The “Top Ten”: Ten (now Eight) Important Factors for Coaches of Mathematics in Elementary and High Schools

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Introduction
This paper reports on the first year of a mathematics coaching project in which 187 mathematics, literacy and science coaches were placed in selected low-achieving elementary and high schools in a large metropolitan city in Australia. The 134 mathematics coaches were given a broad brief by the State’s Department of Education. They were asked to coach teachers in their schools to teach mathematics in a more conceptual, exploratory way, to reduce teachers’ reliance on textbook-based lessons, and to raise student achievement.

Coaching is defined as “a form of inquiry-based learning characterised by collaboration between individual, or groups of, teachers and more accomplished peers”, (Poglinco, Bach, Hovde, Rosenblum, Saunders, & Supovitz, 2003, p1). They describe four types: technical, collegial, peer and mentoring. Technical coaching is typically used to transfer new teaching practices into teachers regular repertoires; collegial coaching is used to increase teachers professional dialogue and aid reflection; peer coaching is commonly defined as two or more professionals working together to improve their professional knowledge and skills; mentoring refers to professional relationships between experienced and novice teachers. Coaches in this project were asked to work within the collegial model of coaching (Poglinco et al, 2003).

What are the behaviours, skills, attitudes, and sets of knowledge that constitute coaching? Feger, Wolek & Hickman (2004) report that the Center for the Enhancement of Science and Mathematics Education at Northeastern University (CESAME) and The Education Alliance at Brown University through its Northeast and Islands Regional Educational Laboratory program (LAB) found that analysis of more than 50 online interviews of maths and science coaches revealed the need for interpersonal skills to establish trusting relationships, content knowledge, pedagogical knowledge, knowledge of the curriculum, awareness of resources available to teachers, and knowledge of coaching skills, such as pre and post conferences, the role of questioning and reflective practice, planning, co-teaching and modelling.

Relationships are central; and they are not easy. All teachers find themselves within complex relationships to other staff and students. If we do not allow for the complexity and negotiable nature of relationships within which teacher facilitators are embedded, we risk regarding them as technicians rather than as facilitators (Leander & Osborne, 2008). Confer (2006), who is a maths coach with 14 years experience in Tuscon, Arizona, makes good relationships with teachers a priority. She reports that this relationship is very fragile at first: “Many teachers feel vulnerable when outsiders come into their classroom, especially one who is there to encourage them to make changes” (Confer, 2006, p2). She works alongside teachers as a co teacher, not as an evaluator or judge; “I find it helpful to move discussions away from the teachers themselves and towards the leaning that we teachers are doing together” (Confer, 2006, p4).

Coaches also need relationships with each other; networks are important. Access to colleagues can be a critical resource for strategies and a lifeline for learning how to manage new situations. (Feger, Wolek and Hickman,2004). Coaches need the skills to network with each other so that they can obtain the support that they need to function in their new role.
Once relationships are established and networks set up, other coaching skills come into play. Content knowledge is pivotal to the adoption of a flexible, exploratory approach by teachers. Coaches need the appropriate level of content knowledge to assist teachers to make the transition from textbook based instruction: “When teachers do not understand the mathematics, they tend to fall into the misunderstanding that their task is simply to cover objectives that will be tested. They believe that objectives have relatively equal importance and that teaching happens best through simply telling the children procedures and having the children practice so they can remember. Instead, this kind of teaching leads children to fragile understandings that crumble under the weight of too many partially memorised, disconnected objectives” (Confer, 2006, p10).

In addition to content knowledge, coaches need the skills to aid teachers to reflect. It is most important for a coach to establish a collaborative reflective relationship with a teacher, not to tell the teacher what to do, but serve instead as a knowledge resource and a mediator to help the teacher reflect (Feger, Wolek and Hickman, 2004).

