

# Reflections on Teaching Mathematics in an Exam-Driven School: An Autoethnography

Fiona Hagan  
*University of Otago, Dunedin*  
fhagan@maths.otago.ac.nz

Concerns over how I changed my own teaching style during a year of mathematics teaching gave rise to the content of this paper. I will discuss how the influence of the culture of an exam-driven school and the impact of examinations enacted on me, and my teaching practice. In this paper I tell my story using autoethnography. This style of writing invites the reader to share in my experiences and reflections, to enter into my world of mathematics teaching, to draw their own conclusions, and promote further discussion and dialogue.

In this paper I will examine the impact of an exam-driven curriculum on my past and present position on the teaching of mathematics. I will be using post structuralist autoethnography to trouble the assessment discourses that I, at the time, unwittingly reinforced during my teaching (see Davies, 2000). I will critically analyse the effects that an examination focus had on my own classroom teaching and the subsequent expectations and creative thinking of the students in my mathematics classes. My particular focus will be on the students in my year eleven<sup>1</sup> class who were sitting the NCEA<sup>2</sup> Level One Achievement Standards at the end of the school year.

Autoethnography can provide a medium for an evocative story, which may activate the reader's subjectivities and compel an emotional response. I am going to recount the story of my school and teacher pre-service education and how this moulded me into the teacher I am now, and how my teaching practice altered in a seemingly uncontrollable way.

Clandinin and Connelly (1991) suggest that the telling of stories is one of the essential human ways of experiencing the world, where conscious "storying and restorying" (p. 259) of one's life is a critical mode of personal development. Before I tell my story I will discuss autoethnography and the reasons I choose this style of writing for this paper.

## What is Autoethnography?

The word autoethnography is used by many authors (Clandinin & Connelly, 1991; Ellis & Bochner, 2000; Newton, 2004; Reed-Danahy, 1997) to describe what I have come to see as an approach to research which places the self at the centre of the research process. Centring the self allows the writer to tell her story and then offer a critical analysis of her own lived experiences. Autoethnographies/narratives/stories allow the writer to put her own body into her text to "write in ways that challenge writing conventions and the polarities of self/other and subject/object (Bochner & Ellis, 1996, p.32). Reed-Danahy (1997) goes further to define autoethnography as "a form of self-narrative that places the self within a social context" (p. 9). In my case, the social context is a particular school system determined in part by a qualification system.

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1 Year eleven students are students in their third year of secondary schooling in New Zealand approx age 15.

2 The National Certificate of Educational Achievement is part of the new qualification system introduced into New Zealand in 2002.

In the process of telling my story I will be contributing to my research and examining my teaching practice and myself. Tedlock (2000) refers to this process as “observation of participation” (p. 471) where the self and the other appear together in the one narrative. My experience will always be a multiplicity of locations, positions, truths and embodiments that are socially constructed and always in flux. Critics of autoethnographic work worry about the work becoming “vanity ethnography” or “self-indulgence” (Van Maanen, 1988) but I believe that autoethnography can provide a comprehensible, evocative, appealing, and personally significant alternative to more mainstream approaches to research.

In the next section I will tell my story and then follow this by unpacking some of the discourses of my story using a poststructuralist lens (St Pierre, 2000). As a poststructuralist educator I am able to question and discuss systems and approaches using multiple interpretations to take into account the different knowledge and ways of knowing present in the situations I encountered (St Pierre & Pillow, 2000).

## My Story

I believe that most of us have had at least one influential teacher in our school years whose influence has lasted throughout our lives. For me, this influential teacher, was John O’Sullivan<sup>1</sup>, my biology teacher in my final year of secondary schooling. John is now a personal, family friend and he continues to teach.

What was it that made him so special? He talked with us, not to us. I remember feeling so indoctrinated into the system of taking notes to use for study for examinations that I continually worried about the lack of notes that he gave us. I worried about how I was ever going to pass the external examination because I felt that I had nothing to study from. I need not have worried as I learned more in that year than I had ever previously learnt or have learnt since. We talked, we discussed, we debated, we were interested, we were respected, our opinions counted, we counted! Also, we all did really well on the final examination.

