‘BOUNDARY CROSSING’:
Negotiating understandings of early literacy and numeracy

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This article is based on the findings of a study which examined the literacy and numeracy pathways for a group of 65 children in the year prior to school entry in Victoria, Australia. The article will discuss key features of the home and community pathways for literacy and numeracy development and learning which were identified in the study. In discussing these findings, the contrastive features between the informal and formal early childhood education pathways are highlighted. As a result of our analysis, the notion of crossing boundaries is advocated as a process for making visible and negotiating between the different literacy and numeracy practices and events in the learning communities of home and early childhood institutions.

Introduction
This article is based on the findings of a federally funded research project, ‘Catch the Future’, designed to address two key research questions: What are the literacy and numeracy pathways for children in the year prior to school entry as identified by the children, their families and early childhood educators? And could interventions support children’s learning in these two areas? The findings from the first research question are the focus for this article. Sixty-five children and families participated in the project which was undertaken in the Westernport region of Victoria, Australia. While Westernport is often labelled as ‘disadvantaged’ and is not an ethnically diverse region, it should be noted that there were considerable differences in lifestyles and anticipated life chances for the child participants in the study. The children attended one of four local kindergartens and one childcare centre.

In this article we use the terms ‘numeracy’ and ‘literacy’ to discuss the multiple and interrelated ways the children in our study created and made meaning within the cultural and social contexts of their communities. In doing so, we recognise that we are conforming to ‘adult conventions’ (Kress, 2003, p. 154) of separating fields of knowledge and ways of meaning-making. Kress reminds us that children make no such distinctions. The term ‘pathways’ adopted in this study includes the values and beliefs held by families and educators concerned with literacy and numeracy and the events provided in accordance with those commitments.

The first section of the article presents an overview of the key research ideas which informed the study’s focus, design, and analysis processes. Methodological matters are featured in section two. Section three discusses the key features of the study findings on the pathways for literacy and numeracy development and learning within the homes and local community, and these are contrasted with the pathways within the early childhood services. In the concluding section, the article advocates for the adoption of strategies based on the theoretical construct of ‘boundary crossing’ (Engestrom, Engestrom & Karkkainen, 1995) as a way to support the processes for negotiation between and making visible the different literacy and numeracy practices and events within the learning communities of home and early childhood institutions.

Literacy and numeracy research contexts
Key ideas emanating from contemporary research in literacy and numeracy provided the foundations for our study, and these are presented briefly as ways to contextualise the study. The traditional understanding of literacy as a ‘fixed, neutral system of language rules, symbols, and conventions’ (Knobel & Healy, 1998, p. 9), has been replaced by the notion of ‘literacies’ which are formed and function in particular social contexts (Gee, 1992; Heath, 1983). Literacy is understood as ‘dynamic and fluid practices undertaken by human agents in social contexts’ (Luke & Freebody, 1999, p. 2). Similarly, the ‘mathematics of young children is embedded within meaningful social contexts and attached to particular social purposes’ (Young-Loveridge, 2002, p. 37). The symbolic knowledge upon which numeracy is based is developed as children participate in purposeful, real-life experiences (MacMillan, 2001). As numeracy is often restricted to
number knowledge and skills, the concept of mathematical literacy (NCTM, 2000) is more useful for encapsulating the range of signs, symbols and perceptions associated with the processes of representing, manipulating, reasoning and problem-solving in mathematical situations in everyday life (Young-Loveridge & Peters, 2005).

**Literacies**

Unsworth (2002, p. 63) argues, 'In the twenty first century the notion of literacy needs to be reconceived as a plurality of literacies and being literate must be seen as anachronistic.' Contemporary theories view literacies as multimoideal, complex, culturally embedded human activities which encompass the many codes and symbolic systems humans use for constructing and representing reality and for communicating with others. The term 'multiliteracies' (Cope & Kalantzis, 2000) also includes the variety of texts (print, visual, audio, multimedia) people create, encounter and utilise in their daily lives, and the interrelationships between these multiple modes and systems.