In summary, the ability to establish effective relationships and networks, the possession of adequate content knowledge, and the capacity to aid teachers in reflection are known factors in successful coaching. This was confirmed in the study of best practice among Victorian mathematics coaches reported here. In addition, we found another six factors that were important at this early stage of the coaching project. Before these are reported, some background to the Victorian Government’s Teaching and Learning Coach project will be provided.

Background to the Teaching and Learning Coach (TALC) Initiative
The Victorian Government’s Teaching and Learning Coach project is briefly described here in order to provide some background to our study of best practice.

Participating low-achieving elementary and high schools were identified from state-wide AIM (now NAPLAN) 2006 test data. (A sample Year 7 Numeracy test can be found at http://www.vcaa.vic.edu.au/prep10/naplan/testing/2009/V2Yr7NCALC.pdf).

Two hundred coaches were employed as maths, science or literacy coaches, and placed in 382 primary and secondary schools, working with 1536 teachers. About half the schools had enrolments of no more than 300 students. About a third of the coaches worked in one school; another third in two schools, and the remainder reported that they were working in three or more schools. Almost half the coaches spent 2 hours per week with each of their teachers, 40% spent between three to five hours per week, and the remainder spent six to nine hours per week with each teacher.

The coaches had previously been teachers, professional development trainers, or senior staff in schools. In the coached schools, they did not teach classes, but worked solely with teachers to improve their practice.

Online surveys were used to seek feedback from all 200 coaches in April/May and in August 2008, from five of their teachers in April/May and in August 2008, and 228 principals in schools where coaches were working in August 2008. All 130 mathematics coaches were encouraged to support their teachers to collect student achievement data. Three tools provided some measure of change in student achievement in Mathematics over the relatively brief period of coaching between the pre- and post-data collections in April/May and August. The one reported in this paper is Scaffolding Numeracy in the Middle Years (SNMY) for Years 5-9 (Siemon, & Breed, 2006; Siemon, Breed, Dole, Izard & Virgona, 2006; Siemon, Izard, Breed, & Virgona, 2006), which uses rich tasks to analyse student learning. (Another similar tool designed for use in early childhood, the Mathematics On Line Interview (MOL), is also referred to briefly). There are two sets of rich tasks in the SNMY kit. The pre-test option provides advice on each response and what a teacher needs to teach to overcome gaps and misunderstandings. The post-test option measures change in achievement. The SNMY tool is discussed in this paper because it is the one that teachers and coaches of middle years students found the most informative. As one coach said “Classes have improved enormously from it. It provides good information if taken seriously by teachers”.
In addition a stratified random sample of 24 coaches was selected for in-depth study and more detailed data collection. Four months after coaches had been placed in schools, semi-structured interviews were conducted with 24 coaches chosen at random, 70 teachers coached by them, and 20 school leaders. Four months later, a second set of interviews was carried out with the same 24 coaches. Participants were initially asked to identify factors that they believed supported and hindered the three aims of the project. From that point interviews were loosely structured so that the coaches, teachers and school leaders felt free to lead the conversations if they desired. (It is this data that will shortly become my focus for this paper).

Initial findings were encouraging. At the end of the first year, there were clear indications that the mathematics coaching program had a substantial impact on student achievement in coached teachers’ classes. Coaches and teachers began to report this anecdotally after 4 months, and the SNMY and MOL tests showed this change when they were undertaken 5 months after the project began. However, improvement had a mosaic pattern. For each coach, there was major improvement in some classes and no improvement in others. As explained below, there were a number of factors that affected outcomes. Some of these were factors over which coaches had no control.

The principals were, in the main, very positive about the impact of coaching on teaching practice. By August 2008, most were in agreement that as a result of coaching, teachers valued the opportunity to work with coaches (94% of principals agreed or strongly agreed), used student achievement data more effectively to plan (92%), had an increased understanding of assessment instruments (95%) and planned to meet the needs of diverse groups of students (91%).

