

Supporting the Leadership of Mathematics in Schools

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This MERGA symposium addresses three aspects of the Numeracy Suite professional development program for leaders of mathematics in schools. The papers include: a description of online courses offered in the program and an analysis of their effectiveness, a report of action research projects conducted by leaders as short “teaching sprints”, and an analysis of leaders’ thinking about their role in improving mathematical outcomes for students stimulated by a one-day workshop.

The Numeracy Suite (2019–2022) was initiated by the Department of Education and Training in Victoria and implemented through the former Bastow Institute of Leadership now the Victorian Academy of Learning and Teaching. A team of mathematics educators from Monash University developed and delivered the program, which was designed to facilitate the professional learning of leaders of mathematics and numeracy in primary and secondary schools in Victoria. To establish leaders’ perceived professional development needs, a state-wide survey was conducted online, and the leaders’ responses were analysed to inform the program design. The purpose of the Numeracy Suite was to challenge numeracy and mathematics leaders to develop a deeper understanding of themselves as leaders and teachers of mathematics and numeracy. The Numeracy Suite supported the leaders to create conditions for effective teacher professional learning and strategic planning for whole-school improvement in mathematics teaching and learning. It also supported the leaders to improve the learning experiences, mathematical dispositions, and achievement of all learners. In analysing the results of the professional learning our purpose was to understand the current practices, views and aspirations of leaders of mathematics and numeracy in primary and secondary schools and to evaluate the professional learning opportunities we offered to the leaders.

Chair & Discussant: Jill Cheeseman

Paper 1: *Online Courses for Leaders of Mathematics and Numeracy in Primary and Secondary Schools: Overview and Effectiveness*

[Ann Gervasoni, Aylie Davidson, Ann Downton, A., Sharyn Livy, & James Russo]

Paper 2: *Teaching Sprints: Action Research Led by School Mathematics Teacher Leaders*

[Colleen Vale & Carmel Delahunty]

Paper 3: *Ways in Which a Workshop Stimulated Leaders’ Thinking*

[Jill Cheeseman, Penelope Kalogeropoulos, Marj Horne, & Michele Klooger]

Acknowledgement. The Numeracy Suite discussed in each of the three symposium papers was funded by the former Bastow Institute of Educational Leadership, Department of Education and Training, Victoria.

Ways in Which a Workshop Stimulated Leaders' Thinking

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Leading mathematics teaching and learning in schools is a complex job that requires the development of specialised knowledge and skills. Opportunities to learn in professional workshops can help to build leadership knowledge and skills. The results presented here describe 262 leaders' prompted reflections at the end of a professional development workshop. Leaders thought deeply about their role in transforming school mathematics. They considered the context of their schools, what was important, and what they valued in mathematics. Leaders thought about the tasks and pedagogies teachers select and the impact teachers' choices have on students' learning. Most of all, leaders reflected on ways that they could act to inspire changes that would lead to improved mathematical outcomes for students. In addition to the reflections of leaders, we present features of the workshop that stimulated leaders' thinking.

There is an increasing appreciation by leaders in educational sectors that the role of mathematics leaders in schools is important in improving student learning outcomes (Department of Education and Training [DET], 2022). To maximise gains by students, leaders of mathematics teachers need to develop both their capacity to lead their colleagues, and their pedagogical content knowledge (Driscoll, 2021). One model of professional learning designed with this purpose in mind is reported here. The professional development program was structured as a single whole day format. A single one-off professional development is usually not recommended (DET, 2005). Yet, in reality, one day of replacement of senior staff is all that is available and feasible in many schools. The challenge was to design a workshop that had the potential to act as a valuable stimulus for thinking for school mathematics leaders and require them to carefully consider ways to improve mathematics teaching and learning in their schools.

The Numeracy/Mathematics Leader Area Workshop 2021 was delivered to 386 participants as 14 single day professional development events. It was designed as part of the Numeracy Suite to lead a cultural shift in thinking about mathematics, develop shared values and passion for mathematics, build confidence of teachers, and positive dispositions for all learners (DET, 2021). It was delivered as an online workshop as the COVID-19 pandemic at the time prevented teachers meeting face-to-face. Every attempt was made to deliver the workshop with Clarke's (1994) inspiring principles of effective professional development in mind. The features of the workshop included:

- pre-workshop tasks to collect interview data from teachers and students to be used in discussions about positive dispositions towards mathematics,
- collaborative small "breakout" groups,
- information sessions connecting research-based theoretical perspectives to the lived classroom experience of the participants, and
- reflection by participants on their thinking at the end of the day.

