Beyond Methodological Boundaries Examining Mathematics Leadership: The Potential of Developmental Work Research

Matt Sexton
Australian Catholic University
matt.sexton@acu.edu.au

Eamon Light
Australian Catholic University
eamon.light@acu.edu.au

Reports of mathematics leadership in MERGA conference research papers have relied on exploratory methodologies, leaving a gap in interventionist approaches. We argue for Developmental Work Research, within the cultural-historical activity theory tradition, as a methodology for examining mathematics leadership during a time of educational change. We outline how DWR can support mathematics leaders and researchers in collaboratively surfacing, examining, and addressing leadership practice problems. We illustrate this through our current project with several mathematics leaders who are experiencing practice problems stemming from policy change.

This paper is not a report of empirical findings, nor is it a theoretical paper in the conventional sense typically presented at MERGA conferences. Instead, we offer a methodologically oriented paper that articulates an approach for examining mathematics leadership using a methodology known as *Developmental Work Research* (Engeström, 2015). Drawing on work within that field, along with insights from the first author's ongoing research program (Sexton, 2025a), we propose a case for using Developmental Work Research (DWR) to create knowledge about mathematics leadership during times of educational change.

We begin with a concise overview of methodologies reported in MERGA conference research papers about primary school mathematics leadership. We identify a gap in the use of interventionist approaches and argue that addressing this limitation is timely given the shifting policy landscape in Victoria, Australia. Then, we outline the nature and function of DWR as a way of working beyond the methodological boundaries that have framed research about mathematics leadership thus far, drawing on examples from our current project to show its application. Given MERGA paper constraints, broad information that prioritises DWR's methodological positioning is presented over empirical claims that are yet to be known.

Historicising Methodologies Reported in MERGA Conference Papers

We focus on primary school mathematics leadership research papers published in MERGA conference proceedings over the past 10 years. As a field of inquiry, mathematics leadership is relatively new to MERGA (Sexton, 2025b). Our review of papers published between 2016 and 2025 found 17 papers focused on primary school mathematics leadership. We broadly attend to methodologies and methods, identifying patterns reported in those papers.

Across the papers, all mathematics leadership studies were conducted in Australia, with a concentration in Victoria. Studies drew on several conceptual and theoretical frames, including teacher professional growth models (e.g., Clarke & Hollingsworth, used by Roche & Gervasoni, 2017), leadership and educational change perspectives (e.g., Fullan, used by Driscoll, 2022), and sociocultural theories including situated learning theory (e.g., Driscoll & Cheeseman, 2022) and cultural-historical activity theory (Sexton, 2025b; Sexton & Lamb, 2017).

Findings were generated through predominantly qualitative methodologies, with case study the most employed research design (e.g., Driscoll, 2017; Copping, 2022), although mixed-methods design has been used (Vale et al., 2021). Studies typically used semi-structured interviews (e.g., Marshman et al., 2024), observations (e.g., Lomas, 2022), and document retrieval (e.g., Sexton & Lamb, 2017) as primary data generation methods. Thematic analysis, conducted inductively or deductively, was the dominant analytical approach (Roche &

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Gervasoni, 2017; Sexton, 2025b). Collectively, the methodological aims and patterns reported in the research papers suggest a largely exploratory inquiry focus.

Given the emergence of the field (Sexton, 2025b), this exploratory orientation is not surprising. However, a gap exists in interventionist approaches to mathematics leadership research, suggesting the need to move beyond the exploratory methodological boundaries that have characterised the field thus far. This is timely in Victoria where the introduction of the *Victorian Teaching and Learning Model 2.0* (Department of Education Victoria, 2025) has mediated tensions for several mathematics leaders navigating the model's mandates.

Articulating Reasons for DWR with Mathematics Leaders in Victoria

The Victorian Teaching and Learning Model 2.0 (VTLM 2.0), officially launched in 2024, has stimulated a change in the Victorian educational policy landscape. The VTLM 2.0 mandates that by 2028, teachers working in Victorian government schools will use explicit teaching across all curriculum areas (Department of Education Victoria, 2025). The VTLM 2.0 expects explicit teaching before opportunities for reasoning and problem solving, representing a departure from student-focused inquiry approaches.