The changes in teacher perception and practice were recorded through the April and August surveys of coached teachers. Although nearly half the teachers were initially concerned about feeling judged by the coach observing their classroom practice, only 10% still held this concern by August. Other changes included: 64% of teachers reported that their pedagogical content knowledge had improved (up from 41% in April), 71% reported that they approached their teaching practice with increased confidence, enthusiasm and/or reflection (up from 61% in April), and 62% reported that they were now developing their own rich tasks (up from 42% in April). Most teachers (95%) commented on increased student engagement, and 92% said that they had observed increased student achievement.

We will now return to the smaller study; the identification of factors comprising best practice among coaches.

**Identifying Best Practice among Coaches**

At the end of the first year, we were asked to identify the factors that contributed to the success of the most effective coaches. In our first attempt, we tried to use student achievement data to determine coach effectiveness; that is, we tried to take a somewhat quantitative approach. However, this was not supportable due to the mosaic pattern of student achievement with nearly all our coaches. When we looked at the interview data, we saw that many factors believed to have affected outcomes had been reported by coaches, teachers and principals. These six factors in particular were believed to have impacted on student outcomes:

1. Time. There was insufficient time for the coaches to attain a measurable positive effect with some teachers. The Department of Education required feedback by August 2008; schools open at the end of January in Australia, but not all coaches had been appointed by then.

2. Teachers. The teacher was a variable. Commonly the same coach is associated with small to large changes with her group of teachers. For example, one coach, Caroline, effected changes of large, medium, small and very small with each of her 4 teachers. We found this to be a common pattern across the study.

3. Students. The student cohort was a variable. Zahrah had a class of students at Zone 7 with an excellent teacher. This class did not improve on the SNMY test, but there was little room for them to move...certainly not enough for it to show up on the time between assessments. However, “students loved the SNMY material, it challenged even the upper end students”, the teacher said.
4. Leadership. The school culture is a variable. Some coaches worked with hostile leadership and were
told to work with teachers who were already excellent, and whose students did not improve significantly.
Others were instructed to work with teachers who required long term professional development before
they might show improvement.

5. Structure. Structure of coaching by the city’s Regional Departments of Education was also a variable:
some coaches were given a large number of teachers, so were not sufficiently effective with any one of
them. Others were given many schools, and had to adjust to very different school cultures before they
could work effectively with the teachers. Some had to travel so far in a week (one coach did 1000km/week) that the time that could be spent coaching was actually spent driving.

6. Diagnostic Tests of School Performance. The Identification of the School as ‘low achieving’ was
problematic. The underlying assumption in the identification of a low-achieving school is that there is a
causal relationship between teacher competence and student achievement in that school. This is may
not be the case. In one school in the study, most students were the children of refugees, living in
government-provided housing. They had arrived in the school when their parents arrived in the country,
and they stayed at the school for two or three years until their parents’ situation stabilised financially,
when they were able to move out of the inner city. They typically moved to the outer suburbs where
housing was less expensive. Consequently their test results did not entirely reflect the competence of the
teachers at the school they attended. Schools like this that have low student achievement data may in
fact have highly experienced and knowledgeable staff whose performance will not noticeably improve
with a coach because they are already highly competent. The low achievement of the student cohort,
who are new immigrants, often refugees from war-torn nations, who have suffered severe dislocation, if
not trauma, and who may have long periods of interrupted schooling, is understandable, and not quickly
rectified.

A Qualitative Approach to Identifying Best Practice
Having discovered that student achievement data was not sufficient to our purposes, a qualitative
approach was then taken to data analysis (Patton, 1990). Four months after coaches had been placed
in schools, we had conducted semi-structured interviews with 24 coaches chosen at random, 70
teachers coached by them, and 20 school leaders. Four months after that, a second set of interviews
was carried out with the same 24 coaches. Participants were initially asked to identify factors that they
believed supported and hindered the three aims of the project. From that point interviews were loosely
structured so that the coaches, teachers and school leaders felt free to lead the conversations if they
desired.

