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Time to make a difference: Using action research to foster student engagement

Christopher Hickey

Abstract

This paper reports on a project, funded by the Victorian Department of Education and Training (Australia), undertaken to explore the capacity for teachers to develop innovative teaching and learning strategies aimed at improving the educational experiences of students in the middle years. Central to this charter was the need for local schools to form Clusters, share ideas and develop strategies designed to improve student engagement and connection. In forming the Buxton (pseudonym) Cluster, four schools came together to declare their shared interest in improving student connection through the teaching and learning of mathematics. The 22 teachers involved in the project shared a broad concern that the traditional pedagogies built up around the maths discipline were contributing to the wider level of student disconnection observed in the middle years. In thinking about change, the group were attracted to constructivist approaches to pedagogy in which learning opportunities and tasks are varied sufficiently to appeal to the various learning styles and aptitudes of learners. Favouring an action research framework, teachers involved in the project embarked on the implementation of pedagogic reforms aimed at improving levels of student engagement.

INTRODUCTION

This paper reports on how a group of teachers came together to design and implement educational innovations aimed at enhancing student engagement in the middle years. Drawing on an action research framework, the paper will look at the change process, and the sorts of tensions, enablers and blockers, that accompanied teachers’ attempts to implement innovative practice in the teaching and learning of mathematics. An important dimension of this project was that teachers were at the centre of the practices and processes involved in designing and delivering classroom innovation. Unlike many other approaches to educational innovation, this one was to be lead from the bottom-up rather than the top-down. Indeed, there is a long history of teacher resistance and resentment toward them having to play a functional role in educational change determined and driven by others (Fullan, 2000). Such attempts are typically framed within various forms of expertise that study, comment on, and provide guides to how teachers should perform their work. These forms of expertise are constantly involved in defining ‘best practice’, such as, how to organise and deliver curriculum, how to manage student behaviour and how to engage learners (Kelly, Hickey & Tinning, 2001). Recognising the limitations of top-down innovation, the goal of this project was to shift the locus of control to those who would ultimately be charged with the implementation of educational innovation, namely, teachers.

There is considerable literature that chronicles the problematic nature of trying to invoke change in schools. From that which has gone before us we know that there exist a great many (covert and overt) forms of resistance to educational change (Cazden, 1988; Fullan, 1999). While there is considerable evidence of change and adaptation in schools, much of this is little more than surface change. Whereas, it is widely accepted that ‘real or deep change’ is a very complex and difficult undertaking (Sparkes, 1990; Fullan, 2000). In contemplating the conditions that support the sort of change that requires teachers and/or learners to think and act in ways that are unfamiliar to them we need to be mindful that resistance comes in many forms. Foremost here is that many aspects of schooling are deeply traditional and therefore rooted in assumptions and practices that are not readily open to rational reconstruction (Fay, 1987). Compounding this, teachers (and learners) are embedded and embodied creatures for whom the terms for change are not always conducive.

Conscious of the limits to educational change, this paper will describe the interactions that took place during the implementation of four (related) innovations across a seven-month period. Drawing on an action research framework, the teachers that agreed to participate in the project were involved in all aspects of designing, implementing and evaluating their educational innovations (McTaggart, 1997). One of the design features of the project was the demand that schools form into Clusters to design and initiate educational reform. There were conditions around the formation of Clusters, one of which required secondary and primary schools to work together. The Buxton Cluster (pseudonym) was formed around Taylors Secondary College, Green Park Primary School, Oldshire Primary School and Feelwell Primary School (all pseudonyms). The project team consisted of twenty-two teachers comprising members of each of these schools.

The project came about as the direct result of initiative undertaken by the Victorian Department of Education and Training (Australia). Situated within a suite of innovations around the Middle Years education, the broad brief of the project was to explore innovative ways of improving the educational experiences of students in the middle years. Identifying students between years 5-9, the middle years initiatives, such as this one, are directed at what are widely recognised to be among the most difficult sets of the education spectrum, the problem of middle years is seen to exist ostensibly in the first three years of secondary schooling. It is in these years that teachers seem to be working the hardest to connect and assert direction and influence over learners (Guglielmi & Tatrow, 1998). This corresponds with a stage of development where expressions of antisocial behaviour and risk-taking are often badges of honour that bring status and kudos among one’s peers (Hickey & Fitzclarene, 2000; Martino, 1999). By extending the focus down to year 5 (to include the top two years of the primary schooling) the scope of this project deliberately stretched the focus to include the lead up to adolescence. In so doing, they also included student transition between the primary and secondary sectors, and by association the teachers that facilitate it.