These ideas resonate with Reggio Children’s (1987) notion of ‘the Hundred Languages of Children’, where experiences with multiple representations using different ‘languages’ or ‘literacies’ are respected as the means by which children and adults make meaning and communicate their understandings. These multiple representations may include verbal and graphic languages, visual images, gestures, mathematical signs and symbols and, increasingly, technology to create webs of meaning. These literacy or meaning-making practices and events take place in culturally specific ways, depending on the context.

**Literacy practices and literacy events**

Street (1995) and Barton and Hamilton (1998), building on Heath’s (1983) work, clarified the differences between literacy practices and literacy events. Literacy practices, as defined by these researchers, are the inferred values or principles which commit individuals to actions rather than practical, observable literacy tasks. Literacy events are the observable activities that flow from or are shaped by held values. This literacy theoretical position helped to underpin our approach to the analysis of the data as we sought to understand the nature of the literacy and numeracy pathways.

**Sociocultural accounts of literacy and numeracy**

From a sociocultural theoretical perspective, the interplay between social and cultural beliefs and the diverse meaning-making practices within families and communities are highlighted (Comber & Nichols, 2004; Kennedy, 2004; Martello, 2002). As active participants in the daily lives of their families and communities, children learn to use the cultural tools and artefacts of their worlds (Arthur et al., 2003) and act as agents in shaping these contexts (Kennedy & Surman, 2002). These experiences of literacies are ‘meaningful and powerful expressions of sociocultural identity’ (Makin & Diaz, 2002, p. 333). Contemporary research has confirmed that literacy and numeracy learning is embedded in the lived realities of children’s everyday experiences, and that this learning and development begins well before children enter the compulsory years of schooling (Comber & Nichols, 2004; Makin & Diaz, 2002).

**Access and apprenticeship: Literacy and numeracy funds of knowledge**

Further findings in early childhood literacy research which are critical to our study focus on the problems that can occur when children’s funds of knowledge (Moll, Amanti, Nett & Gonzalez, 1992) or capital are not recognised or do not match literacy/numeracy practices promoted in other communities where young children participate, such as kindergartens or school entry classes (Luke & Freebody, 1999; Young-Loveridge & Peters, 2005). These researchers argue that family and community literacy/numeracy pathways need to be understood in out-of-home learning communities so that pedagogies, including assessment practices and the pedagogy of relationships, can address the complexities related to children’s different life chances and ways of learning.

**Methodological matters**

A brief overview of the theoretical informants that underpinned the study will be helpful for framing the discussion of the data analysis which follows. In addition, the methodologies adopted to examine the pathways for the children’s literacy and numeracy development and learning will be featured in this section.

**Theoretical informants for the methodology**

Sociocultural theories of learning and development (Rogoff, 2003), combined with the philosophical underpinnings and pedagogical principles of the evolving research and education projects in Reggio Emilia (Malaguzzi, 1998), provided the theoretical foundations for the research project. The research team shared a strong commitment to develop relationships and to engage in open and respectful dialogue with the participants so that everyone’s voice or views could be listened to and affirmed (Kennedy & Ridgway, 2005). The ‘pedagogy of listening’ (Rinaldi, 1997) and the use of pedagogical documentation in order to make visible the children’s literacy and numeracy learning
Methodologies for determining literacy and numeracy pathways

The study was designed to examine the pathways for young children's literacy and numeracy development and learning within homes, the local community and early childhood services. The researchers were able to identify and examine the particular photograph. Methodologies for determining literacy and numeracy learning pathways through the use of these methodologies.

