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RUNNING HEAD: Learning engagement in distance and rural settings

Learning engagement in distance and rural settings: Four Australian cases

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Abstract

This investigation explores the role of the home supervisor (usually a parent) in creating meaningful learning environments for young students' numeracy development. The case study data (from four home sites in remote areas of Australia) outlines the role the supervisor plays in developing student's numeracy in distance education learning contexts. The case studies highlight various pedagogical practices across these rich and diverse educational settings. The quality of the teaching and the influence of the distance education materials on the student's numeracy outcomes were attributed to the resources that were supplied to the home site; the supervisory engagement; and the extent to which learning partnerships were fostered among classroom teachers, parents and other members of the extended community.

Key Terms

- Distance education
- Distance education learning contexts
- Learning engagement in numeracy
- Out of School Learning
- Rural education

Learning Engagement in Distance and Rural Settings: Four Australian Cases

In the Australian context, the term “distance education” describes a formal education partnership between state-based Departments of Education, schools, parents and students. In distance education contexts we can investigate how teachers and parents (in the dual roles of care giver and academic supervisor) establish learning partnerships in situations where decisions about *what* is learnt is dominated by education departments and teachers while decisions about *how* learning is conducted are strongly influenced by parents. Distance education fosters learning cultures where the boundaries between ‘home’ and ‘school’ learning become blurred.

The supervisory role of parents and care givers is extremely influential in the development of students’ numeracy understandings (Goos & Jolly, 2004) since the supervisor is both a parent and a curriculum administrator. Epstein (2001) found that parental involvement benefits children’s numeracy development, while Askew (2004) suggested that the benefits are greatest where the interactions between students, teacher, parent and community are closely aligned. Cairney’s (2000) desire to raise the profile of the family as partners in education is explicitly embodied in the distance education context.

In rural and remote settings, however, there is some evidence to suggest that students are disadvantaged by location (Ryan, 2001). du Plessis & Bailey (2000) reported that parents recognise the educational disadvantage their children suffer through geographical isolation and that parents thus want realistic and effective resources to support education programs for their children. In distance education settings, parental involvement in the learning process appears to be under utilised (Lowrie & Jolly, 2005). Goos and Jolly (2004) recognised that parents lack of confidence in their own ability to understand mathematical ideas tended to prevent

them from engaging in partnership arrangements with teachers that could potentially enhance student learning. More specifically, Dockett & Perry (1999) found differences in the perceptions of city parents and those from rural and remote sites. These differences were associated with what parents thought was important about children's transition to school, including the nature and perceived importance of prior-to-school experiences. Other factors included the particular effects of geographical isolation, school and class size, the nature of local communities, the form of distance education, and the nature of transition programs. Irrespective of the perceived differences between parents' beliefs regarding urban and rural education, however, there is considerable evidence affirming that greater collaboration between teachers, students, parents and the wider community has the potential to influence the quality of teaching and learning experiences (Askew, 2004, Goos & Jolly, 2004).

The National Council for the Teachers for Mathematics (NCTM, 2000) has outlined a set of core beliefs about mathematics regarded as for the development of numeracy in the twenty-first century. These include the view that numeracy is essential if students are to become informed and competent citizens and that students learn via active exploration, inquiry and problem solving in authentic contexts. To be authentic, it is argued school mathematics should be aligned to the kind of problem-solving situations that individuals regularly encounter in their lives so their mathematical thinking will be embedded into activities that they regard as useful and relevant (Boaler, 1993; Lowrie, 2004).

In a similar vein, Lesh and Harel (2003) maintained that problem-solving situations in school mathematics should be simulations of real-life experiences where mathematical thinking is useful in the everyday lives of students or their families and friends. Bonotto (2002) argued that classroom activities should create "situations that

promote learning processes closer to those arising from out-of-school mathematics processes” (p. 3). As Boaler (1993) noted:

The reasons offered for learning in context seem to fall into two broad categories, one concerning motivation and interest of students through an enriched and vivid curriculum, the other concerning the enhanced transfer of learning through a demonstration of links between school mathematics and real world problems. (p. 14)

Such research suggests that rich learning contexts involve problem-solving experiences that are personal and authentic, and are unlike many traditional notions of school mathematics. When students have the opportunity to work one-to-one with others—including parents—there is increased potential to create problem-solving situations that are personal and authentic.

