BETWEEN PARADIGMS

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With the introduction of any new initiative into the mathematics classroom, there is often an assumption that it will produce measurable effects in teaching approaches and pupil progress. Our intention is to examine how teachers from a small project in progress are trying to interpret what a new scheme requires of them and how by engaging with it, they re-describe both their pedagogic understanding and classroom practices relationally to earlier approaches. We focus on the key term 'discussion' and examine the way in which it serves to anchor the teachers' conceptions of themselves during this transition. By using a theoretical framework derived from some neo-Marxist writers we consider these discursive shifts and how they can be seen as relevant to attempts at curriculum change.

INTRODUCTION

This paper is contextualised in the work of the Gatsby project (Eade and Dickinson, 2004-2007) that is currently working with Mathematics in Context (MiC) materials which are in turn derived from Realistic Mathematics Education (RME), an approach to mathematics education developed by the Freudenthal Institute, Utrecht.

It represents the work of a small pilot study, prior to the writing of an ESRC bid, which sought to examine how teachers represented their progress on the Gatsby project. We illustrate this with particular reference to 'discussion', one of the key ideas which teachers offered in interviews and which appears to anchor their sense of practice.

Theoretically, we have sought to establish our position in relation to current thinking about curriculum innovation and briefly outline this here. Our reading of the data is then influenced by the work of Althusser (1971) and Ranciere (2004), which gives it a framing within ideas pertaining to political and cultural discourse and the possibility that individuals have agency within the discourses under discussion.

THEORETICAL BACKGROUND

With the introduction of any new initiative there comes an implicit assumption that it can be implemented at least to a degree that will bring improvement over the pre-existing regime. Looking at the field of mathematics education more specifically, we can indeed find examples of enhanced student performance. There are a number of studies (e.g. Hickey et al, 2001; Swan, 2000) that describe curricular innovation and the modest benefits that follow. This literature gives an impression that improvements in student performance are achievable, yet there is also a sense that they are not easy to bring about. Indeed we find other studies that suggest that asking teachers to move from one teaching approach to another cannot be regarded as a straight forward substitution because of various diluting factors (e.g. Remillard and

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Bryans, 2004; Sztajn, 2003); of these teachers' orientations and preferences are significant (e.g. Brown, 2003). Senger (1999) describes how "The interesting patterns of recursive thought and behaviour displayed by the teachers led me to rethink my own definitions of teacher change" p 218.

Central to our theoretical perspective however is the notion of identity, that is, the way we come to describe ourselves to ourselves and to others. Althusser (1971) employs the term 'ideology' to describe the characteristics of the cultural norms within which we function. In common usage, 'ideology' tends to mean something heavy handed and visible which influences the subject's thoughts and actions sometimes against their better judgement. For Althusser, a condition of becoming a member of any society means accepting sets of norms and associated practices as an individual cannot stand outside these. Ideology functions at its best where norms and practices appear so self evidently part of the world that they are accepted as a 'natural' way of thinking about and doing things.

For Althusser (1971) the only way we can come to understand ourselves is through ideological 'filters'. He describes how individuals are 'hailed' into subjectivity within a particular cultural framing. However, there is always a gap between the subject and the frameworks in which she identifies herself. The 'fit' is never exact and that difficulties that follow are hard to iron out. He suggested, for example, that the possibility of any consensual ideal being reached beyond conflicting ideologies is the biggest ideology of all. However, the gap makes space for possibility. The individual can re-describe him or herself in a more personal way which helps to create a slightly different version of the cultural world s/he inhabits.

LISTENING TO OUR TEACHERS

Their Background

The intention of the project under discussion here was to introduce RME/MiC materials into six secondary schools in Greater Manchester. Of the participating teachers, (N=12) all but one had been educated in the UK system. Many of them had completed their B.Ed degree PGCE certificates at Manchester Metropolitan University Institute of Education. A significant group within the project shared a familiarity with Whole Class Interactive Teaching (Harrington, 1998) as part of their course. There were others who were not familiar with these approaches.

The study here is an offshoot of this project and consists of data derived from interviews with four teachers. Two of these, Jonathan and Michael, were experienced teachers who had each been teaching for more than ten years. Jennifer and Lucy had each been teaching for less than five years.

We focus here on the word discussion which provides an illustration of teachers re-positioning themselves.