With agreement about the need to develop innovations that were practical and achievable, the 22 teachers involved in the project, selected mathematics as a particular
area of the curriculum where many students tended to disengage. They agreed that their current teaching practices in the delivery of mathematics were not particularly innovative and that student engagement was managed through regulation rather than motivation. The teachers shared concerns that the pedagogies built up around this discipline were part of the problem of learner disconnection in the middle years. They chose to explore improved ways of capturing learner interest in mathematics and to investigate student engagement against learning outcomes. Indeed, the tensions around the project related to the balance between engagement and learning outcomes.

Though only a partial response to a much wider problem, they determined that such developments would contribute to students feeling more enthusiastic about their schooling. Importantly, the teachers were able to proceed in the design and delivery of their classroom innovations knowing they had the full support of their school Principals and colleagues. As well as this, the project offered more tangible forms of support in the form of time release and professional development. All of which become significant factors in the change process. Time release would be used to allow for Cluster forums, wherein the teachers would come together to share their planning and practice, as well as opportunities for staff at each school to plan independently. In the Cluster forums teachers shared insights into what they were doing, why they were doing it and how they felt it was going. Professional development, targeted toward the advance of constructivist learning strategies, was offered to all of the teachers involved in the project.

As a researcher, and author of this narrative, I am provoked to let the data speak. Using the undistorted voices of participants, I seek to give authenticity to the views and interpretations expressed by the teachers throughout the project. Emperically, the primary sources of data were compiled through semi-structured interviews, journal writing, work samples, field notes and observations. During the course of the project a cross-section of ten of the participating teachers were interviewed twice, as were a total of 18 students from across the four schools. As an intensely qualitative research process, wherein reality is framed by the experiences and perceptions of participants, frustrations and failures were as important as successes and triumphs. From a research perspective I was as interested in the processes of locally produced educational innovation, as well as its products. Further to this, I was interested in the interactions of the group and their capacity for effective exchange across their discrete educational sites, and sectors. Prominent here was the extent to which teachers who operate in different educational sectors are able to establish meaningful professional connections in the pursuit of improving the educational experiences of students in the middle years of schooling. It is against this backdrop that I have produced the research narrative.

**Innovations in teaching**

Though situated as part of a collective response to the problem of student disengagement in the middle years, the four school projects were quite different. In this section I will provide a necessarily brief account of the innovations undertaken at each school. In what follows I provide an outline of how each school, or group of teachers, managed the local and collective elements of the project. In the nomenclature that follows each quote, PS stands for primary school, SS stands for secondary school, T stands for teacher and S stands for student. For example SS-T, signals that the comment was made by a secondary school teacher, whereas PS-S signals that the comment was made by a primary school student. The following narratives represent the case study data collected through the action research.

**Self-paced, self-directed learning**

The group of three teachers at *Green Park PS* were keen to try an approach to mathematics that provided students with more choice and independence as a way of increasing their participation and learning in this discipline area. In thinking about change, they were keen to alter their students' general level of involvement and enthusiasm in maths classes. As a teaching team they were committed to developing learners that were independent and resourceful so that they would be better prepared for a successful transition into the secondary sector.

"It's disappointing for lots of families when they see their children leave primary school and then they see the systems that they go into in Secondary school. The culture of the two learning environments is so different. Lots of kids get lost in it or just drop away in their performance. We try to get our kids ready for it." (PS-T)

The teachers were attuned to the realisation that as adolescents their students would have access to a veritable cacophony of information and resources, some of which would be useful and some potentially destructive. They recognised that in an information age, the capacity to make independent and informed decisions was crucial in minimising risk and making good life choices. In many ways, mathematics presented as a good medium for encouraging rational thinking skills associated with sorting, analysing and connecting particular decisions with particular outcomes.

"We do a lot of interactive group work with the kids, something where they can have a go by themselves, the old 1,3,5; where first you do it on your own, then with a group of three, then share your responses with others. We try and vary the activities that we do and how we try to develop co-operation and interaction. Get them to present, draw things up in groups, role play and all sorts of stuff like that." (PS-T)

The Green Park team drew on elements of constructivist learning strategies to introduce an activity grid in which students had to draw on different modes of thought and action to solve problems. Inherent in this was an increased demand on them to make decisions about what they would achieve during maths classes. Focussing on the development of numeracy skills and knowledge around measurement, the activity grid contained a range of tasks for students to choose from. Furthering the skills of memory, interpretation, application, analysis, evaluation and creativity, the activities presented on the activity grid were graded in terms of their difficulty. In selecting appropriate activities students were reminded that they had only four weeks to achieve their outcome. Students were cautioned that tasks such as, 'create a ball that, by itself, can measure the distance it travels. Demonstrate your invention', would be both demanding and time consuming. In consultation with their respective teachers, each student was responsible for setting a workload that was manageable and achievable. Once this was done the students simply went about their activities, accessing support as they required it.