I went to the College of Education in 1989 and throughout that year I kept John’s teaching style always in the back of my mind. I wanted to teach like him. I wanted my students to learn like I had in his classroom. I used to teach biology, science, and mathematics and I found that in the science classes we could discuss and experiment to our heart’s desire. However, mathematics was another story.

I recall my final posting at a rural co-educational school. It epitomised the barriers that I was to face as I moved into teaching more mathematics. I was placed with the Head of Mathematics and his year ten class, a top stream<sup>2</sup> class. When I started teaching the class I began by trying out some of the many practical and interesting ideas I had learned about at the College of Education. He took me aside after a couple of lessons and told me that this *fun* stuff and group work was all very well, but no matter what we had been told at College, this was just not how to teach mathematics properly. Mathematics, he suggested, was about routines, a fixed way of doing things- that is what the students expected. For my first few years of teaching, mathematics was just like that. Those ideas and resources were put on the back burner until about four years later when I began teaching part-time at a school

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<sup>1</sup> Name used with permission.

<sup>2</sup> Streaming is where classes are sorted based on the ability of the students. A top stream should have the most able students in it.

with a progressive and enthusiastic mathematics department. I stayed there for nine years moving from part-time to full-time teaching and then eventually becoming the Head of Department.

In this environment I was able to gain back my lost enthusiasm (and confidence) and engage in a style of teaching that reflected my personality in mathematics. I could try new things and new approaches. If it did not work, I could reflect, make changes and try again. If it was successful, we all collaboratively shared new ideas around the department. Mathematics teaching had become exciting and rewarding at long last.

I have recently had one very frustrating year teaching mathematics. I commenced my doctoral studies in 2004 and did some part-time teaching at a new school. I loved and hated teaching mathematics at various times during that year. Sometimes I think that I have read too much theory and that I am now an idealist working in an unidealistic system in which I am powerless to make changes. At other times I feel empowered by all of the new things I have learned and assimilated and I get excited about the fact that maybe I could make a difference; sometime, somehow, somewhere. I enjoyed teaching the girls in mathematics that year. This was the easiest teaching I had ever done in terms of classroom management and the enthusiasm of the girls. It was also the hardest teaching that I had ever done in terms of the culture and resulting expectations of the whole school community.

During this year I was allocated a low-ability year eleven mathematics class. In the end of year practice examinations the girls in my class could, in general, answer the interpretive questions in the Graphing standard because of their high literacy skills. In fact, some of their answers took them into the Merit level of achievement in this area. However, very few of them could draw the two or three graphs required at the Achievement level. My dilemma now was that I had very limited time left in the school year but I still needed to guide them somehow to reach the achieved level that they, the school, and their parents so desired.

Some readers may be thinking at this point that I alone may have got myself into this position and I have reflected on this a lot since the end of that school year. Although my class was considered lower ability than the other three mathematics classes in the school, I was still expected to cover all eight achievement standards during the year. The timeframe for the teaching program was very tight and followed the following structure: teach the work for 5 to 6 lessons; practise an old assessment task; students then sit a new practice task; mark it; hand it back to the students and quickly go through it; and then move on to the next section of work. There were two sets of practice examinations which took out two weeks of teaching time so with the two periods for revision and testing multiplied by eight plus the two weeks for examinations this resulted in approximately twenty-six possible teaching lessons being lost to assessment related tasks.

I now believe that my students would have benefited from the extra teaching time rather than sitting practice assessment tasks which did nothing other than, reinforce the inadequacies they already felt about their own mathematics. They also did not gain anything by having to work at such a quick pace to cover all of the achievement standards. Cutting back the number of standards for them to cover in the one year may have benefited these students in that I could have developed a more in depth approach to the teaching and the learning.

