COMPARING HUNGARIAN AND ENGLISH MATHEMATICS TEACHERS' PROFESSIONAL MOTIVATIONS

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In this paper I present qualitative analyses of interviews undertaken with English and Hungarian teachers of mathematics. One aim of the interviews was to elicit teachers' professional motivations – what were their subject-specific reasons for teaching mathematics? I frame the analyses against the altruistic, intrinsic and extrinsic motivational framework found widely in the literature before discussing its limitations and proposing refinements to highlight substantial differences within superficially similar sets of culturally located espoused motivations.

INTRODUCTION

A frequently cited reason for undertaking comparative education research is that "studying teaching practices different from one's own can reveal taken-for-granted and hidden aspects of teaching" (Hiebert et al., 2003, 3). In part this is because:

> teaching and learning are cultural activities (which)... often have a routineness about them that ensures a degree of consistency and predictability. Lessons are the daily routine of teaching and learning and are often organized in a certain way that is commonly accepted in each culture (Kawanaka 1999, p. 91).

Explanations for such routines draw on beliefs that cultures "shape the classroom processes and teaching practices within countries, as well as how students, parents and teachers perceive them" (Knipping 2003, 282), to the extent that many of the processes of teaching are so "deep in the background of the schooling process ... so taken-for-granted… as to be beneath mention" (Hufton and Elliott 2000, 117). Thus, it is probably not surprising that a substantial proportion of comparative mathematics teacher research has focused on explicating the mathematics teaching script (Andrews, 2007a; Hiebert et al., 2003; Stigler et al., 1999), with a number of other studies having investigated particular contributory factors. For example, text books have been scrutinised (Haggarty and Pepin, 2002; Pepin and Haggarty, 2001; Valverde et al., 2002), teachers' mathematical content knowledge has been analysed (An et al., 2004; Delaney et al., 2008; Ma 1999); as have teachers' mathematics-related beliefs (Andrews and Hatch, 2000; Andrews, 2007b; Barkatsas and Malone, 2005; Cai, 2004; Correa et al., 2008). However, a largely ignored field in comparative teacher research concerns teachers' motivations for their professional activity: what stories do they tell to warrant their roles as teachers of mathematics? This paper is a first explicitly comparative examination of mathematics teachers' professional motivation.

According to available evidence, teachers' professional motives fall into three categories: altruistic, intrinsic or extrinsic (Kyriacou and Newson, 1998; Kyriacou

and Coulthard, 2000; Moran et al, 2001; Andrews and Hatch, 2002), although recently Cooman et al (2007) have highlighted a fourth - interpersonal. An altruistic motive presents teaching as a socially worthwhile act related to a desire to facilitate the development of both the individual and society at large. An intrinsic motive includes, inter alia, a person's desire to work with children or their subject specialism, while an extrinsic motive pertains, for example, to salary, conditions of service, holidays or status. Lastly, interpersonal motives refer to "social interactions commonly present in a teaching job" (Cooman et al, 2007, p. 127). An individual's personal motivation to teach is likely to be an amalgam, in varying proportions, of these factors (Moran et al, 2000) although there is evidence that preservice teachers in developed countries are motivated by both intrinsic and altruistic factors, while in developing countries extrinsic motivations (or mercenary) appeared more prominent (Bastick, 2000). Indeed, in respect of the former, intrinsic motives appeared dominant for preservice teachers in the US (Serow and Forrest, 1994) Greece (Doliopoulou, 1995), England (Reid and Caudwell, 1997; Priyadharshini and Robinson-Pant, 2003; Whitehead et al, 1999), Northern Ireland (Moran et al., 2000) and Australia (Manuel and Hughes, 2006).

In respect of the professional motivations of mathematics teachers there is little research (Reid and Caudwell, 1997). In respect of the UK, students following a post-graduate mathematics teacher education programme were less intrinsically motivated than those of other subjects, showing, in their greater enthusiasm for teaching as a good career, a more extrinsic perspective (Reid and Caudwell, 1997). Also, in contrast with mathematics undergraduates, who privileged intrinsic factors such as being able to use their subject knowledge or working with children (Kyriacou & Newson, 1998), post graduate teacher education students were less enthusiastic about sharing their knowledge, continuing their subject interest, improving children's life chances than their non mathematical colleagues (Reid and Caudwell). In terms of serving teachers, Andrews and Hatch's (2002) study showed that few people espoused either altruistic or extrinsic reasons, with most citing motivations intrinsic to either mathematics itself or teaching as a profession.