The participants were all leaders of mathematics in their schools. Each workshop was designed to focus on a specific geographical area of the state to enable participants to network and to build knowledge of their local schools. Participants were allocated to either primary or secondary school groups when collaborating in small groups to enable them to share their expert knowledge about leading the improvement of mathematics learning.

Table 1
Frequency of categories of response

Category	Frequency (%) (<i>n</i> = 371)
Querying personal leadership	89 (24%)
Creating positive dispositions and motivation aspirations of teachers	76 (20%)
Task for better teaching of mathematics	43 (12%)
Teaching pedagogy	42 (11%)
Working as a team with resources for teaching and learning	40 (11%)
Teachers discussing students' thinking and learning	36 (10%)
Developing students' mathematical reasoning	23 (6%)
Prioritising mathematics and thinking about the future	22 (6%)

The reflections of the leaders are illustrated by several quotes. Many leaders (*n* = 89) queried how they could implement ideas, for example, “How I can best support my teachers to try something new in mathematics—try a challenging, open-ended task and to enjoy teaching mathematics?” Leaders (*n* = 40) reflected on their teams saying, for example, “Today I thought quite deeply about how we are working as individuals and not as a team—and how we should share student thinking [and take] the next step of learning with each other.” Many leaders reported their deep consideration of the importance of positive dispositions (*n* = 76) writing comments such as,

Today I thought deeply about how our school can come together more regularly to foster a more positive disposition. To provide opportunities as a team of mathematics teachers to encourage one another and support one another. To take risks in the classroom.

Table 2
Personal Leadership Sub-categories of Response to “Today I thought quite deeply about...”

Sub-category	Frequency (%)	Illustrative examples
Questioning action needed by them	33 (37%)	How to deliver learning for peers that drives forward their appreciation for mathematics.
Intended actions described	17 (19%)	Working with teachers to start more discussions around students' mindsets.
Personal behaviours required	15 (17%)	Listening more to both teachers and students to understand their perceptions and dispositions and to act upon that information.
What is important/valued	12 (13%)	What success in mathematics looks like, skills and dispositions we value.
Reflecting of school issues	12 (13%)	How we can make changes at our school to encourage teachers to grow their content knowledge, trust their judgements and explore other avenues of assessment. Also, how we can change teachers' mindsets away from 'hating mathematics' themselves and passing those feelings onto students.

The most frequent category of responses termed, Querying Personal Leadership (24%) dealt with applying workshop ideas to the leader's personal setting. The finding echoes Jackson and her colleagues' statement (2015) that leaders needed to apply professional learning to the reorganisation of school practices (Table 1).

Sub-categories of personal leadership considerations were defined (Patton, 2002) to determine what leaders considered important (see Table 2). Almost one quarter of responses (24%) involved participants questioning how to act on ideas raised in the workshop. However, a further 19% of leaders had made up their minds about how to act and stated their intentions as mathematics leaders in their schools. Some leaders (17%) reflected on the personal behaviours they would adopt. Other leaders (13%) thought deeply about what was important in their schools. A further 13 percent of leaders considered broad school issues of leadership. Examples of each sub-category are found in Table 2.

Conclusion

We found that mathematics leaders were stimulated to think deeply about their role in transforming school mathematics during one day of professional development. Leaders considered the context of their schools, what was important and what they valued in mathematics. Further, leaders thought about the tasks and pedagogies teachers use and their impact on students' learning. Most of all, they reflected on ways that they could act to inspire changes that would lead to improved mathematical outcomes.

While there is explicit advice that one day professional development workshops are ineffective (e.g., Campbell, 1997), we argue that it is not the duration of a professional development workshop that is critical (Adey, 2004). It appeared that the participants came to the workshop as producers of knowledge, not as consumers of knowledge. Setting participants' expectations by asking them to collect interview data from teachers and students to use in discussions about positive dispositions towards mathematics sends a strong message about valuing and using their knowledge. By encouraging collaborative small "breakout" groups the learning is personalised and shared and opportunities are made for future networking. Also, providing research-based information connects theoretical perspectives to participants' lived experience affirms their knowledge. Finally, requiring reflection by participants on their thinking at the end of the day gives participants time to consider how to use their learning to initiate changes in mathematics teaching and learning.

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