The project was reported as a resounding success. The teachers and students involved gave ringing endorsement to the increased levels of enthusiasm and engagement...
that occurred as a direct result of the activity grid. From the teachers' perspectives, the activity grid worked to de-emphasise their authority and control over the learning environment. Pedagogically, this facilitated a shift from teacher-as-inculcator to teacher-as-facilitator. By placing the students in charge of their own program and progress the teachers noticed a demonstrable increase in their levels of motivation toward mathematics. While adhering to established classroom rules, students were free to move around the learning environment in pursuit of their activity tasks. This simultaneously freed the teachers up to move around the class and assist students as they worked on their tasks. Further to this, the students were encouraged to access support from a wide range of resources, other than their teacher, in the interest of progressing their projects. This gave rise to students sharing ideas with each other, seeking advice from parents, accessing information via books and the internet and so on.

“..."I think it worked really well for everybody. I didn't have anyone who didn’t achieve what they had set out to do. The twist was that all the children because they could take the task as far as they wanted to. Even the kids who don’t perceive they can do maths, they were on a par with everyone else". (PS-T)

"There was a lot of language developed and I really liked the self-esteem and confidence benefits. Students working with each other sharing ideas, being prepared to say, ‘I’ve got this half done and it’s not going to work’, and accepting other people’s advice. The interaction between the children and their appreciation of others efforts was fantastic. And just their keenness’. (PS-T)

In many ways it was the learning processes, rather than outcomes, that teachers felt most satisfied about. The sharing of ideas, problem solving and general level of student independence and resourcefulness were clearly the highlights of the innovation. In the process of developing their knowledge and skills in numeracy, the students were forced to draw on an array of personal and interpersonal skills. While many of these skills were drawn on in other curriculum areas, they had not been systematically recruited to the maths area. Even students who were notoriously weak in computational demands of mathematics showed a high level of enthusiasm toward participating in maths classes. In assessing the overall success of the innovation, it was the increased level enthusiasm towards maths that really stood out to teachers. Propelled by enthusiasm, students engaged with mathematics in ways that they had previously not done so.

"...I had my grade six boys come in 10 minutes before the bell and say ‘we thought we’d start our maths. We never had that happen before. By the time the cricketers had come in the others were on their way too. I think they just loved the process of choosing what they could do and just doing it. If they finished something else in class, they'd say, ‘I can do some maths now’". (PS-T)

For their part, the students embraced the learning opportunities that were presented to them within the innovation. Foremost here was their enthusiasm for having greater control over what they did in their maths classes. Provoked by a general apathy towards some of the routine pedagogic practices they experienced in their maths classes, they articulated a sense of newness and excitement within the implementation of the activity grid. Students who were generally not inclined toward mathematics revealed an increased sense of commitment to their learning, while those who were generally considered strong at mathematics also enjoyed the freedom to extend and expand their learning. Such was their overall level of enthusiasm for the learning opportunities provided within the activity grid that the students chose to showcase their work across the wider school community.

"It was fun. I liked the way we got to choose different activities and have some harder than others and I liked doing all the research and figuring things out". (PS-S)

"I like it better cause we can choose what we get to do. And you can go on at your own pace so if you’ve finished one thing you don’t have to wait around for new instructions, you can just go onto the next. I worked with a friend, just in case I need help. Some of her choices were a bit different but we could still help each other out". (PS-S)

While celebrating the overall success of the innovation there are a number of issues that demand further consideration. While the teachers had assessed that student’s gained a great deal from having greater control of their learning, they simultaneously felt some degree of compromise in their own capacity to guide effective learning. With students working on different topics and at different rates it became inappropriate for teachers to provide collective and systematic direction. To be true to the student-centred intentions of the innovation, the teachers were forced to merely respond to the individualised needs of students. Pedagogically, this caused them a lot of repetition and a sense that they were very inefficient. In the process of trying to respond to the individual needs of the students the teachers also experienced a general lack of control over who was learning what. Although the students were clearly enthusiastic about the tasks, the decentralising of the teaching clearly conjured some concerns about precisely what mathematical competencies were being consolidated. Importantly, none of the students expressed any concern that the student-centred model had diluted their capacity to learn mathematically.

