

## Strengths approaches in early childhood mathematics education

Amy MacDonald  
Charles Sturt University  
<amacdonald@csu.edu.au>

Angela Fenton  
Charles Sturt University  
<afenton@csu.edu.au>

Matt Sexton  
Australian Catholic University  
<matthew.sexton@acu.edu.au>

James Russo  
Monash University  
<james.russo@monash.edu>

Fiona Collins  
Charles Sturt University  
<fcollins@csu.edu.au>

Steve Murphy  
Charles Sturt University  
<smurphy@csu.edu.au>

Joce Nuttall  
Australian Catholic University  
<joce.nuttall@acu.edu.au>

Toby Russo  
Bell Primary School  
<toby@bellps.vic.edu.au>

This symposium discusses the use of strengths approaches in early childhood mathematics education. *Strengths approaches* can be conceptualised as educational practices that recognise, and utilise, children's strengths. Strengths approaches originate in the social work sector, but are growing in recognition in early childhood education. This symposium considers how strengths approaches might be adopted in early childhood mathematics education, specifically, encouraging pedagogical approaches that recognise, and build upon, young children's strengths in mathematics. This symposium presents theorisation and a case illustration of how strengths approaches can be meaningfully utilised in early childhood settings in order to enhance mathematical learning opportunities for young children. The symposium addresses three aspects: (1) Overview of strengths approaches; (2) Application of strengths approaches; and (3) Leadership to promote strengths approaches; illustrated within the context of early childhood mathematics education.

The symposium format is as follows:

**Chair:** Amy MacDonald

**Paper 1:** Fiona Collins & Angela Fenton *An introduction to the strengths approach*

**Paper 2:** Amy MacDonald & Steve Murphy *A strengths approach to birth-to-3 mathematics education: The case of Banjo Childcare Centre*

**Paper 3:** Matt Sexton & Joce Nuttall *Leadership of strengths-based approaches for early years mathematics education: Using CHAT as a framework for educational leaders' professional learning leadership*

**Discussants:** James Russo & Toby Russo

# Leadership of strengths-based approaches for early years mathematics education: Using CHAT as a framework for educational leaders' professional learning leadership

Matt Sexton

*Australian Catholic University*  
<matthew.sexton@acu.edu.au>

Joce Nuttall

*Australian Catholic University*  
<joce.nuttall@acu.edu.au>

We present a model that employs *cultural-historical activity theory* (CHAT) concepts to inform research with designated Educational Leaders in early years settings. We theorise practice change in early years mathematics education in terms of motive objects of activity and mediation by cultural tools. We show how CHAT can be used to lead development of a strengths-based approach to support young children's early mathematics education through systematic professional learning activity. Our overarching aim is to understand how educational leadership in early learning spaces can be reimagined, drawing on CHAT to theorise this under-researched area of mathematics leadership in early learning settings.

In this MERGA symposium paper, we present a model that employs concepts from *cultural-historical activity theory* (CHAT) to inform research and learning opportunities with designated Educational Leaders in early years settings. We show how the model can be used to lead a strengths-based approach (e.g., Fenton et al., 2016) to support young children's mathematics education. Our overarching aim is to understand how educational leadership in early learning spaces can be reimagined, drawing on CHAT to theorise this under-researched area of mathematics leadership in early learning settings. This reimagining and expansion of work sees Education Leaders lead enactment of strength-based approaches for early years mathematics education through on-site professional learning.

Culturally and historically, there have been limited expectations for mathematics education in early childhood programs (for children aged from birth to five years), relative to the focus on mathematics in the early years of schooling (for children aged from five to eight years). The work of Piaget has long influenced thinking about children's learning in early years education, with a focus on discovery learning of mathematical thinking (Stipek, 2013). This situation has been compounded by early years educators' underestimation of young children's capacity to think mathematically and misunderstandings about how young children come to understand mathematical ideas. Many educators hold negative affective responses to mathematics in general (Knaus, 2017; Moss et al., 2016; Stipek, 2013), and they also tend to have limited understanding of mathematical content knowledge (MCK), particularly understanding mathematical concepts and terms (Knaus, 2017).

The position of Educational Leader has been mandatory in all early childhood services in Australia since 2012. This policy move aims to improve program quality through the leadership of suitably qualified staff who foster changes in pedagogical practice. In Aotearoa New Zealand, there is no such mandatory position, possibly because the proportion of degree-qualified staff in the sector is higher than in Australia. In this paper, we position Educational Leaders as *mathematics professional learning leaders* who direct their leadership activity towards developing colleagues' mathematics teaching practice using strength-based approaches. We show how this leadership-of-learning process can be researched through CHAT concepts.

