

‘In this game you don’t stand still’: policy change as a catalyst for professional development

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Two well-placed mathematics departments were followed through a complete first cycle of a new examination at 16. One achieved a principled enactment consistent with their espoused beliefs and as a result, developed considerably over a wide range of professional competencies. Differential characteristics of that department are considered in an attempt to isolate those features which supported deep change.

Keywords: Mathematics teacher professional development, reform, professional learning communities, reflection, self-efficacy.

Background

This paper reports on one aspect of a study which followed two English mathematics departments as they enacted (Braun, Maguire, and Ball 2010) a new 14-16 curriculum, leading to GCSE mathematics¹. This curriculum features a renewed emphasis on mathematical processes and applications (following failure to implement the process aspects of the 1999 curriculum), and incorporates ‘functional skills’, more multi-step unstructured situations, and genuine problem solving. Such reforms have been widely attempted in the western world, but have met with limited success (Euridyce 2011): they are clearly demanding. Spillane (1998) suggests teachers need a social rather than individualistic ‘enactment zone’, rich deliberation - with experts and grounded in classroom experience - , quality support materials, as well as *motivation* and quality time. Reforms clearly draw heavily on mathematics teacher expertise in some sense, and this study was conceptualised to probe how teacher characteristics, and in particular various aspects of their knowledge and beliefs, affected enactment of the GCSE.

The enactment was studied over two and a half years, from planning through to impact of first results since Hunter (2010) suggests student outcomes are highly influential on teacher action. Seven teachers in two schools were involved in thirty-one interviews, twenty-three classroom observations, department meetings, and document scrutiny at variety of levels; advantage was taken of both informal opportunities to expand the evidence base and of indirect student voice. Semi-structured interviews focused on higher-level pedagogical interpretation and other emerging characteristics of *occupational capacity* in relation to the new GCSE, and the range of interview and documentary evidence was triangulated by classroom observations, which also afforded an additional source for subsequent interviews. There was a dual focus on individual teachers and on the departments concerned, where that made sense. The literature on whole mathematics departments is limited, a notable exception being Watson and de Geest (2010).

The two departments (pseudonyms Greenways and High Wood) formed a ‘telling’ sample in Mitchell’s (1984) terms: initially they experienced very similar

¹ The General Certificate in Secondary Education is the principal assessment at 16 in England, on which secondary school accountability is largely based.

policy contexts (external, situated, school professional, material (Ball, Maguire, and Braun 2012)); they shared espoused beliefs and values, as well as background of ways of working including exploratory projects. Unusually in English terms (Ofsted 2012), both were fully staffed with mathematics specialist teachers. Further, both departments were relatively successful in terms of present performativity demands, and so appeared well-placed for a principled enactment of the new GCSE.

Outcomes at departmental level.

Over time, changing department identities emerged, differing in the ways and language with which departments worked together, and in leadership characteristics: Greenways felt they were increasingly succeeding in a principled enactment, (and in many ways developed similarly to Watson and de Geest's (2010) departments, as if the change were autonomous rather than imposed) whereas High Wood increasingly felt that was desirable but the priority was results, realistically best achieved by least possible change. Differences emerged not in espoused beliefs or in evidence of broad initial available knowledge, but in belief hierarchies, various affective characteristics, and perceptions and use of available tools. These differences should not be characterised as a 'bad' department and a 'good' department: nevertheless, the intended changes enjoy an unusual degree of support among the mathematics education community and many end-users in England (Ofsted 2012).

