Symposium: From Tensions to Opportunities: Evidencing Mathematics Leadership

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This symposium offers insights into the leadership enacted by those who lead the mathematics education professional learning of in-service teachers in schools. We provide evidence of mathematics leadership practice as a way of contributing knowledge to this undertheorised area of mathematics education research. Three separate accounts of mathematics leadership are reported, with two focused on leading enacted in primary school settings, whilst the third paper highlights the support offered to rural and regional mathematics leaders through a sector-wide leadership network initiative.

Although separate accounts of leadership are presented, each paper is connected through the ways that tensions in practice provided opportunities for mathematics leaders to develop leading practices within the spaces in which their leadership was enacted. In this symposium, the relational dimension of mathematics leadership is highlighted, providing evidence of the critical role that relationships play in the ways that mathematics leadership responds to tensions as opportunities for practice development.

The format of the symposium is as follows:

Chairs: Matt Sexton and Ann Downton.

Paper 1: *Evidencing How Primary Mathematics Leaders Balance the Supports and Challenges of Their Role.*
Kate Copping & Natasha Ziebell.

Paper 2: *Evidencing Mathematics Leadership as Relational and Developmental Activity.*
Matt Sexton & Ann Downton.

Paper 3: *Evidencing Sector Leadership for Mathematics Leaders Working in Rural and Regional Schools.*
Bernadette Pearce, andrea O'Connor, & Lauren Gould.

Discussant: Peter Grootenboer.

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Evidencing How Primary Mathematics Leaders Balance the Supports and Challenges of Their Role

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Primary mathematics leaders work together both with and between school leadership and teachers as middle leaders, balancing expectations and responsibilities of themselves, school leadership, and teachers. This paper presents a case study of mathematics leaders in a school with a diverse community and frequently changing staff. It explores the tensions in this school and the supports that help the mathematics leaders find opportunities to respond. Findings show that building relationships and trust with staff were essential to address challenges and meet the needs of the school.

Primary mathematics leaders (PMLs) are middle leaders working with and between school leaders and teachers with a recognised responsibility for improving student learning (Copping, 2022). Mathematics leadership is a multi-faceted and complex role that includes balancing both management and leadership responsibilities to improve teacher impact on student learning (De Nobile, 2017; Gurr & Drysdale, 2013). This paper focuses on the following research question: How do PMLs balance the challenges and supports within their role at a metropolitan school in Melbourne? A case study is reported from one school, Wattle Tree Primary School (WTPS), which has the unique situation of having two mathematics leaders. The narrative incorporates viewpoints of mathematics leaders and others to convey the challenges and supports for primary mathematics leadership at WTPS. Pseudonyms have been used throughout this paper.

Literature Background

Primary mathematics leaders play a strategic role in the improvement of mathematics practices as the critical link between a school's vision and the work enacted in classrooms, working with school leaders and directly with teachers (Leithwood, 2016). In Australia, middle leaders often have a teaching aspect to their role, maintaining current classroom practice, while also working with teachers in other classrooms (Grootenboer et al., 2015). Teachers therefore view middle leaders as still being connected to the classroom and practising alongside them. Concurrently, middle leaders work with school leadership guiding a strategic, whole-school approach to teaching and learning (De Nobile, 2017). A significant role associated with PMLs is ensuring that professional development is localised and targets the specific needs of the school, teachers, and students. Leading this professional learning (PL) in a school requires the development of relational trust with all participants (Grootenboer & Edwards-Groves, 2020).

Common practices of successful middle leaders focus on student learning and teacher development through fostering a clear vision and strategy, collective responsibility, and trust, with high expectations of themselves and others (De Nobile, 2017; Gurr & Drysdale, 2013). These ideas were developed further in a framework of middle leadership, which underpins this research exploring the roles and responsibilities of PMLs. The framework is designed for exploring the roles of middle leaders, as distinct from senior leadership positions, such as a principal's role (De Nobile, 2019). It is important to note that this framework is not a discipline-based model of leadership, but it can be applied to the roles and responsibilities of a primary mathematics leader. The six role aspects are "Student focussed, Administrative, Organisational, Supervisory, Staff development, and Strategic" (De Nobile, 2019, p. 3). This framework of role aspects is situated along a continuum from predominantly managerial tasks at one end to leadership aspects on the other end, reflecting the diverse responsibilities of the role. Each stage supports and enables more effective enactment in the subsequent level.

