teach
learn
share

Coaching and whole-school commitment improve Numeracy outcomes

teach
learn
share

Summary

Through the Literacy and Numeracy National Partnerships project, Moana Primary School appointed a full-time Numeracy Coach from 2009 to the end of Term 2, 2011. Appointment of a coach was part of a strategy aimed at improving student outcomes in numeracy through a targeted whole-school approach, extensive professional learning, and the use of data and diagnostic testing to inform teaching programs.

Moana Primary School developed and adopted this strategy in response to concerns about students' results on NAPLAN tests. The objectives of the strategy were to:

- develop effective and evidence-based teaching of numeracy
- establish strong school leadership and whole-school engagement with numeracy
- monitor student and school numeracy performance to identify where support was needed.

By focusing on these objectives, the aim was to have an increased number of students achieving National Minimum benchmarks, as indicated by NAPLAN results. The main feature of the strategy was the appointment of a full-time Numeracy Coach to work with staff at the school to develop and enhance pedagogy in mathematics across all year levels. The NAPLAN results indicated that the project was successful, with the average gains in numeracy across the school exceeding national expectations.

Target student group

The strategy was undertaken at Moana Primary School, Seaford, South Australia. This primary school consists of about 465 students and 34 staff members; numbers varied slightly over the life of the strategy. The strategy targeted all students and teachers.

Method

The strategy

This strategy was aimed at improving numeracy outcomes for students by building:

- effective and evidence-based teaching of numeracy
- strong school leadership
- whole-school engagement with numeracy.

Student and school numeracy performance was monitored to identify where support was needed.

The role of the coach

To achieve these aims, a Numeracy Coach was appointed to work at the school from 2009 to 2011. The coach worked one-on-one with teachers and in classrooms to plan and implement new numeracy pedagogy. The Numeracy Coach taught model lessons, then moved to team-teaching, then to observing and supporting teachers in the classroom. Critical to the role of the Numeracy Coach was building credibility and relationships with all staff to highlight their knowledge and give them confidence to put new ideas into practice. The Numeracy Coach was responsible for managing and coordinating the strategy over the life of the project.

The Numeracy Coach underwent extensive professional learning to prepare for the role. This professional learning included working with Professor Dianne Siemon on the Big Ideas in Number framework. The Big Ideas in Number framework was then used as the foundation for the development of numeracy pedagogy across the school.

The role of the Numeracy Coach changed as the strategy progressed. Initially the coach oversaw the development of resources for implementing the diagnostic testing and the Big Ideas in Number framework. The coach also worked with specific groups of teachers to implement the Big Ideas in Number framework, and helped class teachers develop their pedagogy. Once staff became more confident and familiar with the new teaching approaches and programs, the Numeracy Coach focused on planning quality numeracy programs. Some teachers worked with the Numeracy Coach and year-level colleagues to design units of work and term planners. At the end of the strategy, staff had access to a range of resources and knowledge that helped them to use student achievement data to plan and implement quality numeracy programs.

Whole-school commitment

The appointment of a Numeracy Coach to facilitate the implementation of the Big Ideas in Number framework was the fundamental feature of this strategy, but it was also built on a commitment from the whole school. For substantial development to occur in numeracy pedagogy, it was critical that all staff were willing to participate and engage in the program. Whole-school data analysis and discussions were the basis (and starting points) for improvement, and this wasn't always easy for staff. The Numeracy Coach had to work with the staff to motivate them and gain their confidence, so that they became enthusiastic and willing to engage with pedagogical change over the length of the project. Having the Numeracy Coach on-site was of critical importance. It meant that the coach was an integral member of the school teaching community – not an external visiting 'expert'.

This allowed the Numeracy Coach to establish relationships with teachers, and meant that she was also available to discuss mathematics learning and teaching with staff formally and informally.

Another feature of the strategy was the use of data to inform pedagogy. NAPLAN and diagnostic data were used to target and monitor student outcomes in response to the new pedagogical approaches. The data were used by staff in their individual planning, by 'syndicates' that looked at student learning across year levels, and at a school-wide level to provide purpose and direction to numeracy learning across the school.

School leadership

The practical, moral and financial support of the leadership was critical to the success of the strategy, allowing it to be sustained as a school priority from its initial phase. Of prime importance were the provision of time for staff to administer any tests and meet for follow-up discussions and planning, rather than asking them to implement the program on top of what they were already doing.

