

STUDENT TEACHERS' RESPONSES TO INFLUENCES AND BELIEFS

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This article briefly summarises part of an ongoing study of the teaching styles of student teachers of secondary mathematics (Smith, 1996,1998). The aspect reported on in this article is an analysis of the effects of the influences brought to bear upon four individual student teachers of secondary mathematics as they progress through a one year postgraduate course of teacher training (PGCE) based at Sheffield Hallam University. The students chosen have differing initial beliefs about teaching, learning and mathematics. As anticipated in the literature, the students' initial beliefs survive virtually intact throughout the year. However, the study suggests that the link between initial beliefs and teaching style is not causal. The study points to ways of encouraging student teachers to employ a range of teaching styles.

Introduction

Internationally, since the work of Dan Lortie, (Lortie, 1975) evidence has accumulated to indicate that teacher training is a minimal impact enterprise. Some of this evidence is reviewed in a meta-analysis of 40 previous studies by Kagan, (Kagan, 1992). The lack of impact of training has been generally attributed to the weight of previous experience of education (as a learner) that each student teacher brings with them to their course (e.g. Powell, 1992). It is thought that this leads to a predisposition to teach in particular "traditional" ways and to entrenched beliefs about the nature of teaching and learning. Some have felt that these initial beliefs need to be re-examined and perhaps modified if student teachers are to make progress.

"The task of modifying long-held, deeply rooted conceptions of mathematics and its teaching in the short period of a course in methods of teaching remains a major problem mathematics teacher education." (Thompson, 1992, p.135).

Previous phases of this research programme (Smith, 1996 & 1998) indicated a number of pressures being brought to bear upon student teachers choice of teaching materials, pupil activities and learning experiences. Briefly, these pressures arose from university - based tutors; school-based class teachers and mentors; pupils (indirectly, through management considerations); the student teacher's view of mathematics; the student teacher's views and experiences of teaching; the student teacher's views on the nature of learning.

Aims

The main aim of the current study was to examine in detail some of the mechanisms influencing individual secondary mathematics student teacher's selection of pupil activities. In particular there would be a focus on the ways in which student teachers devise their own pupil activities, adapt existing activities and make use of pupils' texts and guidance offered by class teachers, mentors and HE tutors.

Data Collection

An "Initial Beliefs Questionnaire" was devised and administered to the entire cohort to identify their initial views on the nature of mathematics and pre-training views regarding teaching style, with the intention of also providing a benchmark for later comparisons when looking for changes over the course. The Initial Beliefs Questionnaire was used to identify five students with varying initial views, who were invited to contribute to the research work. During the course of the year one of the five students left the course, emigrating to work abroad in her family business. This student was not replaced in the sample as it was too late in the year, thus leaving a sample of four student teachers, one female and three male who will be referred to as Emma, Quentin, Keith and Tony. The following actions were undertaken to collect appropriate data using a variety of techniques, each designed to focus on an aspect of the research interest, as shown in the table below.

Question / focus	Methodology
Analysis of student teacher's selection of pupil tasks.	Semi-structured interviews to examine the source of activities used in lessons on block practice.
How does experience in the classroom affect the choice of pupil activities?	Use and documentary analysis of reflective diaries and lesson self-evaluations. Analysis of critical incidents.
What advice is being offered to the student teachers?	Documentary analysis of written advice from teachers. Ongoing interviews with regard to changes in views or practices. Teacher questionnaire / student questionnaire.
What happens when student and mentor have different views of the nature of mathematics?	Teacher questionnaire and analysis of mentor beliefs in comparison with student beliefs.
Do students report accurately on what they choose to ask pupils to do in the classroom?	Lesson observations.
Are there changes in beliefs over the year?	Repeat initial beliefs questionnaire at the end of the year and compare results.

<p>How do student teachers perceive the issues around teaching style?</p>	<p>Ask students to comment on three maths teachers they have seen in action, looking for differences and similarities. Analyse the discourse for student's own descriptors of teaching style.</p>
<p>What are the longer term changes in teaching approaches as student teachers become qualified and adapt to their new post, school, pupils, department and colleagues?</p>	<p>The possibility exists for following up work with some or all of these individuals as they move further into their careers.</p>

A variety of approaches was used i.e. questionnaire, semi-structured interview, documentary analysis and lesson observation to try to improve internal validity. To incorporate triangulation I collected and analysed the views of other observers, i.e. class teachers and mentors.

Reflections

Space does not permit much detail regarding the individual responses given by these student teachers over the year. However, each of the student teachers, for various reasons and with varying degrees of confidence, employed a variety of pupil activities in their teaching. There was a similarity here with Haggarty's finding in her study of 10 PGCE students.