The first set of interviews of all 24 coaches, 70 teachers and 20 school leaders were analysed. The
analysis generated a list of twenty-one factors that participants believed were important in contributing to
the aims of the project. These are reported in Table 1.
### Table 1: First Round of Analysis
#### Twenty One Factors Contributing to Success of the Mathematics Coach Project

- Interpersonal skills
- Good facilitator
- Experienced teacher
- Good content knowledge
- Behaviour management strategies
- Understanding the role of coaching
- Neither a teachers aid nor a consultant
- High expectations of teachers
- Reflective conversations, helping teachers to question their own practice
- Having expertise in resources, contacts, policies, areas that the school can take advantage of…wider than the classroom
- Knowing how to deal with difficult people
- Being available at short notice
- Knowing the teachers
- Being flexible
- Knowing the coaching process is individualised and you do different things with different teachers
- Data-analysing, interpreting and providing feedback to inform practice
- Being able to work with the leadership team
- Need a supportive Principal/Region (except in the case of very highly skilled coaches who excel anyway)
- Not being employed by the school so can be resistant to pressure, but also there is no message of “I need you to achieve this so I look good”
- Maintaining Confidentiality
After the second round of interviews, the qualitative data was again analysed and generated a list of nineteen factors that participants believed were important in contributing to the aims of the project. These are reported in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Second Round of Analysis</th>
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<tbody>
<tr>
<td>Factors Contributing to Success of Mathematics Coach Project</td>
</tr>
<tr>
<td>Coaches Qualifications and Skills</td>
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<tr>
<td>Confidence/Passion for teaching</td>
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<tr>
<td>Honesty</td>
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<tr>
<td>Interpersonal skills</td>
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<tr>
<td>Ability to relate to range of people</td>
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<tr>
<td>Responsive, flexible</td>
</tr>
<tr>
<td>Content knowledge – especially at secondary level</td>
</tr>
<tr>
<td>Pedagogical knowledge</td>
</tr>
<tr>
<td>Management skills</td>
</tr>
<tr>
<td>Organisational skills</td>
</tr>
<tr>
<td>Reflection – support and challenge. Tuning into individual needs.</td>
</tr>
<tr>
<td>Knowing resources</td>
</tr>
<tr>
<td>ICT capacity</td>
</tr>
<tr>
<td>Understanding data (interpreting and using for implementing and planning.</td>
</tr>
<tr>
<td>Understanding of notion of coaching</td>
</tr>
<tr>
<td>High expectations of what can be achieved</td>
</tr>
<tr>
<td>Confidentiality/trust</td>
</tr>
<tr>
<td>Working systematically with all levels of school</td>
</tr>
<tr>
<td>Independence</td>
</tr>
</tbody>
</table>

Themes that were identified in Table 1 were matched against themes identified in Table 2. Common themes were collapsed.

A third round of analysis was then conducted. Researchers gathered in a half day workshop to sort the coaches into positions 1 to 24 in order of competence, (using Tables 1 and 2 as their guide). Ten very competent coaches (C1-C10) were identified by this process.

All qualitative data for Visits 1 and 2 to each of the ten coaches were then read by two researchers, who collaboratively matched the data for each coach against each theme. Themes were further collapsed and new themes were added as we moved through this data. At the end of this process, we had identified fourteen themes.
### Table 3: Third Round of Analysis

**Fourteen Themes Contributing to Success of the Mathematics Coach Project**

<table>
<thead>
<tr>
<th>Themes</th>
<th>Coach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building relationships of trust and mutual respect</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Model teaching/Team teaching</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Provision and/or management of resources/strategies</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Value of data collection and use for evidence based teaching</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Support teachers to set agenda and pace</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Providing feedback, requesting feedback and encouraging professional dialogue and honest responses</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Building understanding of coaching in school</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Listening, confidentiality</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Being reliable, accountable</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Working with leadership team supportive leadership</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
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<tr>
<td>Planning (focus, strategies, student reflection, using assessment for planning)</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Reflection: Encouraging teachers to reflect on their practice</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
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<tr>
<td>Explicit instruction</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
</tr>
<tr>
<td>Classroom organisation/management</td>
<td>☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉ ☉</td>
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</table>

Further refinements were made. One coach, C9, was removed from the sample after this analysis. He had a strongly bifurcated pattern of skill, being highly effective in some areas, but not attending at all to others.

