

Chapter 11

Partnerships that Support Children's Mathematics during the Transition to School: Perceptions, Barriers and Opportunities

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Abstract In this chapter we share the perceptions of a small number of principals, teachers and parents about children's prior-to-school mathematics. Rather than focusing on the somewhat limited notions of young children's mathematical experiences reflected in some of the comments of these adults, we position the transition to school as a relational context, recognising it as a time when many and varied beliefs, expectations and understandings come together as a cultural interface. We advocate that working collaboratively at this time has the potential to enhance the experiences of young children and the adults with whom they interact, and to provoke both professional and personal reflection and change, particularly in relation to mathematics education.

11.1 Introduction

Prior to starting school, children notice, explore and experiment with the mathematics of their world: mathematics is a tool for discovery, a means of investigation and a way to learn more about the physical and social spaces in which they live and learn. As is now well-documented nationally and internationally, children engage in a wide range of mathematical experiences and develop many sophisticated and powerful mathematical ideas in the years before school (Clarke et al. 2002; Geist 2009; Perry and Dockett 2002; Sophian 2009).

How and to what extent children's mathematical ideas develop depends on a range of social, cultural and geographic factors, including family resources and experiences (Biddulph et al. 2003), and access to early childhood education (National Association for the Education of Young Children and National Council for Teachers of Mathematics 2002). A common element across these influences is the involvement of adults.

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11.2 The Influence of Adults on Young Children's Mathematics Learning

Adults are important in the lives of young children. Their actions afford and/or restrict opportunities, enact choices for and about young children's lives, and contribute to the environments in which young children live and learn. Everyday experiences and interaction between young children and adults have the potential to build and extend rich, embedded understandings of a wide range of mathematical concepts (Civil and Bernier 2006; Civil et al. 2005; de Abreu et al. 1997; Sophian 2009).

The influence of parents on the learning of young children has been well documented (Levine et al. 2009; Plowman et al. 2011; Silinskas et al. 2012). As one example, correlations are reported between home numeracy experiences, such as number talk, board games, shopping and cooking, and the mathematical skills of children in the early years of school (LeFevre et al. 2009).

The influence of educators has also been researched extensively (Bowes et al. 2009; Emilson 2007; Fox et al. 2010; Sammons et al. 2008). Young children's play incorporates a wide range of mathematical concepts, ideas and explorations (Seo and Ginsburg 2004). When supported and extended by educators, young children's play and mathematical understandings have been reported as extensive and complex (Ginsburg 2006). Despite this, some early childhood educators have been reluctant to promote mathematical experiences, based on their own lack of confidence with mathematics (DeVries et al. 2010), concern for encroaching on children's play (Grieshaber 2008; Ryan and Goffin 2008) and their own negative attitudes towards mathematics (Sweeting 2011).

School educators also exert major influences on the development of young children's mathematical skills and understandings. First-year-of-school teachers have opportunities to build upon children's existing knowledge and ways of knowing, as they engage children in the mathematics curriculum of school. Effective teachers draw on their own mathematical content knowledge, understandings of curriculum and pedagogy, as well as skilled observation and their experiences as teachers, to generate the conditions necessary to support and extend young children's mathematical ideas (Fox et al. 2010). However, some primary educators are reported to hold limited views of mathematics which impact on the experiences and opportunities provided in the classroom (Nisbett and Warren 2000).

While there is widespread agreement among researchers and educators that adults play major roles in facilitating young children's mathematical learning, there is also recognition that different parents and educators engage with children and mathematics in different ways, influencing different outcomes (Levine et al. 2009). Key factors influencing the ways that adults—parents and educators—engage with children and their mathematics are attitudes and content knowledge. Where adults are uncomfortable and unfamiliar with mathematics, they tend to promote it less than other areas in either the home or educational setting. For example, the depth and extent of educators' mathematical knowledge impacts not only on the experi-

ences they promote, but also the ways in which children's engagement in the experiences is interpreted and extended (Fox et al. 2010).

In a similar vein, adults' emotional connection to mathematics also influences the ways in which it is promoted (Grootenboer and Hemmings 2007; Stipek and Byler 2001). Whilst literature on the affective domain is plentiful in areas of teacher education, secondary school, and the primary school setting, there is quite a 'noticeable (now glaring gap) in any research in the early childhood sector' (Grootenboer et al 2008, p. 10), and an even bigger gap in the literature of transition to school. This also includes an exploration of the ways in which parent and teacher beliefs and attitudes influence the provision of mathematical experiences for young children and how these beliefs and attitudes might sit in tension or come together to support mathematical learning over the transition to school.