A key aspect of success in the leadership role is attributed to the principal's support for a PML by showing trust in the middle leader's expertise, as well as providing the time, organisation, and resourcing to support change and professional learning (Grootenboer et al., 2020). A shared understanding by all staff of their roles and responsibilities is important to attain a school's goals. However, there are contextual factors that can influence or challenge the success of this collective understanding, including time allocation for the role and teachers' experience (Copping, 2023). Challenges for PMLs identified by Driscoll (2017), included: time, leader's expertise, teacher knowledge, and funding. Furthermore, Sexton and Downton (2014) noted the impact of time constraints on the ability to fulfil leadership duties and the difficulty faced in sustaining improvements in changed practices. The research in this paper investigated supports and challenges, such as these, experienced by PMLs at WTPS.

Methodology

This case study forms part of a PhD research project examining how primary mathematics leadership is conceptualised and experienced. A phenomenological approach (Heidegger 2008/1928) has been utilised to acknowledge the experiences, perceptions, and understandings from the participants. The wider project included eight schools within the state of Victoria. Interviews were conducted with the PML/s, a school leader, and two teachers at each school to investigate how primary mathematics leadership was conceptualised and experienced by those in the role, and by those with whom they work. This paper reports on interviews from WTPS, a Government, Foundation to Year 6 school in the northern suburbs of metropolitan Melbourne. At the time of data collection WTPS had an enrolment of ≈400 students. The diverse school community was well below average in socio-educational advantage (>90% English as an Additional Language).

Semi-structured interviews were conducted with five participants at WTPS: Mia, PML for Years 3–6, Zara, PML for F–Year 2 (both worked three days as mathematics leaders and two days as classroom teachers), Assistant Principal Holly, experienced teacher Anna, and graduate teacher Justin. The semi-structured interviews varied slightly depending on the role of the participant. Participants were asked what challenged or supported the PMLs in their role. Interview data was analysed using an inductive approach to identify, summarise, and refine themes (Thomas, 2006), which was then applied to the Framework for Middle Leadership (De Nobile, 2019) to support interpretation of the analysis.

Results and Discussion

Zara (PML F–2) was new to the school and role but had been a primary mathematics specialist at her previous school. Mia (PML 3–6) had been the mathematics leader in the school for more than 5 years. Tensions faced at WTPS by the PMLs were recognised by all participants, as well as supports available which presented opportunities for action.

Consistency of the Instructional Program

Staff turnover at the school was high and there was a large proportion of graduate teachers. The school population was changing with families moving in and out frequently with some students attending an intensive English language school part time on site. Due to these regularly changing circumstances, the school's focus was on consistency of the instructional program. The PMLs were responsible for supporting staff to implement the instructional program, acting in a *Supervisory* role (De Nobile, 2019). This was identified as a clear expectation by all participants, and an area of tension for the PMLs, as Anna stated:

> It's been quite a high turnaround of staff ... there is an instructional model in place in terms of how mathematics is expected to run. But because of Covid, because of the high turnaround of staff, it's hard to then, disseminate it to others, when you're constantly having to start again, start from fresh.

Sustaining and maintaining an instructional model with a consistent approach has been previously recognised as a challenge for PMLs (Sexton & Downton, 2014). Both Zara and Mia acknowledged this as an issue. In response, they enacted their *Staff development* role (De Nobile, 2019), and conducted whole school PL sessions together and participated in coaching sessions with individual teachers, on a needs-based approach. Crucially, Zara and Mia harnessed the opportunity to focus on the development of supportive, trusting relationships (Grootenboer & Edwards-Groves, 2020) to aid in the implementation of the instructional model and address the challenge of changing staff. Mia stated:

> I also think it's the good relationships that I have with the teachers. Because the teachers trust me and especially when we do coaching...it's personal conversation, and I'm not going to be sharing this to other people, and it's confidentiality and non-judgmental. So, teachers give me their trust.

Consistency of Timetabling

Time was another recognised area of tension by all participants. Covid implications resulted in days timetabled for leadership work being used to cover teacher absences. Timetabling and coaching sessions were affected and the *Staff development* role (De Nobile, 2019) was not able to be implemented as planned. Holly stated:

> It's [the PMLs] being used as CRTs [Casual Relief Teachers] a little bit at the moment, and then the coaching disruptions. The inability sometimes to do that part around the conversation after coaching. That's a challenge, because then I'm not able to support with that time.