Results

> 'I believe the 'partnerships in practice' is one of the most effective ways of challenging teacher pedagogy, methodology and practice. Not only do we as classroom teachers get to see effective classroom practice in maths, we see first-hand how new methodologies and ideas can be applied in our classrooms. Another advantage is the time allowed for discussion after seeing the new methodology in practice, as it gives us a chance to discuss how we can further extend these ideas for our maths teaching. Being able to plan and program with a mentor is advantageous, as we continue learning about new ideas, methodologies, practices and resources that can be used in classrooms. Professional learning has also been worthwhile, as all the staff are receiving the same professional learning and messages. Research shows the most effective change is whole-school change, so if we are all getting the same professional learning, change is more likely to occur, as is the improvement of our maths results. The professional learning sessions were part of our staff meetings, which meant that we all had the same ongoing professional learning. The voluntary sessions were extremely useful; in general, most teachers attended because they could see the benefit of the professional learning. I have learnt a huge amount about teaching maths in the last two years from working in the classroom with a mentor, talking about maths strategies, whole-school professional learning, and being able to plan collaboratively with a mentor.'
>
> (Sharon Hillier, year 6/7 Teacher)

There were a number of positive outcomes from the strategy, but most significant were improved student-learning outcomes in numeracy, and improved teacher pedagogical content knowledge and engagement with data-driven pedagogy.

Improved student-learning outcomes

Improved student learning outcomes were evident in both the numeracy tests that were integral to the strategy program and in NAPLAN results.

Teachers met with the Numeracy Coach to identify the conditions of testing, using the Big Ideas in Number diagnostic tests. The teachers decided on the test that would be most suitable for the needs of their students (eg trusting the count, place value, multiplicative thinking, partitioning), and they selected a sample group of students to be tested (eg three lower achievers, three middle achievers and three upper achievers). The teachers implemented the tests, then met with the Numeracy Coach to discuss their test results.

Before-and-after comparisons were made using NAPLAN data from 2009–2011. This allowed the results from the same cohort to be compared over the two years between NAPLAN testing (ie year 3 to year 5, and year 5 to year 7).

Table 1: Student numbers and mean numeracy scores 2009–2011

Cohort	Number of students	2009	2011
Year 3–5	55	366	463
Year 5–7	22	442	514

NAPLAN data from 2009–2011 was used to evaluate students' growth in performance for numeracy. The data indicated that students' growth in numeracy across years 3–5 and years 5–7 was above their expected growth. (Expected growth points were calculated on information provided during a NAPLAN workshop run by the Department of Education and Child Development.) The expected growth for years 3–5 over a two-year period is 80 points, but the actual growth for the year 3–5 cohort over the two-year period was 97 points: 17 points above the expected growth. This equates to almost six months development ahead of the expected growth.

The expected growth for years 5–7 over a two-year period is 50 points, but the actual growth for the year 5–7 cohort over the two-year period was 72 points. The growth of this cohort was 22 points above the expected growth, meaning that, in general, these students were almost one year ahead of their expected growth. (These gains were at a time when the school actually went backwards in some of the other areas.)

Increased teacher Pedagogical Content Knowledge (PCK) and engagement

A critical feature of the strategy was employing a Numeracy Coach to work with the teaching staff. Two key outcomes for the staff were increased teacher Pedagogical Content Knowledge (PCK) and the development of data-based pedagogy.

> 'The opportunity to work with the Numeracy Coach over the past two years has provided some much-needed background knowledge for supporting student learning, especially in Number. By clarifying my own understanding, I have been encouraged to explore Number more deeply and to help students with strategies for counting and undertaking operations. Students have been provided with a mathematical 'metalanguage' they can use to explain their thinking when they are working on activities or sharing reflections about activities.'
> (Jac Hocking, year R/1 teacher)

The Numeracy Coach was able to facilitate increased PCK among staff by providing high-quality, consistent, ongoing, targeted training and development. The Numeracy Coach was also able to see that increased knowledge transferred to the classroom by modelling lessons, team teaching, and observing numeracy lessons.

