Principals' Views on the Importance of Numeracy as Children Start Primary School

Wendy Goff
Monash University
<wendy.goff@monash.edu>

Sue Dockett
Charles Sturt University
<sdockett@csu.edu.au>

Bob Perry
Charles Sturt University
<bperry@csu.edu.au>

This paper addresses data arising from initial discussions with school principals concerning the implementation of a doctoral project in their schools. The doctoral project involved the prep teacher working with the preschool teacher to support children's numeracy practises as they made the transition to school. The findings presented in this paper suggest that numeracy might not be a key priority for schools as children make the transition from preschool to primary school, despite government policy, frameworks and curriculum documentation advocating the otherwise.

There is now overwhelming evidence, both in national and international literature, that children arrive at school with a vast array of mathematical experience, many powerful and well-developed mathematical ideas, and numeracy practices that are both varied, complex and sophisticated (Bishop, 1988; Boulton-Lewis, 1996; Clarke, Clarke, & Cheeseman, 2006; Perry & Dockett, 2002). In fact a number of studies have suggested that very young children, including babies and toddlers, utilise, interact with, process and master a variety of quantitative information, and engage in sophisticated problem-solving long before they commence formal education (Lakoff & Nunez, 2000; Sophian, 2009). However, despite this evidence, the notion that only a few can be successful in mathematical learning appears to be alive and well.

In fact many present day researchers have reported findings that allude to the ingrained and static embodiment of mathematics being most suitable only for the privileged few in a 21st century society. For example, Rattan, Good, and Dweck (2012) explored how implicit theories of ability are enacted in the pedagogical practises of teachers when working with students who are having difficulty with mathematics. In relation to mathematical ability they not only found the notion that only some people can be successful in mathematics was apparent amongst educators, but they also found that the adoption of this notion can have detrimental effects on the mathematical learning of students.

Beswick (2007) found similarly in a study that reported the beliefs of teachers about goals and methods of teaching mathematics to students, including students experiencing mathematics learning difficulties (MLD). When confronted with the statement 'some people have a maths mind and some don't', 18 of the 22 teachers in the study indicated that this was a true statement. Although this number was reduced from 18 to 13 it does suggest that perhaps there is a held belief by teachers that only some people can be successful in mathematics.

An important finding in Beswick's study was that "teachers do hold differing beliefs about mathematics teaching for students with MLD compared with other students" and that "the difference in the teachers' beliefs was such that students with MLD would experience less broad, rich and challenging curricula than other students" (2007, pp. 16-17). In her conclusion, Beswick (2007) states that "attention will need to be paid to teachers' relevant beliefs if inclusive policy is to have a real impact on students with MLD" (p. 18). This is

In V. Steinle, L. Ball & C. Bardini (Eds.), Mathematics education: Yesterday, today and tomorrow (Proceedings of the 36th annual conference of the Mathematics Education Research Group of Australasia). Melbourne, VIC: MERGA.
© Mathematics Education Research Group of Australasia Inc. 2013

an important notion if all children are to be provided with equitable opportunities to succeed in school mathematics.

Mathematics, Curriculum and 'Inclusive Policy'

Seah and Bishop (2002) suggest that "school mathematics is intimately related to the society in which it is taught" and that "teaching mathematics for numeracy further reinforces this connection" (p. 105). In a regime of national and international testing, and a political focus on an outcomes based education, this connection is presently a dominant feature within the *Australian Curriculum – Mathematics* (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2011). The current political landscape within Australia suggests a tone of urgency surrounding the notion of developing a numerate nation. This sense of urgency could be attributed to a variety of reasons such as the new demands of a technology-based 21st century society (Niess, 2005); the growing need for citizens to have a high proficiency of mathematical understanding (Anderson, White, & Wong, 2012); the international climate of the comparison of educational performance (Lingard, 2010); and/or the shifting character of a 21st century workforce (Geiger, Goos, & Dole, 2011). Whatever the reasoning it is obvious that numeracy is now very high on the political agenda, and that this prioritisation is indeed beginning to articulate the shape of school mathematics.