Data analysis

The data gained from the families and the early childhood services, which included photographic images, parent comment sheets, transcribed conversations, pedagogical documentation and field notes, was analysed using a sociocultural framework drawn from the literacy and numeracy research discussed above. The literacy and numeracy funds of knowledge available to the participant children through a wide range of family, community and early childhood education events and practices were identified through the analysis of the data (Fleer & Robbins, 2005). Rogoff et al. (2003) identified intent or guided participation models or processes of learning for children in many different communities. The key features of these access and apprenticeship pathways to being or becoming literate and numerate are that they involve children in everyday relevant experiences, and that the learning or 'transformation' is through active and intent participation. This participation might include observation, collaborative activity, and listening to or imitating adults or more competent peers. These pathways to literacy and numeracy are culturally sanctioned by the family and community. In our study for example, the provision of a well-resourced local public library and the high level of active family membership are evidence of the literacy practices and events sanctioned and supported by this community.

Analysing the data from these perspectives helped the research team uncover the complexities and contradictions in the literacy and numeracy practices and events where the children participated. We found, for example, that the pathways for oral language experiences were more extensive and supported in the home contexts compared with the pathways in the early childhood institutions. In the early childhood services, oral language learning opportunities often restricted children's access to and participation in elaborative codes of oral expression except within the contexts of children's self-directed play. The educators often seemed focused on curtailing children's spontaneous conversations as they worked, with comments such as 'less talk and more work, please' which contradict the understanding that language and thought are interdependent activities.

Discussion of key findings

Understanding the different pathways for literacy and numeracy development and learning for young children can help families and educators to respect, respond to, and negotiate across those local pathways. Literacy research has identified that access to and apprenticeship into the...
institutions, resources, texts and discourses embedded in early literacy education are more significant for learning than are an individual child's skill attributes or deficits (Luke & Freebody, 1999; Makin & Diaz, 2002).

Through the process of categorisation of the photographs and the parents' comments mentioned above, we identified five features of the home and community learning pathways:

1. The diversity and complexity of the literacy and numeracy learning pathways for the children.
2. The embedded nature of the literacy and numeracy learning in the everyday experiences of the children.
3. The wide range of cultural tools and artefacts utilised.
4. The co-construction of literacy and numeracy learning by family members.
5. The acknowledgement of and support for multiliteracies.

While we have listed the above features as separate items, in the literacy and numeracy practices and events within the homes and community they were interrelated and interdependent pathways, and so the discussion which follows will not treat them as separate matters. In order to highlight the features listed above, we have grouped together examples from the photographic images of family and community literacy events and the parents' comments. Contrasts will be made with the pathways for literacy and numeracy learning and teaching we identified in the early childhood services.

Pathways to literacy and numeracy: Playing to learn

A and his brother play with the blocks and cars and they try to re-create a picture from one of his picture story books. He sorts his cars in colours and rows.

So much learning comes from their play. I think siblings are important teachers.

The photographic images revealed that many of the parents valued play opportunities and recognised the potential for literacy and numeracy teaching and learning that play provides, as the above parent comments indicate. Many of the images showed the children playing with a diverse range of tools or artefacts (art materials, blocks, cars, dolls, board games, musical instruments, computer software), play partners (siblings, parents, friends), and in different play events (dancing, imaginative play, board games, block and construction play). Although we had not suggested play could be a site for literacy or numeracy events, many parents seemed aware of the potential for learning through play and some expressed concern that play opportunities might not be available when their child entered school:

My boys play so much. I just wonder what will happen to them at school because they learn with their hands on things.

My boys they play a lot but when they get to Primary school will they get bored?

Parents identified specific literacy and numeracy learning gained through play, including counting, sorting, classifying, measurement, symbol recognition, speaking, listening and writing skills. Some were aware that music and dance were part of being literate or numerate, as they included images of their children engaged in these events. Our analysis of these images and the parents' comments also revealed that children were knowledgeable about popular culture artefacts and narratives and incorporated them into their play.

