Even if computer games are designed as single-person games, the children in the excerpt above transform the one-to-one turn taking between gamer and game character into multiparty interaction, so to say "redesigning" the game to fit their own purposes and to involve co-participants' actions.

Hands-on teaching

The next excerpt aims to illustrate how peer teaching is accomplished when it comes to maneuvering the computer pointer when gaming. Ali, age four, is playing a computer game he truly does not master. Thomas, age five, sits to his left, and supports the gaming both verbally and non-verbally. Thomas is an experienced gamer, and often scaffolds other children in how to follow and interpret the symbols on the screen, or, like here, in how to maneuver the arrow keys on the keyboard.

Excerpt 2 (2008-11-26). Participants: Thomas five and Ali, four years old.

1	Thomas:	**that way [*points to the left on the screen***
		dit
2	Ali:	**[*clicks on the left arrow***
3	Thomas:	**up [*points up***
		upp
4	Ali:	**[*clicks on the left arrow***
5	Thomas:	**that way *points to the right on the screen***
		dit
6	Ali:	***moves the wrong arrow***
7	Thomas:	**that way I said *continues to point***
		dit sa jag
8	Thomas:	**[you have to go tha:t way *continues to point***
		du ska gå di:t
9	Ali:	**[*clicks the arrow unsuccessfully***
10	Thomas:	**that way that way down there**
		dit dit dit ner
11		***bends his finger on "down there"***
12	Ali:	**xx**
13	Thomas:	**that way**
		dit
14	Thomas:	***shows Ali on the keyboard what to do***
		visar på tangentbordet hur Ali ska göra
15	Ali:	***removes his hand from the keyboard***

The interaction between Thomas and Ali illustrates a real hands-on situation. Sitting close to Ali, Thomas clearly scaffolds him turn-by-turn in how to click the appropriate arrow key on the keyboard to move the pointer on the screen in the right direction. He combines his gaming instructions with distinct expressed gestures (see Klerfelt, 2005), which are sequentially organized and deployed as a semiotic modality in their own right (Goodwin, 2000). During the whole excerpt Ali distinctly gazes at the screen. After a successful opening, Thomas has to repeat his instructions on lines 7-8, 10 and 13, and apparently becomes increasingly frustrated, as Ali does not seem to follow them. In line 14 he simply takes over the keyboard and literally shows Ali how to play the game. Ali, on the other hand, makes no objection, and throughout the entire interaction does not talk at all, instead concentrating on using the keyboard while gazing at the screen.

Both excerpts 1 and 2 show how a more experienced child teaches another child at the computer, and in both examples the two children position themselves as teacher and pupil. Björk-Willén and Cromdal (2009) show how the social order of education is transformed into preschool children's play through the children's invocation and construction of the institutional identities of "teacher" and "pupil". In the examples above, however, the peer-teaching events originate in situ, in

which the old-timer (Lave & Wenger, 1991; Macbeth, 2000) is spontaneously highlighting concepts (excerpt 1) and scaffolding in how to handle the computer (excerpt 2). It is also shown how the computer works as an active part providing sound, talk, pictures, etc. that the children continuously configure (Goodwin, 2000) and integrate into their interaction (c.f. Björk-Willén 2012).

In sum, the peer teaching in the two examples above enact both local and curriculum learning goals during their activities. As mentioned above, the local goals for computer use at the present preschool are to give the children possibilities to learn to handle the computer (see excerpt 2) and to cooperate with peers, which are achieved in both excerpts. From a curriculum point of view, the learning of concepts is a part of early literacy goals, and peer collaboration is stated as a device for learning.

As mentioned earlier, mathematics is, by the side of language, one of the subjects underlined in the revised curriculum. Learning math can be carried out in many ways at preschool. For example, many computer games are designed to teach children math. The next two excerpts aim to show how children *do* mathematics, not explicitly but embedded within their interaction around the computer screen.

Math as a tool for social organization

Mathematics in everyday life can be seen as a way of describing measurable relationships between objects in the surrounding world (Schoenfeld, 1994). To communicate with and understand the surrounding world, it is important for children to understand and use mathematical related concepts describing differences, similarities and patterns concerning time, space and quantities in their everyday life. Björklund (2008, 2010) shows that in communication with other children and adults in real-life activities, children have rich opportunities to get a qualitatively better understanding of the concepts used (see also Bevemyr, 2014).