"In addition, although they allieamt to use a range of styles of teaching in the classroom, this in itself did not necessarily significantly alter their views about mathematics." (Haggarty, 1995, p.120)

Emma and Keith seem to have used an extended repertoire of teaching approaches from the perspective of wishing to raise pupil motivation. Both of these students introduced their own ideas and ideas from university sessions into the school placements. For example;

From a sample of Keith's lessons, the sources of pupil activity were reported as follows:

Own idea	50%
Pupil text	22%
Host department	28%

During these lessons a good range of activities and tasks was offered to pupils, including explanations, dialogue with the teacher, a multilink task to represent fractions, pupil text booklets, an investigation into colouring badges, a practical task to measure circle circumferences, using a software package to

reinforce number bonds, worksheets produced by the student, use made of OHP and board, practical task estimating coins in a stack, routine practice from pupil texts.

Emma had persisted with active learning approaches with her Year 8 Set 3 out of 4 despite having some class management difficulties;

"The main reason being to try to improve the pupils level of motivation."

In Week 30, for a lesson on angle properties of triangles Emma chose a practical task of cutting up paper triangle and rearranging comers. "It didn't go well due to the time of day and some individual pupils. The problems arose before the practical work, but I continued with it any way."

The fact that the host department was committed to use a range of teaching approaches may have been helpful in encouraging Emma to use them.

Tony used an extended repertoire of teaching approaches despite some opposition from teaching staff, again from motivational reasons, but also because he felt convinced that this would be more effective than the normal offering by the class teacher. Tony showed himself to be able and willing to take risks in his teaching career where other students were more cautious.

With a bottom set Y9 class Tony claimed to have been advised by the class teacher to use a very didactic and direct instruction-based approach with the suggestion that anything else would not work. However Tony did ask pupils to carry out some structured investigations into angle properties with sufficiently encouraging results to try out further exploratory work with the pupils. This is clearly a good development from the point of view of the aims of this study and so I asked why he had done this kind of work in the face of advice not to do so.

Tony claimed that "It was actually Paul [the class teacher] who said that spoon feeding the pupils was the way to go. I was met by [ironic] comments like "Good luck!" when I mentioned the idea of investigating. In some way this inspired me to go ahead. I wanted to succeed in some way to show Paul that it was possible, one just for self satisfaction and two so that he might try in future."

Quentin appeared to value the practice of using a wide variety of styles, but was often insecure in choosing these for himself and appeared reliant upon the scheme of work to suggest or require particular pupil activities. He nevertheless did introduce some of his own ideas to support the text-based material and some which were beyond the departmental scheme. This appeared to be when he felt confident in the

role of the activities to support pupil learning, rather than simply as an aid to pupil motivation. Quentin commented after the end of the course:

"At the beginning of the course we were shown activities without them being related well enough to topics, or shown where they would lead. I was not experienced enough at that stage to understand how to use them in the classroom. If we had looked at a couple of activities more rigorously before the first teaching practice I may have had more confidence to try them."

"I think my view of a teachers' role has not changed. Learning by discovery or experiment is more enjoyable and more memorable. I am more aware of the problems of control when trying to run a lesson of discovery. I would get more satisfaction from one successful activity - based lesson than a string of quiet, well controlled 'conventional' lessons"

None of the students explicitly related their use of teaching approaches to their beliefs about mathematics. Three were motivated themselves to use a variety of pupil activities by considerations of pupil motivation. The fourth appeared to use his choice of pupil activities more in relation to the mathematical content of the lesson.

Conclusions

This study supports the view that there is not a causal relationship between beliefs about mathematics and the student teachers classroom teaching style. Beliefs about mathematics do inevitably lead to a particular teaching style or to a narrow range of approaches.

The implication of this finding for my own teaching at Sheffield Hallam is quite significant. For many years the university tutor team had felt it appropriate to begin as early as possible to challenge student teachers beliefs and preconceptions in order to help the students to see the value of an extended repertoire of teaching approaches. Now it would appear that this might be inappropriate and unnecessary. Inappropriate because of the persistence of such beliefs despite our best efforts. Unnecessary because the student teachers did adopt a range of approaches despite holding different beliefs about mathematics. Some redesign of the course has now taken place to build upon concerns with class management and pupil motivation.

Future research will build upon, and test the links tentatively established here that:

- Concerns regarding class management leads to an interest in pupil motivation .
- Concern with raising pupil motivation leads to an increased repertoire of teaching approaches.

I feel that I have good reason to consider that this may be a more effective strategy than trying to tackle beliefs about the nature of mathematics, teaching and learning which have proved to be resilient in these individuals as well as in most research studies. It will be appropriate to reflect on what happens to student teachers' range of approaches once pupil management issues are largely resolved and are no longer a driving force for a variety of pupil activities.

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