Fourteen themes were collapsed to eight. Removed were the themes of Explicit Instruction, Model Teaching/Team Teaching, Building Understanding of Coaching in the School and Working with the Leadership Team, as some of the remaining nine highly effective coaches did not do those things this
year. The themes of Listening and Confidentiality and Being Reliable and Accountable were collapsed into the theme of Building Relationships of Trust and Mutual Respect.

These eight themes were subdivided into two categories; Relationship Aspects and Task Aspects. The final themes or factors we produced to represent the practice of highly effective coaches are to be found in Table 4.

### Table 4
Eight Factors of Best Practice in Mathematics Coaching

<table>
<thead>
<tr>
<th>Relationship Aspects</th>
<th>Task Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Relationships:</strong> Building relationships of trust and mutual respect and being reliable, accountable</td>
<td><strong>2. Resources:</strong> Providing and/or managing resources/strategies</td>
</tr>
<tr>
<td></td>
<td><strong>3. Use of Student Achievement Data:</strong> Using student achievement data for evidence based teaching</td>
</tr>
<tr>
<td></td>
<td><strong>4. Teacher Leads the Process:</strong> Supporting teachers to set their own agenda and pace</td>
</tr>
<tr>
<td></td>
<td><strong>5. Feedback:</strong> Providing feedback, requesting feedback and encouraging professional dialogue and honest responses</td>
</tr>
<tr>
<td></td>
<td><strong>6. Planning:</strong> Assisting teachers with planning</td>
</tr>
<tr>
<td></td>
<td><strong>7. Reflection:</strong> Encouraging teachers to reflect on their practice</td>
</tr>
<tr>
<td></td>
<td><strong>8. Classroom Organisation/Management.</strong></td>
</tr>
</tbody>
</table>

Leander & Osborne (2008) argue that coaches position themselves in highly complex ways to multiple others and these multiple positions shape their roles. We found this complexity in this analysis of best practice. While all nine coaches exhibited eight or nine of the Best Practice factors, they differed in the emphasis they placed on each. To illustrate this point, a short case study has been written for each theme. The case studies have been used in 2009 to inform the practice of the coaches. The constantly negotiable and complex nature of mathematics coaching was communicated to coaches. It was made clear to them that these factors were identified as preliminary findings and that some currently discarded factors may in fact emerge as important as coaches become more established and experienced in the second year of the project. We expect, as the project continues, to broaden and change the definition of best practice.

Following are some of the Case Study stories that illustrate the complexity of coaching in mathematics education in Victorian primary and secondary schools.

**Theme 1: Relationships**

Linda had a style that made teachers feel comfortable. Initially her focus was on building relationships with her teachers; she deliberately did this at the beginning of coaching. She went to school drinks and staff dinners, taking advantage of informal communication to get to know the teachers on a social level.
She didn’t focus on forming relationships with the students, because she saw that as their teacher’s role; instead she focussed on the teacher. She found out what the teacher’s goals were through conversation, observation, team teaching and providing resources that the teacher asked for. ‘She has the personality, enthusiasm and a million ideas,’ explained a teacher. ‘She's made it clear that her focus is on the teacher’

Lynda attributed her success at coaching to the time she spent building relationships with her teachers. Without an emphasis on this, she said, you will not get far. You ‘can expect it to take some time, but once teachers trust you and know that you are there for them, you will be accepted easily and you can then be very effective in bringing about change AND having happy teachers’.