In sum, the totality of the above highlights the extent to which the tripartite framework has been used in different research contexts. However, with so little comparative work, and with most studies drawing on different instruments, we know little about the extent to which it adequately represents the motivations and beliefs of teachers in different contexts. In this paper we examine this issue by means of an initial comparative examination of mathematics teachers' professional motivations.

METHOD

Many of the studies cited above used survey approaches to explore teachers' motivations. Of these, many exploited factor analytic techniques to identify or confirm, depending on the type of analysis, motivational constructs. However, such approaches rely, essentially, on predetermined categorisations of motivation and may

miss not only subtle variations within the three dimensions but, importantly, components hitherto unconsidered. In this paper we attempt to let teachers tell their own stories and, to do so, look to narrative research. Narrative research is of interest due to its "potential to access the research subjects' voices and to offer deeper, sensitive and accurate portrayals of experience that have escaped positivist quantitative research and less sensitive, objectivist qualitative research" (Swidler, 2000, p. 553). It "is probably the only authentic means of understanding how motives and practices reflect the intimate intersection of institutional and individual experience in the postmodern world" (Dhunpath, 2000, p. 544). Narrative researchers believe that teachers construct stories to make sense of their professional world (Swidler, 2000; Drake, 2006). That is, stories, "as lived and told by teachers, serve as the lens through which they understand themselves personally and professionally and through which they view the content and context of their work" (Drake et al. 2001, p. 2). Moreover, "these stories are subject-matter-specific and may differ greatly from subject to subject" (ibid).

With this in mind, 45 teachers from two regions of England, and 10 from Budapest, Hungary, were interviewed in the months following a questionnaire study of their conceptions of mathematics and its teaching. In both countries colleagues were drawn from a variety of institutions, which, as shown by various indicators, were representative of state schools in the different regions. The interviews, which were intended to elicit details about informants' professional life histories, were semi-structured and invited colleagues to describe how their careers had developed and to discuss the key episodes, "critical events" (Woods, 1993) or "critical incidents" (Measor, 1985) that had informed or transformed their professional lives. In order to frame their stories, colleagues were invited, fairly early in their interviews, to explain why they had decided to become teachers before being asked to consider the place of mathematics in the curriculum and their personal justification for both its curricular inclusion and their teaching it. Interviews, which were conducted in colleagues' schools, were tape-recorded and transcribed. Transcripts were posted to them for agreement as to their content although not one was queried. The method of constant comparison (Glaser and Strauss 1967, Strauss and Corbin 1998) necessitated that transcripts were read and re-read to identify categories of response. As new categories were identified, previously read transcripts were re-read to see whether or not the new category applied. The two sets of data, English and Hungarian, were analysed separately to ensure that culturally located differences were not obscured.

RESULTS

The reader is reminded that this paper draws on, in many cases, informants' recollections of events of many years earlier. Thus, it is not improbable, particularly acknowledging the temporal shift between events, that for some teachers, recollections concerning decisions about career choice may have been vague and romanticised. In particular, it is not improbable that recollections drew on colleagues'

affective responses to the profession which had dominated their lives. In some cases, but clearly not all, these would have been positive and, possibly, a little heroic. Consequently, some caution should be exercised when interpreting informants' utterances. In the following, all names are pseudonyms. Due to constraints of space, only a partial analysis is reported, which draws on the same three substantial categories of response that emerged from the data of each country. These focused on personal pleasure, the extrinsic properties of mathematics and the intrinsic properties of mathematics. These were not exclusive categories with most teachers alluding to at least two of them.

English teachers: Personal pleasure

Twenty seven English teachers indicated that their professional motives were located in the pleasure they gained from working with students. Jane, typical of most, described an enjoyment located explicitly in their students' mathematical success. She said:

> I just enjoy teaching it (mathematics)… I can't explain it. I enjoy teaching it. I enjoy watching children who can't do maths suddenly discover they can add up. You know, children for whom it's not made sense all of a sudden this…"Oh that's why it works", "Oh now I understand". And I think it's that, and it doesn't matter what level that is. Whether it's down at the bottom end or it's up at the top end, it's that discovery that it works. That's what I enjoy doing. I enjoy seeing children make that leap. Sometimes it happens more often than others; with some children it's very slow, you know, the understanding, but when it comes it's like light dawning and they're so pleased and I think that's what it is.

For the others, like Hazel, their pleasure seemed less altruistically focused. She said:

> I think I would always have ended up as a teacher. I loved being around little kids when I was a child… I'm a maths teacher because that's what I was good at and if I'd been good… at… French then I think I would have been a French teacher.