Unfortunately, I was unable to alter the number of achievement standards they had to do so I made the decision, after discussing the scenario of these students needing to learn some quick fix approaches in a short time frame, with another mathematics teacher. She

suggested that I teach them step-by-step how to draw up an x/y table, fill it in using the formula/rule and their calculator and then plot the points. What I discovered was that even this was not a simple process as there were some difficulties to overcome, which are listed below:

- I had to give them some strategies to use to firstly identify if the graph was indeed linear or parabolic. They could cope if the parabola was in the form  $y=x^2-2$  but when they were given  $y=(x-1)(x+2)$  they could not see the  $x^2$ .
- They had difficulty choosing appropriate x values to input into the formula (from their own x/y table). They were easily stumped if the graph was  $y=(5-x)(x-10)$  and they filled in their table with x values of 0, 1, 2, 3, and 4.
- Even the use of their own calculators was problematic because the model that most of the girls used required them to input brackets around (-2) otherwise -2 would give them an incorrect answer of -4. These students tend to plot their inaccurate coordinates on their graph, as they believed what the calculator tells them.

I've spent quite a bit of time reflecting on the teaching approach I ended up using to show how to draw graphs. I believe that these students wanted to be taught quick, 'easy to follow' rules and procedures because success to them is not about understanding what they are doing in mathematics, but about knowing how to do a particular type of question in a particular way so that the marker will put that magical 'A' (for Achieved<sup>1</sup>) in the space on the right hand side of the examination paper.

Any grand ideas that I had of making their mathematics a connected and relevant experience were greeted with a total lack of enthusiasm from the students. What I had to remember was that some of these girls had been indoctrinated in the culture of the school so by the time I became their mathematics teacher I had many years of examination focus and pressure to battle against. This school prides itself on excellent academic results in external examinations. The girls come from affluent families who have high expectations of their daughters and of the school. What follows is a description of how I felt restricted by the examination and school culture as the school year drew to a close.

### Bound by the Rules

The issues that stand out from my story revolve around the key themes of school culture and expectations and the role that assessment still has in dictating a certain style and approach to teaching. However, this story is about *me* and how I felt I had to alter my teaching style in my mathematics classroom. I agree with Angier & Povey (1999) that mathematics needs "the room to grow as an open and creative subject not restricted to a rule-bound set of procedures" (p. 148). However, the reality that transpired for me was that I was restricted to this rule-bound set of procedures, not due to a lack of enthusiasm, passion or creativity on my part but as directed by the expectations of the traditional examination-oriented push of the whole school community.

Holton (2005) suggests that mathematics is a human activity, not "a set of facts cast in stone and handed down from the mountain". It is a living breathing entity that students can participate in. It is a subject that can involve their creative abilities and a subject where discussion is valuable. When the gaining of the qualification becomes more important than the learning then I believe we have serious problems in our schools. I feel that I can say our

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<sup>1</sup> Under the NCEA Achievement Standards are awarded the grades; Achieved, Merit, Excellence or Not Achieved.

schools as I have heard many comments about how the nature of the standards and the enforced style of assessment are affecting many of my colleagues teaching styles (and not just in mathematics). Holton (2005) discusses a student of his who has reiterated what I have been feeling during this teaching; that is, that we would all love to teach in a problem-solving, creative, open-ended way, but the reality is that we would be “lynched” by the school community at all levels.

I believe that the primary purpose of all assessment, whether it is school-based or externally operated, should be to improve students’ learning and the quality of learning programs. Nisbet (1994) states that teachers “work to the reality imposed by assessment rather than to the rhetoric of a statement of intent” (p. 165). In my opinion the solution is not straightforward. Abolishing external examinations might appear desirable but it is a simplistic notion to eliminate them. Educating and informing the public that external examination results are not always a true reflection of a student’s abilities and strengths may be a more valuable and useful strategy for taking the pressure off students and their results from external assessments.