Learning through Rich Tasks

The three classroom teachers responsible for delivering innovation at Oldshire PS shared an educational commitment to fostering independent and resourceful learners. Focussing on skills and processes rather than content knowledge the Oldshire team sought to create an environment in which learning was experienced as an enjoyable and meaningful activity. The teachers believed that the more active the students were in all phases of the learning cycle, the more meaningful their engagement would be. In leading their own learning students were encouraged to build meaningful links within their learning community. The opportunity to be involved in the project presented the teachers with the resources and impetus to explore the application of different learning practices and procedures in the area of mathematics.

"Children can lead their own learning. It just involves skilling them up to be independent and chose their own tasks. We get them to manage their own time, access different resources, build up community links, work in groups and teams and generally develop the skills to question and research things". (PS-T)

In keeping with the wider learning approaches they had established within their upper school program, the teachers at Oldshire developed a maths innovation around the
application of a rich task. Here, the students were presented with the task of developing a scaled model of their school. To achieve this end in a reasonable timeframe, students were expected to develop a plan of progress and identify the sorts of resources they could use to develop such a model. The students were not restricted in their choice of medium in which to present their model. In fact, once the task had been described and discussed the learning that took place would ostensibly be driven by the decisions the students made. While there was an obvious start and finish, the journey between these two points was pretty much in the hands of the students. It is fair to say that although the teachers were generally excited about the innovation, there was a degree of uncertainty as to whether it would work in mathematics. Central to this was some concern that, although the teachers were generally excited about the innovation, there was a degree of uncertainty as to whether it would work in mathematics. Central to this was some nervousness about the extent to which they would be able to monitor and account for the mathematical learning developed during the life of the task. To this end, the teachers were less concerned about the capacity of the task to capture the students’ interest than they were about the progression of mathematical competencies through its implementation.

Although all teachers conceded that the task they set the students had proved more difficult than anticipated, they viewed it as a valuable learning process for both themselves and the children. Employing a rich task approach to mathematics meant introducing and accepting a level of ambiguity that had not had previously existed in their maths program or pedagogy. Indeed, within the unstructured format they constructed around their rich task, both the teachers and students were forced to embrace a whole new set of assumptions about how effective teachers and learners should operate in mathematics classes. Rather than pre-empt what sort of assistance students would need to function effectively within the rich task context, the teachers chose to deal with such concerns as they emerged. To do otherwise would have compromised one of their core project goals from the start. Though the temptation to embed more structure within the program was both attractive and intuitive it was contradictory to the pursuit of independent learning.

“We haven’t done this in maths before. We have given them isolated opportunities in the past but this is a big ongoing project. I’m sure they’ll get lost at the start. They’ll need a lot of guidance but as we go they will get used to it”. (PS-T)

The fact that none of the children were able to complete the task was disappointing for their mathematical development. However, the project had exposed learning outcomes that it visibly didn’t deliver on. From this perspective, the teachers viewed the project as somewhat of a failure. However, the teachers did not view all aspects of the project as unsuccessful. Indeed, they were united in their belief that the students had demonstrated their capacity to work independently and effectively in a rich task context. Of note here was the teachers’ satisfaction with the way students had been able to organise themselves and manage their work. It was by no means the students’ fault that they were unable to successfully produce a scaled model of the school. While the teachers acknowledged that the task itself proved bigger than initially thought it would be, there were a number contributing factors to the slower than anticipated rate of progress. Bad weather and a severe outbreak of the flu made getting outside very difficult. Even the most organised projects can fall foul of factors out of the hands of their designers and implementers.

“If we had good weather and could get out there everyday to measure and be doing our calculations, I think it would have been quite successful. Our negative perception comes from the fact that we couldn’t get out each day and it became disjointed and lost continuity, and so the kids lost meaning. You had to do it everyday”. (PS-T)

In their reflections on the project the teachers revealed a sense that it had confirmed that they were on the right track and that the initiative was well worth exploring further. Obviously, there was lots of room for refinement but their most fundamental uncertainties about whether the rich task approach could work in the context of mathematics were assuaged. One of the groups they had anticipated as being potentially resistant of the changes was the parents. Conscious that parent voice was an increasingly powerful force within the competitive academic curriculum, the teachers were mindful of the need to present their proposals for change within an educational framework that was developmental.

“We pretty much had the support of the whole school community. With our other areas parents were initially anxious and apprehensive, and didn’t understand why we were doing it. They couldn’t see all of the benefits that we thought would flow from a different approach. So we had to hold parent forums to explain what we were doing and outline our philosophies and aims. This project just fell in behind pretty easily”. (PS-T)

Parent support for the project was probably a corollary of the overwhelming satisfaction that the students revealed toward their involvement. Despite not actually finishing their models, the students demonstrated a great deal of enthusiasm towards the nature of their involvement. Among the range of comments made by students was a resounding affirmation of the level of independence that the approach afforded them. Within the rich task context, they were able to experience the development of mathematical competencies in ways not previously availed to them.