Jennifer works in a school where the mathematics department is open to trying new approaches, the predominant current pedagogy being WCIT, with the NNS taking a

relatively backstage position. Looking back, this is how she described her teaching before her involvement in RME:

> before I was quite happy to discuss all lesson … there was just one question in the class and we worked towards that one … we tried to develop skills in prolonging discussion and some of us got quite good at it.

After a few weeks Jennifer began to realise that her discursive style was not a great fit with the newly introduced MiC scheme. As she tried to accommodate aspects of this new approach she experienced some discomfort:

> I'm torn with are we now rushing through the materials instead of discussing … what's hard now is stopping the discussion. Or deciding what's worth sharing as a class and what's ok just to leave to discuss in pairs … Last lesson I started wondering who was the discussion for. Is it just that I need to be involved? Is it for the few who know what's going on? Is it to give ideas to others who are stuck? And do we need a long discussion all the time? … (I) found myself wondering what are we discussing, are we just discussing the answer or are we discussing the strategies … before I was quite clear what I was discussing and now I'm doing this I'm not sure any more.

Jonathan had also been involved with the local development of WCIT before embarking on the project:

> I think what we had been doing was we'd been getting a good question, getting the kids to work on it for a while and then having a long discussion and hearing lots of different view points and then trying to come to some sort of conclusion about which is the most efficient method … (this) would take the lesson, at least a lesson, may be lesson and homework.

Equally, Jonathan has found himself having to make similar adjustments to his teaching, so as to accommodate the MiC scheme, though his inner tension in doing so appears to be less:

> I've started to try and make it snappier and pacier and you know cut off a discussion when I wouldn't normally cut it off" and "I'm kind of thinking that a lot of the important and most useful comments come out at the beginning anyway and sometimes when a discussion drags on, it's other people repeating what's already been said or making refinements that actually don't improve the overall understanding

Later on, Jonathan seems to have reached a point where he is quite comfortable with this change:

> I've stopped feeling the need for closure on topics. I think you know, at the very early stages it was like walking through every question and ... having to have everyone happy with the answer before you've moved on and I'm very much less bothered by that now and I think the class are more used to doing that.

Lucy entered the project from a rather different starting point. Seemingly in her background "normal classrooms" had assumed a framework where discussion

seemed to fit around the edges of more individually focused activity triggered by some teacher input:

> in normal classrooms you have your introduction where you kind off bounce ideas and then the kids kind of get on with it, but I don't encourage them to be working with each other as much because obviously I don't think the focus is on too much paired working and group working" and "I have got to see how that individual is doing so she has to work on her own.

Clearly for Lucy the journey has been in a different direction. Discussion has become a vehicle for pupils' learning and a way that has both surprised and delighted her.

> since MIC that is all the time "how" or "why" or "where did that come from"; so my questioning has changed and my taking answers, leaving them there for a few minutes … allowing them to get it wrong … they bounce so many ideas off each other so much and they help each other so much.

Michael in describing his teaching before the project, made no reference at all to discussion as such:

> I have questions that I'm going to model and I expect two or three to be done. Then we'll go through the answers … it's just … is the word didactic, where I would say "this is the way, and this is what I want you to do".

However once he has started using the MiC materials, discussion has clearly become a significant feature in these classes and in a way that is very comfortable:

> I'll have moved around the room when they're doing their questions and I'll see particular things that I want to talk about and I will ask those kids particularly to give me their answers … I'd say just take what kids say and leave them hanging there and if no-one comes up with a contradiction or a problem with what is offered, then just leave it and move on and don't bother too much about being the font of all knowledge.

Thus we have four teachers providing thoughts on how the role of discussion changed as a result of embracing RME; two who, in a sense, were seeking to regulate the extensive discussion that they had previously promoted, and two who were interpreting RME as an approach where discussion would figure more prominently than before.

ANALYSIS

The word trajectory is employed by RME/MiC to describe a particular route that teaching and learning needs to take in order for progress to be made. However, it is understood that while routes can be mapped out in advance, the 'journeys' of individuals will neither be identical to each other nor necessarily follow the entire route to a pre-determined point. It is these aspects of trajectory that we are choosing to emphasise.

It would appear initially that the implementation of MiC has impacted on the practice of these teachers tangibly. For Jennifer and Jonathan, both of whom had participated in WCIT, discussion represents an aspect of their practice which is already well developed yet needs to be reconsidered in relation to MiC approaches.