**Theme 2: Resources**

Peter established his credentials early on by showing himself to be a “resource donkey” with a bag of resources that he offers to teachers. He is a mixture of PD presenter, mentor and coach. This is his way of engaging and enthusing the teachers about his role as coach. He encourages teachers to use the wealth of resources that are online, including the National Library of Virtual Manipulation, and has created a power point to link the progression points in Mathematics to these resources. “Packaging the resources for the teachers is important,” Peter explained: “modelling how to use these resources in the classroom to enhance mathematics is an important step, together with encouraging teachers to work together by sharing lessons and discussing pedagogy at the PLT meetings. It has given them confidence and they become enthusiastic in presenting them.” Aligning himself with the principals and working with them to develop a whole school approach, Peter acquired the cooperation of all staff.

Feeling supported by Peter’s ability to discuss issues in teaching and learning, and impressed by his attitude to evidence-based teaching involving innovative teaching activities which she now uses to close the gaps in student understanding, a teacher commented that, “He makes it so practical, I feel like I am learning for the future.” She in turn has been able to pass on all of the resources via the principal to the teachers in the classes below grade 6, thus enabling whole-school participation in this new Initiative.

**Theme 3: Student Achievement Data**

Carmel began by conducting all MOL (early childhood) interviews herself as the teachers hadn’t used the interview protocol before. She showed each teacher how to do the interview and they did 1-2 of their students themselves. The coach collated the data and analysed it with the Admin team to determine common gaps in student skills, then organised for the teachers to present their data to the whole staff and share their understandings about its value and what it means for their teaching. The coached teachers showed others how to analyse data and use it to ‘drive their teaching’. (Previously teachers had collected data as directed but made no use of it). This was seen as a very successful and empowering session. One teacher said that having the coach ‘makes me think carefully about what we do for these kids’.

By engaging in curriculum planning based on data, Carmel has helped teachers to group students with like needs. She has stressed the Number Dimension and making sure the students get the basics before moving them on. One teacher mentioned this was good for him because prior to this he had been doing a ‘scattering all over the place’ in order to try to cover everything. Another teacher mentioned that while the data showed some progress had been made in some areas, in certain areas ‘a significant number of students had shown no improvement’. He added that the way he will use the data now means that he will be better able to target those areas. ‘Anecdotally students are having fun with Mathematics,’ explained Carmel, ‘while we are filling in the gaps in their knowledge. We have added numeracy checklists in their home ready record (diary) - recall/revision/practice. Students have readily taken it up.’

In another school where Carmel coaches, the teachers were pleased to find their students are doing well against the standards and realise they have been too harsh in their teacher judgments. “The data indicates that many students are above the level for their age. We are pumping up high expectations and we are not giving any negative vibes. The students are well nurtured and there is an expectation of learning. We are value-adding to a culture that is already rich”. Using data to improve teaching has resulted in much more targeted teaching, with the results showing in some of the students work. “Some
students have moved up 5 levels, which is a result of being able to identify their needs in maths so accurately from the data we got from this project” says Carmel.

**Theme 4: Teacher Leads the Process**

Through the course of lots of conversations, Jenny was able to support teachers to set their own agenda and pace. She helped them to choose the improvements that most suited them, then showed them how to set specific goals and then how to select strategies to enact them. Because she believes that “You can’t make change suddenly,” she coaches teachers to think things through and envisage other possibilities so that changes that happen are ones with which teachers agree. The flow-on effect has been that teachers are starting to think and discuss, “Do we really want this…no, we can do better,” and a notable effect of this has been a decision by the teachers in one school to eliminate streaming students into elite classes, replacing them with multi-ability classes.