Zara and Mia's time for mathematics leadership was affected by teacher absences and staffing issues, as Zara said, "Obviously the absences and not being able to do the coaching is a massive challenge." This impacted their opportunity to get into classrooms and to enact their plans as intended. They experienced frustration due to time constraints (Driscoll, 2017). However, this challenge was recognised by the leadership team, as Holly said, "Also giving them that time out of the classroom, I think is essential." The support of school leadership was evident (Grootenboer et al., 2020) with extra time provided where possible. The PMLs also adjusted their schedules to find opportunities to support teachers, as Mia explained:

> I try to, even though time is a challenging issue for me, but I still try to, whenever I'm available, I get to make-up my coaching or I get to meet this teacher catch up with teacher ... even though sometimes I lose my lunch or I lose my time, but I still, I still want to support people.

Being a Middle Leader

Tension was noted by participants that working with and between school leadership and teachers requires balancing leadership, *Administrative, and Organisational*, responsibilities (De Nobile, 2019). Justin stated, "Being part of leadership here, I know you do get roles outside your maths domain." Zara also noted that managing leadership duties was challenging, "It is hard, and I find I'm unfortunately the kind of person that just, especially when you're in leadership, I take on all those things that I can't control." These extra duties can be draining on middle leaders and it is important that PMLs do not get overwhelmed by administrative responsibilities (Grootenboer et al., 2020). However, the support between Mia and Zara to help manage their roles was widely noted by the participants, particularly Zara:

> Mia is an amazing support because she's, one, been at the school for, for longer than me, but also she's got great maths knowledge. But also just, she's further along in her leadership journey... So, um, she's been great to talk to about what's going on and how possibly to approach.

Additionally, participants discussed the support the PMLs had from school leadership noting the principal trusted the PMLs and valued their role (Grootenboer et al., 2020). Zara discussed the possibilities of her role, saying, "I think that the, the principal is very supportive of the role and that is massive ... I know that it's really valued." While Mia stated, "My principal trusts that I'm doing my job well ... I get my opportunity to work with teachers and work with

students." Both identified the opportunities present while acknowledging the challenges they face and that supportive relationships built on trust are essential to their role.

Conclusion

Balancing the responsibilities and roles of PMLs, such as leadership, staff development, supervisory, administration, and organisation (De Nobile, 2019) was impacted by the school's needs and resources (e.g., human, time). However, supports were in place which afforded opportunities to address these tensions. One of the most significant findings was the development of trust between the two PMLs, between school leadership and PMLs, and between teachers and PMLs. The nurturing of supportive relationships enabled the PMLs to meet challenges with the development of relational trust being central to their success. Support and trust were not one-way, but multi-layered and multi-directional. For PMLs and school leaders, the relationships between and within PMLs, school leadership, and teachers are important to build and maintain, as it is the relationships and the support offered through them which provide opportunity to address tensions within schools.

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Evidencing Mathematics Leadership as Relational and Developmental Activity

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We report the leadership of mathematics leaders who participated in a leadership intervention. Participation in the intervention was provoked by a tension in teaching practice concerned with a lack of challenge in mathematics teaching in the leaders' schools. We evidence how the mathematics leaders sought to address the tension they faced through their relational and developmental leadership activity.

Using cultural-historical activity theory (CHAT), we report on the collective activity of eight primary school mathematics leaders who participated in a leadership intervention. The intervention focused on expanding mathematics leadership activity. The intention of activity expansion focused on ways that leaders influenced teachers' use of pedagogical approaches that facilitated greater challenge for student learning in mathematics lessons. We attend to the motive-objects and the mediational means that facilitated the leaders' activity with the purpose of responding to this research question: At what do mathematics leaders direct their activity and how is their leadership mediated?

Literature Background

Teaching practice that challenges learning can support students in becoming more autonomous learners as they rely less on teacher support and take greater ownership of their learning (Ingram et al., 2020). However, a tension that faces many teachers concerns the enactment of practices that incorporate appropriate challenge for all students in mathematics lessons (Russo & Hopkins, 2017; Sullivan, 2018). Sullivan (2018) stated reasons for this tension including teachers' beliefs about challenge in mathematics (Russo et al., 2020), and infrequent use of pedagogies that incorporate and maintain challenge. Another reason is teachers' limited mathematical content knowledge (MCK). The ways in which mathematics leadership responds to this tension in teaching for challenge remains undertheorised.