## Theorising Leadership as a Research and Learning Opportunity

We argue for the explanatory power of CHAT for researching and transforming long-standing workplace practices, such as the historical neglect of mathematics in early years education. Professional learning can enhance educators' knowledge and practices for mathematics education, including their dispositions and expectations for young children's mathematical learning (Perry & MacDonald, 2015). We are concerned specifically with professional learning focused on strengths-based approaches for mathematics education with young children, including the use of documentation associated with those approaches (Fenton et al., 2016). We suggest that that documentation, including the concepts and practices of strength-based approaches, offer new cultural tools to inform professional learning in early years settings. These offer opportunities for educators to work on new motive objects focused on young children's mathematics learning. In this sense, we believe that research and learning opportunities lie in expanding the work of designated Educational Leaders to identify as mathematics professional learning leaders in their work sites.

We draw on three core concepts of CHAT: *motive object of activity*, *cultural tools*, and *mediation*. CHAT understands all human activity as *object-oriented* (Kaptelinin, 2005); that is, psychological and practical activity are simultaneously drawn forward by attention to collaborative tasks (*motive objects of activity*) that result in desired outcomes (Engeström, 2015). This differs from dominant understandings of motivation, which see it as an individual and internal force of will. We use the well-known triangular representation of collaborative activity (Figure 1) to show how subjects of the activity system (designated Educational Leaders) are motivated to enhance teaching practices of their colleagues. The Educational Leaders' motive object of activity is the development of mathematics teaching practices. The desired outcome is quality mathematics education for young children.

This relationship between Subject and Object is *mediated* by valued *cultural tools*. The mediating function of cultural tools is due to culturally-specific meanings that inhere in those tools. Buttons, for example, are mostly associated with clothing, but in early years education, another contextually-specific meaning inheres in a box of buttons: the pedagogical opportunity they offer to teach higher-order concepts (e.g., classification & subitising).

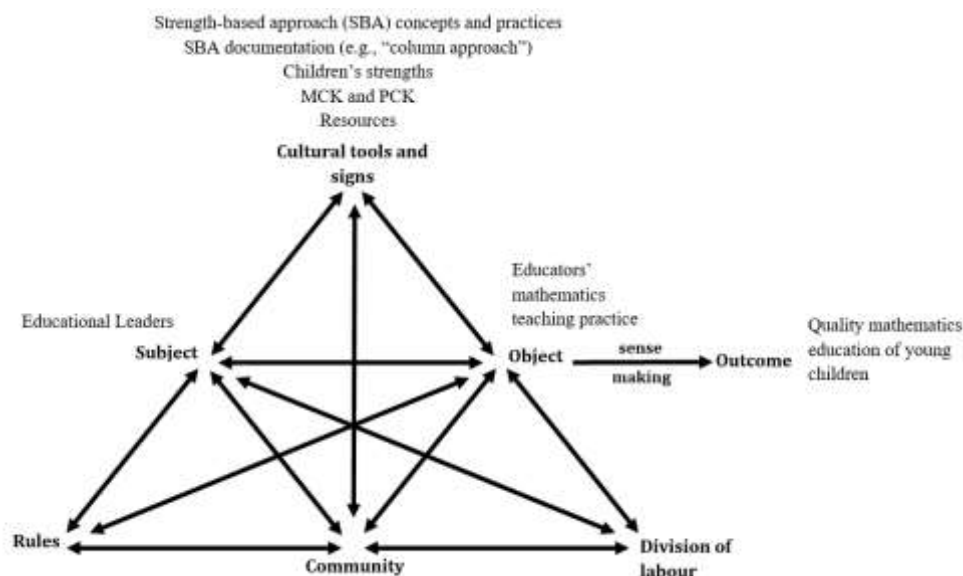


Figure 1. Representation of the Educational Leaders' mathematics professional learning activity system.

## *Children's Strengths* as a Temporary Motive Object of Activity for Educational Leaders as Mathematics Professional Learning Facilitators

A way for researchers to use these CHAT concepts and to understand changes in the professional work of Educational Leaders is to address and transform long-standing practices that have impeded mathematics education in early years learning spaces (Knaus, 2017; Moss et al., 2016; Stipek, 2013). This could be achieved by using the example of 'children's strengths' as a cultural tool that Educational Leaders can deliberately reposition as a temporary motive object of activity. Cultural tools do not become effective components of practical and psychological activity without deliberate efforts to understand and expand the meanings that inhere within them. A key "move" for Educational Leaders in early years education therefore is to make the definition, identification, and valuing of *children's strengths* a temporary focus in their work with colleagues (i.e., a temporary motive object of the collaborative professional learning activity they are leading).

Without this critical first stage of meaning-making in professional learning, the capacity to mobilise any new concept in the context of teaching practice, including strengths-based pedagogical activity, will be severely limited. Once children's strengths takes on a stabilised meaning across early years educators' conceptualisation of young children's learning, pedagogical strategies for applying strengths-based approaches can become the *next* temporary object of activity in an *ongoing sequence* of professional development focused on a series of *related motive objects*. Educational Leaders therefore have a critical role in progressively introducing new and more complex cultural tools to support educators' professional learning of strength-based approaches. For example, in Figure 1, we included mathematical content knowledge (MCK), pedagogical content knowledge (PCK), and resources (both in the classroom and for professional learning) as further cultural tools (and therefore potential temporary motive objects for professional learning) in the mathematics professional learning leadership activity of Educational Leaders. As noted earlier, early years educators may not feel adequately knowledgeable or disposed toward mathematics pedagogy due to their own limited mathematical knowledge (Knaus, 2017). Their own internalisation of specific mathematics concepts may therefore be a critical temporary motive object of professional learning leadership activity to support educators' confidence in teaching mathematics to young children.