The first author has worked with several mathematics leaders in a leadership program in Victoria since 2023. The program has focused on developing leadership practice of mathematics teaching aligned with student-focused inquiry approaches (e.g., English, 2023) to meet expectations of the Victorian Curriculum (VCAA, 2023). This historical focus now sits in tension with the VTLM 2.0 mandate, creating a practice problem for the mathematics leaders. The following comments from two leaders illustrate this tension:

> The move towards explicit teaching including what classifies as explicit teaching is a massive issue. There has also been a move towards retrieval practices and what classifies as feedback and assessment. But what's missing is the how and why…and how that relates to learning maths.

> I'm still getting my head around "Vic Curric 2.0", especially the new processes. But something tells me that you can't teach the mathematical processes if you only use explicit teaching. Aren't the processes about inquiry and helping the students to find out using maths? I'm not sure lately.

We interpret these accounts as experiences of a genuine practice problem about how to reconcile policy mandates with the mathematics leaders' historical leadership focus. This tension is not one of simply implementing the VTLM 2.0. It has the leaders grappling with questions about pedagogy and leading development in mathematics teaching. We see this space as a research-rich opportunity that demands an interventionist approach. An aim of our current project is to support the mathematics leaders as they navigate complexities of VTLM 2.0 implementation, while simultaneously creating knowledge about the enactment of mathematics leadership in contexts of policy-driven change.

As an interventionist methodology, Developmental Work Research (DWR) engages participants in surfacing, examining, and addressing practice problems with researcher support (Engeström, 2015; Nuttall, 2013). DWR positions participants as co-researchers who analyse workplace activity and develop new solutions to practice problems. The situation experienced by several Victorian mathematics leaders represents the kind of historically embedded practice problem that DWR is designed to surface, examine, and address.

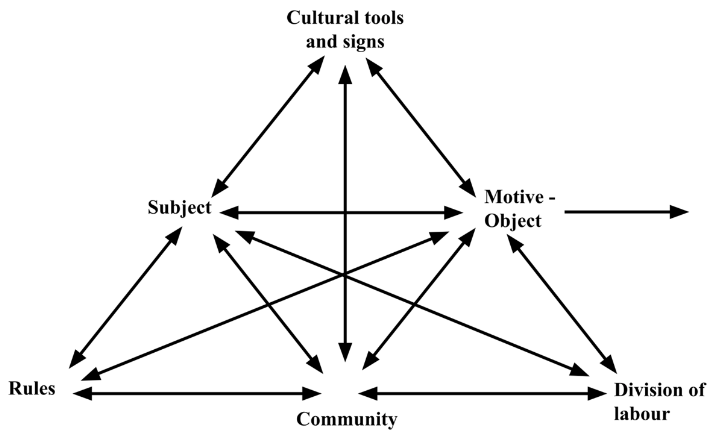
Situating DWR Within a Cultural-Historical Activity Theoretical Frame

To understand how DWR is used to respond to practice problems, it is necessary to first situate it within its theoretical home in cultural-historical activity theory (CHAT). CHAT stems from the work of Vygotsky and his collaborators in early twentieth century Russia. In the late 1980s, Engeström further developed CHAT through his theorisation of the *activity system* (Engeström, 2015). As a theory of development, CHAT explains the relationship between human thought and action, focusing on how humans develop internal activity, understood as cognition, and external activity which is materialised through forms of behaviour (Nuttall, 2013). CHAT proposes that both psychological and practical activity are simultaneously drawn forward through mediation processes that shape relationships between individuals and socially shared *motive-objects* of activity. Motive-objects are the teleological, collectively oriented purposes and tasks that give activity its direction and meaning (Leont'ev, 1978; Nuttall, 2013).

Building on Vygotsky's foundational ideas, Leont'ev theorised that human activity is inherently collective in nature and always oriented toward motive-objects that sustain both cultural and social life (Leont'ev, 1978). Engeström (2015) further expanded this by arguing that the activity system is a collectively organised, mediated formation oriented towards shared motive-objects that are transformed into culturally valued *outcomes*. Engeström's idea of the activity system is depicted by the well-known triangular representation (Figure 1).

Figure 1

Activity System Triangular Representation (Engeström, 2015)



The activity system representation explains the dynamic relations within human activity and the mediational means through which activity is organised. These include *cultural tools and signs*, *rules* guiding shared activity, and the *division of labour* which explains role, responsibility, and power distributions within and across the system (Engeström, 2015). The activity system also includes the *community*, the people who share and contribute to achievement of motive-objects. A defining feature of activity systems is that of *contradictions*, understood not only as practice problems, but as productive drivers of development and change (Engeström, 2015). Contradictions surface from misalignments between the mediational means within and beyond activity systems. When brought to people's consciousness, contradictions provide the driving force for *expansive learning* (Engeström, 2015; Nuttall, 2013). DWR harnesses this developmental process methodologically by using interventions to surface and examine contradictions within a professional community and to address them collectively through new, expanded forms of activity (Engeström, 2015).