Other policies related to numeracy in the current political landscape are those surrounding the notions of equity and inclusion. Once again there are several reasons that might have contributed to the development of this focus, many of which are dealt with in detail in Atweh, Graven, Secada, and Valero (2011). Such reasons might include, but are by no means limited to, the continued disparity in mathematical performance between children from middle-class and low socio-economic (SES) backgrounds on international testing regimes such as PISA 2009 (Sullivan, 2011); or the strong discourse of accountability and measurement that is currently dominating the political climate (Zevenbergen & Ortiz-Franco, 2002).

Whilst it is encouraging that numeracy appears to be a priority within the current political climate, and that notions of inclusion and equity are at the forefront of policy agenda, it is also concerning in that a variety of crucial ingredients appear to be missing. One major ingredient is highlighted in Beswicks' (2007) concluding statements in relation to the held beliefs of teachers. This is a key notion that needs to be addressed if school mathematics is to be accessible to all Australian children, and the governmental goal of a 'numerate nation' is to be achieved. Do principals and teachers believe in the potential of all children to be successful at school mathematics? Do principals and teachers perceive young children as capable users of mathematics before they start school? The remainder of this paper explores these questions through presenting the early findings of a doctoral project.

The research project

The doctoral project utilised the theoretical lens of the cultural interface (Nakata, 2007a, 2007b) to explore the processes involved when preschool teachers, families and primary school teachers work together to support the numeracy practices of children as they make the transition to school. The project utilised a Design-based Research (DBR) methodology (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Collins, Jospeh, & Bielaczyc, 2004) to implement a small-scale intervention that involved the establishment

of two separate research teams (a preschool teacher and a primary school teacher). Each research team was located at a different site in rural Victoria and worked together to explore the numeracy practices of children in the preschool setting, with the aim to use this knowledge to create a plan that would support practice as children made the transition into the primary school classroom. The researcher's focus was on the processes required to engage in such an approach.

Recruitment of participants for the project involved a variety of processes. One of the early stages of recruitment involved making contact with principals to organise meetings to discuss and receive input into the proposed intervention. These meetings were designed around the notion of an informational interview (Bolles, 2012) whereby information in relation to the project and the principals' particular settings would be shared and discussed. Barty, Thomson, Blackmore, and Sachs (2005) suggest that "Governments across the world are convinced of the importance of school principals to the achievement of successful school reform" and that "this view is supported by researchers from the school change, effectiveness and improvement fields, as well as those who undertake in depth school ethnographies" (p. 2). Whilst the doctoral research reported here was not focused specifically on school reform, the intervention being proposed to principals and later developed with practitioners was centred round a view to generating a 'new-way-of-doing'. Hence, principal buy-in was a vital component of the research project.

Method

The data presented in this paper derive from the informational interviews with principals and some first-year-of-school (Prep) teachers that were undertaken during the first phase of the project. The selection of school to be approached during this phase of the project was based solely on the geographical location of the school and contact was initially made via email or telephone. During this initial contact a time for the researcher to either visit the school, or meet via telephone was arranged. When the meetings took place the principal (and the prep teacher if they were in attendance) were presented with the basic ideas underlying the research project, asked to contribute their thoughts in relation to the project and their particular context, and to indicate whether they would agree to the researcher developing the project further by organising a meeting between the prep teacher and a teacher from a 'feeder' preschool. The project involved the prep teacher working closely with the preschool teacher and families in the preschool context. The aim of the partnership was to research the numeracy practises of children, and to work together to devise a plan that would support those practises as children made the transition from preschool to school. Six of the 10 principals approached did agree to meet with the researcher: four face-to-face and two via telephone. Two prep teachers were also participants during this stage of recruitment.

Findings

Principal 1, who met with the researcher via telephone and without the prep teacher present, suggested that; "behaviour and emotional development are much better areas to focus on during the transition to school". Principal 2, who met with the researcher in person without the Prep teacher present, offered a similar perspective: "numeracy isn't really a focus at the beginning of the year". This principal clarified that, for this particular school, it was "all about routines during Term 1." She added; "as you know, it takes a long time for them [the children] to master what school is all about." Principal 3, who opted for

a telephone meeting without the Prep teacher present, communicated "it wouldn't be something that we [the school] would be interested in because the numeracy interview at the beginning of the school year provides the Prep teacher with all the information that she needs".