Learning Dimensions of Mathematics

Schoenfeld (1989) argued that learning and doing mathematics is an act of sense making that necessarily involves cultural, social, and cognitive processing. If explicitly designed to connect with students’ experiences in each of these three ‘learning dimensions’, mathematical problems can be personalised in ways that enhance mathematical meaning-making. Unfortunately, school mathematics rarely considers the social and cultural contexts of learning (Lowrie, 2004) because it is difficult and problematic to plan in-school mathematics experiences that build on individual students’ mathematical understandings developed from their out-of-school experiences (Masingila & de Silva, 2001). Moreover, as Greer (1997) and Lowrie (2002) have shown, students themselves tend to ignore relevant and authentic aspects of reality and exclude their real-world knowledge when solving school mathematics

problems. It is disheartening that these differ significantly (Lave, 1988; Lowrie & Clancy, 2003) and that children appear to construct a set of beliefs and assumptions about problem solving that actually reduces the likelihood of their connecting school mathematics to realistic contexts. According to Bonotto (2002), this will only change if there is a transformation of teacher conceptions, beliefs and attitudes towards mathematics sufficient to alter the lived culture of the mathematics classroom.

In distance education settings, where the supervisor has considerable influence on the engagement of the child in problem-solving (Goos & Jolly, 2004), it might appear that the gap between everyday life and mathematics problem solving could be bridged. However, it is difficult to expect untrained ‘teachers’ to create personalised environments if distance education teachers are not modelling such practice. Unfortunately, the disconnection between realistic and traditional problem solving institutionalised in the school life/home life separation is so established that children begin to assume that what they know about the real world is not useful or valid in solving school mathematics problems. On the other hand, authentic problem-solving contexts can provide opportunities for children to acquire knowledge and skills in situations that are meaningful and relevant to their personal experiences in both school and out-of-school contexts. In distance education settings, where children are at school and at home, opportunities to blur the boundaries between home and school seem more likely to succeed.

Numeracy in Distance Education Contexts

Few studies have examined issues associated with mathematics education from a rural context (Howley, Howley & Huber, 2005). In Australia, many children who live in remote areas rely on distance education in order to attend school. Distance

education programs provide learning materials suitable to the children's levels of learning (Taylor, 1998). Throughout these courses, students receive feedback and contact with their teachers via such means as online satellite communications, telephone conferences, marking and written reports, home visits and residential schools. In contrast to a regular school classroom, teacher contact is very limited. Most face-to-face instruction is provided by a home supervisor. In Australia, the role of the home supervisor (usually the student's parent) is particularly important for children in remote areas. Not surprisingly, the home supervisor plays an influential role in the development of students' learning outcomes (Louden & Rivalland, 1994).

Methodology

A case study methodology was considered to be the most appropriate approach for the collection and analysis of data since it provided an opportunity to report on real-life contextual conditions (Yin, 1994), and helped ascertain the influence and impact of personalities and other complexities (Merriam, 1998) in four distinct learning environments. Since it was anticipated that the supervisor (in these cases a parent) would be a powerful influence on each child's day-to-day learning experiences (Goos & Jolly, 2004) each case study was considered to be "instrumental" in nature (Stake, 2000). Consequently, the case studies could be analysed individually and collectively. Moreover, it was anticipated that in each site the numeracy practices would be contextualised in dynamic and different ways (Askew, 2004).

Context of the Study

This paper describes part of the case study component of a six phase research project commissioned by the Australian Government through the Department of Education, Science, and Training. These case studies were intended to explore how children in their first three years of schooling, together with their home supervisor, made sense of numeracy understandings when studying in a distance education context.

The four case study sites discussed here are located across Australia and are affiliated with state education curriculum standards. Two were associated with one distance education centre and two from another. In each case, the home sites were hundreds of kilometres from the school. The communication between the distance education providers and the students varied depending upon the Centre, however, most communication was through audio cassette tapes, notes from the teacher, email and telephone conversations. All students participated in School of the Air radio lessons. Of the four home sites presented in this investigation, only one had satellite communication. Most interactions between supervisor and teacher occurred through written feedback on students' work. Direct face-to-face contact transpired far less frequently—generally through mini-schools. Mini-schools, which were organized two or three times per year, allowed students, parents and classroom teachers to participate in curriculum-based activities that were more aligned to “regular” school contexts. These mini-school experiences provide an opportunity for students to further their development in all curriculum areas and were an excellent forum for isolated students to socialise.

