Abstract This paper considers the nature of mathematics classrooms as communities of practice and the social practice of teacher questioning. Theories of participation in situated practices are a rich way to understand the way in which cognition and learning are social. However, on their own they do not enable us to understand all that happens or is experienced in classrooms. In particular, the concept of an individuals 'life-world' is helpful in understanding classroom interactions. I present material that resulted from research with a class of eleven and twelve year old students in the UK. I discuss the students' experience of different teacher questioning strategies and their response to them. By highlighting features such as authority, diversity and conflict, I suggest that mathematics classrooms can be seen as communities of political practice. Introduction The central aim of this paper is to contribute to a theoretical understanding of the nature of classrooms as communities of practice (Lave and Wenger 1991; Wenger, 1998). Theories of participation in situated practices have been a rich way to understand the way in which cognition and learning are social. Theories of participation give ontological and epistemological priority to action, they focus on what people do, but we are more than what we do. If we want to understand why we do what we do and how we experience our actions and those of others as meaningful, then other theoretical frameworks need to be drawn on and theories of social practice need to be complemented by other perspectives. An important theoretical tool, both in my interpretation of interview material and in the theoretical framework of the paper, is the concept of 'life-world' (Ashworth 1997). Considering each student's life world means more than thinking about their individual experiences of the social practices of the classroom, rather it asserts the personal truth of each participant's situation. Thinking about students' perspectives on classroom interactions as giving insight into their life worlds is worthwhile for a number of reasons. Methodologically, it means listening to the students as credible informants. Theoretically, it allows us to make sense of the complexity of the classroom, the way in which there is one class but many worlds (Roth et al 1999). Politically, accepting the validity of individuals' life worlds is congruent with a commitment to 'deep democracy' (Mindell 1995). However, I am not attempting a theoretical synthesis of theories of social practice and the concept of the life world; they have very different philosophical foundations that do not easily speak to each other. Rather, I am using both as maps that can help us to understand the same landscape; one helps to map the way in which meaning is constructed and the shared, the other the way in which it is individual and the diverse. My focus here in this paper is on teacher questioning of students. Teacher questioning is a frequent, universal, and pervasive practice in school classrooms (Roth, 1996, page 710). The way teachers and students interact through questions both typifies and is productive of the fuller range of classroom practices. And so offers insights into the nature of these social practices. In addition, the way in which students experience different forms of teacher questioning has not often been reported on. The unreflective use of questions and some of the forms the practice can take has been criticised both on grounds of its effect on learning (Dillon, 1985; Dillon, 1988) and on the children' affective experience of mathematics (Anderson, 2000; Anderson and Boylan, 2000). One of my assertions in this paper is that mathematics classrooms are communities of political practice. My concern here is not with the 'big' politics of mathematics education. This 'big' politics is concerned with what aims and values are being promoted by policy and practice, what ideologies inform them, which social groups benefit and how does mathematics education help to maintain and regenerate society. There is another way in which education can be viewed as political and that is at the level of the interactions within each individual classroom community. The construction of politics at the level of society as a whole develops due to conflicts over elements such as scarce resources, different interests, and different worldviews of members of society. Similar factors cause such classroom to be a political arena. Paying attention to this 'small' politics is not simply about examining the ways in which policy, ideology and so on can be found in, and affects, individual classrooms. It is also about the politics that is produced within the individual community. For example, the big politics of gender relationships and identities are participated in constructed within classrooms; the relationships between the genders are political. So also are the relationships within the gender groups between different individuals. The labels 'small' and 'big' should not be taken to indicate the relative importance of these two arenas. Indeed arguably it is at the level of the 'small' that individual teachers, researchers and students have the most opportunity to act politically. There is a relationship between these two levels of politics. This is a dialectical one in which connections to each individual classroom is a reflection of, and framed by, what happens at the level of policy and ideology. However, in this paper I am primarily concerned with using a political lens to understand the individual classroom community1. Research material To illustrate my claims I draw on material collected during an extended research project. The project was part of wider exploration of the nature of community within classrooms and an investigation into some of the limits and possibilities for transformation in secondary mathematics classrooms in the current UK context. I worked closely with a teacher of mathematics, Jill, in her first