Mathematics leadership is understood as a form of middle leading, enacted by a staff member who leads mathematics education whilst undertaking teaching responsibilities (Sexton, 2019). Working in the space *between* executive leadership and classroom practice mathematics leaders enact leadership that develops dispositions, practices, and knowledge for mathematics education (Grootenboer, 2018). Sexton (2019) outlined how they lead that developmental work as a form of activity, through their leadership of school-based professional learning (PL). CHAT understands activity as *object-oriented* meaning that psychological and practical activity is concurrently advanced through attention to *motive-objects*, pursued in dynamic ways to achieve desired outcomes (Engeström, 2015). Motive-objects drive activity and are vital when interpreting the 'what' and 'why' of activity (Kaptelinin, 2005). Motive-objects are realised through a hierarchical organisation of activity, implying that individuals engage in action sequences to achieve the motive-objects they pursue (Leont'ev, 1978).

With *mediation* as core to CHAT (Miettinen, 2006), activity is facilitated through mediational means. Meditational means are understood as *cultural tools* (psychological tools like concepts and physical ones such as laptops), *rules* that explicitly and implicitly govern behaviours of those involved, and a *division of labour* that mediates the distribution and organisation of roles and responsibilities among those engaged in activity (Engeström, 2015). In CHAT, tensions are catalysts for change and the adoption of new mediational means can facilitate change in activity through the process of *remediation* (Miettinen, 2006).

Methodology

The context of the study was a mathematics leadership intervention, focused on leading the development of teaching practice that incorporated greater opportunities for challenge in mathematics lessons. The intervention was funded by a Catholic education system in the Sydney region during 2023. Eight mathematics leaders, working in five schools involved in the intervention, participated in our study. Three schools had two staff members undertaking the mathematics leadership role, whilst the other two schools nominated one leader. Each participant was required to enact mathematics leadership whilst undertaking teaching responsibilities, meaning they were middle leaders in their schools (Grootenboer, 2018).

In August 2023, data were generated using semi-structured interviews with each of the eight mathematics leaders who volunteered to take part in the study. Interview questions were informed by CHAT concepts, specifically motive-object, cultural tool, rules, and division of labour, to evidence the what, the how, and the why of the collective mathematics leadership activity enacted across the schools. Documents identified by the leaders, along with photographs of leadership activity were also collected. We used the aforementioned CHAT concepts when deductively analysing data, searching for evidence of them in the dataset. Inductive analysis involved asking these questions of the data: What are the mathematics leaders working on? How are they working on that? What is mediating their work?

Results and Discussion

We found that the mathematics leaders worked on two main motive-objects of activity: the development of relational trust and the development of mathematics planning practices.

Development of Relational Trust

The development of relational trust through collaborative approaches to PL surfaced as a motive-object of mathematics leadership activity. Table 1 provides examples of evidence.

Table 1

Evidence Examples of the Development of Relational Trust Motive-Object of Activity

Motive-object	Key leadership actions	Adoption of mediational means
Development of relational trust	Making the developmental work focus explicit and shared amongst staff	**Cultural tool** Mathematics Leadership Activity Plan (MLAP) **Rule** Everyone knows what we are working on and why
	Creating dialogical spaces for pedagogical discussions about teaching practice development	We are all in this together, so everyone has to trial ideas in classrooms **Division of labour** Leaders share their own PL with staff along with their own experiences of teaching for challenge Leaders and teachers engage in pedagogical discussions to create shared commitment to new practices

The mathematics leaders pursued relational trust development when they nurtured shared understandings about the purpose and content of the leadership intervention through the deliberate opening of spaces for pedagogical dialogue (Grootenboer, 2018). Developing relational trust through a commitment to collaboration supported the adoption of new rules (Miettinen, 2006). Those new rules concerned shared understanding of reasons for teaching practice development and the expectation that teachers will trial new pedagogical practices.