Within the home sites, the settings tend to range from formal classrooms (designated areas created in the home to mirror regular school classrooms) through to informal arrangements (where students learn throughout the day through interaction with learning materials and engagement with their supervisor). The students used

learning materials distributed from a Distance Education Centre (school) each fortnight, with a supervisor (usually a parent) responsible for establishing a learning environment and providing an opportunity for students to complete the designated activities over the two week period.

Interview Schedule

The Home Supervisor Interview Schedule was developed to initiate a conversation with the home supervisor in relation to the program. Most items were associated with aspects of numeracy, specifically strategies used for promoting numeracy, feelings about the program in terms of developing their child's numeracy, and the nature and quality of support provided by their distance education provider.

The following are examples of interview questions asked on each home site visit.

1. How do you feel about the learning program you follow in terms of promoting this child's numeracy?
2. What other strategies do you utilise to foster this child's numeracy development?
3. What types of numeracy practices do you hope the child will be able to demonstrate by the end of the year?
4. If this child is/ was experiencing difficulty with numeracy, what sorts of strategies would you use?
5. What support do you get to promote this child's numeracy development from your distance education provider?
6. What is your opinion on the quality of support?
7. How could your distance education provider support you better to foster the numeracy development of this child?

The investigator spent the day at each home site and these structured questions were posed over a four hour period at the site. During the visit the investigator observed the student participation in maths lessons as the supervisor presented learning activities.

The participants

Case 1: The Howards

The Howards lived almost an hour from a small township with their property surrounded by several other holdings—in fact the access road to their property crossed the land of two other neighbours. The Howards had three children, two of whom were schooled by distance education. Their other child would begin school in two years time. The two school-aged children, both boys, went to school in town one day per fortnight. Although the Howards' home is relatively isolated, their decision that the children not attend school was as much to do with a life-style choice as it was to do with issues of isolation. The rationale for sending the children to school was predominately for socialisation or as the youngest commented, “to make friends”. Although Kyle (a kindergarten student) felt that the type of activities he completed at school were similar to those he engaged in at home, he maintained that it was much easier to concentrate at home.

At school it is noisy and loud...it is good to play but not work...I like having school at home. (Kyle, aged 5)

The three children were comfortable talking to me about their work, with the two boys eager to discuss what they had been working on that day and to present the work samples they had completed in their respective numeracy and literacy units from the previous two weeks. They both loved drawing, with images from the first Lord of the Rings movie influential in the youngest's work.

The Howards' living conditions could be described as "primitive". The two batteries that powered their generator provided the family with adequate lighting but not much more. Their computer could only be used for a few hours per day—Mr Howard explained that they required an additional four batteries in order for the generator to function satisfactorily but the cost of batteries was exorbitant.

The Howards had a telephone line which had taken eight months to install from the nearest connection point. Unfortunately the telephone line was quite unreliable. The children had radio broadcasts from their distance education and were able to hear their teacher during radio lessons but it was very difficult for them to hear other children. Connection to the internet via a modem was more or less impossible. Their connection provider could only guarantee byte rates of 19K/sec, however the connection speed rarely got above 9K/sec. Not even the most basic web pages could be reloaded at this speed. Consequently, the only option for internet access would be satellite technology, not presently available in the school site.

Case 2: The Bells

Although the Bells lived less than 40 minutes from a township with good amenities and shopping facilities they generally only visited the town once a fortnight. Most groceries were purchased on such journeys and contact with other families was infrequent. The Bells did not have electricity, or a phone connection. Power was supplied through a generator however it needed to be used in a conservative manner. The Bell's had direct line-of-sight access to a digital tower and consequently had a reliable mobile phone signal.

One of the main reasons the Bells did not regularly need to leave their relatively remote site was that they ran a business from home. Most contact with the

“outside world” eventuated from selling their timber and furniture products at markets on the weekend. At the time of the home visit, such business initiatives had been put on hold because the truck used to transport the furniture was not roadworthy.

The Bells had five children, two of whom lived at home. The case-study participant, Janelle, was in Grade 2. Some of the other children had previously attended school in the nearby township, but Janelle’s three years of schooling had been via distance education. Janelle did not talk during the two-hour visit although she did carefully listen to questions posed to her; nodding her head, laughing and whispering responses to her mother from time to time. Until recently, Janelle was also quite reluctant to talk to her teacher or other children at the mini-schools—mini-schools provided opportunities for children who studied via distance education to gather for intensive instruction with classroom teachers and supervisors two or three times per year.