English teachers: Extrinsic properties of mathematics

Forty-two teachers commented that they were teaching mathematics to prepare students to manage successfully a world beyond school. The explicit foci of these comments varied but the underlying message was essentially the same; a child who cannot understand mathematics would struggle to make sense of the *real world* or *everyday life*. James commented:

> I feel that maths is a tool and that if students… are to be fully prepared for what the modern world is to throw at them... I think that it's very important that they are... able to handle all the things that can be thrown at them.

For others this was explicitly linked to employment. Jack, who had previous work experience in cotton mills and council offices, suggested that:

> It's there all throughout isn't it? I mean, at basic levels, the practical jobs, measurement and things like that through to, yes, obviously people want to be well qualified to go on and do, you know, industrial engineers or civil engineers, work that involves high powered mathematics as well.

Susan indicated yet another utilitarian perspective. She said that:

> I think my main reason for supporting maths is because I think it's a support subject for other subjects as in you can't take your science or computers nowadays or anything further, if you, if students want to, without a basic knowledge of maths. So you can't do a lot of things further and develop knowledge that way. So I see it being a support subject for other subjects.

English teachers: Intrinsic properties of mathematics

Fifteen teachers offered statements indicative of their justifying their teaching of mathematics as a consequence of its intrinsic properties. Jean commented that "I always got a… buzz out of solving particular problems…especially when you've worked on them for quite some time. And so it's that enjoyment of the subject that I like to try and put across to children". Judy, in addition, discussed wanting her students to become critical thinkers:

> I want children to feel the need to solve a problem. I give them the skills and help them to think through how to achieve that, even if it's a very, very simple idea, I always give them a reason why… I always say, don't ever be satisfied with well that is how it is, always ask and if I can't give you a reason then I should go away and find you a reason because I won't expect you to believe it just because I say so.

In similar vein Frank, discussed his belief in the importance of mathematical reasoning. He said that "the one area of maths that I really enjoy working with students is, is trying to get them to explain things, I suppose, explain, justify, prove along some sort of continuum there".

Hungarian Teachers: Personal Pleasure

Eight of the ten Hungarian teachers talked about pleasure gained from their professional activity. For the most part, this drew on students' mathematical successes. Vera commented that, "It feels good to teach the children to think", although most indicated that their pleasure derived from their students understanding of mathematics. Emese, for example, said that when "I tell them something new…and although they would probably have learnt about it without me, not only do they know it but they also understand it".

Two teachers located their comments on student understanding within the domain of problem solving. Ilona commented that:

> I would like my students to understand and think about smaller or bigger problems in mathematics with joy... And I think it's the greatest thing in the world that I can teach mathematics because it's a fantastic way for educating children... when I see twenty kids

> sit down and think and wrinkle their foreheads, and they put their heads in their hands and they turn the small wheels around until they get to some solution independently.

Hungarian Teachers: Intrinsic properties of mathematics

Every Hungarian teacher commented in ways indicating that, for them, mathematics possessed important and, essentially, intrinsic qualities. Emese noted that "students have to see that in mathematics you have to think logically". Robert, expressing a similar theme, commented that "it is important that a child learns a particular thinking scheme and can solve problems with this method… how you can make a child to become a thinking child".

At an explicitly philosophical level, Eva commented that "I like to quote an aphorism which more or less determines my life. Leonardo said *mathematics is the most important tool for understanding the truth everywhere and in everything* and this is my philosophy" while Robert added that mathematics "was a spiritual adventure and this was what attracted me so much (to the teaching of the subject)".

Unlike the English data, three intrinsic subthemes emerged from the analysis. These concerned mathematics as problem solving, mathematics as a connected body of knowledge and mathematics as experientially learned.

Mathematics as problem solving

Nine Hungarian teachers discussed the importance of problem solving in their conceptualisation of mathematics and its teaching. Vera, outlined a view that teachers should alert students to

> ... certain types of problem which come up again and again …, they should know the typical problems that they have to go through. And then it's also good if there are problems, we give them problems, which don't have completely unique solution so they should find them in other ways.

Emese, in addition, acknowledged the affective domain as part of the problem solving experience. She commented that:

> We should teach them how to recognise the problem, develop ideas for the solution, put them into a logical order, and this way you reach the solution… The most beautiful and simple thing in the world is when you solve a problem and you realise that you were able to solve it…It can help you with a little more self confidence too.