11.3 The Transition to School

In recent years, there has been growing national and international focus on the processes of starting school (Dockett and Perry 2013). Such focus has resulted in wide recognition of its importance, particularly in relation to the impact that experiences of transition might have on the later learning and developmental outcomes of children (Margetts and Kienig 2013). Contemporary research, policy and practice around the transition to school recognises it as a major life transition (Sayers et al. 2012).

Transitions are times when people change their roles in communities (Rogoff 2003). Starting school is a time when children, families and educators change their roles in the educational communities in and around schools (Dockett and Perry 2007). Changing roles affords both opportunities and challenges for all involved (Educational Transitions and Change (ETC) Research Group 2011). When considering young children's mathematics, starting school generates opportunities for them to demonstrate their knowledge and understandings and for educators to notice, recognise and build upon this (Dockett and Goff 2013). At the same time, starting school can be a time when children, parents and educators experience challenges as they navigate new context, experiences and expectations (Perry and Dockett 2008).

A range of research has highlighted the importance of relationships at this time, both between and among adults, as well as children (Birch and Ladd 1997; Hamre and Pianta 2001). Positive home-school relationships (Pianta et al. 2001), and positive connections between educators located in primary schools and prior-to-school settings (Einarsdóttir 2006) can facilitate the sharing of information, which in turn, can promote recognition of children's existing knowledge and interests. Relationships between educators and parents have the potential to support positive transitions to school by building bridges between home and school or prior-to-school settings and school. In particular, positive relationships between educators in different settings provide impetus for the development of partnerships and, through these, spaces for reflection on the 'cultural encounter between school and preschool, as

well as the pedagogical possibilities and risks involved in an integration of the two school forms' (Moss 2013, p. 20).

Conceptualising the transition to school in relational terms situates the processes and the experiences of starting school within the complexities of human interactions. It provides opportunities to recognise social and cultural elements of the transition, while at the same time acknowledging the unique experiences of each individual. In such a frame, difference is regarded as positive and to be expected.

Relationships are forged through the coming together of people. However, they do not create the space: relationships are the result of what happens in the space of coming together. Nakata (2002, p. 285), defines the space that is created when people come together as the cultural interface,

The place where we live and learn, the place that conditions our lives, the place that shapes our futures and more to the point the place where we are active agents in our own lives—where we make decisions—our life world.

It is the space in which relationships can be forged or resisted, and in which differing and similar views, beliefs and culture can be both rejected and harnessed. It is the starting point from which relationships commence and a crucial component of the relational context of starting school.

In the following sections of this chapter, we explore data generated through the first author's doctoral project. Key components of this project were the conceptualisation of the transition to school as a relational context, generating a cultural interface which promotes relationship building; and the importance of adults in supporting children's mathematical learning across and between differing contexts. Findings around other themes that have emerged throughout the project have been reported elsewhere (Goff et al. 2013). However, this is the first time in which the data reported in this chapter have been shared.

The project explored the notion of prior-to-school teachers, families and primary school teachers working together to support the mathematics learning of children as they made the transition to school. It involved the implementation of a small-scale intervention, based on the establishment of two research teams located at two different sites in rural Australia. Each research team consisted of a prior-to-school teacher, a first-year-of-school teacher and parents of children who were attending the prior-to-school setting. The aim of each research team was to investigate the mathematics learning of children, and to then use this information to devise a plan that would support this learning as children made the transition to school. The project drew on a design-based research methodology (Herrington et al. 2007) and utilised the conceptual framework of the cultural interface (Nakata 2002, 2007) to explore the processes employed by each of the research teams as they worked together through this experience.

The focus of the following discussion is data generated during the recruitment stage of the project. It reports the perspectives of a small number of principals, teachers and parents as they reflected upon young children's mathematical learning and capabilities at the time of transition to school.

11.4 Principal, Teacher and Parent Perspectives

Establishing each research team required ongoing liaison with the directors/managers of early childhood services and school principals. While these people were not necessarily directly involved in the study, they did act as gatekeepers, controlling access to educators in different settings and, through this, access to potential parent participants as well. Hence, interactions with school principals and early childhood centre directors were a necessary feature of the recruitment process.