Case 3: The McMullens

The McMullens lived on a relatively large farm and were involved in grazing and crop production. One reason the McMullens had elected to participate schooling via distance education was because of the travelling time to the nearest school. Although there was a school bus stop within twenty kilometres of their home, the actual time taken to get to the school was viewed as both too far to travel and too tiring for the children. The children did make this trip each Friday and they were exhausted by the end of the day.

There were four children in the family. The eldest, Georgia, had been involved in schooling via distance education for four years. The twins, Paige and Holly, were in Grade 1 while the youngest, Alexis, would begin pre-school one day per week next

year. The children went to the “local” school mostly as a form of socialisation and in order to allow the supervisor (mum) to undertake work and house related duties that would otherwise not be completed if the children were at home doing their school work. Although the children enjoyed catching up with their friends each Friday, they much preferred engaging in literacy and numeracy activities at home rather than at the local school.

School is fun [at home]. Our school [room] looks nice and we got to paint it to look beautiful...We get to help one another and mum helps us too. Going to our other school [in town] is good but we get very tired. I like home better.

(Holly, aged 6)

The twins were highly articulate girls who were at ease discussing comparisons and contrasts between the two settings. They enjoyed the flexible nature of schooling via distance education and had already begun to develop important skills of independent learning. They enjoyed the learning environment that had been established at home.

At home we get to learn in fun ways. When we have finished our work we can do something else...sometimes play and sometimes more work. At school [in town] I have to wait till everyone is finished their work...and that takes a long time sometimes. (Paige, aged 6)

The McMullens spent \$5000 to purchase a demountable building three years previously, and had refurbished it as wonderful classroom. The twins commented on how they had helped to paint the classroom and took pride in the colourful display of work samples and paintings around the room. The supervisor commented that it was important to have a defined space for the classroom so that there was an obvious barrier between home and school. The girls indicated that mum even had to lock the room in the school holidays because they wanted to use it outside school hours. It was

clearly evident that the girls enjoyed being taught by their mother and had a vibrant and passionate “love for learning”. Moreover, it was also evident that as a supervisor, Mrs McMullen had a sound understanding of pedagogy and the distinctive learning needs of her children.

The site was well equipped to take advantage of their distance education provider’s satellite initiative. In fact the property was classified as a dual site—which meant the satellite dishes on the property had two sets of connectivity hardware (including computers, scanners, modems and writing templates). They also had another computer specifically designated for software utilisation (eg. CD ROMS). Although the satellite initiative had only been in place for nine weeks, the twins had embraced the technology enthusiastically. They thoroughly enjoyed their lessons and it was fair to say that they regarded the ½ hour satellite lesson as a highlight of the week.

Case 4: The Andersons

Mr and Mrs Anderson lived on a large rural holding approximately 80 minutes from the nearest township. In fact, their property was located half way between a mining town and a town that services a farming shire. They tended to do their grocery shopping at one town and their equipment purchasing at the other—with pricing influencing their decisions. They were both graziers (predominately cattle) and farmers (several forms of grain). They had four children, two in primary school and two in high school. All studied via distance education mode.

Interestingly, the two older children were enrolled via one distance education centre while the younger children were enrolled in another. At the time of the home visit, the younger children’s school was not involved in satellite education—if these

children were enrolled in the other school they would receive this benefit (although this initiative is presently not available to high-school aged students).

Analysis of Case Studies

In the first level of analysis, each of the four case studies was analysed separately; in a second level of analysis, reported here, the cases were compared and contrasted across common themes or categories. Drawing on the above literature and data, five key themes for this analysis emerged: 1) students' and supervisors' use of real-life contexts and problem-solving investigations; 2) flexibility in the curriculum and school-based program; 3) authentic play; 4) engagement and partnerships; and 5) other qualities the supervisor brought to the learning context.

A variety of pedagogical practices were implemented across the distance education programs provided to the case study children to engage them in numeracy experiences. From a curriculum perspective, there was considerable diversity in relation to the strategies and approaches used to promote numeracy development. Such an assortment of approaches was magnified by the fact that the face-to-face learning interactions were so variable. A broad range of learning contexts had been observed during the case study phase of the project, with these diverse environments often quite different to 'normal' school settings. For example, the Howards' learning space was restricted to a very small work area in their caravan with few opportunities for the children to explore their surroundings while the McMullens' demountable classroom provided a learning environment that resembled a traditional classroom. The dynamics of the different learning environments were also significantly different to traditional contexts—with the supervisor having a dramatic influence on the teaching and learning process. This influence was often aligned to the supervisors'

content knowledge of the curriculum and their educational level—for example, while the Howards and the McMullens each had university degrees, the Bells and the Andersons had all left school by Year 10 of school.

