Crossing the divide between teacher professionalism and national testing in middle school mathematics

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This paper was originally published in: Hunter, R., Bicknell, B. & Burgess, T. (Eds) (2009). *Crossing divides, Vol. 2* (Proceedings of the 32nd Annual Conference of the Mathematics Education Research Group of Australasia). Palmerston North, NZ: MERGA.

Teacher professionalism is a social construct which varies across time and place. In relation to the teaching of mathematics in the middle school, professionalism is a concept under siege; with the advent of national testing some teachers predict dire consequences for student learning. In this small research project several teachers depicted their views of 'quality' in relation to the teaching of mathematics and potential threats from the coercive context in which they work.

The middle school years have featured on the reform agenda within Australian education for more than a decade. As we move into the second phase of middle school reform, schools are urged to address what has been overlooked: supporting the transition between primary and secondary school in an "academic sense" (Perso, 2004, p. 29); especially through school-based revitalisation. This strong shift in the middle school movement challenges educators to develop intellectually engaging pedagogy and align it with a curriculum relevant to student needs (Prosser, 2006). In this small research project I endeavoured to collect some data on how this reinvigoration was being thought about and implemented in relation to the teaching of mathematics. Also of interest were indications of the status of teacher professionalism in relation to this task.

Teacher professionalism is a "socially constructed concept" (Helsby, 1995, cited in Day, Flores & Viana, 2007, p. 250), in a constant state of transformation. Teachers in the middle school now operate in a climate of quality control which affects their practice. The social context, an environment of prescriptive accountability especially in relation to national testing

could induce de-motivating trends such as a concentration on 'teaching to a test'. Collay (2006) warned that an agenda of surveillance and compliance (Luke & Woods, 2007) could perpetuate a culture where teachers are seen as "semi-professionals and recipients of reform policies" (Collay, 2006, p. 2). Day, Flores and Viana's (2007, p. 250) research in Portugal and England found that the "greater accountability" and "public scrutiny" that accompanies "performativity agendas" contributed to a decline in job satisfaction and professional capacity for teachers.

In this paper I report and analyse four (4) teachers' views and practices of 'quality' in relation to the teaching and learning of mathematics in the middle school. While these teachers felt comfortable in relation to their content knowledge and instructional practices, they felt their professional standing and student learning could be compromised by the enforcement of bureaucratic accountability agendas. The teachers felt these might cause divisions, cracks in their professionalism and pedagogical practices, with students' learning the ultimate casualty.

Methods

Four teachers—Sue, Anna, Liz and Dave—of varying experience from four different middle schools in Cairns, Queensland participated in this study. Three questions informed the study:

1. What would you say constitutes "quality" in mathematics education in the middle school?
2. What particular teaching strategies do you use in your classroom to ensure 'quality' outcomes in mathematics?
3. How/in what ways do you consider that these strategies enhance learning, especially in middle school mathematics?

This small study is a preliminary investigation for a larger case study and is couched in a view that "within the practice of mathematics teaching and learning, the people within the practice, and the social conditions they experience play a major role (Grootenboer, Smith & Lowrie, 2006, p. 614). If we are to cross the divides that exist in the middle school mathematics context, the views and insights of teachers make valuable contributions regarding what constitutes 'quality' in mathematics education, and how we are to attain it.

Results and discussion

Teachers describe quality

There was a solid consensus in the data placing teachers' pedagogical content knowledge as an essential component to engaging students successfully in the classroom:

Sue: Teachers with subject specific expertise in their field facilitate and maximise student learning.

This view concurs with Jasman and Martinez (2002) who suggest that teaching outside of their subject areas places excess stress on teachers and limits quality teaching and learning opportunities for their students.

Building quality through relevance

The academic dimension of quality mathematics education was highlighted when the teachers discussed guiding students through the skills and procedures of the mathematics, within relevant contexts:

Sue: The first thing I do when teaching a new concept or rule in mathematics is to show students there is a need… if time permits the students can try to find ways to solve the problem…the setting out is very important for students so they can deconstruct their understanding. It is also an essential tool for the teacher because it highlights gaps in student understanding as well as misunderstandings.

Liz: Students should understand what mathematics is involved in a problem, e.g., finding area, multiplying, conversions, fractions; and break each question into smaller parts to solve, using only relevant information. Students also need to see that the maths is important and useful.

An approach where the focus of the classroom practice is on the students' idiosyncratic ways of understanding appeared to be important to these teachers. Lott Adams, (1997, p. 2) for example, advises that relevancy "gives children a platform from which they can construct their own mathematical knowledge".

Enhancing learning through quality classroom practices

The teachers suggested that using basic mathematics and mathematical procedures to aid conceptual development before progressing onto problem solving optimises students' opportunities to experience success, and this enhances learning:

Liz: By deconstructing 'modelling and problem solving questions' together with the class, students can pick out the important information and then they can apply their 'basics' to real life problems…real life in maths gives students the opportunity to extend and apply maths beyond the classroom.