Jenny’s strength is in her ability to individualise support, working with teachers to identify the particular areas in which they feel they need it. Specific examples of this include, for example, showing primary school teachers how to use MAB blocks rather than worksheets throughout early years of school; analysing the effectiveness of new strategies such as this and then identifying ways of transferring their new learning to other areas. In a high school she inspired teachers to want to replace the maths textbook with projects and explorations. One of the teachers analysed their maths textbook to identify repetitive aspects of the curriculum, and then replaced those sections with explorations, thus reducing student boredom.

The teachers responded very well to Jenny’s coaching, perhaps in part because of her ability to differentiate between inexperienced, developing and experienced teachers and thus set the appropriate agenda and pace for each individual teacher, recognising they all have different needs. She feels this shows in the results: “The SNMY results were excellent”.

**Theme 6: Planning**

Esra’s aim was to build teachers’ confidence through planning. She found teachers needed help with planning the lesson focus; planning how and when to integrate resources; planning a mix of individual, group and whole class activities; planning for questions they would ask students; and with using assessment data and VELS to drive planning.

Together, she and the teachers developed goals for their teaching which included increasing student engagement, alternatives to text books and work sheets, and the introduction of group work. She said she “improved one teacher’s ability to plan by deciding together what student outcomes he wanted at the end of the lesson, and then I related these to VELS so that he could see that VELS could be a guide to his planning. This resulted in more structured lessons, and he could then plan for his next goal, which was learning to ask more effective questions”. Esra helped another teacher to plan ways in which she could use manipulatives instead of worksheets in her lessons, and to work on how assessment could inform learning. She used a differentiated planner with all her teachers, planning for three groups in each lesson, and reminding them that it doesn’t matter who is in each group, what is important is that the teacher offers different activities for different abilities and different levels of interest. This includes providing open-ended tasks, especially for the students who are achieving highly.

The coach found that she needed to plan with these teachers and then model some lessons with their classes to show them how planning could improve their teaching. The teachers’ planning skills developed, and changes were noticed in their classrooms. Esra said “The higher achievers were difficult before, but are now engaged. The tasks are more open-ended and more challenging. The students are more responsive, generally more behaved, and seem to enjoy maths more”.

**Theme 7: Reflection**

Conrad focused on reflective practice in his coaching – how to set goals, how to choose the best improvements and enact them … and did this through lots of conversations, which he found were very productive.
Questioning is an important part of reflection. In Conrad's schools, questioning has improved as a result of the coach counting and categorizing the questions used in class, then reflecting on how to incorporate more and a variety of questions. He says “The students know they are accountable for learning as the teacher uses questions to probe their understanding: ‘how did you do that, which is the best strategy, what do you know now you did not know before’. Students come prepared to share at share time”. Conrad has seen a big improvement in the teachers’ practice and in the students’ results.

Reflection also involves the coach having conversations with teachers to explore their goals. One teacher wanted to focus on students equitably, set that as a goal and has improved in attending to all students. With another teacher, planning was non-existent, and so the coach encouraged conversations around the uses and benefits of planning, and then helped the teacher plan units of work. Conrad is currently working with another on conversations around the purpose of assessment as learning, focusing on the metacognitive aspects. “I would say the biggest change agent has been the conversations; being available and ready to have them when the teachers want them”, said Conrad. “That has been the most effective part of coaching for me, and in my school I have seen astonishing rises in the student achievement data. I attribute it to the teachers becoming much more aware of their teaching by reflecting deeply about it in a non-threatening, supportive environment”.

Conclusion
At the conclusion of this preliminary stage of the analysis, we have identified eight factors that coaches, teachers and principals believe contribute to best practice in mathematics coaching. These are relationships; resources; student achievement data; teacher leads the process, feedback; planning; reflection and classroom organisation/management.

These factors appear to be most likely to contribute towards the aims of this project at this stage of the study. Coaches will focus on these factors during the 2009 phase of the project, which will be further evaluated. Some currently discarded factors may in fact emerge as important as coaches become more established and experienced in the second year of the project. We expect, as the project continues, to broaden and change the definition of best practice.

References


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