In all site investigations, the supervisor was regarded as having the strongest influence over the way in which pedagogical practices and learning outcomes were presented to children—no doubt the dual role of being a parent as well as a ‘teacher’ had a substantial effect. Not surprisingly, the learning environments established within the home contexts were also diverse. Some supervisors relied heavily on the learning materials supplied by the school (the Bells) while other supervisors had the confidence and capacity to promote learning from ideas contextualised in the children’s personal experiences and day-to-day lives (the McMullens). In contrast to traditional school settings, where a wider variety of social, environmental and cognitive dimensions impact on pedagogical practices, the case study sites were more refined and embedded in the home contexts. Consequently, the child’s knowledge base, the supervisor’s view and understanding of the learning process, and the engagement with pre-designed learning materials were more influential on pedagogy than would be expected in ordinary classroom contexts that include more children, contact with a range of teachers, and a more comprehensive range of curriculum resources. It could be argued that the socio-cultural dimension of learning was often restricted to one-on-one relationships. Consequently, the supervisor’s influence over the learning process was dramatic and fundamental to the development of the learner’s numeracy understandings.

Real-life contexts and problem-solving investigations

At first sight there appeared to be greater possibilities for the integration of ideas, content and learning strategies into life-like contexts and authentic problem investigations in the case study settings than in more traditional classrooms. The McMullens established a learning culture that was often quite seamless—for example audio-tapes of mathematics lessons were played in the car on the way to town. The children were able to study with greater flexibility and were not restricted to some of the infrastructure problems associated with traditional schooling. They were able to modify curriculum content to make links to day-to-day situations. Mrs Bell was confident and at ease with her teaching style—she had already undertaken a close supervisory role with her three older children (all of whom had now completed high school). The structured lesson progressed smoothly and she enjoyed what she was doing. Although she often referred to the teaching guide during the lesson, it appeared to be for self-pacing rather than accessing teaching strategies and directions. This supervisor had the capacity to engage her child in the activity and related discussions. The particular numeracy lesson observed required a high degree of hands-on learning but Mrs Bell did not deviate from the prescribed lesson outline. She commented that this was an atypical lesson—most numeracy lessons were worksheet orientated. Interestingly, she indicated that few of the mathematics lessons challenged her child to consider numeracy understandings in situations that were related to real-life or his personal interests.

Both Mrs Anderson and Mrs Bell maintained that they were not confident enough to modify numeracy programs despite feeling that their children were not learning. This was particularly the case if the home supervisor was inexperienced or had not had the opportunity to talk to other supervisors with children the same age as their own. Mrs Anderson, for example, did not have the confidence to deviate from

the mathematics program at all. Although she spent considerable time creating learning materials and other stimulating resources to conceptualise ideas and amplify learning engagement, the daily program was never altered despite her perception that the child struggled with most mathematical ideas presented to him. Not surprisingly, she became concerned whenever she and her child were unable to complete set activities within the two-week period.

It was evident that the experience and confidence of the supervisor was a major factor in whether or not learning materials were implemented in ways described in written documentation. All of the supervisors indicated that the strategies they used to promote learning moved toward a more flexible and open-ended learning process as they developed their own strategies—which generally supplemented school-based materials rather than relying on them. In all cases, the supervisors maintained that they developed mathematical ideas in situations that were not directly related to syllabus outcomes. For the Howards, developing the capacity to weave mathematical ideas into art lessons and science activities took some time—Mrs Howard felt that her content knowledge of mathematics was not strong, but she began to relate mathematics to the building projects underway as Mr Howard was building their new home. Interestingly, most supervisors commented that linking mathematical ideas to other learning situations only occurred when they felt that their child was successfully completing prescribed work. By contrast, Mrs McMullen indicated that she began to make these connections when her children did not understand the key learning ideas presented in the curriculum. Her all-encompassing view of mathematics went beyond isolated facts and strategies in much more sophisticated ways than the other case study supervisors. It could be argued that her socio-cultural viewpoints were actually more sophisticated than those of the classroom teachers her children encountered.

Mrs McMullen incorporated authentic real-life learning techniques into most of the prescribed numeracy activities. She often made connections between mathematics activities and everyday family experiences or presented applications to life on the property. She was conscious of the fact that the twins required different forms of engagement but at the same time recognised that it was advantageous for the girls to bounce ideas off one another in order to stimulate learning.

