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# "There is mathematics in there too": Parents' and teachers' discussions about mathematics for young children

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*This study focuses on a discussion between parents and preschool teachers about mathematics education for young children. Data were gathered through focus group interviews, where participants' own photographs were the stimuli for the interviews. Bruner's narrative construction was used to identify how parents' and teachers' views about valued mathematics education were expressed. The results indicate that participants had different roles in children's mathematics education, and these roles contributed to only some views being valued. Preschool teachers' knowledge about appropriate pedagogical practices tended to take precedence, but parents could sometimes disrupt the teachers' presentation of their views, leading to different interactions. The findings indicate that although the Norwegian early childhood curriculum requires collaboration, achieving it may be difficult.*

*Keywords: Mathematics education, parents, preschool teacher, photo-elicitation.*

## Introduction

In this study, I investigate discussions between parents<sup>1</sup> and Early Childhood Education and Care (ECEC) teachers about mathematics education for young children to provide insights about the nature of collaboration between home and ECEC<sup>2</sup> for children's learning of mathematics. In Norway, the Norwegian Framework Plan describes how institutions should work co-operatively with parents in order for children to receive good care and develop their potential (Norwegian Ministry of Education, 2017). There should also be opportunities for parents to engage in and influence planned activities in ECEC institutions. However, research suggests that collaboration is difficult to achieve, partly because there is a lack of information about developing this partnership in curriculum documents (Hujala et al., 2009).

Parents' and teachers' roles and experiences affect what they consider valuable for their children's learning and development of mathematics skills (e.g., Blevins-Knabe et al., 2000). Teachers have professional roles with educational responsibilities for children's mathematics learning and are expected to have the knowledge to implement appropriate practices at ECEC (Helenius et al., 2014; Mosvold et al., 2011). Alternatively, parents might also have similar views as ECEC teachers about pedagogical practices for the mathematics education of children. For example, as found in Lembrér (2018), an immigrant parent from Poland was inspired to collect stones as a play activity and then talk with their children about their size or shape, similar to how it was done at ECEC in Sweden.

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<sup>1</sup> I use the term 'parents' to refer to adult family members in the role of children's caregivers.

<sup>2</sup> I use term ECEC for institutions for Early Childhood Education and Care in Norway, for children age one to six.

Even if parents' knowledge about mathematics for young children is recognised, there is little research on parents' and teachers' interactions when sharing their views about children's mathematics learning. Therefore, in this study, I aim to provide insights into how parents and teachers expressed their views on mathematics education as valuable. The research question is: How do parents' and teachers' views on mathematics education for young children come to be valued in their interactions?

## **Parents' contributions to their children's interactions with mathematics**

Early childhood research has recognised the importance of families in young children's education (Phillipson et al., 2017), with parents being seen as positive contributors to their children's educational outcomes (Missall et al., 2015). At the primary school level, it has been documented that collaborating with families increases families' awareness of the home activities which foster children's mathematics (Epstein & Sanders, 2006). Levenson et al. (2022) stressed the importance of considering adults' potential in children's lives to promote early mathematics. When looking at the ECEC–parent partnership, it seems urgent for parents to have opportunities to contribute to their children's mathematics education both at home but also in ECEC. Parents can be made to feel that their contributions are of little value. For example, Takeuchi (2018) identified that parents were concerned that ways of doing mathematics or how they were taught were not in alignment with their children's current schooling. Highlighting the importance of parents' experiences with and views about their children's mathematics learning might overcome such negative perspectives. Regardless of their background, many parents have knowledge about mathematics education for young children (Lembrér, 2021). Previously, I found that parents viewed counting as necessary for young children, and everyday life experiences were considered an appropriate means for introducing them to mathematical ideas (Lembrér, 2020). The findings also indicated that parents' views on mathematics education were influenced by wider societal expectations connected to ECEC pedagogical practices.

Collaboration between parents and teachers can be challenging because of the different nature of their roles. Wager and Whyte (2013) investigated ECEC teachers' views on using children's home experiences in ECEC. They found that the teachers made use of home experiences in two different ways. Some teachers recognised only familiar opportunities for learning mathematics, allowing them to continue working in the same ways in ECEC. Other teachers were able to incorporate unfamiliar opportunities for learning from the children's home environments into planned activities. These different roles may hinder collaboration when parents' views about mathematics activities that were not in alignment with those known and valued by the teachers.