“It was heaps funner. It’s just more creative and it sort of hides the maths part of it. So you doing something creative but you’re doing maths at the same time. You do it and it doesn’t feel like you’re doing maths”. (PS-S)

Open-ended questioning

The four staff members that worked in the upper school section of the Feelwell Primary School worked as a team. Together they would plan and implement the sequential learning experiences that would be presented to students across grades five and six. On accepting the invitation to be involved in the project it was a relatively straightforward process for them to get together for planning. The project focus on numeracy was welcomed among the group. Several members had particular interests in the development of numeracy in the school curriculum and had undertaken specific training toward this end. That said, there was a sense among the group, that although they had established a high quality numeracy program at Feelwell, there was always room for improvement. Rather than focus on altering what they taught in numeracy classes, the group decided to focus on the way they taught. Underpinning this was a shared commitment to altering the pedagogic positioning of the learner towards playing a more active role in the generation and development of numeracy competencies. Rooted in constructivist methodology, the innovation at Feelwell demanded that teachers provide learning opportunities that would
allow students to work at different rates and levels according to their aptitude and interest.

"This group were so used to a right or wrong answer and worried about getting it wrong. They really struggled at first at just having a go. They've had years of doing it one way and here I am giving them textas and saying 'write what you think'. It takes time to shift their attention from the product to the process". (PS-T)

The teachers decided to use open-ended questioning as the pedagogic strategy through which to advance their shared commitment to expanding the learning opportunities for students in mathematics. The key attraction to an open-ended questioning approach was its capacity to place the students at the centre of their own learning. In the spirit of problem-based learning, the open-ended question would invite students to apply and with other members of the class.

By and large, the teachers viewed the innovation as a resounding success. They agreed approach had provided them with an opportunity to explore student learning from a broadened set of learning outcomes. They agreed that an open-ended questioning different vantage point. Numerous comments were made about how capably and and maintain a rich learning environment around good open-ended questions within learning from each other. The major difficulties experienced by staff involved their own, student levels of engagement was of a very high standard. Indeed, the teachers were overwhelmingly in their endorsement of the value of an open-ended questioning approach. They generally saw it as a method that gave maths more meaning. The students

"I'd put it on the board, we'd talk about it and the vocabulary. Once we knew what the question was asking we'd share our interpretations in small groups and later with the whole grade. The students would take some time to ponder, pool their ideas and develop strategies how to solve the problem. At the end of the lesson we'd always get someone out to show us how they'd solved it, just to share their strategy". (PS-T)

By and large, the teachers viewed the innovation as a resounding success. They agreed that being involved in the project had given them the impetus to reflect on their teaching practice and to contemplate the effectiveness of their respective maths programs against a broadened set of learning outcomes. They agreed that an open-ended questioning approach had provided them with an opportunity to explore student learning from a different vantage point. Numerous comments were made about how capably and resourcefully the students had embraced the challenge to work in more undirected ways. All teachers commented on how well the students had worked together and accepted learning from each other. The major difficulties experienced by staff involved their own, rather than the learners, incapacities. Foremost here was the lack of ability to establish and maintain a rich learning environment around good open-ended questions within appropriate group practices. When they got this combination right they all agreed that the student levels of engagement was of a very high standard. Indeed, the teachers were overwhelmed in their endorsement of the value of an open-ended questioning approach in mathematics in the interest of improving student engagement and enthusiasm.

"I've learnt so much from my kids about the way that they think which has helped me to teach more effectively and to assess how effective my teaching has been. What this project has done has made me realise why we should be teaching like this. It's opened my eyes us to how kids can think - it blew me away". (PS-T)

For their part, the students responded well to their role within an open-ended questioning approach. They generally saw it as a method that gave maths more meaning. The students broadly felt that learning in maths was more interesting when it was simulated within a real life context.

"I liked it best when we were doing things hands on, working them out as in real life situations rather than just copying out the sums. I learn it better when its real". (PS-S)

Further to this, the students embraced the opportunities that open-ended questioning presented for them to work with their peers. Rather than describe this as inherently more fun, their enthusiasm for group work was propelled by the sense of autonomy it provided them. That is, the autonomy to both teach each other and learn from each other.