The girls have different needs and different approaches to learning. One is able to start on work almost immediately while the other wants her work checked to ensure she is on the right track...it is a form of confidence building. They both have different strengths and are prepared to help one another when needed but they also need the opportunity to engage in activities that interest them (transcript from Mrs McMullen).

She acknowledged that many content-based learning activities in the distance education program incorporated agriculture or farming ideas. She suggested that this provided her with the opportunity to develop a range of life-experience activities that were both practical and meaningful. From a numeracy perspective she suggested that “distance education gives children the ability to learn independently and undertake their own research...while setting them up for a range of life skills”.

Although the supervisors observed in the study demonstrated the capacity to modify learning activities to embed them in real-life contexts that were authentic and appropriate to the students needs and interests, it should be noted that most of the distance education learning materials did not offer such flexibility. It was the creativity of the supervisor that initiated this change in focus toward the local context. For example, one of the lessons observed at the McMullens was based almost entirely on concrete materials and Mrs McMullen made every effort to link the concepts with

the child's real world experiences such as "remember the other day when we cut your sandwiches?" She also encouraged active participation by the child and was skilful in posing alternatives and focusing on the process rather than the product. Questions were open-ended in nature and led the child to arrive at independent conclusions. She enthusiastically described a range of strategies she used to promote numeracy, explaining that real-life experiences played an enormous part in the children's early learning. Mrs McMullen used analogies to contextualise numeracy understandings and promote engagement. For example, she would challenge the children to consider how far they could walk in 20 minutes and predict a destination if they drove in the car for the same duration. Importantly, these hypotheses were often tested and verified. The morning news reports were also used to link numeracy understandings to authentic contexts. She felt that such conversations and activities were necessary in order to bring mathematics out of the classroom. She maintained that she felt she had become very skilled at including numeracy learning as the family went about their day to day living.

Flexibility in the program

School supplied learning materials were more likely to be used in flexible and dynamic ways if the supervisor initiated the (re)construction of learning activities. The evidence from this study suggests that classroom teachers rarely encouraged and enhanced such flexibility. The Andersons and the Bells were quite comfortable in presenting very structured lessons directly aligned to the distance education materials. These supervisors tended to present materials verbatim, with the tasks reintroduced if the child did not understand the concepts. Such structured learning was fuelled by the fact that supervisors could not ascertain how well their child was progressing because

they could not compare them with other children of the same age. The lack of informal benchmarking (which traditional classroom teachers undertake on a regular basis) understandably resulted in a reluctance to stray from the content and processes developed by the teachers. As mentioned previously, these structured presentations only changed when supervisors felt that their child had successfully completed prescribed work.

Initially, Mrs Anderson was diligent in ensuring that all activities produced written outcomes so the classroom teachers could actually see the work and perhaps to show the teachers that she was doing “the right thing”. This only changed when she realised that feedback on the children’s work was often slow (sometimes taking six weeks) and consequently not meaningful to her child anyway. Generally the supervisors indicated that classroom teachers were helpful in adjusting and modifying programs to cater for the needs of the children. It seemed to be the case, however, that most of these changes only took place when initiated by the parent. For example, Mrs Anderson indicated that changes were most likely to occur when she highlighted the fact that prescribed work was too difficult for her child—however this was more likely to be initiated by the supervisor rather than the teacher. Program flexibility (and variation) often emerged from their children’s interests. Mrs Anderson explained that her child had difficulty remembering the days of the week and had a fixed interest on tigers for her writing. Together she and the classroom teacher agreed to create a book that focused on each day of the week, and modified writing tasks to include stories about different animals.

Authentic play

Generally, the supervisors acknowledged that it was important to generate a sense of excitement and pleasure for young children to learn. Mrs Anderson argued that it was even more important to motivate her child and keep him actively engaged in learning activities than it would be in a regular classroom—given the distractions of being at home. For example, on the day of the site visit her six year old son wanted to go with his father to repair fencing on the property. During the site visits there were many examples of child-initiated play within numeracy frameworks. The play scenarios included playing with money (the Andersons), cooking morning tea (the McMullens), playing skipping and string games (the Bells). Mrs McMullen explained that real-life experiences played an enormous part in the children’s early learning. She stated that discussion and talking about things outside the schoolroom was invaluable. “Cooking in the kitchen is just brilliant” as it allowed her to use many numeracy terms and procedures.