## **Bruner's narrative construction**

Bruner's (1991, 2004) narrative construction is valuable to consider how people collaborate because by constructing a narrative, a person provides an opportunity for others to interpret what someone has said so they can determine what this person meant: to proceed from what seems to be the case to what the case is about from the interpreter's point of view. For Bruner, narrative construction provides insight into how the tellers of narratives view ways of thinking, ways of constructing meaning and ways of experiencing the world.

As Bruner (2004) highlighted, narrative construction is embedded in lived experiences in society and also acknowledges people's active and independent role within that society. Therefore, narrative

construction shows the importance of contexts and provides opportunities for exploring views on particular topics, such as the needs of children and the family culture in which mathematics education occurs. According to Bruner (1991, 2004), people share their views when interacting by telling narratives about events and experiences. Narratives are social or personal stories which refer to cultural values and traditions that offer meaningful connections to events. When people talk, personal views are constructed and reconstructed through social interactions. In interactions, people navigate between their previous experiences and knowledge of the world around them. This navigation can lead to insights about their views and whether they need to be changed. Intentionally or unintentionally, how and what is discussed between parents and teachers becomes a way of controlling what is valuable as mathematics education for young children.

## **Methodology**

For this study, I conducted photo-elicitation focus group interviews (PEIs). PEIs were set up for parents and teachers to share their views about mathematics education for young children. In PEIs, participants' photographs are used as stimuli for discussion (Hurworth, 2004) and thus provide insights into individual views based on specific reasons for taking a photograph which is meaningful for them. Photographs have been used in previous mathematics education research and contributed to participants being able to influence the interview topic and describe events linked to the photographs (Hauge et al., 2018).

Participants were asked to take up to 10 photographs of children engaging in mathematics activities (at home and ECEC). For PEIs, I chose one photograph from each participant that I considered captured children engaged in activities that could have occurred in respective environments of home and ECEC. As stated by Hurworth (2004), the use of photographs provided a structure for the PEI and photographs act as stimuli for the interview rather than being its sole focus. Three focus groups were organised, with a diversity of participants and a reasonable group size (Morgan, 1996). The interviews lasted approximately 45 minutes and were audio-recorded. After introducing each photograph, participants were asked to discuss two questions as a starting point: 1) what kinds of mathematics do they see children doing in the photograph? 2) how do children engage in mathematics activities at home and at ECEC?

In this paper, I describe and analyse how parents and teachers interacted, using examples of transcripts from one of the three PEIs. In this group, two parents and three teachers discussed a photograph taken at home of a child playing Pokémon Magikarp Jump<sup>3</sup> on a tablet. This interaction was typical of how parents and teachers engaged in all three focus group interviews. In the section on findings, transcripts from PEI indicate the role of a participant as Parent–1 or Parent–2 and Teacher 1–3.

To analyse transcribed auto-recordings, I adopted the constant comparison analysis (Onwuegbuzie et al., 2009) to identify emerging themes. In the interview transcripts, I identified narratives that described events and experiences in mathematics education for young children. From this initial

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<sup>3</sup> Magikarp is an app with simple controls to feed a fish, keep training it to increase its “jump power”, fish for all kinds of magic carp and raise magic carp in a pond (<https://www.pokemon.com>)

analysis, different themes became evident. These themes were: pedagogical practices; roles and responsibilities for children's learning and development; and mathematical skills, knowledge or content. Participants' descriptions of what parents or teachers are obligated to do at ECEC and at home, for example, using digital tools or feeding children, were categorised as roles and responsibilities. Narratives categorised as mathematics skills and knowledge described the mathematical concepts the children engaged with. In the second stage of the analysis, I used the conversation analysis (Onwuegbuzie et al., 2009) to determine how participants interacted with each other (i.e., a form of taking turns, how participants portray themselves within the group to influence, convince or argue). I focused on identifying different words to determine what was valued and in what way. This analysis allowed me to identify how the participants' views were valued in the interaction, either by an individual, the group of teachers, the pair of parents, or the whole group. As it seemed that parents and teachers held different views on digital games, as has been noted in other research (Neumann et al., 2020), they had to negotiate what was valuable information from their experiences.

