

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]

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

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Professional learning for school mathematics leaders is a key aspect of the Victorian Government's strategy for improving mathematics for Victorian students. This is because middle leaders in schools play a vital role in designing and leading school improvement. As part of the Numeracy Suite, four online courses were designed in 2020 to support the professional learning of mathematics leaders. The courses were implemented and evaluated across 2020-2021. The evaluation showed that each online course was effective in meeting the professional learning needs of primary and secondary mathematics leaders.

As part of a five-year initiative to improve the mathematics learning of students in the State of Victoria, the former Institute of Educational Leadership launched the *Numeracy Suite* (<https://www.academy.vic.gov.au/initiatives/numeracy-suite>) to build the capacity of mathematics leaders in primary and secondary schools. Monash University academics were awarded the contract to design and deliver four 15-week online courses as part of the *Numeracy Suite*. This paper provides an overview of the four courses and insights from the course evaluations about their effectiveness.

Development and Overview of the Online Courses

Prior to developing the online courses, the Monash University team conducted a Needs Analysis survey of Victorian mathematics leaders in 2019 to inform the design and focus of the online courses (Vale et al., 2020, 2021). Two items addressed leaders' professional learning needs. Question 7 invited leaders to select four priorities for their *mathematics leadership professional learning* from a list of nine topics. Five topics were selected by approximately half of all participants ($n = 196$). These were:

1. Facilitating effective mathematics planning (60%).
2. Leading teacher professional learning in mathematics/numeracy teaching (56%).
3. Encouraging staff to take risks and trial different teaching strategies and tasks (53%).
4. Supporting, mentoring and coaching colleagues (50%).
5. Enhancing positive dispositions of students and teachers (49%).

These five topics were selected by leaders in both primary and secondary schools, regardless of their location or region, and were consistent with previous research about the challenges middle leaders face in leading change (Grootenboer, 2018).

The mathematics leaders were also invited to select four priorities for their professional learning in mathematics teaching practice from a list of ten topics (Question 8). Five professional learning topics were selected by about half of all leaders. These were:

1. Effective assessment of content, proficiencies, and dispositions (54%).
2. Differentiating instruction to cater for the needs of all students (53%).
3. Using strategies to improve student proficiency in understanding, fluency, problem solving, or reasoning (53%).

4. Using data, including artefacts and work samples, to measure learning growth over time (49%); and
5. Including student voice and providing opportunities for students to negotiate their learning (47%).

Informed by these identified priority areas and the current mathematics and leadership literature, four online courses for mathematics leaders were developed. Each 15-week course was organised into four inquiry cycles so that content and leadership approaches could be adequately explored, trialled, and critiqued. Each inquiry cycle included a virtual workshop, optional online synchronous discussion groups, asynchronous learning activities and professional readings via the Bastow 307 learning management system (LMS), a weekly school-based investigation, and a weekly online discussion post to share insights about the school-based investigation. In learning cycle four, participants undertook a project relevant to their leadership context. Participants were invited to complete mid and end-of-course evaluations that inform course improvement. Outlines of the four online courses (OCs) follow.

Online Course 1: Leading Differentiated Teaching in Mathematics

Effectively differentiating learning for students with diverse abilities, backgrounds, and performance levels is a challenging aspect of teaching mathematics. This course enables school mathematics leaders to explore and critique several inclusive pedagogical approaches that cater for diverse students. Leaders focus on how attending to specific learning design characteristics when developing (or sourcing) tasks enables the whole class to undertake the same core mathematical activity, at a level of challenge, appropriate for each student.

Online Course 2: Leading Mathematics Planning

Collaborative planning is a critical part of the learning and teaching cycle. In this course, leaders explore key features of planning that underpin and enhance student-centred learning. Course content explores planning documentation that focuses on student-centred learning, embedding professional reading to support teachers' mathematical knowledge for teaching, and a model that guides leaders through the complexities of mathematics planning. Participants examine their school's planning approaches and develop a plan to lead teachers towards placing student-centred learning at the forefront of mathematics planning decisions.

Online Course 3: Leading Student-centred Assessment in Mathematics

Assessment is often viewed and practiced as a periodic externally imposed event or as an individual teacher-conducted activity that interrupts instruction—both practices treat assessment as something completed by students. The course aims to assist mathematics leaders to understand assessment practices and ensure that assessment is an integral part of instruction. Overall, the content focus of the course is to investigate how collaborative assessment practices can provide new “eyes” for understanding learners' mathematical thinking and dispositions, thereby guiding more effective teaching responses. A range of assessment strategies are explored and analysed across both cognitive and affective domains.

Online Course 4: Leading Improvement in Mathematics Teaching

Improving mathematics teachers' knowledge, confidence, attitudes, dispositions, and mindsets are important goals for professional learning. This course enables mathematics leaders to explore and critique approaches to leading professional learning in mathematics/numeracy teaching, and for supporting teachers to take risks and trial different teaching strategies and tasks. Participants use protocols and approaches to collect and analyse

data with their teachers in order to trial and enact evidence-based teaching practice in classrooms.