For Lucy and Michael, it represents at least in hindsight, a deficiency in their previous practice. For all four, 'discussion' is an important word which anchors them into the MiC register and shapes their new practices. They identify with it as an aspect of teaching as they understand it at this time.

It could be said that all four teachers are following a common trajectory in so far as they all regard discussion as important in the new approaches they are adopting. They have a new conception of discussion which each sees as an improvement on their earlier practices and which plays a significant part in how their teaching is configured in the lesson. However, they are not all going in the same direction.

Jennifer questioned the target of her earlier faith in discussion and now wanted to be clearer about what discussion was getting at and how it might be better shaped to meet these objectives. Jonathan wanted to be 'snappier' and 'pacier' rather than let the discussion 'drag on'. He also began to see less of a need to include everyone's perspective, perhaps as a result of being governed by a clearer sense of what he was trying to achieve as a teacher, or perhaps in response to advice.

Meanwhile, Lucy and Michael appeared to be converts who had previously marginalized discussion in their practice. Lucy was now seemingly delighted that children could 'bounce ideas' and have an opportunity 'to get things wrong'. Michael appeared to have become more relaxed about not achieving closure, rather like the earlier stance adopted by Jennifer.

All four teachers had created a register through which they could describe and evaluate their practice. It seemed that working on MiC had motivated our two pairs of teachers rather differently. To us, it appeared as if they were seeing improvement as travelling along trajectories in different directions. . It would be difficult to argue at this juncture whether there would be convergence to a point that was compatible with RME/MiC recommendations. The degree to which this takes place is the subject of our on-going research.

Althusser suggests that the individual cannot fit entirely into an ideological framing. The fit is never exact. One way of thinking about this is to see the introduction of any innovation as potentially incomplete in relation to the original vision. This would seem to be born out by research undertaken in relation to curriculum innovation where there has been, at least in the UK, a succession of innovation over the years, each seen as providing a remedy for perceived gaps in earlier versions.

However, more positively, an inexact fit allows for some agency on the part of the individual. Holland, Lachiotte, Skinner and Cain (2003) see this gap, between the discipline of following a particular ideology and the agency of more personal action,

as creating space that enables the individual to re-describe his or her self thus creating new possibilities.

What can be argued here is that the teachers have been brought closer to the desired conceptions of practice as outlined in RME/MiC, however those concepts come to be judged at some future point.

REFERENCES

Althusser, L. (1971) Ideology and ideological state apparatuses. In *Lenin and philosophy and other essays.* London: New Left Books.

Askew, M., Brown, M., Rhodes, V., Wiliam, D., and Johnson, D. (1997) The Contribution of Professional Development to Effectiveness in the Teaching of Numeracy. *Teacher Development*, 1(3), pp 335-356

Brown, M., Askew, M., Millett, A. and Rhodes, V. (2003) The Key Role of Educational Research in the Development and Evaluation of the National Numeracy Strategy, *British Educational Research Journal*, 29(5), p655-667

Harrington, A. (1998) *Whole Class Interactive Teaching in Mathematics.* London: TTA

Hickey, D.T., Allison, A.L. and Pellegrino, J.W. (2001) The Motivational and Academic Consequences of Elementary Mathematics Environments: Do Constructivist Innovations and Reforms Make a Difference? *American Educational Research Journal*, 38(3), p611-652

Holland, D., Lachicotte, W., Skinner, D. & Cain, C. (2003) *Identity and agency in cultural worlds*. Cambridge, Mass: Harvard University Press.

Ranciere, J. (2004) *The politics of aesthetics*. London: Continuum

Remillard, J. and Bryans, M. (2004) Teachers' orientations towards mathematics curriculum materials: implications for teacher learning. *Journal for Research in Mathematics Education*, 35(5), 352-388

Senger, E. S. (1999) Reflective Reform in Mathematics: The Recursive Nature of Teacher Change. *Educational Studies in Mathematics*, 37(3), p199-221

Sztajn, P. (2003) Adapting reform ideas in different mathematics classrooms: beliefs beyond mathematics. *Journal of Mathematics Teacher Education.* 6, 53-75

Swan, M. (2000) GSCE mathematics in further education: challenging beliefs and practices. *The Curriculum Journal*, 11(2), P 199-223