

Primary School Mathematics Leaders' Views of their Mathematics Leadership Role

Kerryn Driscoll

Monash University

<driscoll.kerryn.k@edumail.vic.gov.au>

School mathematics leaders play a significant role in leading improvement in mathematics education in schools. An online survey was administered to obtain an overview of the current nature of the role of the school mathematics leader. Responses were received from 56 primary school mathematics leaders from Victorian government schools. Findings based on leaders' views contributed to building a picture of the complex nature of the role. Survey responses suggested the impact of school mathematics leaders was often compromised by lack of time, confidence, expertise and funding. The extent of classroom teaching, teacher content knowledge and principal support also impacted on effectiveness of the role.

Quality leadership in mathematics education is fundamental in improving teacher practice and student outcomes (Gaffney, Bezzina, & Branson, 2014). The actions of leaders, along with the actions of teachers who are skilled, confident, and who have the pedagogical content knowledge to teach mathematics effectively, are critical in improving student learning (Gaffney, Clarke, & Faragher, 2014). Teachers need support to develop the knowledge to meet students' needs and to guide their practice. This support needs to come from leaders who can help them to use evidence of the results of their practice in effective ways (Timperley, 2010). Leaders of mathematics are not always in formal positions such as school principals (Spillane, Healey, & Parise 2009); they are often teachers with the responsibility of leading mathematics in schools. Through their actions they play a significant role by developing connections between leadership and learning and improving teaching practice and student outcomes (Gaffney et al., 2014). As a result, these leaders have the "greatest capacity to bring about positive practical and sustainable change" (Grootenboer, Edwards-Groves, & Rönnerman, 2015, p. 277).

Over the years, teacher leaders in Australian schools who support teachers to improve outcomes in mathematics teaching and learning have been referred to by a variety of terms, including teaching and learning coaches (Department of Education and Training [DET], 2013), numeracy leaders or numeracy coordinators (Cheeseman & Clarke, 2005; Corbin, McNamara, & Williams, 2003), middle leaders (Grootenboer et al., 2015) and more recently in Victorian government schools, Primary Mathematics Specialist Teachers (DET, 2013). These leaders, while building their own mathematics discipline and pedagogical content knowledge and capacity to lead, have the responsibility of supporting the learning of their colleagues by sharing subject expertise and influencing practice (DET, 2013).

For the purpose of this paper, I have used the term *school mathematics leader* to convey what the role entails, which is leading mathematics teaching and learning in schools. The research question addressed in this paper is: What is the current nature of the role of the primary school mathematics leader and what influences the effectiveness of this role?

Literature Review

Cheeseman and Clarke (2006) described the role of numeracy coordinators or school mathematics leaders, and noted their importance in education in primary schools. More

recently, Faragher and Clarke (2014) investigated how to develop and sustain improvements in numeracy achievement of students living in low-socio-economic communities. They described the value of having dedicated staff roles in numeracy, and also described the support and professional learning that numeracy coordinators or school mathematics leaders provided to staff, as an essential feature for effective outcomes. In addition, Jorgensen (2016) concluded that school mathematics leaders played a key role in developing successful numeracy/mathematics practices in remote and very remote schools.

Gaffney et al. (2014) described the importance of principals and school mathematics leaders working together collaboratively to bring about better learning outcomes in mathematics. Further research by Sexton and Downton (2014) found that school mathematics leaders faced many challenges. While leaders also experienced many successes, they were concerned about sustaining improvement in mathematics education.

The reported research describes the support provided by external advisors or specialist training, which enabled school mathematics leaders to develop their knowledge and skills to support classroom teachers. Such support was instrumental in the success of their research. Faragher and Clarke (2014) reported that, by building on existing strengths and using a research-based model of effective teaching, school mathematics leaders afforded opportunities to support teachers to further develop pedagogical content knowledge. Targeted funding, time for meetings and professional development were found to facilitate the role of the school mathematics leader (Sullivan, 2011). Meanwhile, support from principals who prioritised programs that supported and valued teachers and their professional learning was found to enable effective mathematics leadership (Gaffney et al., 2014).

Although school mathematics leaders facilitated improvements in mathematics education in their practice, many experienced a variety of constraints. Many of the demands and tensions that exist in the role have not always been recognised (Millett, 1998). Some school mathematics leaders display “differing levels of confidence” (Millett & Johnson, 2000, p. 397) and do not always have the resources and the support to carry out the role effectively (Millett, 1998). Also, many school mathematics leaders often make “enormous demands on themselves in terms of curriculum and pedagogical skills” (Millett & Johnson, 2000, p. 396).