"There are some people who aren't as good as maths so we just put them with someone who is pretty good. They could explain it to them and help them understand. Its good to help others work things out, sometimes they give you a different answer and helps you too". (PS-S)

**Teaching for understanding**

"Maths is interesting because the kids are pretty much conditioned just to do what you give them. That's actually what's wrong with it! You can give them stuff and they'll do it and look busy but I don't think they're really learning it". (SS-T)

The staff in the junior maths program at Taylors Secondary College (TSC) were more numerous but less integrated than their primary counterparts. Though they were a formally constituted 'teaching team', their collective identity was not very strong. The problem was not that they didn't get on or share common educational issues and concerns, but that they were too dispersed to give much to such forums. All of these teachers were members of other teaching teams within the wider school program. Together with their homeroom and extra curriculum activities, these teachers could teach more than 150 different students in any given week. It was under these circumstances that the members of the junior maths team were brought together to discuss their involvement in designing and implementing some sort of change to the way they thought about and implemented their junior maths program.

"I must confess, when I was first asked to be part of the project I was really sceptical. I thought it would probably be a total waste of time. Things like this come and go from time to time but nothing really comes of them. You just don't have time to waste on things that are not going to work in schools". (SS-T)

With little more than the promise of support and good will they agreed to take up the challenge which would mean having to meet on a regular basis. It was determined that every Monday lunchtime, pending the swapping of a few yard duties, they would meet to discuss and plan their innovation. It was during one of the early meetings that the idea of 'teaching for understanding' was raised. Following the lead of the junior science program they decided that they would attempt to teach mathematical skills and competencies using a thematic approach. This involved presenting mathematical concepts and skills within a thematic context, within which their computations would have meaning and relevance, rather than as abstract processes.

"Last year I had Y8 maths and I tried very hard to make the activities seem relevant to them. At the start it was very textbook maths so I tried to come up with other stuff. Like we were
After piloting some activities in which they sought to integrate maths with a Year 7 trip to the zoo, the group set about trying to teach mathematics within the theme of Space. In the normal sequence of the junior maths curriculum students would have been learning decimals and fractions. Rather than completely purge this sequence, the maths team determined that they would develop these concepts through the Space theme. To this end, the project was developed as a hybrid between the traditional and thematic programs.

Rather than develop a Space narrative through which to progress and develop a range of maths knowledges and competencies, they sought to give meaning to the computational exercises they wanted the students to undertake by using Space as a narrative. Working with the planets, namely their distances, sizes and environments, students were asked to compare, order, estimate, add, subtract and generally make sense of fractions and decimals. On many occasions this reportedly worked really well. Activities that required them to interpret gravitational forces on different planets so as to calculate how high they would be able to jump, or work out their living requirements if they were to travel to particular galactic destinations, were generally well received by teachers and learners. Unfortunately, the development of such activities took time and in the day-to-day cut and thrust of teaching this time was often difficult to find. When it happened that no-one had time to develop new activities, or when teachers completed an activity ahead of their colleagues, most of them simply reverted to their traditional text book program. The only thing that bound the two extremes was their interest in fractions and decimals.

"I still feel like it would be better if there were clearer aims or goals rather than say lets do a theme like space. Space became the theme and we worked to fit the theme into the maths, rather than the other way around". (SS-T)

There were mixed opinions as to whether the innovation was successful among team members who had differing views about what had been achieved and what had not. Among the positives was a broad recognition that it had brought them closer together and provoked them into an ongoing conversation about effective teaching and learning in mathematics. They all agreed that such conversations are a rarity amongst teachers, due to the time constraints associated with getting groups of teachers together. Further to this, some members of the junior maths team were regular attendees at the Cluster group gatherings that sought to bring together the participating teachers from all four schools. Unfortunately, a number of the members of the secondary team were unable or unwilling to avail themselves to these gatherings. For some, getting release from their teaching duties in the senior school was more difficult than its perceived worth.

Unlike their primary school counterparts, the junior maths teaching team at TSC appeared less homogeneous in their educational philosophies and practices. Compounded by the structural divisions that mitigated to disperse their collective energy, the processes of change were considerably more difficult to orchestrate and implement in this environment. Against this backdrop their intention to change the maths program was ambitious. Effective maths pedagogy has long been understood within an expert to novice relationship. Part of taking up a thematic approach involved a destabilising of some fundamental pedagogic assumptions held among the team. Rather than controlling and sequencing the learning environment, employing a thematic approach encouraged the teachers to allow students more room to explore and experiment with different learning strategies and interests.