## Findings

I present three extracts from a transcript of parents' and teachers' interactions about children's mathematics learning when using tablets at ECEC and home. The interaction began with parents discussing their children's experiences playing Pokémon Magikarp Jump, and the teachers then described their experiences with two other apps used at ECEC. In the discussions, it was clear that the parents and teachers both valued children practising mathematical skills.

### Appropriate pedagogical practices for learning mathematics

The parents and teachers raised a series of views about pedagogical practices concerning mathematics teaching and learning. The narratives gave insights into knowledge the teachers considered valuable for deciding what were suitable apps for ECEC. The teachers did not view Pokémon Magikarp Jump as an appropriate app for counting and sorting, so they listed more appropriate apps that they used at ECEC.

Teacher-1: What kind of game is it here?

Parent-1: It's something like Pokémon, I think; I don't quite remember. It looks like Pokémon.

Parent-2: I remember that he (a parent at a previous parent PEI) explained about that fish that had to be fed, and I wondered, "Is it good to teach them to eat things?"

Parent-1: To gain points because he should train the fish, one had to have so and so many points to [pause], then there is something like jumping high. Yes, how high and [pause] I don't quite remember because he has not played it for a while. So, jump higher than other (fish).

Teacher-3: There is mathematics in there too.

Teacher-2: Yes.

Teacher-1: But it is perhaps not as relevant in the ECEC to play like that.

Teacher-3: No, not so much, right, but we do have a little, and we do have tablets.

Teacher-2: We have tablets similar to those they have [at home].

Teacher-3: Yes, we work with tablets with the children. We have some such games that are downloaded the university has made and a few other things.

Teacher-3: Yes [pause], but we use it now and then when we have a quiet time, usually. And then not too many should be sitting around, right. You have to [pause] It should be possible with an adult and two children, for example, withdraw and keep going with it.

The interaction began with a teacher (Teacher-1) asking a parent about the game, suggesting an interest in parents' knowledge, possibly knowledge that the teacher did not have. Parent-1 provided the name of the game, and Parent-2 gave information about the content. These provided narratives to do with the content, such as gaining points and comparing the height of the fish's jumps. Parent-2 expressed some ethical concerns about the game, indicating what she valued, although it was not about mathematics in this case. Teacher-1 and Teacher-2 acknowledge that the app described by the parents included some mathematics.

As the interaction continued, Teacher-1 used knowledge of appropriate pedagogical practices at ECEC to suggest that Pokémon was not appropriate. By using the word "we", Teacher-2 and Teacher-3 suggested a shared view and knowledge by providing a narrative about using an app with children. Thus, the teachers controlled the interaction using their professional knowledge, perhaps to gain the support of the parents to approve the teachers' views about which apps were valuable and contributed to appropriate pedagogical practices. This is similar to the ECEC teachers in Wager and Whyte's (2013) research, where the teachers did not accept activities done in the home as valuable in the preschool if they themselves did not recognise them as typical activities for preschools.

In the next extract, the teachers highlighted specific mathematical knowledge as being valuable when sharing narratives about the app Tella<sup>4</sup> and an app about sorting. These narratives are related to shared values (Bruner, 2004) and views acknowledged by teachers. These narratives included descriptions of the mathematical concepts that the children engaged with at ECEC, in play and when using tablets.

Teacher-3: We have "Tella". Yes, is it not what is called [one of the apps]?

Teacher-2: Yes, right, and the other one [app] about sorting, you are supposed to find how many yellow and then place a circle around a number. For example, where does one item belong, and what belongs to what, and what kind of food does it eat.

Teacher-2: Colours, right [pause]. These are activities children use tablets for, and we observe them doing the same activities without tablets. Children sort items by colours, all red in one basket, blue in another, yellow in that basket etc.

Teacher-1: Yes, and triangles also and isn't it a little like that? Symbols.

Teacher-2: And symbols, right. Symbols, triangles and squares. And we see that when they play, they very often line up [toys or items], and they are sorting by colours.

Teacher-1: It's coming again [pause] in the regular play.