Principal 4 met with the researcher in person and communicated that, "we [the school] work with families from very, very, very low SES backgrounds". When probed by the researcher in relation to what this might mean, the principal went on to explain that, "these children do not even have access to books in their homes, let-alone any materials to do with mathematics, they come to us with nothing". When a variety of provocations were presented to the principal, such as the possibility of the children having exposure to varying opportunities in the local preschool program, the principal conceded that "some form of mathematical learning must take place [before children come to school]" but also commented that "it is nothing robust". It was explained to the researcher that "there is no use focusing on [mathematical] learning when children have such difficult home lives" and that "our [the school's] focus is simply on making the children feel safe, cared for and comfortable". It was further explained by the prep teacher present that "these children can't learn anything if these things are not addressed first".

Principal 5, who opted for a face-to-face meeting, communicated that; "we [the school] have had a strong focus on literacy over the past few years with our oral language program. Numeracy has been a bit neglected. It will be good to refocus". The Prep teacher, who was present at this meeting, appeared receptive to the notion of the project's focus on numeracy. This was evident in the teacher's comment that, "maths isn't really one of my strengths but I would really like to have some time to concentrate on developing this area, I'd love to do it [participate in the project]" and also that "it will be great to focus on it [numeracy] again, you're right [turns to principal], it has been neglected".

Principal 6 met with the researcher alone and asked several questions, particularly in relation to the focus on numeracy. Toward the end of the meeting the principal said, "I think that it [the project] sounds good". He then went on to explain that throughout his career he had found that "numeracy has always been the poor cousin to literacy in primary schools" and that "some teachers are so focused on getting the kids to read in that first year that maths takes a back seat". Principal 6 stated; "it's good to see a numeracy focus" and agreed to participate in the project.

Discussion

Much of the data collected during this recruitment phase of the project suggest that, for some principals and schools, numeracy might not be a focus or a priority when children commence school. Whilst this perceived lack of focus might also have been a polite way to 'opt out' of the doctoral project, it is concerning that only two of the six principals spoken with indicated that numeracy was a key area of focus for their school at the time of the commencement of school. This is in contrast to statements contained in a number of frameworks and other policy documents about transition to school and mathematics education. For example *Transition: A Positive Start to* School (Department of Education and Early Childhood Development [DEECD] 2009a), suggests that, "placing greater emphasis on the continuity of learning recognises that building on children's prior and current experiences helps them to feel secure, confident, and connected to people, places, events, routines and understandings" (p.2:3). The *Victorian Early Years Learning and Developmental Framework* (DEECD, 2009b), portrays a similar notion in communicating that practitioners should "build on children's prior learning and experiences to build

continuity for their learning and development from birth to eight years of age" (p.10). Despite these messages, the findings in this study suggest that in relation to the continuity of mathematical learning during the transition to school, schools might not be taking up the recommendations.

The held beliefs of principals and teachers might be one reason for this lack of focus during the transition to school. For example practitioners, despite policy and literature stating otherwise, might not perceive young children as capable of using mathematics until they have experienced school mathematics. This was certainly evident in the comments made by Principal 4 who conceded that "some form of mathematical learning must take place [before children come to school]" but that, "it is nothing robust". Perhaps some more work that focuses on highlighting the capabilities of young children in relation to how they use school mathematics before they make the transition to school is needed for practitioners to change their perceptions and thinking. Findings in this study indicate that there are some school leaders who do not recognise that young children are engaging with and using mathematics long before they enter the school grounds, or if they do, they do not see supporting the continuity of this learning as a priority as children make the transition to school. Both notions are potential obstacles in relation to the development and support of children's numeracy skills and understandings in and out of school, and also as children make the transition to school.