It became evident through the process that the grip of known and familiar is clearly a powerful one. Not long into the innovation a number of teachers expressed concerns about the capacity for the thematic approach to deliver clear and coherent maths outcomes. The issue of developmental sequencing was most pronounced against the backdrop of assessment. Given the highly measurable nature of the subject matter, there was a strong sense that a good maths program could be identified through demonstrable learning outcomes. That is, if you want to know whether students have understood decimals or fractions you test them. To the extent that any particular subject matter knowledge can be quantified, maths is at the top of the pile. The prevailing logic toward maths programs is that when it comes to computational know-how, students are either right or wrong. The uptake of any program that is not clearly able to demonstrate how it would advance, or at least maintain, student progress in this way, is destined to be problematic.

"The hardest thing is the people that have these traditional ideas about learning, and can't get past them. They call it 'academic rigour' and they think that unless you're doing textbook work then you're not being rigorous. Getting a supportive team together to do anything different is really difficult". (SS-T)

"Whenever it gets down to assessment it always falls back to traditional forms of assessment and they (teachers) just don't seem to be able to break away and no matter how much you plan and try. It's incredibly strin-g - traditional teaching in maths". (SS-T)

Despite reservations about the approach, there were some in the group who clearly felt that the innovation had been successful. Foremost here was their sense that the thematic approach underpinned a pedagogic shift that allowed learners greater flexibility to work at their own pace and at different levels. For those of lesser mathematical aptitudes this relieved them of the stress of keeping up with the group. It did not mean that they didn't have to work as hard, but rather that they could progress at a more natural rate.

"I thought it suited my high achievers because there were times there that they were really able to do some work that was well beyond what they would have got in the Year 7 textbook. On the other side are the kids that struggle a bit, there were activities for them to do too. The activity goes where the ability allows, there was always something for them to do". (SS-T)

The following student perspective gives support to any approach that is able to accommodate the individual learning needs. In revealing her overall disappointment with the maths program at TSC, this student clearly reveals her frustration at the lack of challenge and extension that exists within the Year 7 program. As was expressed by a number of other students, she had anticipated that the secondary school maths program would have been more challenging than it was. It was not clear from the student interviews whether there was any discernable improvement in their learning experiences within the thematic approach.
forms of development are trivialised in comparison. Indeed, there is a very narrow set of
discourses that determine what is and isn't appropriate in the area of mathematics. The
ultimate measure of this is not how happy students are, but whether or not they can
achieve the right answer and under a bad one they won't. In seeking to unsettle this
demonstrate competency.
Given the sophisticated and established regime of testing and sorting that exists around
discourses that determine what is and isn't appropriate in the area of mathematics. The
improving or rejuvenating existing practice. Given that we already know that the carriage
of 'real' change is difficult, it is extremely important to better understand the conditions
that are most likely to nurture its progress. The fact that each of the innovations presented
here was undertaken by real teachers and students in real settings, it is reasonable to
assert that their experiences provide real insights into the carriage of change. At a macro
level the innovations contribute to a growing research literature around issues of
connection and engagement in middle years schooling, while at a local level they reveal
the contextual and contingent needs and expectations of teachers and learners. Within the
dual interests of, connecting with wider debates about best practices in middle schooling
and advancing local practice, there are a number of important insights that emerge from
this project. Among these are; (i) a better understanding of the conditions that enable
educational change, (ii) a shared recognition of the generic attributes of a more engaging
pedagogy for middle years schooling, and (iii) the need to establish clear criteria, rooted
in student experiences, around which the effects of a more engaging pedagogy might be
measured and reported.
A central element to the success with which the project was able to bring four
groups of teachers together to establish a shared commitment to change involved the
allocation of time. There was a unanimous sense that time was the biggest enemy of
change.

Implications
The implications of this work are potentially far reaching. At the local level, the changes
undertaken across the four sites reveal the potential for teachers to lead the way in

"I expected it to be more of a challenge. I expected it to be very different. At primary school
we used to do heaps and heaps of maths. Year 7 is a breeze. It's not the way we're treated but
this stuff is just way too easy, because we already learnt it! I find we cover things and some
people still don't get it so we cover them again and again. The people who are slower get
more help than the people who know it". (SS-S)

Given the sophisticated and established regime of testing and sorting that exists around
the development of student competencies in mathematics, it is not surprising that other
forms of development are trivialised in comparison. Indeed, there is a very narrow set of
discourses that determine what is and isn't appropriate in the area of mathematics. The
ultimate measure of this is not how happy students are, but whether or not they can
demonstrate competency. Put pedagogically, under a good maths teacher, students will
achieve the right answer and under a bad one they won't. In seeking to unsettle this
relationship, by proffering a more contextual and interactive learning methodology, the
teachers were espousing a broader set of learning outcomes that were otherwise
understood. It is important to note that a number of the staff did not interpret a
broadening of the learning opportunities as a compromise of learning outcomes. Rather,
there were a number of staff members who genuinely believed that the learning of the
discipline would ultimately be advanced through such an approach. The problem with
arguing for learning contextually verses learning sequentially is that the established test
regime is geared for the latter. Precisely what mathematical knowledge is learnt within a
unit that asks numerical and computational questions about Space is far less certain than
one that focuses on fractions and decimals.