Play for learning was described as central to pedagogy in the early childhood services. We observed that children had access to a wide range of play materials and play opportunities every day. Some of the services displayed statements around the room which identified the value of particular play, such as the 'value of block play'. Less visible was the actual learning that happened in and across these contexts through documentation of the children's words, thinking, and shared efforts at meaning-making. At one meeting with the early childhood educators and teachers from the schools the children would be attending the following year, we showed a range of family images and parents' comments. The primary school teachers acknowledged that there would be limited opportunities for playing in the formal curriculum at school, although they did express an interest in improving the opportunities in the playground through introducing dramatic play resources and providing improved access to areas such as sand and water play. Despite our having many examples of parents valuing play, most of the educators suggested that they 'needed to educate the parents about the value of play'. This statement resonates with anecdotal evidence from early childhood educators that parents do not understand the value of play for children's learning and development. Our research findings suggest that this is not true for all parents.

In addition, recognition of the children's funds of knowledge related to popular culture was not evident in the early childhood services, and indeed was often silenced with rules which banned the use of popular culture narratives in play. This is an arena where there is
often a clash of values and expertise between adults and children, and which tends to be controlled by the adults rather than explored critically with the children. Larson and Marsh (2005, p. 156) argue that educators need to 'actively and meaningfully use these literacies in the curriculum' in ways that go beyond merely celebrating or valuing children's expertise and interest.

**Pathways to literacy and numeracy: Using computers**

We keep the computer in the kitchen and we do things together all the time.

Through the images and parents' comments, we identified families using computers for games, finding information, communicating with extended family members, and more directed learning through the use of education software. These events were embedded as daily routines within the home. The images also revealed that children often worked with an adult or a sibling when using the computer, which suggests possibilities for co-construction of meanings. When children and adults work together on the computer they are using a tool which supports the development of multiliteracies as they read icons or symbols, follow hyperlinks, respond to audio cues, and solve problems (Hill & Broadhurst, 2002). In contrast, from our observations and discussions with the children's early childhood educators, we found most of them were resistant to acknowledging the signification of information technologies as cultural tools and regarded computers as inappropriate for early education. We noted the contrastive images of how the computer was used by all the family members and its positioning, for example, on the kitchen bench, a place which is central to family life, with the peripheral positioning and usage in most of the early childhood services. Most of the educators seemed unaware of which children were computer literate and who might have expertise which could be used to support or transform other children's learning. In addition, the educators did not identify the equity issues for children who did not have access or apprenticeship into using these technologies. If connections are to be negotiated between families and early childhood institutions, we would argue that the use of computers and other information technologies in early childhood education needs to be debated with families and early childhood educators in order to negotiate priorities.

**Pathways to literacy and numeracy: Family routines**

My son is really good at maths. He loves reading the supermarket price tickets and telling me which aisle number we are in.

Family routines such as shopping, cooking, driving in the car, walking in the neighbourhood, feeding pets or giving medication were all presented as sites for literacy or numeracy learning. Parents identified everyday experiences such as reading or using artefacts such as clocks, microwaves, computer keyboards, telephones, speed signs, calculators and board/card games as providing children with opportunities for learning alphabet letters or numbers.

Shopping was identified by the families as an event which provided diverse and real-life literacy and numeracy teaching and learning opportunities for their children. We analysed many images of children helping with the family shopping and purchasing their own items with pocket money. Parents identified that these events helped children learn to count, recognise coins/notes and their value, read signs and symbols, and understand the concepts of buying and selling. Inferred from the images and the comments from parents were the values and attitudes they held about family spending, budgets, personal saving and fiscal responsibility, as the following comment from one parent suggested:

I give my children pocket money and they take their purses to the shops and they pay for their things, working out if they have enough money.