By contrast, Mrs Anderson indicated that she did not have the time to engage in play during school-related activities. The constant drive to complete worksheets and other assessable work tended to reduce the likelihood of constructive and free play. She felt that the literacy demands in the numeracy program were too high for her child. She held the view that there was a great deal of writing on each activity page and her six year old was required to process too much information before exploring mathematics concepts. She believed that young children need “touch-feel” concrete understandings rather than exposure to so much written content. She stated that her son missed the concrete play (including “free play” with jigsaw puzzles and other games) that were part of the previous year’s pre-school program. As a result of the constant drive to complete prescribed work set by the classroom teacher, she felt that

her son was less likely to explore and play with mathematics ideas that had been developed through play situations in the distance education preschool program.

Engagement and partnerships

One of the most influential ways of promoting engagement among supervisors was through the centralised mini-schools that brought teachers, parents and children together two or three times per year. Mrs Bell commented that these initiatives provided her with the opportunity to reflect upon her role as a supervisor with other supervisors—helped her to know what sort of questions to ask the teachers when engaging in pedagogical conversations. The community group empowered her to the extent where she could contribute to the mini-schools in different ways and gave her confidence to pose questions to other parents without feeling that she was wasting other people’s time. Mrs McMullen commented that the mini-schools were so important because they helped break down myths about the program and allowed parents to talk about common interests and frustrations in a supportive environment. She appreciated the crucial role the school teachers played in this partnership. It was acknowledged that the teachers encouraged the parents to talk about their successes and challenges in a non-threatening manner whilst offering sound advice about common misconceptions or problematic content.

There was a feeling that the mini schools were a great way of meeting new parents in an environment outside the school-based activities. Strong friendships developed as a result of the mini-school—with these friendships important for “friendship’s sake” and as a support mechanism for supervisors. Mrs Anderson commented that she learned a great deal about teaching and learning from the other participants in the mini-schools and really appreciated the fact that the school actually

placed a great deal of importance on developing and maintaining these support systems.

The mini-schools are so good for my confidence...You get to see that other parents and their children are experiencing the same things you are. It's good to be able to ask the teachers questions and get their advice but the real support comes from parents with children who are the same age as your child or parents who have older children who have already completed that grade. It makes you realise that you are doing OK. (Mrs Anderson)

The supervisors also commented on the importance of the home visits in facilitating a productive learning environment. These face-to-face sessions were of critical importance to the supervisor—not only for demonstration purposes but for the opportunity to seek guidance on a one-to-one basis. The 'tyranny of distance' often meant that there was a small window of opportunity to engage in conversation about teaching and learning. Not surprisingly, the supervisors wanted more time with the classroom teacher than they presently received. The same could be said for the children.

Other qualities the supervisor brings to learning context

All four supervisors made clear distinctions between their roles as supervisors and as parents. On occasions this was achieved by having a room that was designated for school—which would be locked on weekends and during the holidays so that boundaries could not be blurred, as in the McMullen's case. Nevertheless, Mrs McMullen also seemed able to foster learning easily outside as well as within the 'school', providing rich tasks and flexible learning situations in and outside designated school time. All supervisors had a strong commitment to supporting their

children as they progressed through the early years of school. On the other hand, it would be fair to say that some do not possess the skills and knowledge needed to facilitate quality learning experiences while others did have the skills and knowledge to enhance learning in powerful ways. For many of these young children, the distance education programs cannot stand alone in supporting student's numeracy development—the home supervisor is a critical component of the learning process.

Discussion and Conclusions

The case study data highlighted various pedagogical practices across a number of rural educational settings. Their diversity did not appear to be attributed to the degree of isolation observed or to approaches to delivering learning content. It was more likely to be the case that this diversity—and the extent to which quality teaching and learning was fostered—could be attributed to 1) *resourcing issues*; 2) *supervisor engagement*; and 3) *the quality of the home-school partnerships*. The three themes are outlined below.

Resourcing Issues

There was certainly extreme variation in the amount and type of Information and Communication Technology usage observed in individual case studies. Although a range of technologies were used in distance education arrangements at these four sites, some sites had access to relatively sophisticated resources (the McMullens) while others had little or no access to the online learning materials (the Bells). These variations included access to hardware, software and electronic communications. Increasingly, classroom teachers were asking students to search the internet for supplementary information for lessons and projects—which was problematic when

access was so unreliable (the Howards). All supervisors were willing to embrace new technologies but recognised that they needed ongoing professional development in order to support their young children. Nevertheless, dramatic pedagogical change is unlikely to occur without reliable internet access.