11.4.1 Principals

To promote participation in the project, the researcher met with principals to share the research proposal, garner feedback about the planned research, and seek permission to present the project to first-year-of-school teachers. Ten principals in regional Australian schools were approached: six agreed to a talk about the project. The data reported are drawn from these meetings.

Principal 1 agreed to a telephone conversation about the project. When the researcher explained the project focus on researching and supporting the mathematics learning of young children as they made the transition from preschool to primary school, Principal 1 suggested that "behaviour and emotional development are much better areas to focus on during the transition to school" and added that "all that learning stuff comes when they can sit on the floor and listen, and when they're all settled into their classes". Principal 2, who met with the researcher in person, offered a similar perspective, suggesting that primary school is "all about routines during term 1" and noted that "we get into focusing on mathematics and literacy after they have adjusted to the school environment". Principal 3 opted for a telephone conversation and commented that, "we like to give them some time to get to know the school and then we focus more on learning".

Principal 4 met with the researcher in person and described the schools focus as "simply... making the children feel safe, cared for and comfortable". Principal 5 also met with the researcher in person. She explained that, at her school "numeracy has been a bit neglected", noting that "it's so busy at the start of the year, it's hard to find out what they know. You feel like you're chasing your tail a bit." Principal 6, who also met with the researcher in person, explained that throughout his career he had found that "some teachers are so focused on getting the kids to read in that first year that maths takes a back seat". He elaborated his view that "they are both equally important" and that "you don't want to stop or slow that momentum that's been building in kinder".

During these conversations there were also varying insights into the principals' perceptions of prior-to-school mathematics learning and the capabilities of young children. For example, Principal 1 commented "kids are so used to playing that it's hard for some of them to just sit and concentrate, especially on maths, you know it's hard when they can't sit still." Principal 2 outlined the provision of "little things

like puzzles that can help with their mathematics, but nothing too heavy when they first come”. When discussing prior-to-school mathematics learning, Principal 4 proposed, “some form of mathematical learning must take place” before children come to school, but indicated that “it is nothing robust”. Principal 3 described the approach in his school as setting “up similar little things to preschool but start focusing on learning when they’re a bit more comfortable.” Principal 6 explained, “we [the school] don’t have much to do with the kinder so I can’t really tell you what mathematics they do, probably the usual type of things, sand, water, puzzles... not sure”. He concluded, “most of the kids that come in are pretty switched on. We can have kids working way above where they should be so something is working.” In relation to prior-to-school mathematics, Principal 5 suggested, “the kinder do a great job, the kids amaze us every year, most of them can count and they know their shapes and things...”. Principal 5 also suggested that, “they [the kinder] have a tough job given the area that we’re in, they do an amazing job really. I’m not sure that much is done with them [the children] before they get to kinder. So yeah they do an incredible job.”

Teachers of the first-year-of-school were present during the meetings with two of the principals. In one instance, the teacher and principal opted into the research project immediately after it was presented. In another instance, the principal suggested that the researcher meet with the first-year-of-school-teacher to discuss the project further and to gauge her interest to participate. The remaining principals indicated that they did not wish to pursue involvement in the project. While it can only be supposition, the comments reported earlier suggest that mathematics was not a priority area of focus for these principals.

11.4.2 Teachers

The recruitment phase of the project also involved meetings with several Transition to School Networks—informal gatherings of prior-to-school and first-year-of-school teachers working in the same geographical location. During these meetings, four teachers provided some insights into their perceptions of prior-to-school mathematics learning and the capabilities of young children.

Teacher 1, a prior-to-school teacher suggested that, “my curriculum is play-based but I can adapt it to focus on maths [for the project]”. Teacher 2, also a prior-to-school teacher, explained “the problem is in my training I was taught about numeracy not maths, and that kinder is preparation for life skills not school...I don’t want to go over that boundary and focus on school skills rather than life skills.” This teacher went on to explain that “we support their numeracy by talking to them, we don’t have lessons, but we support their learning with the environment and stuff, we still teach them, but just different.” Teacher 3, a first-year-of-school-teacher, described prior-to-school mathematics learning as “incidental mathematics, you know nothing too much just those incidental things that happen that are maths during the

course of the day". This same teacher elaborated "those incidental things help with the more difficult maths" and "it's good if they have been to preschool 'cause they know nothing if they haven't". Teacher 3 added further that, "you can really tell the kids that have been to preschool cause they're way ahead in maths than those who haven't. Those that haven't are lucky to count to ten." Teacher 4, a first-year-of-school teacher, suggested to a prior-to-school teacher that "it'd be good to have some time to show you [the prior-to-school teacher] what maths they [the children] will need to do, you know, to get them ready... it would help you to see how it sets them up for what's to come."