The *Victorian Early Years Learning and Developmental Framework* (DEECD, 2009b) articulates its purpose to be advancing children's learning and development from birth to 8 years. However, findings in this study would suggest that some schools and principals are focused mainly on children's development at the time of the children's transition to school. This was apparent in four of the six principal's comments where priorities appeared to centre round social and emotional development rather than continuity of children's learning. Both areas need to be foci if children are to be given the best start to formal education – particularly in the area of mathematics education where it is important to build on existing ways of knowing and doing as well as to introduce something that appears foreign and unrecognisable to children to scaffold learning (MacDonald, Davies, Dockett, & Perry, 2012).

The comments made by Principal 4 are certainly indicative of strong beliefs surrounding mathematics and children and families from low SES backgrounds. During the meeting with the researcher, this principal was able to provide an explicit picture of the numeracy practices of families and children preparing to make the transition to the school the following year - families and children that this principal was yet to meet. Such findings not only resonate with the concluding comments made by Beswick (2007) in that attention might need to be paid to the relevant beliefs of teachers (and principals) if the mathematics found in schools is to be inclusive of all children and families. They also suggest a belief that children from low SES backgrounds do not have the capacity to engage in any form of numeracy prior to the commencement of school, and that their families are unable to support them.

Principal 4's comments are also insightful in relation to inclusive policy and DEECD documentation surrounding notions of inclusiveness. Principal 4 knew that the families (he seems to be saying 'all of these families') preparing to make the transition to his school were from low SES backgrounds since the allotment of government funding to the school is based, at least in part, on the SES characteristics of the families. Unfortunately, what also appears to have been communicated to this principal is a detailed description of the families and children in the school community. Families who do not have "access to books

in their homes, let-alone any materials to do with mathematics". For the purpose of the distribution of economic resources, the majority of this school's community had been described by government policy and funding, and perhaps interpreted by this principal, as a generic group positioned in deficit, in relation to mathematics education, before they have even entered the school ground. Such a circumstance suggests the need for reconsideration if all of these children are to be provided with equitable access to successful engagement in school mathematics.

Conclusion

The findings presented in this paper suggest that numeracy might not be a key priority for schools as children make the transition from preschool to primary school, despite government policy, frameworks and curriculum documentation advocating that it should be. Whilst this paper reports findings from a small case study, it highlights the differences between policy and practice and that these need to be explored further, particularly in relation to mathematics education and notions of inclusiveness.

Another area that demands exploration is the views that educators hold in relation to the mathematical knowledge and numeracy practices of young children, particularly round the notion of the gatekeeper. If young children are not perceived as capable users of mathematics outside the school ground then links between home and school learning will be very difficult to make. If every young child is not perceived as a capable user of mathematics prior to the commencement of formal education then existing knowledge, skills and understandings will not be taken seriously, harnessed and built upon. This has particular importance for children from minority backgrounds.

If children from low SES backgrounds are positioned in deficit before they commence school, the expectations of these children and families could potentially be lowered, and varying opportunities for educators to build on existing understandings, knowledge and strengths might be lost. *All* children should be expected to start school with some experience in using mathematics in their day-to-day lives, and *all* children should be expected to succeed in school mathematics when formal education begins.

The key message from this paper is that much wider investigations are needed to come to any conclusive understandings or definitive findings about the place of numeracy as children and families make the transition into primary school. This is particularly the case if children's existing knowledge is to be established and harnessed. It is also necessary if school mathematics is to be an area of the curriculum in which all Australian children have equitable opportunities to succeed.

References

Atweh, B., Graven, M., Secada, W., & Valero, P. (Eds.) (2011). *Mapping equity and quality in mathematics education*. Dordrecht: Springer SBM NL.

Australian Curriculum, Assessment and Reporting Authority (ACARA). (2011b). *Australian curriculum – Mathematics*. Retrieved from http://www.australiancurriculum.edu.au/Mathematics/Rationale

Anderson, J., White, P., & Wong, M. (2012). Mathematics Curriculum in The Schooling Years. *Research in Mathematics Education in Australasia* (2008-2011), 219-244.

Atweh, B., Graven, M., Secada, W., & Valero, P. (2011). *Quality and equity agendas in mathematics education*. The Netherlands: Springer.