In the context of this symposium, the "column approach" described by Collins and Fenton (Paper 1 in this symposium) offers a key cultural tool to enhance the PCK of early years educators. A temporary focus on the use of this tool has been shown to effectively foster the uptake of strengths-based approaches (Fenton et al., 2016). According to our conceptualisation, we suggest this success is due to the new meanings the column approach makes available to mediate early years mathematics pedagogical practice.

Educational Leaders can employ a variety of approaches in directing colleagues' psychological and practical activity toward new cultural tools as temporary motive objects. These strategies include providing reading materials, practice development through action research, collaborative design-based research activities, or through the practice methodology developed within CHAT, known as Developmental Work Research (DWR) (Virkkunen & Newnham, 2013). Strengths of DWR include its incorporation of simultaneous research and learning activities, allowing researchers to track shifts in meanings and practices at close hand, and its emphasis on the volitional action of the research participants to solve practical problems found in their work (Sannino, 2015). This would prove to be helpful in expanding the work of Educational Leaders to include mathematics professional learning leadership.

## Conclusion

Given the insights from Fenton et al. (2016) and MacDonald and Murphy (Paper 2 in this symposium) regarding early childhood educators' use of strengths-based approaches for mathematics education in early years settings, a research focus on the role of the Educational Leader in these settings is timely. Strategies to expand their work activity as mathematics professional learning leaders who can mobilise concepts, practices, and documentation of strengths-based approaches as motive objects of activity is one way of fostering mathematics education in early years settings. CHAT and DWR methodology have been shown to transform sedimented practices in early education (e.g., Nuttall, 2013) and is effective in expanding Educational Leaders' work (Nuttall et al., 2016).

However, this work has not hitherto focused on young children's mathematics development or educators' mathematics education knowledge, practices, and dispositions. We suggest that interventions informed by CHAT and DWR offer researchers and Educational Leaders the opportunity to conceptualise new, expanded work activity together for the professional learning leadership of strengths-based approaches for early mathematics education. Such a conceptualisation draws on the role of motive objects, specifically the adoption of new cultural tools that support the development of educators' understanding and use of strengths-based approaches for mathematics education. This would be a significant shift in the cultural and historical norms of early years mathematics education, but one that appears necessary if sedimented practices related to mathematics education in the early years are to be transformed. This research and learning opportunity, concerning the professional learning leadership of strength-based approaches, might be the investment that Stipek (2013) called for in evolving mathematics education practice in early years settings.

## References

- Engeström, Y. (2015). *Learning by expanding: An activity-theoretical approach to developmental research* (2nd ed.). New York, NY: Cambridge University Press.
- Fenton, A., MacDonald, A., & McFarland, L. (2016). A strengths approach to supporting early mathematics learning in family contexts. *Australasian Journal of Early Childhood*, 41(1), 45-53.
- Kaptelinin, V. (2005). The object of activity: Making sense of the sense-maker. *Mind, Culture, and Activity*, 12(1), 4-18.
- Knaus, M. (2017). Supporting early mathematics learning in early childhood settings. *Australasian Journal of Early Childhood*, 42(3), 4-13.
- Moss, J., Bruce, C.D., & Bobis, J. (2016). Young children's access to powerful mathematics ideas. In L. English, & D. Kirshner (Eds.), *Handbook of international research in mathematics education* (3rd ed., pp., 153-190). New York, NY: Taylor & Francis.
- Nuttall, J. (2013). The potential of Developmental Work Research as a professional learning methodology in early childhood education. *Contemporary Issues in Early Childhood*, 2013(3), 201-211.
- Nuttall, J., Thomas, L., & Henderson, L. (2016). Formative interventions in leadership development in early childhood education: the potential of double stimulation. *Journal of Early Childhood Research*, 16(1), 80-91.
- Perry, B., & MacDonald, A. (2015). Educators' expectations and aspirations around young children's mathematical knowledge. *Professional Development in Education*, 41(2), 366-381.
- Sannino, A. (2015). The principle of double stimulation: A path to volitional action. *Learning, Culture and Social Interaction*, 6, 1-15.
- Stipek, D. (2013). Mathematics in early childhood education: Revolution or evolution? *Early Education & Development*, 24(4), 431-435.
- Virkkunen, J., & Newnham, D. S. (2013). *The change laboratory: A tool for collaborative development of work and education*. Dordrecht, The Netherlands: Springer.