One critical mediator that supported the pursuit of the relational motive-object was the *Mathematics Leadership Activity Plan* (MLAP), a leadership planning resource introduced

within the intervention. The MLAP, which documented their work plans for influencing teachers' PL, was adopted as a cultural tool by the leaders (Miettinen, 2006). They used the MLAP to develop *interactional trust* by creating communicative spaces about reasons for teaching practice development, as well as *pragmatic trust* by highlighting how that development was linked to teachers' work in reasonable and practical ways (Grootenboer, 2018). This was highlighted by Cathy's (a pseudonym) statement about the use of the MLAP:

> Because we had to make the plan on the MLAP. So, then we shared with the staff what we were doing and why we were doing it. And that seemed to be a big shift with how teachers were participating in the planning (meetings), but also what we were doing in the classroom.

Development of Mathematics Planning Practices

The mathematics leaders engaged in developmental activity by working on improvement of mathematics planning practices in their schools. Table 2 presents examples of evidence.

Table 2

Evidence Examples of the Development of Planning Practices Motive-Object of Activity

Motive-object	Key leadership actions	Adoption of mediational means
Development of mathematics planning practices	Using challenging tasks with teachers in planning meetings to develop teachers' MCK Influencing teachers' use of anticipation, questioning, and extending prompts during planning meetings	**Cultural tools** Mathematics Leadership Activity Plan (MLAP) Planning documentation includes sections about anticipation, questioning, and extending prompts for tasks Mathematical task analysis document with pedagogical discussion prompts Challenge task sequences **Rule** Planning meetings are teacher PL opportunities. Teachers do the maths tasks in planning meetings and specifically plan for the use of extending prompts **Division of labour** Mathematics leaders facilitate planning meetings Teacher share responsibility for the design of planning documentation

The leaders decided that to address tensions about the lack of challenge in mathematics, they needed to create opportunities that influenced how teachers were prepared to teach for challenge. This saw the surfacing of the developmental motive-object, realised through a repositioning of planning meetings. This developmental motive-objects was mediated by the leaders' own PL within the leadership intervention within which examples of challenging task sequences, advice concerning the use of anticipation and extending prompts (Sullivan, 2018), and a mathematical task analysis tool were provided. The leaders claimed they used those as planning resources, evidencing an example of cultural tool adoption intended to remediate teaching practice (Miettinen, 2006).

Remediation of planning practice was further evidenced through the adoption of new rules (Miettinen, 2006). This was realised through the leaders' co-option of teachers' planning meetings, using them as opportunities for PL to improve teachers' MCK (Sullivan, 2018) and to develop beliefs about challenge (Russo et al., 2020). MCK development was worked on when leaders used challenging tasks along with the mathematics task analysis document in planning meetings. They also encouraged teachers to adapt planning tool to include sections for anticipation, questioning, and extending prompts as ways of preparing teachers to teach for challenge. Claire (a pseudonym) evidenced this when she shared:

> It is about them (teachers) actually taking the time to do the tasks themselves, to work it out, because then that's going to lead them to being more confident in presenting it and working with their students. But it's also giving them ideas, and think, 'oh, what kind of questions might the kids ask in response to this?'

It is important to acknowledge the crucial support of principals. The mathematics leaders reported how principals created conditions for their leadership. An example of this support was how principals advocated for the introduction of facilitated planning meetings and arranged the spatial and temporal resources for those meetings to take place. This highlights again the role of principal leadership in mediating mathematics leadership activity (Sexton, 2019).

Concluding Remarks

We do not know yet the influence on teachers' practice, but we highlight that the mathematics leaders responded to the practice tension by directing their activity at relational and developmental motive-objects. We evidenced the adoption of cultural tools, rules, and divisions of labour by the leaders and how they acted as mediational means that mediated the motive-objects of their leadership activity with the intention of remediating teaching practice. Although presented separately, the mathematics leaders pursued their motive-objects in simultaneous and dynamic ways (Engeström, 2015). For example, as they engaged teachers in challenging tasks during planning meetings to develop MCK (Sullivan, 2018), they also worked on relational trust development by opening dialogical spaces for teachers to engage in pedagogical discussions (Grootenboer, 2018). This highlights the dynamism of mathematics leadership as a relational and developmental activity.

