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Leading Numeracy

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Summary

‘A challenging course, some really solid ideas based on research and useful to take back to school to make sustainable changes.’

The Leading Numeracy professional learning course aimed to build the strategic capacity of school leaders to work with teachers in their school community to develop sustainable improvement in student numeracy outcomes. Fundamentally, this initiative was a leadership development project. It was built on the premise that a strategic investment in curriculum leadership development would lead to better numeracy pedagogy in the classroom, and in turn improved student learning outcomes. The course content was designed to deepen leaders' knowledge and understanding of:

- numeracy pedagogical content knowledge and evidence-based approaches to numeracy pedagogy
- the use of a range of assessment tools to analyse students' numeracy behaviours and plan for targeted and differentiated numeracy pedagogy at the individual, class and whole-school level
- the leadership capabilities required to support teachers to become effective numeracy teachers so all students are learning and engaged.

The course was developed and delivered by numeracy experts. The course content and delivery provided an innovative professional learning context that enabled the participants to develop collaborative teaching and learning practices with teachers in their own school community, and to develop an inherently sustainable and localised whole-school numeracy improvement approach.

Who was involved?

Twenty-four school leaders, including two school principals, participated in the course during 2010–2011. Eighteen of the participants worked in schools in the metropolitan area and the remaining six participants worked in schools in rural and remote areas. While there were 24 participants in the course, a significant aspect of the professional learning required the numeracy leaders to work with teachers in their school community, so the actual number of teachers and students influenced by the initiative was quite large.

The Leading Numeracy course

The Leading Numeracy professional learning course aimed to build the capacity of school leaders to work with teachers in their school community to develop sustainable improvement in student numeracy outcomes. The targeted improved student capabilities of this initiative included increased levels of student engagement, and increased student understanding and application of key ideas and concepts in numeracy (DEECD 2009). The course objectives for school leaders were to increase their understandings of:

- strategies to review current student outcomes in numeracy and instructional practices to identify and plan for a renewed whole-school numeracy improvement plan
- the stages of students' numeracy development and related evidence-based implications for scaffolding student learning in numeracy (DEECD 2009)
- implementing models of collaborative teacher professional learning to build teacher capacity in using student assessment data to plan for and implement differentiated numeracy instruction.

The initiative was also designed to present school leaders with an overview of recommendations from national and international research, and reviews of effective numeracy teaching in various school contexts. From this knowledge base, the leaders were encouraged to investigate, develop and enact school-based numeracy development plans. These plans had to address a range of factors including teacher quality and teaching styles; school climate reflected through student behaviours, broad aspirational levels of student achievement and student views on teachers and the school; they also identified factors and strategies for effective numeracy teaching within the classroom.

The professional learning course included five topics, each with specified learning outcomes to guide participants' learning.

Reviewing current teaching practice and student numeracy achievement

Learning outcomes:

- Review the school's current performance using student numeracy learning outcome indicators and review the school's current teaching practice in numeracy.
- Create and sustain a whole-school approach to numeracy assessment that provides accurate evidence to inform improvement in numeracy learning and classroom instruction.
- Use strategic knowledge of stages of students' numeracy development to support effective numeracy instruction.
- Use evidence-based models of collaborative teacher professional learning to build teacher capacity in planning for and implementing differentiated numeracy instruction.

Building teacher capacity to link assessment with numeracy instruction

Learning outcome:

- Understand how to create and sustain a whole-school approach to numeracy assessment that provides accurate evidence to inform improvement in numeracy learning and classroom instruction.

Enhancing teacher knowledge in numeracy

Learning outcome:

- Use strategic knowledge of stages of students' numeracy development to plan for and support effective numeracy instruction.

Building teacher capacity in teaching numeracy

Learning outcome:

- Understand how to use evidence-based models of collaborative professional teacher learning to build teacher capacity in numeracy instruction.