11.4.3 *Parents*

The project was also presented to parents and prior-to-school teachers at four prior-to-school settings. During these presentations, six parents referred to their children's mathematical experiences, learning and capabilities.

Parent 1 explained, "we don't really do much [mathematics] at home, we count but that's about it... we don't do anything else like sums or that". Parent 2 asked the prior-to-school teacher, "You don't do much at preschool do you?" and then explained, "there's plenty of time for it all next year when they go to school, no need to rush into maths, they need time to play and be kids first." Parent 3 explained that

Maths is everywhere but I'm not sure that it really makes sense to them [children] until they start school, like they count but it doesn't really make sense 'til they start doing it all properly, so we can't really support it until then, can we? ... They're more interested in playing at this age group, when they get to school they know they've got to learn, so it's different.

Parent 4 suggested that "the preschool do a lot, they're always counting and they read stories with numbers and that, we do the same, well... similar things at home but yeah, it's just fun stuff, you know like at preschool". Parent 5 indicated that

The kinder give us lots of ideas for home. We've started making puzzles, yeah that's the latest. He draws a picture, we cut it up and he puts it into one of those um snap-lock bags, you know those sandwich bag things, then he pulls them out and puts them together.

Parent 5 also described how her son was, "always counting and watching that show on TV, what's it called, you know the one with Piggly Winks, lots of maths in that show, he learns heaps from that." Parent 6 explained, "I hate maths but his father loves it. He's always telling him to do something, counting, adding things up, minus you know. They spend ages doing it." In relation to the prior-to-school setting, Parent 6 suggested that "they do so much here, all those songs, drawing around their bodies and lining them up, the cooking yeah just so much, he's doing so much and he loves it, its good."

11.5 Initial Impressions

These data provide a window into the perceptions of young children and mathematics held by this small number of principals, prior-to-school teachers, first-year-of-school teachers and parents. Two main issues were identified from these data:

1. The most nuanced views of young children's capabilities and their mathematics learning came from those who interacted with them most frequently—their parents and prior-to-school teachers.
2. The inference that 'real' mathematics was encountered at school.

The six parents, more so than teachers or principals, recognised their children's engagement with mathematics beyond counting and knowing shapes, mentioning puzzles, singing, drawing and cooking. One of the two prior-to-school teachers emphasised differences between mathematics and numeracy, preferring to focus on 'life skills, rather than school skills'. This contrasted with the view of the two first-year-of-school teachers, one of whom offered to share "what maths they [the children] will need to do" when the children commenced primary school. Most—but not all—principals reported limited views of young children's mathematics before they started school.

Despite the range of mathematical experiences noted by parents, most of those discussing the project regarded the play-based, holistic curricula associated with prior-to-school settings as not facilitating opportunities for intense engagement with complex mathematical ideas.

One of the implications of the expectation that young children do not engage with sophisticated mathematical ideas before they start school is that existing knowledge is neither recognised nor valued. This can mean that the maintenance and enhancement of that knowledge is then compromised. The view that children only encounter 'real' mathematics within school contexts not only devalues the learning that may have occurred prior-to-school, but also contributes to expectations that do not match children's existing understandings and interests. In order to recognise the mathematical learning young children bring with them to school, it would seem important to engage with those who know them best—their parents and prior-to-school teachers.

11.6 The Cultural Interface

At first glance these data could be interpreted as identifying some major barriers to overcome in relation to supporting the mathematics learning of young children as they make the transition to school. However, this is not our intention. In the remainder of this chapter, we consider an alternative approach, focusing on the ways in which these perceptions might be reframed to facilitate the mathematical learning of young children, particularly in the context of relationships but also in the context

of starting school. To achieve this, we draw on the conceptual framework of the cultural interface (Nakata 2002, 2007).