Explaining Developmental Work Research

DWR moves beyond action research approaches that emphasise individual reflective practice. Within DWR, participants work alongside researchers, collectively examining systemic contradictions in their workplace to develop more robust understandings of their work activity (Engeström, 2015). With researcher support, participants also work together to adopt new or adapt existing mediational means with the aim of transforming the activity system in response to the surfaced and examined contradictions (Engeström, 2015; Nuttall, 2013).

Expansive Learning

Central to DWR is the concept of expansive learning (Engeström, 2015). Within DWR, learning is not merely the acquisition of new knowledge and skills. Instead, expansive learning is understood as a collective process of transformation of the entire activity system in which the participants work. Engeström (2015) reported the nature of expansive learning as:

- *Contradiction-driven transformation:* Expansive learning is initiated when participants encounter systemic contradictions that cannot be resolved through existing ways of working. Contradictions are historically accumulated, and tracing their roots is central to understanding why current tensions exist. When contradictions become consciously felt by participants as a *double bind* (an experience of being pulled in irreconcilable directions), they provide the driving force for expansive learning (Engeström, 2015; Kerosuo et al., 2010; Nuttall, 2013).
- *Motive-object expansion:* Through expansive learning, participants fundamentally redefine the motive-object of activity, constructing a new shared motive-object that redirects collective activity toward outcomes not previously possible within the existing activity system (Engeström, 2015; Kerosuo et al., 2010).
- *Double stimulation:* Expansive learning is grounded in Vygotsky's principle of double stimulation, whereby participants simultaneously work on contradictions while engaging with theoretical, conceptual, and practical tools as a second stimulus. This dual engagement produces the deeper conceptual shifts that distinguish DWR from other methodologies like action research (Engeström, 2015; Nuttall, 2013).
- *Collective and collaborative activity:* Expansive learning is not an individual pursuit but rather a social process through which participants collectively analyse their activity system, trace its historical development, and work collaboratively toward new, expanded forms of practice (Engeström, 2015; Kerosuo et al., 2010).

Figure 2 illustrates how these expansive learning characteristics are enacted through actions that mediate participants' transformation of activity with researchers.

Figure 2

Expansive Learning Cycle (adapted from Engeström, 2015; Nuttall et al., 2024)

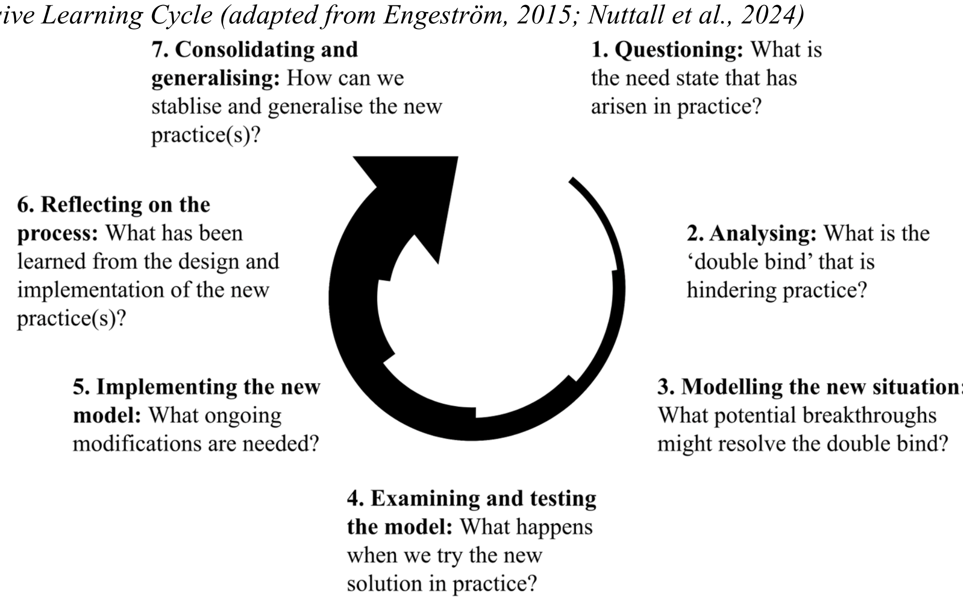


Table 1 illustrates each expansive learning action and their anticipated application in Change Laboratories (Change Labs), the spaces in which we will work with the leaders during our project.