Barty, K., Thomson, P., Blackmore, J., & Sachs, J. (2005). Unpacking the Issues: Researching the Shortage of School Principals in Two States in Australia. *Australian Educational Researcher, 32*(3), 1-18.

Beswick, K. (2007). Influencing Teachers' Beliefs About Teaching Mathematics for Numeracy to Students with Mathematics Learning Difficulties. *Mathematics Teacher Education and Development, 9*, 3-20.

Bishop, A. J. (1988). *Mathematical enculturation: a cultural perspective on mathematics education*. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Bolles, R. N. (2012). *What Color Is Your Parachute?* (40th Aniversary Edition 2012 ed.). United States: Ten Speed Press, an imprint of the Crown Publishing Group, Random House, Inc. New York.

Boulton-Lewis, G. (1996). Representations of place value knowledge and implications for teaching addition and subtraction. In J. Mulligan & M. Mitchelmore (Eds.), *Children's number learning: A research monograph of MERGA/AAMT* (pp. 75-88). Adelaide: Australian Association of Mathematics Teachers.

Clarke, B. A., Clarke, D., & Cheeseman, J. (2006). The mathematical knowledge and understanding young children bring to school. *Mathematics Education Research Journal, 18*(1), 78-102.

Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design Experiments in Education. *Educational Researcher, 32*(1), 9-13.

Collins, A., Jospeh, D., & Bielaczyc, K. (2004). Design Research: Theoretical and Methodological Issues. *The Journal of the Learning Sciences, 13*(1), 15-24.

DEECD, D. o. E. a . E. C. D. (2009b). *Victorian Early Years Learning and Development Framework*. Melbourne.

Geiger, V., Goos, M., & Dole, S. (2011). *Teacher professional learning in numeracy: Trajectories through a model for numeracy in the 21st century*. Paper presented at the Australian Association of Mathematics Teachers (AAMT) and the Mathematics Education Research Group of Australasia (MERGA) Conference 2011, Alice Springs, NT, Australia.

Lakoff, G., & Nunez, R. (2000). *Where mathematics comes from*. United States of America: Basic Books.

Lingard, B. (2010). Policy borrowing, policy learning: testing times in Australian schooling. *Critical Studies in Education, 51*(2), 129-147.

MacDonald, A., Davies, N., Dockett, S., & Perry, B. (2012). Early childhood mathematics education. In T. L. B. Perry, T. Logan, A. MacDonald, & J. Greenlees (Ed.) (Ed.), *Research in mathematics education in Australasia* Rotterdam: Sense.

Nakata, M. (2007a). The cultural interface. *Australian Journal of Indigenous Education, The, 36*(Supplementary), 7-14.

Nakata, M. (2007b). *Disciplining the savages: Savaging the disciplines*. Canberra: Aboriginal Studies Press.

Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education, 21*(5), 509-523.

Perry, B., & Dockett, S. (2002). Early childhood numeracy. *Australian Research in Early Childhood Education, 9*(1), 62-73.

Rattan, A., Good, C., & Dweck, C. (2012). It's ok — Not everyone can be good at math: Instructors with an entity theory comfort (and demotivate) students. *Journal of Experimental Psychology*. doi: 10.1016/j.jesp.2011.12.012

Seah, W. T., & Bishop, A. J. (2002). Values, mathematics and society: Making the connections. In C. Vale, J. Roumeliotis & J. Horwood (Eds.), Valuing mathematics in society (pp. 105-113). Brunswick, Australia: Mathematical Association of Victoria.

Sophian, C. (2009). Numerical knowledge in early childhood *Encyclopedia on Early Childhood Development*.

Sullivan, P. (2011). Teaching Mathematics: Using research-informed strategies. In S. Mellor (Ed.), *Australian Education Review*. Camberwell, Victoria: Australian Council for Educational Research.

Zevenbergen, R., & Ortiz-Franco, L. (2002). Equity and Mathematics Education. [Editorial]. *Mathematics Education Research Journal, 14*(3), 151-153.