"Its hard to measure quantifiably it’s more of a feel, you’ve got to look at how the kids got
engaged or didn't get engaged and whether they’re pleased to be doing their maths or are you
constantly fighting with them to do their maths. I just think they’re a bit more interested,
that’s all. And they’re talking about it". (SS-T)

Despite its various shortcomings and impediments there was a strong sense that the group
at TSC were eager to continue their pursuit of change. The impetus for continuing
seemed to be in the potential for their innovation to provoke change rather than on the
back of the results achieved in this foray. Indeed, there was a sense that the results of
their current efforts did not accurately reflect the gains that had been made. When taking
into account where they had started from and looking at what they had achieved in such a
short time, and against a range of forces that actively militate against change, the group
felt that there was just reason for optimism. When looked on as a start point, rather than
as some sort of completion, staff felt that their work was going in the right direction.
While they were aware that there would be new obstacles and challenges ahead, they
were generally enthusiastic toward further opportunities to build on the work they had
already done.

"I think we should continue because its only going to get better. We can’t expect to reinvent
the wheel in a short time. We’ve learnt a lot and next year it will be hopefully better again".
(SS-T)

Contrary to common sense understandings of educational innovation, the infusion of
(external) expertise was considered less important than the provision of adequate time to
think, discuss, plan, implement and reflect. In fact, the presentation of new ideas may
become little more than a source of frustration in the absence of adequate time to engage
them. In light of this, the provision of time for the teachers to meet and interact within
their "normal" working cycle was a crucial enabler for educational change. It was through
such opportunities that the teachers in this project developed their collective sense of the
possibilities for change. Further to this was the knowledge that their efforts, be they
failures or successes, were supported and encouraged at the School and Departmental
levels. The ultimate goal of the project is to understand and develop the conditions that
sustain and extend curriculum and teaching practices that motivate and engage students in
the absence of external support and funding.

While the dragon of student disengagement is far from slain, there is considerable
room for optimism that strategic modifications can be made to improve things on this
front. Even in an aspect of the curriculum where change is notoriously slow and
contested, the teachers were able to engage in meaningful adaptations to improve the
appeal of their maths programs. Inherent in the quest for greater student connection was
the need to protect the progress of student learning. With its pedagogic roots in recitation
and repetition, there was a degree of tension with regard to maintaining the rigour of the
maths discipline, at all four sites. Developing maths competencies has long been something that all students have to participate in, even if disengaged. The challenge to reconcile tensions between the needs of the learner and the rigours of the discipline was better managed at the three primary school sites. The reasons for this are partly structural and partly personal. Whereas secondary teaching is geared toward maximising each student's vocational potential, primary schooling continues to place its greatest importance on more affective dimensions of student development. Within professional structures that nurture greater staff-student connection, primary school teachers are generally better placed to mobilise change. However, while the primary school teachers that participated in this study were better able to alter the learning environment their efforts were tempered by their professional concerns about the need to project a sense of rigour in their maths programs. For the secondary teachers, on the other hand, the carriage of rigour was driven by a number of external forces. Beyond this, the need to better understand the conditions that give rise to increased levels of student motivation, engagement and connection in the middle years of schooling, remains a key goal of this project. The generic dimension of such conditions should transcend teachers, schools and sectors.

A big part of the challenge to legitimate alternative curriculum and pedagogic practices involves the need for greater practical and theoretical recognition of the capacity of teachers to coordinate and control their form and substance. While the dominant educational discourses continue to privilege deductive logic over inductive thought, competition over cooperation, and accountability over experimentation, this presents as a considerable challenge. Student enjoyment and satisfaction are simply not as highly valued as student improvement and attainment in the analysis of learning outcomes. The need to define, defend and propagate the sorts of values and practices that underpin the reforms undertaken in this project presents as an ongoing issue for participants. At the local level this involves the need to establish the validity of their reforms across their respective school communities. For change to be meaningful and accepted, validity must ultimately be established through the demonstrable advance of learning outcomes, not rhetorical ardour!

References