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Evidencing Sector Leadership for Mathematics Leaders Working in Rural and Regional Schools

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We share our experience of establishing a network for primary and secondary mathematics leaders working in rural and regional Catholic schools in Victoria. We evidence the influence of our sector leadership that addressed a tension concerning the leaders' work isolation through a network initiative. This network initiative was in response to the leaders demands for establishing a way to connect and to learn from and with one another using evidence-based mathematics learning and teaching practices.

For decades, a tension in mathematics education has existed that sees urban school students outperforming rural and regional students in mathematics (McConney et al., 2018). The Organisation for Economic Co-operation and Development (OECD, 2013) reported that according to the Programme for International Student Assessment (PISA) 2009 results, urban students outperformed rural students in every country that participated. On average urban students outperformed rural students by up to half a year of schooling (Lamb et al., 2014). Contributing factors to the widening gap include staff access to quality professional learning and educational resources (Murphy, 2018). For staff working in rural and regional schools, these factors cause another tension that problematises this situation further. These schools are faced with the challenge of attracting talent from urban communities, retaining the best talent over time, and conquering the tension of distance (Hargreaves et al., 2015).

Literature Background

The greatest in-school factor for improving student learning and achievement is teacher quality (Hattie, 2009). Fullan and Hargreaves (2012) discussed the benefit of building professional capital of teachers and leaders by investing in leadership through the provision of high-quality professional learning (PL). Opportunities are required to build and share knowledge, and provide feedback in communities characterised by relational trust, strong collaboration, and a shared vision to improve student outcomes. Unfortunately, access to quality PL and opportunities to connect and network with colleagues from other schools is a significant challenge for rural and regional teachers and leaders (Hargreaves et al., 2015).

Networks provide a platform for educational leaders to connect and collaborate through the delivery of high-quality PL to build professional leadership practice (Hargreaves et al., 2015). Rincón-Gallardo and Fullan (2016) highlighted the importance of three shifts needed in relationship between network participants and sector leaders for the establishment of successful networks. These shifts are critical to ensure the sustainability of any network. Figure 1 captures the shifts as reported by Rincón-Gallardo and Fullan (2016).

Figure 1

Required Shifts in the Relationships Between Networks and Sector Leadership

However, the effectiveness of networks measured through improved system-wide student learning outcomes is varied and is dependent upon how the network facilitates effective collaboration and relationships driven by a shared purpose (Rincón-Gallardo & Fullan, 2016). Figure 2 presents a summary of the eight Essential Features for effective networks that support the successful implementation and impact of professional learning features.

Figure 2

Eight Essential Features Required for Effective Networks (Rincón-Gallardo & Fullan, 2016, p. 10)

The eight features provide guidelines that support the development of an educational network by building relational trust that facilitates effective collaboration between system and school leaders. Relational trust is especially highlighted in features 2, 3, 4, 5, 6, and 7.

Our Response to the Tension

Catholic Education Sandhurst (CES) has been intentional in engaging with research literature concerning middle leadership and mathematics education as a tool to support innovation and improvement in student learning outcomes. In response to that literature and using the work of Rincón-Gallardo and Fullan (2016), CES sought to create a network for mathematics leaders working in the diocesan primary and secondary schools. One intention of the network was to provide opportunities that developed mathematics leadership practice through networking and relationship building. This was done in response to the tension of work isolation, which was compounded by the effects of the COVID-19 pandemic that faced the mathematics leaders working in schools within the CES diocese.

The establishment of the Sandhurst Numeracy Leader Network (SNLN) in 2021 aimed to provide CES mathematics leaders access to quality mathematics PL and to support the formation of a professional network between leaders, professional organisations, and mathematics educators working in universities. In essence, the SNLN intended to impact students' mathematical achievement by developing the professional practice of mathematics leaders so they could lead improvement in mathematics teaching practice in their schools.

During the formation of the SNLN, a steering committee was developed to set goals and develop a shared vision for the network. The steering committee included CES staff members, mathematics leaders working in diocesan schools and a mathematics educator working in a Victorian university. The formation of this steering committee was informed by Essential Features 6 and 7 for effective networks (Rincón-Gallardo & Fullan, 2016).

As a way of supporting the implementation of the SNLN, mathematics leaders were included in nominating content of the PL, making the content more demand driven and learning-oriented (Rincón-Gallardo & Fullan, 2016). CES staff developed a needs analysis tool as a way of collecting data, used to inform the content and implementation of the SNLN workshops. Workshops were a combination of virtual and face-to-face PL opportunities, used to address the tension of work isolation whilst focusing on mathematics leadership and teaching

practice development. In this paper, we evidence the influence of the SNLN drawing on data about the perceptions of mathematics leaders who have participated in the network.