Greenways weathered several perturbations, notably in the approach to final assessments, when the discourse became dominated by student performance: they perceive the new policy as 'giving us permission to teach in the way we want to' (Gillian, interview 3). In many ways, they chose a 'writerly' approach to policy (Barthes 1970). They adopted a 'narrative' role (Ball, Maguire, and Braun 2012) both within school and in the local authority, in addition to aspects of an 'enthusiast'; they developed a deeper professional community *including the language* to tackle resulting challenges: for example, they began regularly to use language such as 'rich-but-skills-based KS3, rich-with-skills-in KS4' (Nigel, interview 5), 'coherent teaching', 'scaffolding', 'cognitive challenge', 'metacognition'- and such words became part of their everyday interchanges. They developed distributed leadership consisting of the head of department, the second, and another teacher, and this supported a persistence of goal through individual 'wobbles'. The eventual results were still high stakes, as is clear from interviews:

'It was a real threat when we turned in the best ever results a year into the course: I really really didn't want that in some ways, it set the barrier just so high.' (Nigel, interview 3)

...but in the event that did not fundamentally disturb the pathway embarked on. They are aware that there is still a way to go in achieving a principled enactment, and expect that to take time:

'We're nowhere near there yet, but we're happy we've made a good start, and it's self-perpetuating: the further down this road we go, the happier the students are, so it's positive reinforcement really – so long as the results hold up. Real lasting, deep change – that's what we're after, and it's not going to happen overnight.' (Gillian, interview 4)

However, over the course of two and a half years, observations and student feedback show Greenways achieved an increasingly principled 'big picture' enactment – and, it would appear, *have been increasingly well-equipped to do so*: in other words, the

project of attempting to enact the GCSE in a principled way has served as effective embedded professional development for them, as expanded below.

The two departments appeared at the start of the study to have comparable knowledge bases in terms of subject, subject pedagogical and general pedagogical knowledge over the range addressed by Ball, Thames and Phelps (2008), and indeed of the other generic areas addressed by Shulman (1986), yet just over two years later the depth of professional knowledge, understanding and competences displayed in interviews and in lessons was regularly greater at Greenways, and indeed whether the teachers at Greenways were compared with the English Teacher Standards (DfE 2012) or against slightly broader criteria such as the Danielson Framework for Teaching (2011), they appear to have made differential gains in professional capacity *including some not obviously targeted by change* (eg use of data, knowledge of students ...).

One such area of growth is in the department's teaching of problem solving. Their initial approach was relatively superficial, but classroom observations prompted fairly detailed structured interview discussion of the demands of 'new' style GCSE questions, and they came to the conclusion that students were not experiencing the depth of problem solving opportunities they actually valued – that too much structure was often offered, reducing the opportunities for student creativity and deep learning. Such depth of discussion was increasingly observed in formal and informal meetings. Nigel became very clear about the challenges for the teacher he thinks are posed by genuine problems, and over the two years developed vocabulary to address that:

'It's more demanding, definitely.... It requires you either to be incredibly creative, opening up the original problem, which I think all teachers are potentially capable of, but I don't think always have the quality time.... developing a good problem requires you to see at least some of its potential, although often students will go on and surprise you, but the best problems can go in all sorts of directions, they can support students in making links, and in challenging their own understanding. Ideally they'll be open to different approaches, that require sustained monitoring and evaluation, so students develop in their metacognition and in their ability to be flexible in their thinking, but also to sustain approaches and communicate solutions... for the teacher, you need a ..em..grabber if you like, to hook them in, followed by a coherent explanation of the problem situation, perhaps so they get to pose the questions, and then the scaffolding that goes on has to be sensitive to the emerging needs of the group... you almost know it's successful if you're standing looking around the room wondering which groups needs help or prodding or questioning or even wondering if they're better left to themselves at the minute because they're all clearly engaged in something deep in their groups....' (*Nigel, interview 5*)

This depth of talk was mirrored in increasingly sensitised classroom practice, with teachers very clear about the increased demand on their pedagogical and subject knowledge, but claiming to be buoyed by the resultant increasing self-efficacy – their belief in a job being increasingly well-achieved. The strength of the professional community was increased by the exposure to new subtleties of subject knowledge, and assessment became more sophisticated as teachers became aware of greater depths in their classrooms, of the challenges of supporting that productively, and of the inadequacies of superficial summative assessment of that. Depth of enaction was by no means uniform, but all teachers in the department clearly moved in their practice and in the way they talked not only about teaching and learning but about individual students:

‘Trying to work in this way has made me think so much harder about individual student needs – I take much more care about how I group students, how I deal with behaviour challenges and so on – but then, I know them so much better because I’m released to think about what’s actually going on, they’re taking much more responsibility for the actual learning, so I can often listen, and think.it’s great! (*laughs*)..except for the days when it goes horribly pear-shaped.’ (*Carol, interview 3*)

This is consistent with what was observed in lessons. The department sought student feedback via an electronic questionnaire, and were further sustained by the responses given, as well as by excellent GCSE results at the first completion.