Building teacher capacity to provide for individual difference in numeracy

Learning outcome:

- Understand how to strengthen teachers' capacity to differentiate numeracy instruction.

The course was delivered over a 20-week period using a blended learning delivery model. It included two whole-day, face-to-face sessions on each of the five course topics, facilitated by experts in the field. The course also had online video material and research papers and articles. To facilitate deep learning, each of the topics had set tasks and online discussion forums with networked colleagues and the expert presenters.

What happened?

This project focused specifically on improved mathematical pedagogy through the development of curriculum leadership. With this in mind, the changes we report here relate primarily to the development of teacher-leaders in the participants' schools and the course itself. That said, as an integral part of the leadership course, the participants had to interrogate their own school student numeracy data as a foundation for their development plans. The investment in building school-based leadership capacity is a long-term strategy to improve numeracy outcomes, and the benefit of this will become increasingly evident in the ensuing years.

At the school level, the design of the data collection process to investigate changes to teacher practice and improved student outcomes in numeracy was negotiated between the principals, school leaders and the teachers they worked with, typically discussed at professional learning forums. The principals and school leaders selected and implemented strategies to assess the impact of learnings from the course, which they shared with their teachers to improve assessment and instructional practices in support of improved student achievement in numeracy.

Data on the outcomes of the project were collected through:

- questionnaires to course participants during and at the end of the course to monitor their learning and the relevance of the course content to their local context and school numeracy improvement agenda
- interviews with course participants and facilitators to review the applicability and transfer of knowledge developed in the school context
- interviews between course participants and teachers to review the outcomes of the project in shaping and supporting school-based planning and implementation for improved numeracy instruction
- assessments of student numeracy learning outcomes as selected and administered by the schools, to measure the impact of the project on improving students' numeracy achievement levels.

The feedback on the course was generally positive, and the participants noted some particular features. First, the course presenters were seen as credible and well-regarded experts in the field. They included leading mathematics education researchers, and in their presentations they used recent and relevant research findings to facilitate practical pedagogical development.

> ‘Knowledge and expertise of the presenters, the research and professionalism that went into the preparation of the course, the exchange of ideas, different learning contexts, experiences and opinions of other participants were all extremely valuable. I have appreciated their presentations and honesty in sharing their numeracy journey.’

Second, the course material and activities were seen as relevant and pertinent to their own school contexts. Indeed, it seems that the participating leaders developed theoretically robust and research-based knowledge which they were then able to use and apply in their role as a numeracy leader.

> ‘Very useful and practical course. Looking forward to embedding new knowledge and skills back at school and leading staff in new directions to benefit our students' learning in numeracy.’

> ‘The further into this course we went the better it got. Whilst our school already had very strong links with learning and assessment, and as it is something I have a particular interest in and aptitude for, I was challenged to think outside the square at every session.’

Finally, the course was seen as valuable because the professional development the participating leaders experienced then, in turn, equipped them to lead professional development in their own schools. This had a generative effect and supported the ongoing and sustained development of mathematics pedagogy in their schools.

> ‘Differentiating the curriculum to adapt to suit individual student learning needs, building teacher capacity to create a positive learning experience and to meet the needs of all students … all of this (is) so important and I now have the knowledge and skills to work with my staff to do this.’

Overall, the participants' survey-response feedback statements as well as individual participant's documented performances of understanding and peer presentations demonstrated advanced understandings of numeracy pedagogical content knowledge and instruction as a result of their participation in the course.

Lessons learned

In general, it was clear that this course, designed to increase leadership capacity in schools, was effective and in demand. Through the delivery and evaluation of the course, a greater understanding was obtained about what makes an effective leadership development program.

First, a key factor contributing to the success of the initiative was that it was student-centred and evidence-based, recognising the importance of instructional leadership capabilities in the school context to build teacher capacity to improve students' numeracy outcomes. Although the participants in the course came from a variety of different schools, it was important that the development was always situated in their own school context, so their learning had an impact on the learning and teaching of their students and colleagues.