We saw evidence of dramatic play in the early childhood services, where children could act out family literacy and numeracy events such as shopping or cooking. Making explicit links with the children's real-life experiences of shopping to extend their understandings to a more critical or meta-thinking perspective, through discussion, questioning, or posing problems, happened very rarely. We contrasted the children's real-life learning opportunities, such as shopping, with the generally decontextualised experiences which were often a feature of the pedagogy in the early childhood programs. For example, the morning after a wild storm which caused an electrical blackout and damage within the local community, one educator, rather than responding to the children's intense interest in, experiences of, and concerns about this event, chose to read a story about windy weather on an English farm. In this example, the teacher's decision to decontextualise the children's learning about storms through using a fictional account effectively silenced their stories about the real storm they had experienced.

**Pathways for literacy and numeracy learning: Reading and writing texts**

I enjoyed information books as a child and their father is reading them information books now. This is a book on sharks.
The families took many images which showed them sharing stories or texts, as well as their children engaged in a variety of tasks involving making meaning through graphicy tasks such as drawing, or writing messages and the words of songs. Some children had access to well-stocked bookshelves which included fictional and non-fictional texts; for others, the local library was utilised regularly for borrowing books for all the family. One mother noted, ‘My children have their own cards for the library and they love it.’

The images revealed that book-reading was usually a shared activity with adults and siblings and was often connected with daily routines such as bedtime. One parent noted that, while her husband didn’t read stories to the children, he was good at ‘making up stories’ and playing games with them. Oral storytelling is an important literacy event, and for some communities it will be the culturally sanctioned modality for sharing stories which needs to be valued and incorporated into formal education contexts.

‘School’ literacy and numeracy understandings were co-constructed at home, especially with older siblings. Some families mentioned that older siblings modelled and encouraged the younger children to participate in school learning as they shared the take-home readers and other homework tasks. As one parent explained, ‘The younger ones like to look at the take-home books from the older ones at school.’ Through active participation in these practices, some children were co-constructing understandings of school literacy and numeracy learning well before they entered school.

The children’s apprenticeships as readers and writers were continued in the early childhood services through access to a wide range of art mediums and daily experiences of reading texts in groups and individually. None of the educators used the terms, ‘literacy’ or ‘numeracy’ in their daily programs, and they seemed unaware of the reading and graphicy events being provided at home. For example, one parent had noted that her child was very skilled at word-finder puzzles and could read quite a few words, but her teacher was unaware of these skills until we showed her the images taken at home.

The contrasts between home and out-of-home learning communities in this study were evident in the data we gathered. Families seemed aware of what was happening in their children’s out-of-home experiences; in contrast, the early childhood educators generally showed considerable ignorance of the literacy and numeracy practices and events available for the children within the homes and local community.

Implications from the findings
Contemporary research studies which have examined the diverse pathways for children’s literacy and numeracy development and learning have highlighted the gaps between family–community culturally sanctioned literacy practices and events and those of formal education contexts (Gregory et al., 2004; Heath, 1983). As Comber and Nichols (2004, p. 60) assert, ‘Relationships between forms of knowledge, literate practices in the contrastive early childhood sites of home, school and community remain unresolved.’ The data from our study confirms that children from diverse family contexts are engaged in meaningful literacy and numeracy practices and events which may or may not be regarded as valuable capital that can be actively embedded into pedagogy when children enter early childhood education services or schools.

Early childhood educators are faced with competing demands as they work within a framework of sensitivity to the ethical and political dimensions of their work. This makes it difficult for them to respond in their pedagogy with flexibility, creativity and intellectual rigour. Government policies and regulations may position educators as technicians whose role is to implement mandated requirements which focus on norms, standardisation processes and benchmarking. Research and theoretical imperatives challenge early years’ educators to work as co-constructionists and negotiators of pedagogy with children, families and community members as they respond to the increasing diversity of children’s life experiences.