Supervisor Engagement

It was evident that the home supervisor had a dramatic influence on the teaching and learning processes being implemented to support young children's numeracy development. The dynamics of the learning environments were significantly different to traditional classroom-based contexts—with the supervisor having a powerful influence over the way in which pedagogical practices and learning outcomes were presented to children—particularly in the dual role of supervisor and parent. In most cases, a clear delineation of the school 'space' was constructed to separate parenting and teaching roles and to overcome the dilemmas associated with these dual roles—which all supervisors identified as an ongoing issue in their relationship with their children. The respective supervisors were able to establish strong connections between in and out-of-school engagement (Masingila & de Silva, 2001) and actively attempted to create such contexts even though the blurring of these boundaries created other challenges. The shared decision making that was negotiated and established within this distance-education context (Goos & Jolly, 2004) was highly influential in students' numeracy development. The dual role, however, did not seem to be fully understood by the classroom teachers. The teachers seemed to value the effort displayed by the supervisors however it seemed that they did not appreciate fully the impact the supervisors were having on the learning process. As Goos & Jolly (2004) argued, the structure of schools delineates the nature and scope of parental

involvement with mismatches between home and school occurring when the partnership between them is not recognised or valued.

The distance education learning materials provided to the children varied in quality and impact—with the supervisor’s capacity to work with the material often a predictor of the materials’ relevance and success. There were certainly cases of excellent practice in relation to provision of support material, including distance education teachers supplying additional enrichment tasks, designing group projects and providing access to online learning that incorporated the latest technologies. Generally, however, the supervisors were reluctant to modify learning activities to meet the individual needs of their students and consequently relied on set materials. Not surprisingly, their confidence and/or capacity to devote large amounts of time to pedagogical practices influenced the extent to which they adapted or modified set materials. Interestingly, school supplied learning materials were more likely to be used in flexible and dynamic ways if the supervisor initiated the (re)construction of learning activities—rather than the respective teachers encouraging such modifications of content. As Masingila & de Silva (2001) argued, those “teachers” who are able to make strong connections between in and out of school learning will attempt to persist with more flexible engagement despite the additional challenges that may arise.

The Quality of the Home-School Partnership

One of the most influential ways of promoting engagement among supervisors was through the centralised mini-schools that brought teachers, parents and children together two or three times per year. These face-to-face sessions were of critical importance to both the supervisor and teacher because they provided opportunities for

the stakeholders to engage in conversation about teaching and learning (Goos & Jolly, 2004). Moreover, these mini-schools allowed parents to talk to other parents about their struggles and successes in ways that were both empowering and enlightening. There was a feeling that the mini-schools were a great way of meeting new parents in an environment outside the school-based activities. Strong friendships developed as a result of the mini-school—with these friendships important for “friendship sake” and as a support mechanism for new supervisors. Supervisors tended to develop a range of teaching and learning strategies from teachers and other supervisors and really appreciated the fact that the school actually placed a great deal of importance on developing and maintaining a range of support structures.

Implications

These case studies highlighted the home supervisor’s influential role in the construction of the teaching and learning processes to support young student’s numeracy development in rural settings—with the influence being much more dramatic than the classroom teachers envisaged. The dynamics of the learning environments were significantly different to traditional classroom-based contexts—with the supervisor having the strongest influence over the way in which pedagogical practices and learning outcomes were presented to children.

Presently, very few studies have considered mathematics education in relation to specific issues in rural contexts (Howley et al, 2005). This investigation has examined rural education in relation to practice and policy in a context that is embedded in issues of remoteness, isolation and restricted opportunities for communication. Nevertheless, these home-learning environments provided

opportunities for the classroom teachers to create learning activities that had authentic links between school mathematics and real world problems (Boaler, 1993). Unfortunately, the disconnection between realistic and traditional problem solving institutionalised in the school life/home life separation is so established that the case study participants assumed that what they know about the real world was not useful or valid in solving school mathematics problems. By contrast, there were instances when a supervisor established authentic problem-solving contexts for children to acquire knowledge and skills in situations that were meaningful and relevant to their personal experiences in both school and out-of-school contexts. In distance education settings, where children are at school and at home, opportunities to blur the boundaries between home and school seem more likely to succeed (Goos & Jolly, 2004).

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