The teaching staff also became knowledgeable and sophisticated users of data in their planning. Specifically, through their work with the Numeracy Coach, the teachers were able to use NAPLAN and diagnostic data in planning and in targeted teaching. They were also able to use data to analyse their own teaching practice, to track how the numeracy program was going overall, and for following student progress over time.

> 'The partnership with the Numeracy Coach has been fantastic. I never enjoyed teaching maths, and had a hard time engaging and assessing students. Through this partnership, I have been introduced to more fun and engaging ways of delivering maths. I enjoy teaching maths now and my students are enjoying it. The Numeracy Coach has passed on so many helpful resources. Thank you so much!'
> (Mel Callagher, year 2 teacher)

Lessons learned

The appointment of the Numeracy Coach was the major contributing factor to the success of the strategy. This required significant funding, but it was worthwhile because it provided deep and focused expertise in the area of numeracy. It was important to appoint the right person to this role because they had to support, program and plan with staff individually and at a whole-school level. The Numeracy Coach had a good knowledge of numeracy pedagogy and the particular needs of the school community, and so they were able to order and purchase appropriate resources. The Numeracy Coach also had to provide regular high-quality professional learning to staff, and manage the details of the program. This meant that they had to have excellent management and people skills; the school was fortunate to have a high-quality person in this position during this strategy, and this contributed greatly to the program's success.

The appointment of a Numeracy Coach was a clear indicator that the school had a real, intense, and long-term (two-year) focus on numeracy. It is not always feasible for schools to have such a long-term focus on numeracy, but there was a substantial commitment of time, energy and resources into this area; this emphasis provided an environment where lasting and well-informed development could become part of the school culture, so the benefits would remain after the project was finished.

Integral to all the factors mentioned, to a greater or lesser extent, was a whole-school commitment to pedagogical development in Numeracy. There were varying levels of excitement and engagement with the strategy but, on the whole, all the teaching staff were dedicated to improving student outcomes in numeracy across the school. Therefore, creating a whole-school plan was essential, and this needed to be supported by leadership and become a school priority, particularly in its initial phase. It was clear that the success of this strategy was only possible because the whole school was involved, it was well-supported by the leadership, and all staff were committed to the project. These factors are essential for any school-based pedagogical reform to be successful.

Next steps

Now the project has finished, staff members are conscious of sustaining the pedagogical gains, particularly following changes in staff and other competing issues. There are many factors that could ensure the sustainability of the program after the strategy has ended. The Numeracy Coach provided regular high-quality professional learning to staff, but teachers were also encouraged and invited to attend professional learning from outside sources (eg professional learning with Dianne Siemon; Natural Maths with Ann and John Baker; professional learning with Michael Ymer), and this will continue, ensuring that the accumulated staff knowledge will be sustainable.

Further, the skills and knowledge that the teachers have developed in the use and analysis of data (eg NAPLAN) will remain, and this will inform pedagogy and planning, and show growth over time. Finally, site-improvement planning has been undertaken to ensure sustainability, with new targets set and key priorities documented.

Research base

There is growing recognition that professional learning models based solely on traditional 'one-off' teacher workshops have little impact on teachers' classroom practice. While teachers may gain new knowledge about teaching ideas, this knowledge does not lead readily to changed practice in the classroom. Cornett and Knight (2008) identified that coaching improves teachers' attitudes and job satisfaction, and can significantly improve teaching practices by increasing the uptake of new pedagogical ideas in classroom practice and increasing teachers' sense of self-efficacy. Vanderburg and Stephens (2009) found that coaching led to teachers:

- being more willing to try new practices
- using more authentic assessments
- being more able to modify teaching to meet student learning needs
- changing their beliefs and educational theories.

Therefore, a coaching model was implemented in this project to provide ongoing, site-based professional learning. The Numeracy Coach was employed to work with teachers to plan, implement and evaluate the impact of new teaching practices on student engagement and achievement, thus promoting data-driven pedagogy.

Further reading and links

Cornett, J & Knight, J 2008, *Studying the impact of instructional coaching*.

Vanderburg, M & Stephens, D 2009, *What teachers say they changed because of their coach and how they think their coach helped them*, Literacy Coaching Clearinghouse, accessed 13 April 2009.

Contacts

For more information go to www.moanaps.sa.edu.au or email admin@moanaps.sa.edu.au