Table 1

Expansive Learning Actions and Their Anticipated Application to our Current Project

Expansive learning action	Description	Anticipated application to our project
1. Questioning	Participants begin to question their prevailing activity, surfacing a state of need that signals contradictions within the activity system that require attention (Engeström, 2015).	Mathematics leaders have begun questioning how to reconcile their historical leadership practice on developing student-focused inquiry practices with the VTLM 2.0 mandate for explicit teaching.
2. Analysing	Participants analyse the historical roots and current state of contradictions within the activity system, surfacing *double binds* that act as drivers of change (Kerosuo et al., 2010).	Through initial interviews and document analysis, we generate mirror data and co-identify historically accumulated tensions between mathematics pedagogy, change driven by policy, and mathematics leadership.
3. Modelling the new situation	Participants collectively model new solutions to identified contradictions, creating new and/or reconfigured motive-objects, adopting/adapting mediational means, and practices within the activity system (Engeström, 2015).	Change Lab workshops support mathematics leaders to use theoretical, conceptual, and practical tools to model new approaches for leading mathematics teaching that reconcile student-focused inquiry and policy mandates for explicit teaching.
4. Examining and testing the model	New model is examined and tested within the activity system, with adjustments made as the model is enriched through practice (Kerosuo et al., 2010).	Leaders trial new approaches between Change Lab workshops, reporting back on experiences, change in leadership, and impacts for collective examination.
5. Implementing the new model	New model is implemented within the activity system, with participants taking increasing responsibility for its development at the level of practice (Engeström, 2015).	Leaders implement new model of leading mathematics teaching within schools, navigating the complexities of VTLM 2.0 implementation by adapting/adopting mediational means within the activity system.
6. Reflecting on the process	Participants evaluate and stabilise the process of expansive learning, consolidating new understanding of their activity system (Kerosuo et al., 2010).	Leaders collectively reflect on the expansive learning process, evaluating new leadership actions developed through the Change Lab workshops.
7. Consolidating and generalising	New practice is consolidated and generalised, with participants embedding new ways of working within and potentially beyond their activity system (Engeström, 2015).	New model of mathematics leadership is developed and enacted within leaders' schools, and new knowledge about mathematics leadership is created.

Whilst the expansive learning cycle provides a coherent framework for how DWR unfolds, in practice, the cycle is responsive rather than linear (Nuttal et al., 2024). The cycle's actions are adaptive as participants work through contradictions and trial new action models (Kerosuo et al., 2010). We anticipate that responsiveness will feature in our work with leaders as they navigate VTLM 2.0 implementation complexities whilst making sense of the theoretical, conceptual, and practical tools offered to them within the Change Laboratory workshops.

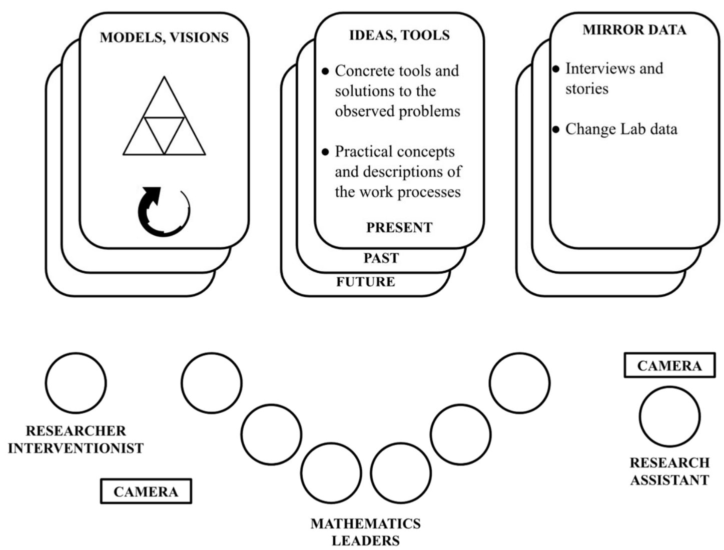
Change Laboratories

Change Laboratories (Change Labs) are the site where expansive learning is enacted (Engeström, 2015; Nuttall, 2013). They consist of at least four workshops in which researchers and participants co-analyse and plan ways to address contradictions within the activity system. Workshops typically run for about three hours (Nuttall et al., 2024). Before the first Change Lab, researchers interview participants and analyse documents to identify workplace contradictions. Analysis insights are presented as mirror data in the initial workshop, reflecting experiences of contradictions back to the participants (Nuttall, 2013).