Classroom teaching responsibilities, in addition to subject responsibility, contribute to the difficult nature of the role, and can “be a conflicting priority” (Millett, 1998, p. 240). Limited resources or funding can add further tensions. In some schools, despite the school mathematics leader role being seen as integral to the success of improvement in mathematics, there is often no specific, or targeted funding for such a role (Jorgensen, 2016).

Inadequate time allocation is another common constraint of the school mathematics leaders’ role, which creates pressure (Cheeseman & Clarke, 2006; Millett & Johnson, 2000). A major factor that influences the success of the role, is lack of time to visit classrooms to gain an overview of mathematics in schools, and to support teachers (Millett & Johnson, 2000). Many school mathematics leaders devote much of their own time to carry out the role, using spare moments in the day to meet informally with teachers (Nias et al., 1989, as cited in Millett, 1998).

The existing research describes the importance of the role of school mathematics leaders and the complexity of the role. In addition, research has shown actions of leaders can influence teachers’ practice, which in turn influences students’ mathematical learning.

The current research seeks to paint a picture of the everyday work of the primary school mathematics leader in Victorian government schools.

Methodology

A survey was designed to collect data about the current nature of the role of the primary school mathematics leader and aspects that influence effectiveness of the role. The school mathematics leaders that were surveyed were recommended by consultants, university staff, leading teachers or principals, and were sent a link to the survey by email. Survey data were collected online between August and November 2016. Responses were received from 56 primary school mathematics leaders, from schools of different sizes with a range of socio-economic backgrounds. Of the respondents, 48 (86%) were female leaders and eight (14%) were male.

There were 23 questions in total. The survey was designed to be completely voluntary with 20 multiple-choice or short response options that could be added to and three open-response questions, taking no more than 10 minutes to complete. Questions reported in this paper include the years of experience of the school mathematics leader, classroom teaching responsibilities, and the perceived degree of principal support. Three open-response questions provided school mathematics leaders the opportunity to expand on ways they felt they supported teachers: some of the challenges they had experienced, and some of the achievements they felt were significant. This qualitative data was analysed and coded to identify themes.

Results and Discussion

Survey responses are reported in two sections. Firstly, responses to three of the fixed questions will be shared, and then the five most commonly occurring themes from the open response questions will be used to respond to the research question.

School Mathematics Leaders' Experience

To begin it was important to know how many years each school mathematics leader had been in the role. This provided a sense of how well they understood their role, and how many years of experience they were able to draw upon, compared to “newcomers” to the role (Lave & Wenger, 1991).

Table 1

Number of Years of Experience as a School Mathematics Leader (n = 56)

Years of experience	Number of teachers	%
1 - 2 years	20	36%
2 - 3 years	11	20%
3 - 4 years	3	5%
4 - 5 years	5	9%
5 + years	17	30%
Total	56	100%

Table 1 shows 17 (30%) school mathematics leaders had been in the role for five or more years, five (9%) for four to five years, three (5%) for three to four years, 11 (20%) for two to three years and 20 (36%) for one to two years. Of the group of 20 (36%) school

mathematics leaders, nine (45%) are beginning leaders involved in the state government Primary Mathematics Specialist (DET, 2013) program.

Classroom Teaching Responsibilities

While the role of school mathematics leaders is to support teachers, there are many who have the added responsibility of classroom teaching. Table 2, shows almost three quarters ($n = 39$) of the school mathematics leaders surveyed, were responsible for teaching children in classrooms, in addition to leading school mathematics. This ranged from teaching eight hours a week to a full-time teaching allocation. Nearly half ($n = 18$) of the 39 school mathematics leaders had no allocated time release for the responsibility of leading mathematics. The frustration of teaching full time in a classroom with no additional time release was expressed in this comment:

The workload in being a leader in the school is enormous and I feel it is almost impossible to be an effective classroom teacher and an effective curriculum leader.

Table 2
Indication of Classroom Teaching Responsibilities (n = 56)

Years of experience	Classroom teaching responsibilities	No classroom teaching responsibilities
1 - 2 years	17	3
2 - 3 years	8	3
3 - 4 years	3	0
4 - 5 years	3	2
5+ years	8	9
Total	39	17

Interestingly, 17 respondents had no classroom teaching responsibilities. Fourteen of these leaders had full-time coaching, intervention and support roles and three combined their mathematics role with other leadership roles. According to one respondent:

I was a full-time maths specialist at my last school. It was such a privilege. Now they don't have a full-time person driving the change, and I think it makes all the difference.