Model for School-Based Professional Learning/Improvement Cycles

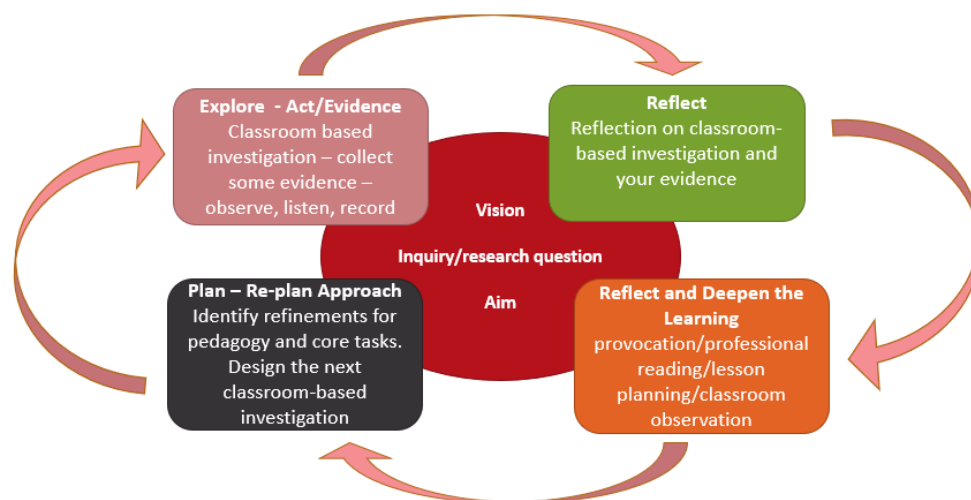


Figure 1. Model for school-based professional learning/improvement cycles.

The overarching goal of the Numeracy Suite is building leadership capacity to create and shape the conditions for whole school improvement in mathematics and numeracy learning and teaching. Thus, the online courses need to prepare leaders to enact school-based professional learning cycles/improvement cycles in partnership with colleagues (e.g., see Grootenboer, 2018). Figure 1 shows the model for school-based professional learning/ improvement cycles developed for the online courses to guide leaders in this endeavour. This model is informed by critical participatory action research (Kemmis et al., 2014). Course activities and LMS content support the model and provide material for leaders to use when leading school teams.

Effectiveness of the Online Courses

Participants in each of the Numeracy Suite online courses were invited to complete online mid-course and end-of-course evaluations that consider the knowledge and skills gained, the effectiveness of the course design, learning environments, facilitation, structure, and discussion groups, and participants' views of their overall experience of the course, including the most positive aspects, and aspects that could be improved. The evaluation included a mix of 5-point Likert-scale items, and open response questions. Mean-responses were calculated for each Likert-scale item, and the open responses were examined to identify key themes, using a grounded theory approach (Charmaz, 2008). Analysis of data from Semester 2 2021 end-of-course evaluation was used to provide illustrative examples of the course evaluation findings. Of interest for this paper was whether courses were viewed by mathematics leaders as effective, aspects of courses that were viewed positively, and aspects that might be improved. These findings can inform the design and content of other online courses.

Overall, the evaluation findings for Semester 2 2021 provide strong endorsement of the relevance and quality of the online courses. The mean responses ($n = 62$) for the 5-point Likert-scale items for the 6 evaluation categories, averaged across the four courses, were: knowledge gained (4.5); skills developed (4.4); online learning environment (4.1); virtual workshop facilitation (4.7); course design (4.6); and course structure (4.0). These positive results were

amplified by nearly 100% of respondents across all courses indicating that they would recommend their course to colleagues and were satisfied with the quality of the course.

Positive aspects of the courses identified by participants in the two open-response questions included course content, opportunities for discussions and collaborations with other mathematics leaders, course design, facilitators, and the readings and resources. For example, one participant in OC2 commented, “*I found the structure of the course great, it built on skills and knowledge each week and prepared you well for the final project.*”

Participants also indicated that they valued the practical nature of the *tasks* and being able to put into practice many of the leadership strategies about which they were learning. For example, “*I have adapted our assessment schedule to fit the new learning*” (OC3) and “*The Planning Model allowed me to lead my team through improving our current planning practices. I really valued the Enabling and Planning prompts to support learning success for all students*” (OC2). Participants also highlighted the opportunities to work with and learn from other leaders as one of the most positive aspects of the course. For example, “*talking with other Numeracy Leaders*” (OC4) and “*also enjoyed the numerous opportunities to interact with staff from other schools to gain new perspective and ideas*” (OC1). Participants valued the facilitators’ expertise as one of the most effective aspects of the course, consistent with literature indicating that access to experts is important for leading and sustaining change in mathematics (Clarke, 1997; Goos et al., 2018). For example, “*[The facilitators] were able to provide us with on-the-spot resources based on the discussions we were involved in*” (OC4), and “*Facilitators were engaging and extremely knowledgeable*” (OC2).

Suggestions for course improvements varied across the four courses. Common themes related to difficulties with workshops being scheduled after school hours and competing workload expectations, clarity of course requirements, challenges with using the Bastow 307 LMS, and one request for more specific secondary content.

Conclusion

Overall, the findings provide confidence about the quality and positive benefits of the Numeracy Suite online courses for leaders of mathematics. It was clear that participation in the courses was having positive impact and assisting mathematics leaders to create conditions for effective teacher professional learning and strategic planning for whole-school improvement in mathematics teaching and learning. However, many of the mathematics leaders had little time during school hours to support their professional learning, or to implement their initiatives. (Vale et al., 2020). These time constraints limit the potential impact of leaders’ work.

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