Teacher-2 described two mathematical apps used at ECEC. Both apps focused on sorting by colours and recognising the symbol for amount. This teacher also noted that similar activities were observed in children's play, "we observe them doing the same activities without tablets." This teacher indicated that this kind of observation was done and known to the other teachers through the use of "we" and "we see that when they play". Teacher-2 and Teacher-1 built on each other's description of the mathematics in these apps and used their knowledge of appropriate pedagogical practices. They valued the knowledge they had from observing children playing at ECEC, and this led to them controlling the interaction. Lacking the teachers' professional knowledge, it seemed difficult for the

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<sup>4</sup> Tella is an app that introduces children to mathematics and is designed for 5–8 year old children. Tella consists of sets of games with tasks such as: size and order, training sequences of counting words, combining quantities and number symbols ([www.tella123.org](http://www.tella123.org))

parents to enter the discussion, although earlier, they had clearly shown that the parents valued their children learning about numbers (Lembrér, 2021). Instead, the discussion focused on what the teachers observed at the ECEC.

### **The tablet as a pedagogical tool**

Sometimes the parents could focus the teachers on issues that they thought were important. In the following extract, Parent–2 talked about tablets as a pedagogical tool and the value of children practising different mathematical skills, such as counting, while using digital tools. This was part of her wider concern about children using tablets. Teacher–2 supported Parent–2's concerns about tablets. Parent–2 seemed to be setting up an alternative narrative about valuable activities for children, which the teachers accepted.

- Parent–2: I think, for example, if we [parents] can use a tablet for learning about amounts, or drawing letters by practising on it, then it can be good. We borrowed a tablet when going on holiday, but it seemed that our children were not interested. I think it can be a good thing to practise on and learn things through it. And get inspiration from it. At the same time, if you don't use a tablet, then you are forced to be creative.
- Teacher–2: We are not noticing any difference between the children who have tablets and those who don't when it comes to playing, learning about amounts and mathematics. So, there are no differences between children who have tablets at home, at ECEC or only on the weekends. [pause] Keep it away as long as possible.

Parent–2, as a parent, had limited experience with their children using tablets but considered tablets useful for practising mathematics skills. Tablets were considered useful for practising mathematical skills "if we [parents] can use tablets for learning about amounts or drawing letters" Parent–2 implicitly indicated that children being creative was important, but this could not be done using tablets. Parent–2 highlighted their knowledge of children's learning and development by raising pedagogical practices for mathematics teaching and learning about counting and creativity. Teacher–2 validated the parent's concerns that the tablet did not offer children better play or learning possibilities. Teacher–2 view that tablets had a limited value for practising skills seemed to reinforce the parent's narratives about children's learning mathematics and creativity without using tablets.

### **Conclusion**

In this article, I have analysed parents' and teachers' interactions and identified how parents and teachers valued views about pedagogical practices with examples of specific mathematical concepts. Parents and teachers had different understandings, which seemed to be affected by their roles and responsibilities for children's mathematics learning. The teachers' roles meant that they presented themselves as professionals with expert knowledge. This made it difficult for the parents to have their knowledge recognised and valued. However, when a parent presented a view about tablets which was in alignment with that of the teachers, even if it was not necessarily in alignment with the Framework Plan (Norwegian Ministry of Education, 2017), the teachers were likely to show support for the parent's point of view.

The teachers focused on building trusting and collaborative relationships amongst themselves to present a united front, whereas the parents focused on addressing their children's needs as they saw them individually. For example, Parent–2 brought up different views than those of teachers, which

led to negotiation about whether digital tools should be used for practising counting skills. The interactions between parents and teachers created resistance to accepting each other's views as valuable. At times in the interactions, the whole group valued a particular type of knowledge, usually originally brought up by the teachers (similar to the research of Wager and Whyte, 2013). However, the variety of knowledge they had shown in parent-only PEIs (Lembrér, 2020) was not evident in any parent-teacher PEIs. Such normalisation emerged from discussions of well-established views, often the teachers', rather than from sharing alternative and different sets of views. If teachers are supposed to listen to parents and gain insights from their knowledge, then more attention should be given to teachers learning to recognise parents' knowledge and engage in collaborative discussions about what could contribute to ECEC practices.

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