Change Labs are structured environments, and Figure 3 illustrates the anticipated physical arrangement of our project's Change Labs. This includes the placement of the *mirror data*, *ideas and tools,* and *models and visions* wallboards. It shows the positioning of participants, research team, and recording equipment used to capture data. The setup moves between past, present, and future timeframes, enabling participants to surface and trace the historical roots of contradictions, examine their current manifestations, and address them through envisioned and new forms of practice. The participants' dialogue and actions about the adoption and adaptation of mediational means (e.g., theoretical tools like the "Engeström triangle") form the data that evidence expansive learning enactment (Nuttall, 2013). In our project, we plan to use four Change Labs across the 2026 school year to allow time and space for the mathematics leaders to enact the expansive learning cycle (Engeström, 2015).

Figure 3

Anticipated Layout of Change Laboratory Workshops (adapted from Kerosuo et al., 2010)



The mirror data wallboard presents participants with evidence of contradictions with their activity system. The models and visions wallboard provides the theoretical and conceptual tools, including the activity system model (Figure 1) and the expansive learning cycle (Figure 2). These tools support participants to co-analyse contradictions and co-develop new forms of action. Within DWR, these tools function as more than explanatory diagrams. They become cultural tools, introduced as a second stimulus, that mediate the analysis of contradictions and the planning of new forms of activity. The ideas and tools wallboard captures the practical tools, new solutions, and agreed approaches collectively generated by participants as they work through the expansive learning cycle. This wallboard externalises emerging forms of practice, making them available for collective reflection, critique, and further development (Engeström, 2015; Kerosuo et al., 2010). In our project, this wallboard will document a new model of leadership that participants co-develop as they navigate VTLM 2.0 implementation.

Change Labs act as a professional learning and research methodology which means they simultaneously generate rich data about educational leadership as a form of emergent, contested, and developmental practice (Nuttall, 2013). It is this dual purpose that positions DWR as an approach that works beyond the methodological boundaries reported in previous mathematics leadership research.

Acknowledging Strengths and Constraints of DWR

DWR offers several affordances that make it suited to examining mathematics leadership during a period of educational reform. First, DWR simultaneously functions as a professional learning approach and a research methodology, positioning mathematics leaders as co-researchers rather than as passive subjects of inquiry (Nuttall, 2013). Second, DWR creates the conditions for mathematics leaders to enact professional agency at a time of mandated reform, supporting them to collectively surface, examine, and address contradictions between their historical leadership practice and new policy mandates. Third, the longitudinal and interventionist nature of DWR generates rich data about leadership as emergent, contested, and developmental (Nuttall et al., 2024) directly addressing the methodological gap identified in previous mathematics leadership research published by MERGA.

DWR is not without its constraints. It is labour-intensive, requiring sustained commitment across pre-Change Lab workshop data collection, Change Lab workshop facilitation and data generation, between-workshop analysis, and the planning of follow-up workshops (Kerosuo et al., 2010; Nuttall, 2013). Change Labs are also not scalable, meaning claims generated from them are context specific (Nuttall et al., 2024). A further tension exists in honouring the collective and individual dimensions of participants' experience, which is an ongoing challenge within expansive learning research more broadly (Engeström & Sannino, 2010). Despite these constraints, the affordances of DWR make it a methodology for examining mathematics leadership in the context of policy-driven change.

Conclusion

We have argued for DWR as a CHAT-informed methodology that moves beyond the exploratory research approaches reported in MERGA conference proceedings. DWR offers a way of examining the tensions mathematics leaders face during periods of policy-driven reform. By positioning mathematics leaders as co-researchers and simultaneously functioning as a professional learning and research methodology, DWR offers a means of not only examining mathematics leadership but transforming it. The tensions facing several Victorian mathematics leaders navigating VTLM 2.0 implementation are the kinds of historically embedded contradictions that DWR is designed to address, making it a fit-for-purpose methodology for our research project.

Whilst this paper has prioritised methodological positioning over empirical claims, our project aims to generate data about mathematics leadership as an emergent, contested, and developmental form of middle leadership practice. We do not propose DWR as a replacement for existing methodologies, but as a timely addition to methodological conversations about mathematics leadership research within the MERGA community.

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