Methodology

We draw on data from workshop feedback provided by 30 primary and secondary network participants who engaged in middle leadership of mathematics in CES rural and regional schools. Data were gathered using open response questionnaires. Participants were provided with prompts asking them to comment on new learning and actions they will take up as mathematics leaders in their schools. Using the features of effective networks (Rincón-Gallardo & Fullan, 2016), a coding scheme was created to support the deductive analysis approach that was used to generate evidence of those features in the mathematics leaders' responses. Workshop data were also read and coded using an iterative inductive approach that supported the development of themes that captured the leaders' perceptions.

Results and Discussion

Four key themes were generated from the data analysis which are presented in Table 1.

Table 1

Data Excerpts of the Mathematics Leaders Responses Aligned to the Themes

Themes	Essential network feature	Evidence of responses from mathematics leaders
Engaging in interactive opportunities to learn with other leaders	5, 6 & 7	Being able to engage with a [mathematical] task with other [mathematics] leaders from different settings
		Having time to dissect task with others to identify the maths involved, the possibilities for extension and enabling
		I was able to collaborate with a colleague that is further along the journey than I! Helped clarify next steps
		Great to listen to other leaders explain their journey with their MLAP [mathematics leadership activity plan]. Gave us some ideas
Developing strategies for mathematics leadership	4	Looking at the Data to help guide our planning, it's ok to start with a small team [of teachers] before trying to implement whole school [improvement]
		In planning sessions, being mindful to spend time explicitly planning for [differentiation] prompts. Also have teachers 'become the learner' with rich tasks so they feel confident to transfer this to the classroom
		Ensuring I am continuously meeting with my [executive leadership] team and referring back to data to inform our practice
Planning for leadership of school-based professional learning	1 & 4	Think more deeply about common student misconceptions with tasks and plan for them more explicitly
		Continue to work with staff on developing the use of open/challenging tasks and how we can enable and extend students
		Model/use the differentiation planning sheet to support staff PCK
		Using MLAP to develop goals and planning
Having access to resources to support leadership	8	The MAAP tool [mathematics task analysis document] is so useful for discussing the possible avenues that the task can take a learner
		I really enjoy activities where we get to trial a task. I want to do more of this with my teams at school
		Love the Jigsaw protocol, something I wish to incorporate into my learning leader meetings moving forward
		Add the MLAP tool to team meeting

Along with those themes, links to network features (Rincón-Gallardo & Fullan, 2016), and data excerpts (quotes from mathematics leaders) are also reported. The responses are illustrative

of how the SNLN provided opportunities for mathematics leaders to interact with and learn from each other to build their skills and expertise to enact this new learning with the teachers in their schools. This is evidenced in the theme of *Interactive opportunities to learn with other mathematics leaders,* suggesting to us that the SNLN responded in some way to the tension of work isolation by building relationships through networking. This highlights the importance of interacting and learning with others within network settings (Rincón-Gallardo & Fullan, 2016).

The data also suggest that the SNLN facilitated opportunities for mathematics leaders to focus on developing leadership strategies, allowing them to engage with executive leaders and teachers in their schools through leadership of mathematics PL. Focusing leadership work on school-based PL for teachers is central to the work of mathematics leaders (Sexton, 2019). It was also evident how the SNLN provided resources that mathematics leaders claimed they would use as part of their leadership. We interpreted this as another way of addressing the tension of work isolation as rural and regional staff members may have limited access to such resources compared to colleagues working in urban and metropolitan schools.

Conclusion

The establishment of the SNLN stemmed from a tension brought on by work isolation. It presented opportunities for our CES leadership to bring together geographically diverse mathematics leaders through networking as a relationship building initiative. We have evidenced enactment of the essential features of networks using data concerning perceptions held by the mathematics leaders. This small study provides opportunities for future research into the key features of successful networks and how they address tensions that exist in rural and regional settings. We had the opportunity to support mathematics leaders to connect, collaborate, and engage in mathematics leadership PL, but more importantly, influence relationships between the leaders as a response to the work isolation tension they faced.

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