The following excerpt takes place in front of a computer during free play period. In front of the computer, there is a couch with room for three children. The children at this preschool are allowed to use the computer for gaming for five minutes each – this time a math game is on the agenda. To keep the gaming time, a timer is placed close to the computer. In the episode below, three five-year-olds (Elvis, Hanna and Lisa) negotiate about how long the present player (Elvis) can play before it is the next player's turn. When we enter the activity, the timer has just rung:

Excerpt 3 (2009-04-13). Participants: Elvis, Hanna and Lisa, all five years old.

1	Elvis:	**I'm just going to do one more exercise**
		jag ska bara göra en till övning
2	Lisa:	**then (1) we do that (xx) then**
		då gör (1) vi (xx) den här då
3	Elvis:	**it's the last one then**
		det är den sista då
4	Hanna:	**yes**
		ja
5	Elvis:	**yes**
		ja
6	Hanna:	**I´m number three**
		jag är trea
7	Elvis:	**two re(x) we have to choose two rewards**
		två be(x) vi ska välja två belöningar
8	Lisa:	**you only get to do two more times now then**
		då får du göra två gånger till bara nu då

9	Elvis:	**no one**
		nej en

The sound from the timer is the signal to change players. Elvis argues that he is going to play one more time (line 1). To prevent or abate objections from the other children, on line 3 he declares that this will be the last time he plays. Elvis and Lisa seem to come to an agreement about the order of turn, and Hanna also agrees by stating that she will be number three (lines 4-6). Elvis then expresses that they now have to choose two rewards (line 7), something that Lisa misunderstands, and believes he wants to play two more times, which she also sanctions (line 8). Elvis, however, corrects her misunderstanding and makes clear that he is only going to play once more.

In the excerpt above, the children use mathematical related concepts like *one more* (line 1), *last one* (line 3), *number three* (line 6), *two* [rewards] (line 7), *two more times* (line 8) and *one [more time]* (line 9) to negotiate and organize their social activity. In doing so, they make use of various such concepts that are relevant and meaningful to them in this specific social context. This kind of knowledge also qualifies them to participate in this community of practice at the computer.

The excerpt further shows how the children's employment of a few mathematical concepts is used to organize and negotiate when to change players and also their order of turn when gaming. It is notable that the math game that the children are playing in fact seems to have a rather subordinate role. Instead, the event of potential learning mainly takes place *in front of* rather than *at* the computer. In any case, the computer as an artifact has a great influence on the children's interaction since its use attracts the children and, as has been shown, motivates them to organize their participation in a rather sophisticated way.

If we analyze the children's activity from a curricular point of view, their practice of mathematical concepts is clearly goal-oriented, because the curriculum recommends that children experience and learn basic math at preschool. However, the mathematical practice is not obvious to the children as it is hidden within the interactional business of turn taking for the gaming. On the other hand, this can be seen as a clear example of an event in which a teacher, if present, could have grasped the potential of learning and made the children aware of the mathematical practice they were staging in front of the computer.

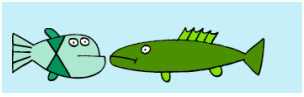
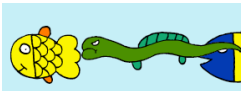
Shifting agenda

Something that is rather common in the present data is that the children play the games in other ways than what is supposed or intended (compare with excerpt 1). Producers of edutainment games often include instructions or a kind of game plan within the game that the child should follow to achieve the (learning) goal of the game. For various reasons, children occasionally do not obey this game plan but instead deliberately choose to accomplish an agenda of their own. One reason for this may be that they feel the game plan is too difficult to understand. Another reason may be that they believe the challenges and tasks of the game are either too hard or too easy, or simply that it is more fun to play it in another way than intended.