Whether the role is labelled as a Coach, a Teaching and Learning Leader or a Specialist, it can be argued that leading mathematics in schools is far more effective without added classroom responsibilities, especially a full-time teaching commitment.

Principal Support

The survey sought to gauge the perceived level of principal support because leadership support that links priorities and programs is crucial to the effectiveness of the role of the school mathematics leader (Gaffney et al., 2014). Table 3 shows that 19 (34%) school mathematics leaders rated their principal support as a ten (very supported), 12 (21%) as a nine, 11 (20%) as an eight, six (11%) a seven and eight (14%) a six or below. Three quarters of the respondents ($n = 42$) who rated principal support as eight or more out of ten, possibly felt they were working well with their principal, and that their role was valued and supported. It is important to note that only five (9%) respondents rated their principal at or below the mid-point on the scale of support.

Table 3
School Mathematics Leaders' Perception of Principal Support (n = 56)

Response Scale	1	2	3	4	5	6	7	8	9	10
	Not									Very
Frequency	0	0	1	1	3	3	6	11	12	19
Percentage	0	0	2	2	5	5	11	20	21	34

Themes That Emerged from Open Response Questions

Time. Nearly half of the school mathematics leaders ($n = 26$) identified time constraints in relation to implementation of their role. This is due to having multiple dimensions to their work – such as classroom teaching, coaching, providing feedback, supporting planning, providing professional development, managing resources, supporting data analysis and collection, and developing whole school programs. Time is needed to meet and plan with teams, and to work with students and teachers. As one school mathematics leader reported:

Time to get it all done. Time to give more support to teams and individual teachers.

Frustration was obvious through responses such as:

Time! (1st challenge). I find it very difficult to be as an effective leader as I would like to be. Extremely frustrating ... we don't have enough time to meet and do this during our lunchtime ... Even if I was to work more – i.e. full time, I would not be able to have extra time in classrooms to assist with coaching roles, look for new initiatives and implement programs.

Limited time allocation for the role was also an obvious frustration in this response:

One hour a week time release to plan Mathematics for whole school PD, data analysis, audit and manage maths resources, prepare for team meetings and provide feedback to teachers being coached.

Although almost half of the school mathematics leaders ($n = 26$) indicated that they were hindered by time constraints, they managed to achieve a great deal. This may partly be attributed to the fact that school mathematics leaders often devote much of their own time to carry out the role (Nias et al., 1989, as cited in Millett, 1998).

Leader confidence. Leader confidence (Table 4) was a major theme that emerged from the data. Twenty-three school mathematics leaders expressed varying levels of confidence in their ability to fulfil expectations of the role. Interestingly, a lack of confidence was not only a concern of less experienced teachers new to the role, but was also a constraint expressed by several ($n = 4$) more experienced school mathematics leaders. Of the 23 (42%) school mathematics leaders who expressed lack of confidence, 10 who had been in the role for one to three years, commented lack of training and access to expertise were constraints in relation to the role. One pointed out that she was worried she was not meeting expectations. Another was concerned about: “Being new to leading a curriculum area and knowing what to do as a leader.” Often there is an issue in schools with high staff turnover, or when leaders themselves move schools. As one respondent said: “Coming into the school and establishing myself as a leader and building relationships with teachers was challenging.”

Table 4

Number of School Mathematics Leaders Who Expressed a Lack of Confidence in Leading Mathematics (n = 23)

Years as a School Mathematics Leader	Frequency	Percentage
1 - 2	11	20%
2 - 3	5	9%
3 - 4	2	4%
4 - 5	1	2%
5+	4	7%
Total	23	42%

Developing credibility as a leader and unclear job descriptions were also mentioned as constraints and added to the insecurity and uncertainty of the role. One respondent highlighted her concerns and lack of confidence in this comment:

Not having enough time to discuss direction with my principal [but also] strategies to support me as a coach/mentor.

Leader expertise. One school mathematics leader reported her struggle as she began in the role:

I was completely inexperienced when taking on the role, and whilst I have had complete trust, support and mentoring from my principal, it has been hard to build my own capacity while trying to build others.

However, as she continued to be involved in on-site professional learning twice a week, to build teacher expertise, this school mathematics leader, pointed out:

My own leadership and pedagogical content knowledge grew significantly.