The challenge for governments, policy developers and educators is to provide early childhood programs (Hill, 2004; Surman, 2003) that connect with children’s worlds, respond to diverse learning pathways, and utilise existing expertise and patterns of interaction (Comber & Nichols, 2004; Hill & Nichols, 2004). In reflecting on the writings of Paulo Freire, Roberts (1998, p. 107) argues that for any educational program to be successful it must connect with the knowledge of the participants and begin with ‘the reality of their lived experience’. This connecting with children’s everyday or lived experiences requires educators to understand and seek ways to build bridges between the worlds of home, family and community, and the early childhood service or school.
Engestrom, Engestrom and Karkkainen (1995) developed the bridges metaphor further in their conceptualisation of 'boundary crossing', where understandings of contradictory or multiplicity of practices and events can be developed or negotiated from the shared exploration of issues or problems. This notion moves beyond concepts of 'value-adding', 'continuity' or 'matching' in pedagogy or curriculum to a position where families and early childhood educators respect the power and diversity of each context as a potential learning site, and are willing to negotiate how to learn with and from each other. Unless educators make visible their values and beliefs concerned with all aspects of their work, they will not be able to negotiate new positions which might be required if they are to connect with and embed children's funds of knowledge into relevant and rigorous pedagogy. For example, if educators believe that the transfer of expertise is always a vertical activity from themselves to children and families, they will find it difficult to develop practices and events which support horizontal transformations or transfer of expertise between themselves, children and families (Engestrom, Engestrom & Karkkainen, 1995).

Boundary crossing, as we use it here, requires educators to be comfortable with complexities and contradictions inherent in the multiplicity of literacy and numeracy practices and events to be found in every community. For example, boundary crossing would mean that the different literacy practices (values and beliefs) and events (activities in homes and early childhood services) concerned with the teaching of the alphabet to young children would be made visible and debated by families and educators—not just to respect each other's position but also as a way to understand how these different practices and events could be refigured or prioritised in both homes and early childhood settings. Early childhood educators may be required to initiate and sustain the mediation tools or processes for such boundary-crossing activities.

In our study, pedagogical documentation, responsive listening and disposable cameras were used as ways to make visible (mediate) the children's understandings and skills as literate and numerate persons. We found these methodologies provided insights we would not have gained through traditional research methods (Kennedy & Ridgway, 2005). Pedagogical documentation which moves beyond captioning, labelling or displaying children's work, along with responsive listening, have been recognised as powerful tools or processes for making learning visible (Rinaldi, 2001). In the ongoing research collaboration between Harvard University and the educators in Reggio Emilia, these two processes are central to acknowledging the power, memories, histories and dynamics of a group as a learning community. Documentation can be used by educators and families to honour child, family and community funds of knowledge, and as a tool to revisit and relaunch new ways of thinking as part of continuous pedagogical negotiation (Ridgway, 2006). Crossing boundaries cannot begin without knowledge of or making visible the literacy and numeracy practices and events in which children are active and intent participants. Negotiation between the children's different learning communities needs to grapple with the complexities and contradictions of the practices and events which are made visible.

Conclusion

Our study provided insights into family, community and early childhood education literacy and numeracy practices and events. We positioned ourselves as learners in this project as we sought to develop shared understandings with the families and educators. We began to understand how difficult it is for educators to negotiate between and respond to children's different learning communities, as Comber and Nichols (2004, p. 60) suggest:

We know that when teachers actively design curriculum and pedagogies that are permeable and allow children to make use of knowledge and practices acquired in home and community sites, children's literacy development is enhanced ... Incorporating children's knowledge in the official school curriculum is a matter for continual negotiation between teachers and students in particular school communities.

We believe that early childhood educators need to cross boundaries through a process of 'continual negotiation' between professional and family contexts. Finding ways to mediate between inherent complexities and tensions would support early childhood educators in committing to new pedagogies which recognise the dignity of all the participants in education enterprises. Findings from our study indicate that literacy and numeracy outcomes for young children can be improved when families and educators are willing to negotiate across and make visible the different pathways for early literacy and numeracy development and learning in their local community.
References