Second, participation needs to be voluntary. The participants self-selected for participation in the course in response to the identified numeracy learning needs of the students in their schools, and an appraisal of their own numeracy knowledge and that of their staff. This meant that the participants were intrinsically motivated to engage with the course material and apply the knowledge learned back in their schools.

Third, the program needs to be structured with relevant content and clear learning outcomes. In this case, the material focused on best practice in numeracy pedagogy and leadership development. Furthermore, it needs to be supported and provided by highly regarded experts in the field. The course content was structured around explicit learning outcomes for each of the five topic areas in the course.

> ‘Excellent references which prompted professional conversations that supported my understanding of the big ideas in numeracy and the implications for working with staff to develop a whole-school approach to numeracy teaching and learning.’

> ‘Know so much more about a range of assessment tools we can use at school and am now more confident to continuously use that information to support differentiated student learning.’

Fourth, the course delivery needs to be paced in line with school agendas. In this initiative, the course delivery model allowed for cumulative and progressive learning that the participants were able to share with their school communities, thus building a collective capacity for improved, evidence-based numeracy teaching. The use of blended learning opportunities and the provision of ongoing support were important for the provision of relevant input, which was then applied at the school level.

Finally, it was clear that there were potential challenges a school might face in trying to participate fully in the developmental course. To be successful, there needs to be a readiness and a commitment to critically examine student numeracy data to inform planning and instruction for student-centred numeracy learning. Dedicated time for engagement in, and completion of, all components of the course is also required (Sparkes 2003).

Next steps

As has been noted previously, this initiative did not focus directly on student learning or student outcomes, but rather it was designed to build long-term leadership capacity in numeracy education in schools. By focusing on numeracy curriculum leadership, the effect of the initiative should be experienced by many students as they progress through the schools. To this end, the participants in the course are now equipped to be numeracy leaders in their schools, and to work with their colleagues to develop good mathematics learning across all the classrooms in their schools through data analysis and professional development.

> 'All of the sessions have made me reflect, learn and think about future directions in numeracy at our school. It has got me strategically thinking about how to raise the profile of numeracy within the school and, as a school leader, deeper pedagogy needs to be implemented into our Annual School Improvement Plan to support learning in numeracy.'

At a system level, the effect of the initiative and its sustainability at the school level is indicated by the high demand for the program, with many inquiries from potential participants wishing to enrol in the course.

Research base

To improve student learning outcomes and aspirations, defining what highly effective teachers do in the classroom remains a priority, and integral to this is the significant effect that school leaders can have on teaching and learning. School leaders require a deep understanding of quality pedagogy to effectively support teachers in improving student learning outcomes (DEECD 2005, 2009).

The specific numeracy focus of this initiative was informed by longitudinal state, national and international analyses of student outcomes (DEECD 2009). The key ideas and research base for this numeracy professional learning initiative were built on the findings and recommendations from significant numeracy research projects including the Early Years Numeracy Research Project (1999–2001), the Middle Years Numeracy Research Project (2001) and Scaffolding Numeracy in the Middle Years (2003–2006). Ideas and recommendations from these projects that informed the content of this initiative included effective leadership and coordination at the school level, and a shared set of beliefs and understandings about numeracy, supported by a whole-school approach to numeracy planning and instruction.

Further reading and links

Systemic documents

DEECD 2005, *Professional learning in effective schools: The seven principles of highly effective professional learning*, Melbourne, https://www.eduweb.vic.gov.au/edulibrary/public/teachlearn/teacher/ProfLearningInEffectiveSchools.pdf

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DEECD 2010, *Teaching and Learning Coaches Initiative guidelines 2011*, Melbourne, www.education.vic.gov.au/Documents/about/programs/archive/11tchlearn.pdf

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Munro, J 2005, *Professional learning teams: Building the capacity for improving teaching and learning*, Nottingham, National College for School Leadership.

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