However, at this stage teachers raised concerns about the national testing and how the need to prepare for this testing restricts opportunities for relevant, quality interactions in the classroom:

Sue: Quality teaching is difficult to measure, since the exams are not always indicative of student understanding… I have concerns about teachers teaching to a test, particularly since these teachers become the 'good' teachers.

Dave: Some of the testing results in contrived tasks that don't really tell us much about students' understanding.

Anna: The national test is one testing tool and has too much influence, particularly since the focus is on school performance and not on the individual student… Queensland is a year behind other states [in age] which is a problem on the national test, and with a high proportion of Indigenous students at my school, that puts our school results even further behind. I have a problem with some teachers at other schools that are teaching to the trial national test appearing to be the 'better' teachers.

The teachers also felt there was an unrealistic expectation of what students should achieve on a national test given the variation in curriculum requirements between different states within Australia and different contexts between schools.

Interpretation and analysis

The data indicate that the teachers in this study are using their pedagogical content knowledge to intellectually engage students in the rigorous mathematics required to support academic progress in the middle school and beyond. However, a divide emerges when teachers struggle to follow through with high quality pedagogical interactions by using their professional judgment to build relevance for their students, whilst also adhering to the quality control measures of testing. The research literature identifies concerns about prescriptive testing. Luke and Woods (2007, p. 16) discuss the introduction of the "quality control" of national testing as having a "host of collateral effects that include narrowing of the curriculum, teaching to a test, teachers' deskilling and attrition, documented test score fraud and manipulation at the state and school level—with no visible sustainable effects at improving equity outcomes." The data from this study do indeed concur with the literature suggesting that the current climate of accountability in Australia has brought suspicion and competition within the teaching profession. Indeed, as predicted by Day, Flores and Viana (2007, p. 251) there appears to be a "struggle for the soul of professionalism" within our schools. Moreover, the mathematical confidence and literacy of our students may fall between the divide created when the work of teachers is dominated by such accountability agendas.

A point of departure in spanning the divide is to consider the work of teachers. The national test acts as a control mechanism and reinforces the notion that "despite the rhetoric about teacher professionalism, current State and Federal governments do not trust teachers to make the big curriculum decisions" (Reid, 1999, p. 198). Furthermore, the national test appears to reinforce the notion that 'good' teachers should act as passive recipients of government initiatives, and conform to 'official' curricula. However, teachers in this study are unhappy with the national testing and are not willing to be passive recipients. Problems will arise though when they continue to try to find the best way to engage students into quality mathematical education, since it means finding "a way around, ignoring or resisting official direction" (Reid, 1999, p. 190). Time could be better spent in granting teachers the opportunity to participate in the "exciting process of theorising about educational ends and curriculum goals", in this way shaping their "labour process" (Reid, 1999, p. 198). Teachers having input into the curriculum may then allow the testing to be more aligned with classroom contexts; building relevance to student needs. It is anticipated that when teachers have opportunities to intellectualise in this way within their work, their professionalism reaches a new high, with students receiving the quality rewards in their mathematics education.

Conclusion

The national test is creating a divide that destabilises the professionalism of teachers in the middle school, which then raises concerns about how teachers can remain motivated and empowered to engage students in

quality mathematics. Finding mutual concessions between intellectually engaging pedagogy and the results driven agenda of the national test limits the potential of quality interactions in the middle school classroom. Teacher input into shaping a relevant curriculum, to inform testing, emerges as a credible avenue to cross this divide. However, in the current climate of superficial policy rhetoric, this crossing seems unlikely.

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From Helen Prochazka's

Scrapbook

Mathematikoi

At the age of 56, Pythagoras (ca. 580–500), the charismatic Greek mathematician and spiritual guru, founded his famous philosophical and religious school in Crotona on the east coast of southern Italy. A contemporary of Buddha and Confucius, he had spent the previous 40 years seeking to learn mathematics and esoteric mysteries from the great teachers in the ancient world.

There was an inner circle of followers known as "mathematikoi," meaning "those who studied all." The word was coined by Pythagoras and from it comes the word "mathematics." The mathematikoi lived permanently with the society. They were vegetarians, had no personal possessions and were taught by Pythagoras himself. The "akousmatics" were the outer circle of followers. They lived in their own houses and came to the school during the day.

The Pythagoreans beliefs included:-

- reality at its deepest level is mathematical
- spiritual purification could be achieved through philosophy
- certain symbols have a mystical significance.

Women were permitted to become members of the society, both as teachers and students. It is thought that Pythagoras' wife Theano wrote books on mathematics and that she and two of their daughters ran the school after Pythagoras died.

In their ethical practices, the Pythagorean were known for their friendship, selflessness and honesty.