The cultural interface provides a framework to consider how and why parents and educators come together as children start school, creating an interface where perspectives, culture, beliefs, values, and knowledges meet. In relation to the data presented in this chapter, it provides a way to re-examine this through exploration of the interface of home, prior-to-school and school contexts, and to explicate potential opportunities and facilitators for growth, learning and change as these different contexts, and the people within them, come together during children's transition to school. This directs our attention to the ways in which these different people and contexts interact, the links they build and the ways in which they confer and enact value and respect. Using the framework of the cultural interface recognises the important contribution of all participants to the co-construction of transition experiences (Griebel and Niesel 2013), as well as the processes of continuity and change that underpin transition to school for all involved (ETC 2011)

Utilising the framework of the cultural interface repositions transition to school as a time when the adults in young children's lives, as well as the children themselves, inhabit spaces of possibility—spaces where there are opportunities for all to work together to support the learning of young children. Essential to this repositioning is the valuing of the contributions that each participant brings, the relationships that are forged, and a commitment to identifying and working with the tensions that will often arise. In Nakata's words, the interface promotes focus on the processes engaged in, as well as the processes experienced or omitted (Nakata 2007).

Identifying the transition to school as a cultural interface provides a means to identify the possibilities and opportunities that arise to scaffold adult interactions and relationships, and to promote recognition of young children's mathematical understandings. It provides a context for learning from one another, and with one another, to support the learning of young children. The following section of this chapter provides a re-examination of the data presented previously, using the lens of the cultural interface.

11.7 Principal, Teacher and Parent Perspective—A Second Look at the Data

Examining the data using the framework of the cultural interface helps to consider alternative interpretations of the data. These readings are based on the expectations that people will bring different views and understandings to bear in new contexts. This framework situates the transition to school as a time for sharing perspectives and forging relationships that help to explore the challenging and the complex, and that generate new possibilities and new learnings (Nakata 2007).

As one example, we consider the views of four of the principals who agreed to discuss the project, but on reflection decided that mathematics was not an area of

priority focus as children made the transition to their schools. Rather than addressing any curriculum area, these principals referred to the importance of socio-emotional factors, such as helping children to settle in to school and feel comfortable. While it is possible to interpret the lack of attention to mathematics as a barrier to promoting continuity of learning for the children, it can also be interpreted as a realistic approach to children's wellbeing during this time. However, this focus contrasts with the views of the first-year-of-school teachers, who referred to readiness and the importance of preschool in preparing children for school, to the extent of offering to show the prior-to-school teachers what was required in terms of mathematics. While cautious in interpreting the data from such small groups, it is likely that ongoing interactions between teachers and principals have the potential to generate some common ground about expectations and approaches.

A further example is drawn from the views of parents and prior-to-school educators. While these groups seemed to have a more nuanced views of prior-to-school mathematics than school educators, there remained a strong sense that 'real' mathematics was encountered at school. This suggests both common ground and different perspectives that could inform ongoing interactions.

11.8 Relational Spaces

Framing the transition to school as a cultural interface presumes that adults identify this as a time when they have much to gain, and much to share in interactions with others. Relationships that are forged at this time have the potential to go well beyond the rhetoric of 'readying for school' (Moss 2013, p. 9), establishing a potential meeting place for the sharing of expertise and recognition of different knowledges and beliefs. These, in turn, can generate new or stronger ways of knowing and doing.

In some contexts, adults have already generated spaces where different views may be shared, explored, challenged, tested and contested. In other contexts, some prompt or provocation will be required to create such a space; in others even with such prompts, generating such spaces will present challenges. Despite this, the transition to school is a time recognised by many adults as a time of change and as a time to reach out to others, as well as to become engaged with others.

Much of the research literature about transition to school centres round children and families, the skills they bring and the experiences they encounter (Perry et al. 2014). The data presented in this chapter suggest that the transition to school also affords opportunities for adults—parents and teachers—to forge relationships and work together in ways that provoke examination of pedagogies and practices, as well as expectations and entitlements. Such examination can occur independently, with one another, and with children. It can also occur in varying ways. For example, through ongoing dialogue, frequent interactions, and the sharing of information. Professional and personal growth and change is an important notion: it is important for the adults in the lives of young children to be open to new ways of knowing

and doing, and also to the possibilities of and for change. If different views, beliefs and attitudes around children's learning remain isolated, such change might not be realised. Reconceptualising starting school as a relational context affords these opportunities.

11.9 Conclusion

In this chapter we have shared the perceptions of a small number of principals, teachers and parents about children's prior-to-school mathematics, and positioned these as potential barriers and/or facilitators. Rather than focusing on the apparently limited notions of young children's mathematical experiences reflected in some of the comments of these adults, we position the transition to school as a relational context, recognising it as a time when many and varied beliefs, expectations and understandings come together as a cultural interface. Working together at this time has the potential to enhance the experiences of young children and the adults with whom they interact, and to provoke both professional and personal reflection and change.

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