year of teaching. We focused particularly on two of her classes. It is material from interviews and observation with one of these, Seven B, which I present here2. Seven B, a grade six class, were in the first year at secondary school at the time of the project. The school they attended, South School, is a large 11–18 school in London. Students' attainment is near national averages. Students come from a wide range of ethnic backgrounds and there are a significant proportion of refugee children and whose home language is not English. The school has a gender imbalance with significantly more boys than girls. The composition of Seven B reflected the diversity and composition of the wider school population, with thirteen different ethnic backgrounds represented within the class. Approximately two thirds of the students were boys and one third girls. Year seven children are taught in mixed ability classes. Research into different types of classrooms has tended to focus on paradigmatic cases. However, many classrooms share features of different typical cases (Boylan, Lawton and Povey 2001). This was true of Jill's classroom in which features of both more traditional and more inquiry-based practice could be found. However, questioning usually followed the common form of initiation, response and evaluation (Mehan 1979). During the year, Jill attempted to enact more open and democratic practices. In particular she explored alternatives to children answering by putting their hands up and the teacher choosing who answers. The students' experiences of real or imagined questioning practices were one of the subjects of the interview material presented here. For further details of the research methodology see Boylan (2001). Asking and answering questions and authority in the community John, George, and Dave are ranking statements about possible situations that might occur during teacher questioning. The first dimension they have been asked to consider is how often the different events occur 'during their lessons and to put those that happen most often at the top and those that happen least at the bottom. John: [Ranks] "The teacher does not ask questions", that would be in Australia, way down George: Maids Vale [...] Dave: Plain John: Canada For these boys the idea of a teacher who did not ask questions of the class is almost unbelievable. It is so far removed from their experience that the physical metaphors they use are places on the other continents, the opposite side of the world, the far reaches of the solar system and somewhere just as far away, 'Maids Vale'3. The students' responses confirm the universal nature of teacher questions within their life worlds. All the other groups of students ranked 'the teacher does not ask questions' in a similar place. Although the students did and could ask questions, questioning by students has a different purpose. Susan: "we get to ask the question", so we never do Jenny: exactly that's right at the bottom [tone of complaint] Kerry: we get to ask the question [scrutiny or wondering tone] Jenny: well sometimes like today we finished a b and c, we went down to the bottom and done like your own way that's like asking your own questions [referring to that day's mathematics lesson]…The only time we get to ask questions is if we don't understand, the only time like [to] ask what kind of thing is this because in like the teacher's job to do that is show us how do everything. 'The teacher's job is to show us how to do everything' and to ask questions to ensure that the students know how to do it. The student's role is to answer questions and to 'do it'. When knowledge is viewed in this way than the holding of it confers authority on the holder. Given that it is almost taken for granted that the teacher has a monopoly on being the questioner, the means by which students can establish their authority is by answering questions. The students' purposes within Seven B, when asked about their responses to questioning practices were often connected to status and authority and not to mathematical learning. Here, we see an example of the ways in which participation can link a lack of mathematical engagement (Dreyer et al 2001). Within Seven B participation in teacher questioning practices often related to status and authority. Asking and answering questions is a means by which authority is claimed, established, and contested. If we wish students to have greater mathematical authority, it means that control over interactions must be more equitably shared. An obvious way to do this is to encourage students to ask meaningful questions. Interestingly, when asked what would be more helpful to their learning, the students incurably indicated asking questions. However, this was also the possibility that they were most nervous about. It has been found that asking questions can lower your mathematical status in small groups (Ivey 1997). There is then an asymmetry with respect to authority and questioning for teachers and students. When a teacher asks a question it is an assertion of their knowledge and authority. When a student asks a question it indicates a lack of knowledge and may diminish their authority. A fear of this, as well as the unknown and unusual nature of the practice, may lie behind the students' anxiety. There is a diversity of life worlds, identity, and interest. The political nature of classroom communities is brought out more fully when the diversity within the class is considered. The children's life worlds mean that they have different interests in the way teacher-student interactions are conducted. I illustrate this with four students by briefly describing aspects of their identity, position, and role within the class and view of teaching and learning as summarised from interviews and observations, and relating this to their preference for how students should answer. Nikita Nikita's family are recent migrants from Eastern Europe. Conversations and interviews with her reveal