

Noticing Young Children's Mathematical Strengths and Agency

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

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

This paper promotes the importance of noticing young children's mathematical strengths. It draws on the philosophical positions of children's rights and competence to propose a shift in the ways in which all involved might notice the mathematical engagement, understandings, experiences and practices of young children. Noticing children's mathematics generates the potential for educators to document learning and to respond in ways that promote ongoing engagement in areas that are of relevance and interest for young children.

Changing Images of children

For many years, early childhood educators and researchers have devoted attention to accessing and responding to children's perspectives and interpretations of issues and events that are relevant for them. These commitments have been heightened by international focus on the *United Nations Convention on the Rights of the Child* (CRC) (United Nations, 1989) and the emergence of the sociology of childhood. Underpinning these positions are recognition of children's rights to contribute their views on matters that affect them (rights discourse) and respect for children's competence and agency (sociology of childhood discourse). Together these promote recognition of children as experts in their own lives; skilful communicators who engage a range of strategies to share their expertise; active participants in a wide range of experiences, who exercise various forms of agency as they interact with the world around them and experience the agency of others as they are influenced by that world; and meaning makers, constantly seeking to understand and make sense of their interactions with people, places and experiences (Lansdown, 2005).

Perceptions of children's competence influence the ways in which educators plan learning environments and experiences, what they expect will be learned as well as how that learning may occur. Often, expected competencies are based on ages or stages (Christensen & James, 2008), with ages often determining expected levels of competence as well as whether or not children have access to specific experiences.

Alternative approaches to competence consider experiences and contexts, recognising that the nature of tasks, as well as the social and cultural contexts in which they are located, impact on levels of participation and outcomes (Lansdown, 2005). Regarding children as competent highlights the importance of context and the ways in which children develop competence in contexts that matter for them (Rogoff, 2003). The following example (Perry, Dockett, & Harley, 2012, p. 169) illustrates this point.

The long and short of it

Harry¹, today you played Red Rover on the tennis courts. Everyone lined up and the caller called over people wearing shorts. You looked down at your legs and seemed unsure as to whether you were wearing shorts or long pants. When you bent forward, your shorts got longer; it was a bit of a puzzle. You turned to the person next to you and compared what they were wearing with what you were wearing. You looked back and forward from their legs to yours. Your friend said, "go on Harry, you've got shorts on." You decided that you were indeed wearing shorts and took off across

¹ Harry is 5 years old.

the court. The next time that the caller called for people wearing shorts, you had no hesitation. You took off across the court and ran so fast that nobody could catch you.

Mathematics exists across many diverse contexts. Recognising young children as competent mathematicians requires educators and researchers to consider these diverse contexts and the ways in which children interact and navigate their ways within these. It requires that we look beyond the perceived limitations of children's understandings, looking beyond what we identify as things they cannot do to the ways in which they demonstrate competence.

If we seek evidence of children's mathematical understanding in limited ways, we should not be surprised if we find limited understandings. If we explore multiple strategies for seeking such evidence, we are likely to find a wide range of evidence indicating children's knowledge and understandings. For example, children's play has been identified as a key context for many mathematical experiences as children investigate their environments and engage with challenges and problems that are relevant for them (Seo & Ginsburg, 2004; Perry & Dockett, 2008). However, while the potential for play to contribute to children's mathematical understanding has long been recognised, this potential is only realised if the mathematics in play is noticed, explored and talked about. Many educators do notice mathematics in children's play; so too do other children and other adults. The interactions that occur as a result of this contribute a great deal to children's developing mathematical understandings.

Noticing Mathematics

Observation and the importance of observing children in various contexts at various activities has long been a core element of quality early childhood education pedagogy (Forman & Hall, 2005). For some time, observation was taken to be a passive activity whereby adults had a role in setting up the environment, but then aimed to step back and observe children's actions with relatively little intervention (Fleer & Richardson, 2004). Greater awareness of the social nature of learning and the significance of interactions with more experienced others has recognised the importance of active participation between and among children, peers and adults. The result has been a greater focus on observing not only individual children's learning and understanding, but also the ways in which interactions with others impact and influence these outcomes (Fleer & Richardson, 2004).

Despite this, the concept of observation sometimes retains a sense of formality, tied to objective or scientific study of specific events or experiences, focused on recording individual development across defined domains. Changing views of children that recognise their competence and their rights, as well as emphasising their active engagement in learning, challenge these notions and encourage the positioning of children as co-constructors and meaning makers. Such an approach is reflected in *Belonging, Being and Becoming: The Early Years Framework for Australia* which presents children as "active participants and decision-makers" who "actively construct their own understandings and contribute to others learning" (DEEWR, 2009, p. 9).

In this symposium, we seek to move beyond the potentially limited uses of observation and, instead, promote the notion of noticing young children's mathematics. Our conceptualisation of noticing is two-fold, combining both recognising and responding to children's mathematics.

Recognising mathematics may mean paying attention to spontaneous as well as planned experiences or events, and considering the unexpected as well as the anticipated actions of children. It does require that educators themselves have a sound understanding

of mathematics and are open to the potential for mathematics in many situations. It also requires recognition of children's competence and strengths, involving them in the identification and negotiation of mathematical experiences.

Recognising and responding to children's mathematics challenges us to look beyond observations and expectations. Many of our observations are based on expectations - we usually find what we expect, whether those expectations are based on age, ability (or disability), curriculum, context, experience, culture or another premise. Our expectations influence what we observe, what we designate as significant and what we value as learning (Carr & Lee, 2012). While it may not be possible to work without expectations, it is important not to be limited by these. At the very least, we need to be aware of our expectations and to reflect critically on the ways in which these guide what we observe.