As school mathematics leaders continue to build their own expertise, they become increasingly confident and more knowledgeable. This was evident in responses by many ($n = 32$) school mathematics leaders that reported they had played a major role in developing staff use and understanding of assessment data. They provided ($n = 39$) support with planning effectively and ($n = 35$) provided regular professional learning to staff. This is how one particular school mathematics leader supported staff at her school:

Attend the four level planning days for 100 minutes to support teachers in term planning. Organise professional development for the staff from outside experts. Attend the local mathematics network meeting to represent my school. Deliver professional development at least once per term. Head the Mathematics Action team meetings held fortnightly after school (agendas and minutes and actions related). Provide support for other teachers for their mathematics planning. Manage the mathematics budget and order resources for mathematics. Administer DET On Demand assessment program; administer Athletics; administer other maths related programs such as Maths 300. Prepare documentation to support the delivery of maths at my school including a language continuum and units of work. Organise and deliver an annual Family Maths Night.

Although this school mathematics leader was new into the role, as an experienced teacher, she was enthusiastic and confident and had developed knowledge and skills over time. School mathematics leaders are often seen as the “front line” people who help teachers to improve their teaching of mathematics (Cheeseman & Clarke, 2006).

Teacher knowledge. Teacher knowledge was another theme that featured in the survey responses. Responses from almost half ($n = 25$) of the school mathematics leaders pointed out that teacher expertise, including teacher content knowledge and pedagogical content

knowledge was a constraint when working with teachers. One school mathematics leader explained:

We have to spend a long time building up pedagogical content knowledge along with effective teaching structure and strategies for maths.

According to Gaffney and Faragher (2010), there are “significant numbers of Australian primary teachers who would benefit from professional learning in pedagogical content knowledge” (p. 74). However, almost two-thirds ($n = 35$) of school mathematics leaders believed they had supported teachers to build this knowledge through coaching, modelling, mentoring, providing feedback, professional development and sharing academic readings. One school mathematics leader explained that she:

Built teacher capacity by providing support in planning, running whole-school professional learning sessions, in class coaching and sourcing external professional learning opportunities.

Another commented on opportunities to develop teacher expertise at her school:

On-site professional learning is held twice a week, ... focused on building teacher capacity to use data to design for deep learning. Mathematics has continued to be a priority over the last two years. Teams of teachers plan and teach collaboratively to support and challenge each other’s practice. Our graduate teachers are given a one-hour block each term with the Numeracy leader to debrief, goal-set and clarify. All teams have ongoing support during planning and weekly data analysis.

These examples of regular professional development involving school mathematics leaders contributed to building teachers’ pedagogical content knowledge and demonstrate how School management structures can support collaboration and team building.

Funding. Finally, almost a quarter of the responses ($n = 13$) indicated that school mathematics leaders felt constrained by limited budgets, not only in terms of money to purchase equipment, but also to implement programs, to fund professional development, and to provide time release to allow them to work collaboratively with teachers and in teams. Further tensions existed when literacy became the focus for resources and programs rather than mathematics. One leader pointed out when writing became the focus at her school:

Maths took a step back resulting in slippage from the years [when] we had three dedicated maths specialists.

Conclusion

Data presented has contributed to building a big picture of the current nature of the school mathematics leader role. It is clear that the actions of school mathematics leaders, who support teachers to build their pedagogical content knowledge and develop and embed quality practice, are a vital link in developing the connection between leadership and learning (Gaffney et al., 2014). Recent projects referred to in the literature are evidence of the value of having dedicated school mathematics leaders (Faragher & Clarke, 2014). School mathematics leaders surveyed shared many successes and achievements. However, based on their views, it is also evident that the role continues to have challenges. The extent of classroom teaching responsibility, time allocated to the role, leader confidence, and funding influenced effectiveness of the role. Although most school mathematics leaders believed their principal supported their role, it would appear that many principals did not always prioritise programs and apply sufficient funding to enable the leaders to achieve maximum effectiveness in their role. As a result, many school mathematics leaders experienced frustration, issues with confidence, and a degree of uncertainty in the role.

When schools see the value of school mathematics leaders as integral to developing quality practices in mathematics teaching and supporting staff, “the role can be funded through various means” (Jorgensen, 2016, p. 36). The implication of these data for educational sectors is that limited investment impacts on effectiveness of the role of school mathematics leaders. To fully support teacher development and improved learning outcomes for students, school mathematics leaders need time to do the job, support from principals, and professional development as leaders.

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