The excerpt below shows four five-year-old children playing a computer game at preschool. Emma sits in front of the computer handling the mouse, with Katie on her left. Jack and Adam are standing behind the girls - Jack on the left and Adam on the right. The teacher's intention for letting the children play this game during free play is to give them an opportunity to practice similarity in shape and pattern in an enjoyable way. Making children familiar with such similarities is part of the mathematics objectives in the Swedish preschool curriculum. During the game, the children are instructed by a recorded voice telling them how to pair fishes with same shape and pattern, by dragging them across the screen with the mouse. The computer voice says "Click and drag one of the fishes that swim by to a matching fish that is "standing and resting". The children are all involved in

playing the game, despite the fact that Emma is the only one handling the mouse. When two similar fishes are placed in front of each other, a juicy kiss sounds from the computer and the children all cheer loudly. Such is the stage at which we enter the excerpt:

Excerpt 4 (2009-04-13). Participants: Jack, Katie and Emma, all five years old.

1	All:	**HA HA [HA HA**	
2	Jack:	**[did you see**	
		[såg ni	
3	All:	**HA HA [HA HA**	
4	Katie:	**[pick the wrong fishes**	
		[ta fel fiskar	
5	Emma:	**y**	***drags a pink fish in***
6			***front of a fish***
7			**"standing and resting"**
8			
9	All:	**ha ha**	
10		**(x)**	
11	Emma:		***drags an eel so it will***
12			***kiss another fish***
13			**"standing and resting"**
14			
15	All:	**ha ha [ha ha**	
16	Adam:	**[did you see the eel**	
		[såg ni ålen	
17	All:	**ha ha [ha [ha**	
18	Adam:	**[ä:::**	
19	Jack:	**maybe the eel should kiss him**	
		ålen kanske ska pussa honom	
20			***points his finger at the***
21			***green fish*** **"standing and**
22			**resting"**
23			
24	All:	**ha ha**	

When Emma accidently pairs a fish that is not at all like the fish "standing and resting", this seems to cause the children to laugh (line 1). The laughter continues after Jack pays attention to the mismatch (line 2). Judging by the children's laughter on lines 1 and 3, the experienced mismatch probably does not simply derive from a mismatch of similarity in shape and pattern, but more likely also has a social dimension whereby social norms of what is and what is not appropriate come into play. When Katie suggests on line 4 that they keep picking the wrong fishes, she verbally displays this new social agenda. On lines 5-8 Emma follows suit, putting a small pink fish with big red lips in front of a green fish with a large protruding jaw. This action makes all the children laugh (line 9).

When Emma later tries to pair an angry looking eel with a small, cute yellow fish, all the children laugh loudly (line 15). The reason they laugh is most certainly the same as earlier, possibly intensified by the fact that the eel seems to try to kiss the yellow fish from behind. On line 16 Adam strengthens the focus on the eel's "behavior" and the laughter continues, while Adam makes a sound that can be interpreted as a way of expressing his dislike (line 18). When the laughter has subsided, Jack suggests that the eel should perhaps kiss the green fish (line 19). Both the angry looking eel and the green fish with the large protruding jaw can be recognized as "male fishes", something Jack has probably noticed, as he points at the green fish and says "maybe the eel should kiss him" (lines 19-23). His new suggestion to display another mismatch – this time with two male fishes - is received with laughter from the other children. Above all the excerpt demonstrates that the children already had an understanding of the aim of the game and its design. Because of that, the shift from a mathematical agenda to a social one, challenging social norms of what is and is not appropriate, has taken place. In sum, their knowledge about the game gives them the possibility to use it in a different (new) way and for their own purpose.

From a learning point of view, this excerpt also shows that children do not always follow the agenda intended by the teacher or the game provider, because it might not be challenging enough. This is not to say that the children learn nothing from playing the math game in an alternative way; when they change agenda the objects of learning – knowledge about similarities in shape and pattern – have not disappeared but have merely been exchanged and elaborated. Condition for this elaboration is their understanding of similarities and differences between the shape and pattern of the fishes. When the children change the order of the math game to fit their own social agenda, the event of matching fishes instead provides an arena for them to reflect on social norms and stretch the limits of social order.