Expectations are often age-based, with young children perceived as not capable of complex mathematics. Yet their engagement in a range of experiences, explanations and arguments suggest that they deal regularly with complex mathematical ideas and situations (Clarke & Robbins, 2004; Seo & Ginsburg, 2004). While their ability to express complicated mathematical ideas may be limited when compared with adults, they nonetheless deal with complex issues. In the following example (Dockett & Perry, 2001, pp. 227-228), Jeremy refers to some complex mathematical understandings as he describes what happens when he draws a line on a balloon and then inflates the balloon:

It's gone, cause I blew it up too much and the ink's gone, it's fade.

It's faded cause it goes stretches and the ink disappears. The ink stretches and leaves little dots and then it disappears. It gets smaller and smaller and smaller and it disappears.

How come this happens?

Because it was very long and once it grows they get to be little dots and then it disappears. Then it gets disappearing.

The second element of noticing children's mathematics involves responding in ways that identify the mathematical content of experiences, value the inherent mathematics and provide options to pursue the mathematical thinking. Responding requires educators who are prepared to be amazed, and possibly confused, by children's mathematical understanding. Effective educators engage a number of ways of responding that both affirm and stretch children's understandings. For example, educators may adopt the role of *provocateur* (Edwards, Gandini, & Forman, 1993), or they may promote a time of sustained shared thinking (Siraj-Blatchford & Sylva, 2004), with the aim of engaging over time with children in a process of cognitive co-construction, working together to solve a problem or clarify understandings.

There will be many reasons for noticing children's mathematics. Some of these will be related to external issues, such as reporting requirements. In these cases, noticing can be the basis for documentation and assessment. However, in all instances, noticing young children's mathematics can serve to acknowledge existing learning and to plan for future learning.

Beyond Noticing

Noticing children's understandings is not a neutral activity - it is imbued with expectations and notions of what is valued, what constitutes evidence of learning and whose understandings are most likely to be noticed. Noticing young children's mathematics has the potential to respect children's rights and recognise their competencies. However, the processes of noticing and critical reflection need to go hand-in-hand, in

efforts to ensure that the understandings of all children are noticed and valued and that the diversity of understandings among any group of children is valued. Noticing children's mathematics can be a way of respecting children and engaging with them to promote greater and deeper understandings.

References

- Carr, M., & Lee, W. (2012). *Learning stories: Constructing learner identities in early education*. London: Sage.
- Christensen, P. & James, A. (Eds.) (2008). *Researching with children: Perspectives and practices* (2nd ed.). Abingdon, UK: Routledge.
- Clarke, B., & Robbins, J. (2004). Numeracy enacted: Preschool families' conceptions of their children's engagements with numeracy. In I. Putt, R. Faragher, & M. McLean (Eds.), *Mathematics education for the third millennium: Towards 2010* (Proceedings of the 27th annual conference of the Mathematics Education Research Group of Australasia) (pp. 175-182). Townsville: MERGA.
- Department of Education, Employment and Workplace Relations (DEEWR). (2009). *Belonging, being and becoming: The early years learning framework for Australia*. Canberra: Commonwealth of Australia. Retrieved from: http://www.deewr.gov.au/earlychildhood/policy_agenda/quality/pages/earlyyearslearningframework.aspx
- Dockett, S., & Perry, B. (2001). "Air is a kind of wind": Argumentation and the construction of knowledge. In S. Reifel & M. Brown (Eds.), *Early education and Care, and reconceptualizing play*, 11 (pp. 227-256). Oxford: Elsevier Science.
- Edwards, C., Gandini, L. G., & Forman, G. (Eds.) (1993). *The hundred languages of children: The Reggio Emilia approach to early childhood education*. Norwood, NJ: Ablex.
- Fleer, M., & Richardson, C. (2004). *Observation and planning in early childhood settings: Using a sociocultural approach*. Watson, ACT: Early Childhood Australia.
- Forman, G., & Hall, E. (2005). Wondering with children: The importance of observation in early education. *Early Childhood Research and Practice*, 7(2). Retrieved from <http://ecrp.uiuc.edu/v7n2/forman.html>
- Lansdown, G. (2005). *The evolving capacities of the child*. Florence, Italy: UNICEF Innocenti Research Centre. Available from: www.bernardvanleer.org/files/crc/4%20Gerison_Lansdown.pdf
- Perry, B., & Dockett, S. (2008). Young children's access to powerful mathematical ideas. In L. D. English (Ed.). *Handbook of international research in mathematics education* (2nded) (pp. 75-108). New York: Routledge.
- Perry, B., Dockett, S., & Harley, E. (2012). The *Early Years Learning Framework for Australia* and the *Australian Curriculum – Mathematics*: Linking educators' practice through pedagogical inquiry questions. In B. Atweh, M. Goos, R. Jorgensen, & D. Siemon (Eds.), *Engaging the Australian Curriculum Mathematics: Perspectives from the field* (pp. 153-174). Adelaide, South Australia: Mathematics Education Research Group of Australasia. Retrieved from <http://www.merga.net.au/onlinebooks>
- Rogoff, B. (2003). *The cultural nature of human development*. Oxford: Oxford University Press.
- Seo, K.-H., & Ginsburg, H.P. (2004). What is developmentally appropriate in early childhood mathematics education? In D.H. Clements, J. Sarama & A.-M. DiBiase (Eds.). *Engaging young children in mathematics: Standards for early childhood mathematics education* (pp. 91-104). Mahwah, NJ: Erlbaum.
- Siraj-Blatchford, I., & Sylva, K. (2004). Researching pedagogy in English preschools. *British Educational Research Journal*, 30(5), 713-730.
- United Nations. (1989). *Convention on the rights of the child*. New York: Author. Retrieved from <http://www.unicef.org/crc/crc>