It appears far too common sense for me to just state that the external examinations were dictating the way in which I taught. I believe that many schools rely on their students’ results to promote the academic image of their schools. I see this culture of market-driven education as; “more bottoms on seats” means more funding, which means more and better programs, which means attracting better teachers, which means better academic results. Here lies the school circle of life. I felt that I had to teach to the examination; I felt that I owed it to my students to prepare them in the best way I could for those external examinations. However, I believe also that I had an obligation to teach my students how to learn and how to think.

Did my students want to think or did they just wanted to ‘pass’? Regularly comments were made like ‘Just show us what to do to Achieve’, “Do I really need to know this?” or “Will this give me credits?” The Achieved level of an Achievement Standard is predictable. Just like many external examinations in the past you can practise the ‘right material’ until it is automatic. The difference now was that these students of mine appeared happy just to learn those limited skills in their quest for credits. The Merit and Excellence level required more work, more effort, and more understanding – three things they appeared not to want or experience. I believe that these students saw their own futures as determined by the number of credits. “How many credits do I need to get into Level 2 mathematics?” was another very common question. They never asked “If I don’t understand this work properly what will it mean for me during the following year’s maths course?”

I sensed that the quest for understanding – my goal for them – was not a priority in their lived reality of school mathematics. Was their goal just to get the minimum level of credits with the minimum level of work? An intrinsic love of learning in mathematics was never apparent to me. Their position in the school the following year appeared dependent on this credit accumulation and their status may have significantly dropped if they did not achieve the prerequisites. Did they want a rewarding learning experience in mathematics? For some of these students the credits gained would allow them the option to opt out of mathematics entirely at Year 12. Failure to gain the credits at Level One would be placing them in a ‘catch-22’ position of having to do mathematics in Year 12 solely for credit accumulation. Another year of mathematics was not an option I think some of these girls desired. Like

many other girls in many other schools (see Shannon, 2004) many of these girls wanted to opt out of mathematics entirely!

## Concluding Comments

For the purposes of this article, one year of teaching has become an autoethnography as it encompasses my practice and reflections during that year. I did not anticipate until after I left this school that my students would become the focus of my reflections and they do not know that they have become that either. I am speaking about and for this group but also about and for myself. I have territorialised their space in my research (St Pierre, 1997) to show these realities in my writing but I have also excluded many other realities in my snapshot of their edification in my classroom.

In summary, as I see it, there are four main issues that stand out from my story:

1. I felt that I had to change my style of teaching to accommodate the examination culture of the school;
2. I do not believe that it is sound pedagogy to teach mathematics in bite-size pieces as this distracts from the creative side of mathematics;
3. There were many discrepancies between what I wanted to do in my mathematics classroom and what I felt I could do; and
4. I could not be the teacher I wanted to be. The John O'Sullivan style that I wanted to model appeared unattainable in an exam-driven environment.

I do need to be careful here to say that just because I wanted to teach mathematics *my way* does not mean that *my way* is the *right way*. I believe that teaching and the development of a teaching style is very much a personal journey but a journey that needs to be based on sound pedagogy and the best interests of all students.

I don't have any answers. I can see the issues and I can see the source but I cannot see the solution. Who has the last word? My readers do. I've told a story about my year teaching. If my readers have been able to enter and feel a part of my story then part of my goal has been achieved. If my readers have been able to feel and think about their own lives and experiences in relation to my story then another goal has been achieved.

I have not provided facts but I have provided human experience and personal voice. I do not want to stand and speak with all-knowing authority. I want my readers to make their own interpretations and meanings from what I have written. I want them to put themselves in my place, think about what they would have done, how they would have reacted and voice their own point of view and perspective.

Often our accounts of ourselves are unflattering and imperfect, but human and believable. The text is used, then, as an agent of self-understanding and ethical discussion. (Ellis & Bochner, 2000, p. 748)

As writers and readers we need to broaden our horizons, consider critically our own experiences, enter other worlds disparate to our own experience in a compassionate way and engage in dialogue on the social and moral implications of the different perspectives and standpoints that we encounter. I invite you to become co performers in this narrative. Let the dialogue begin.

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