‘It’s not that we’ve cracked it, but yes, it does feel good, as if we’re achieving something that’s worthwhile’ (*Gillian, interview 5*)

Discussion.

So what characteristics of the Greenways department distinguish them from High Wood? Participant Greenways teachers exhibit a belief in their own *learning as dynamic*:

‘In this game you don’t stand still’ (*Gillian, interview 3*);

‘I’ve changed enormously – I’ve learnt so much, and of course I hope I shall go on doing so, I do think you never get there, it’s part of what makes the job so satisfying, there are always new ways to try to infiltrate students’ thinking, to make links with them – it’s been really quite exciting and I’d say we’ve enjoyed it, the students and I.’ (*Carol, interview 5*)

... and harness these characteristics to sustain and generate new learning, in common with the more successfully changing teachers in Franke et al.’s (1998) study.

The change is supported across the department by a clear ‘*professional learning community*’ consistent with Fullan (2001, 74), who states “..professional learning communities ... are critical for the implementation of attempted reforms”. They seek and *harness external expertise*, consistent with both Spillane’s (1998) necessary conditions for successful change, and were clear that in the case of problem-solving they would have made less progress, and less rapidly, without that. They exhibit an *extended reflective palette*: there is a greater demand and opportunity, in their enaction, and that includes the need for developing a *language for reflection*, as exemplified above. They talk about, and frequently exhibit *high-level reflective skills* such as noticing (Mason 1998), attention (Ainley and Luntley 2007), and deep reflection on/in/for practice (Schon 1983).

In parallel with these characteristics, Greenways participants exhibit a number of differential affective traits: a sizeable store of *confidence*, linked by Beswick, Watson, and Brown (2005) with teacher effectiveness; and a *positive attitude to risk and challenge*, which has been shown at least for students to be enhanced by collaborative approaches and linked with self-efficacy (Curee/QCDA 2009). Similarly, the concept of *resilience* (Henderson and Milstein 2002), which was very apparent at Greenways, has been shown to interact positively with self-efficacy (Gu and Day 2007), especially in times of imposed change, as does their clear *motivation* and *will* for principled enaction (Meece, Anderman, and Anderman 2006, Middleton and Spanias 1999). This literature taken together, suggests that these very empowering characteristics interact with teachers’ self-belief about the effectiveness of what they

do (their *self-efficacy*) in a virtuous circle, which is further nurtured by its embedding in a supportive professional learning community, the leadership for which should ideally be strong and distributed (Dufour and Eaker 1998): not inconsistent with Millett, Brown and Askew's (2004) findings about the critical roles of subject lead and headteacher in primary schools undergoing imposed change in mathematics.

This amounts then to a good capacity and inclination for sustained learning, and for quality dialogue focused on teaching and learning, and is consistent with the literature on development of effective communities of practice (Wenger 1998), impinging as it does on the four complementary strands of learning-meaning-community-identity. Finally, the enactment at Greenways is consistent with the effective professional development literature as reviewed by Lipowski (2004) and Joubert and Sutherland (2008): sustained, embedded in collaborative cycles of context-specific designing, testing and evaluation; and supported by deep and informed professional reflection.

This small-scale study does suggest that teachers can engage productively with quite demanding imposed change and in a way which results in considerable professional growth; but that to do so they may need to draw on important affective characteristics that interplay with self-efficacy. It suggests that perhaps these should be nurtured alongside other competences often valued in teacher development, including, importantly, various aspects of deep reflection - and that these are critical components of teacher occupational capacity, a construct which clearly needs further development. It adds further evidence to the literature supporting the centrality of professional learning communities for effective teacher growth.

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