Mathematics as a connected body of knowledge

Five teachers commented explicitly on mathematics as a connected body of knowledge. Rita, talking about number theory and geometry, commented that:

> Within number theory, for example... you can take the numbers apart. Think of numbers and how they are built up. This building up is very important. And with other topics too, in geometry it's important to be able to build up things… This taking apart, building up, and often the building up is at least as important as taking apart.

Robert offered a more abstract perspective, commenting that "mathematics is built in such a way that it states certain things and it calls them *axioms* or *statements* which are considered as true and then I start to build up something and I wonder how far you can get from it".

Mathematics as an intellectual challenge

Five alluded to mathematics as an intellectual challenge, something for which learners should expect to struggle. Eva commented that students:

> shouldn't get everything ready-made but should have to look for the truth, to search for it. I mean it's more the research than the experience. I, for example, like geometry very much when they have scissors in their hands and they're folding and cutting papers and getting experiences… Still you can research to look for different solutions. We get to the same truth in different ways.

Kati, commented in similar vein, that children should experience the "joy of research… I think that one of the most important things is that children should be brave and should be able to get close to an unknown problem. And it's also very important that this love of adventure shouldn't be spoilt by me". Zsolt, commented that "they have to get experiences. No matter what topic of mathematics they're learning, they should get as much experience as possible".

Hungarian Teachers: Extrinsic properties of mathematics

Five teachers commented explicitly that mathematics provided key skills for a world beyond school. Vera noted, briefly, that it "has an influence on their whole life; the rational way of thinking", while Ilona said:

> I think we teach mathematics to help children find their way in life more confidently. Whatever they become, a cleaning lady, a banker, a doctor or anything... mathematics is a logical skill. Facts and things thought over a logical way will help them make their way more confidently.

In similar vein Emese commented that children "should be able to calculate the change in the shops and I want them to understand all it's good for in everyday life… I think they have to see that mathematics is about life", while Rita said that it's "good if they can count. If they can look through how much is how much. Estimating is very important... I always say, you cannot read a book if you have to think about each letter".

DISCUSSION

The above, albeit limited, results show that when located alongside their subject specialism, teachers of mathematics in England and Hungary report intrinsic motivations, although the three categories of response comprise embedded altruistic, intrinsic and extrinsic characteristics respectively. Thus, on the one hand, it could be argued that English and Hungarian teachers of mathematics present similar subject-related professional motivations. On the other hand, the widely differing proportions

of teachers reporting these categories indicate something profoundly different. Of course, the differences can be explained against a variety of cultural frameworks. For example, the dominance of the mathematically intrinsic motivations of Hungarian teachers and mathematically extrinsic motivations of English teachers reflect the underlying rational encyclopaedist and classical humanist traditions of Hungary and England respectively (Andrews and Hatch, 2000). But such explanations offer little by way of highlighting differences other than in the frequencies of the three dimensions. Therefore, the following is a tentative revision of the framework drawing on notions of rhetorical and warranted motivations.

Firstly, in respect of mathematically altruistic motivations, English teachers talked, in an unspecified manner, of motivations linked to mathematical understanding, while their Hungarian colleagues spoke of understanding-informed mathematical thinking and problem solving. Thus, on the one hand, around half the English sample presented rhetorical altruistic mathematical motivations, while, on the other, almost all the Hungarian teachers articulated a warranted altruistic mathematical motivation. Secondly, in terms of mathematically intrinsic motivations, English teachers tended to articulate a perspective concerning problem solving and the logical skills necessary to solve them, while the Hungarian teachers presented a variety of perspectives concerning not only problem solving but also the structural properties of mathematics and the intellectually challenging nature of the subject. Thus, the English teachers presented a weakly warranted, almost rhetorical, intrinsic mathematical motivation when compared with the Hungarian teachers' robustly warranted intrinsic mathematical motivation. Thirdly, in respect of mathematically extrinsic motivations, almost every English teacher and half the Hungarian teachers discussed mathematical success as a necessary prerequisite for employment or the learning of other subjects. In this regard, both groups of teachers presented a moderately warranted extrinsic mathematical motivation.

In summary, the qualifiers of rhetoric and warrant allow us to distinguish between the two sets of motivations and understand more fully the ways in which mathematics teachers' professional motivations are products of the cultures in which they live and work. A speculative conclusion would be that while both sets of teachers present a moderately warranted wider-world (extrinsic) justification for the teaching of mathematics, the English tend towards rhetorically-based motivations while the Hungarian tend towards warranted motivations.

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