Concluding discussion

The aim of the present article is to explore preschoolers' own initiated *communities of practice* at the computer, which reveal *events of potential learning,* and to discuss these events in relation to the curriculum goals and the children's own interest and *play apprenticeship*. By analyzing children's activities at the computer in detail and how they orient towards various learning issues, we have shown a variety of events of potential learning at the computer. As a consequence, a range of possible learning objects have been made visible, like language (word recycling), math (order of turn) or social organization, physical practice (how to use the keyboard) and social norms (examining the limits of social order). How can we interpret these different scenarios of learning practices? First of all, we have shown how the computer assumes an important role in the children's interaction as both a multimodal actor and an attractive artifact, which tempts them to take part in the activity, but perhaps not always with the function intended by the game producers or preschool teachers. In all the excerpts the computer games have, for most of the children, a secondary importance during the activities. In excerpts 1 and 4, the games are even transformed by the children to suit their own purposes. In excerpt 2 the game works as physical (hands-on) practice rather than gaming, and in excerpt 3 it is the negotiation of turn order prior to gaming that stands in the foreground. There are several possible explanations for the children's neglect of the computer games, namely i) the games are not challenging enough for them, ii) the games are meant for a single user but are handled by a group of children; or iii) the social business between the children is more important than the gaming. What is of particular interest is that the social aspect, rather than the gaming in itself, seems to be the driving force for the children to participate in these communities of practice at the computer. According to Lave and Wenger (1991), the driving force for participation in an everyday community of practice is to become a full practitioner. This is accomplished through learning more about *how*, *when*, and *what* old-timers

collaborate in this special practice, for example what to laugh about, how to handle the mouse, or how to click the appropriate arrow key on the keyboard.

From an educational point of view the object of learning according to the curriculum is not always clearly obvious in our data, at least not to the children. It is easy to name, but not to follow, Froebel's suggestion proclaiming that preschool teachers should capture the situation of children's own playful learning for further elaboration within their work (Manning, 2005). Or, as Pramling Samuelsson and Asplund Carlsson (2008) point out: preschool teachers can shed light on the children's play activities and make them objects of learning. In excerpt 3, for example, we have shown how children use math concepts to organize their order of turn. From a curricular and a teaching angle, this can be seen as an event of potential math learning, similar to excerpt 4, in which fairness and social norms could be further used for educational purposes. On the other hand, in excerpts 1 and 2 it is easier to grasp the object of learning, as the word recycling and the hands-on scaffolding are more obvious. The learning event between an old-timer and a novice is also more clearly displayed here.

In conclusion, the playful activities at the computer during the *free play* period give rise to a range of events that are headed for various kind of learning (Evaldsson & Aarsand, 2011). However, it is not altogether easy to grasp what the object of learning is since it also must be related to for whom, and from whose perspective, it is chosen. But it might not be the object of learning that is essential in the first place, but rather understanding how children organize play apprenticeship in their own communities of practice. From the children's point of view, peer socialization seems to have high priority during the free play activities at the computer. In that case, what can the educational practice learn from this? What actually motivates and drives children to participate in their own initiated communities of practice – is it to be a full practitioner or is it just to have fun? One conclusion to draw is that we need more detailed studies about how children socially organize their participation in various spontaneous communities of practice in preschool to fully understand and grasp the potential of learning. Our study, however, gives a hint that rather than discovering the objects of learning, the real educational challenge is to make visible the trajectory of learning and how learning is accomplished.

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Appendix A

[ ]	Square brackets mark the start and termination of overlapping speech.
Underlining	Signals emphasis; the extent of underlining within individual words denotes emphasis.
CAPITALS	Capital letters mark speech that is obviously louder than surrounding speech.
◦	Quieter speech
(2)	Pauses measured in seconds
(.)	Micro-pause
((text))	Transcribers' comments
:	Prolongation of preceding vowel
.	Falling intonation
> word<	Quicker than surrounding speech
<word>	Slower than surrounding speech
=	Immediate "latching" of successive talk
_	Utterances interrupted or ebbing away
(….)	Talk that has been omitted
(text)	Uncertain interpretation
(x) (xx)	Inaudible word or words
ha ha	Laughter
text	Swedish
text	Translation into English
text	Nonverbal action is transcribed in bold italics.