a strongly expressed belief in the importance of education that she shares with her family. Nikita believes that the role of teachers is to explain well, and for students to listen properly and to work hard. She finds mathematics lessons easy and often unchallenging. During teacher questions Nikita rarely volunteers to contribute although she does not find teacher question a cause of anxiety. As she is confident of her mathematical ability she does not seek status by answering. Sometimes, rather than appearing to pay attention to the teacher during questioning she continues to do another task. Nikita accepts that it is part of the teacher's role to ask questions but within her life world such times are a delay to being able to start written exercises. She wants the teacher to exert control so that the ritual of asking questions can be gone through as quickly as possible and she has no sympathy for others who feel anxiety and want to have time to discuss answers. "I think it's better if someone just ask questions and picks someone" Susan Susan is from a white English family. She finds mathematics difficult and she began the year uncertain about her ability. Her relationship with the teacher is central to feeling secure about engaging mathematically. Susan too prefers exercises. Often she will receive individual support from the teacher or another student before starting the exercise but once she is clear about what she is expected to do she prefers not to be interrupted. Susan is very sociable and interacts with many of the other members of the class. She is a frequent protagonist in argument with boys in the class who, due to their genuine numbers and loudness, tend to dominate interactions. Susan wants to be involved in teacher question interactions. However, teacher questions are a source of anxiety, a wrong answer risks being laughed at4: "…and then you get all, you just get all giggly [angry and upset sound] and the teacher tells them to stop" For Susan the fear of embarrassment means that for her the situations that make her most nervous and those that she finds least helpful to her learning are the same. So when asked to select the situations that were least helpful she responded: "The one when we write it down and the teacher tells us instead of us getting embarrassed when we put up our hand" In addition, Susan talked favourably about a new strategy that Jill had introduced in which students displayed their answers simultaneously. This indicates the cause of embarrassment is not having to respond publicly in itself, but rather having to respond individually in a public way. In addition these means of answering would mean that there would be more time to arrive at an answer so: "you don't get cut off like, where there's brainy people and they like know the answer, and when you go to get them [answers] they just cut you off and tell you the answer when you could have tried" Lee Lee is an Afro-Caribbean student. Education is important to his family and this is a motivating factor at school. Success in tests is primarily about making his family proud. He finds mathematics uninteresting and sometimes difficult. Lessons are an opportunity to socialise. He is part of a group of other boys who spend a good deal of time interacting with each other during mathematics lessons. They communicate by means of "making notes" through tapping or drumming on tables. The teacher frequently tells Lee off or spends time trying to get him to work. During teacher questions Lee socialises with wherever he is so not to be seen by the teacher. Lee usually does not want to have to respond individually but to have the opportunity to discuss with a peer before answering so that he can be part of a: "Team" John John is a white English boy. He finds the mathematics in lessons easy and is often bored. Sometimes he is interested and responds in the way the teacher wants. During other lessons he spends time talking the person he sits next to. John is cynical about the world in general and teachers in particular. Teachers and the world are waiting to trip him up. He has a world-weary humour that belies his age of eleven years. He does not like the teacher choosing who answers without the students showing that they want to answer: John: When she asks you for an answer and everybody in class knows it except you, she'll pick you! MB: How does she know, how does that happen? John: I don't know why. Some things happen like that. Like if you've got a bunch of money in your hand like a pound and a five p you'll obviously drop the pound it just works like that Like Susan the risks of being shown not to know are being laughed at or being embarrassed. John's strategy in mathematics lessons is to choose when he engages in activities. Often he does not listen to the teacher's questions. If the teacher picks a student to answer he may be caught out and gives that part of his status in the class is based on generally being able to answer correctly, this social practice is one he dislikes. Sometimes John does participate in teacher question interactions. However, he is as cynical about the teacher's motivations as the way the lines conspire against him. "If you're like that [raises his hand, leans forward in an eager pose] and you really want to answer it, they look at you and then start looking at everyone else." John is very concerned about fairness, for him the fairest way is for the students to take it in turns. Answering questions for John is not primarily about contributing to a process of learning mathematics but about status and identity. There are some questions he really wants to answer; these tend to be the more challenging ones. If students took it in turns to answer then John would be able to continue with his socialising Nikita, Susan, Lee and John have four different preferred means of answering questions. Other students responded differently. For example George and Dave suggested an approach where the teacher allowed every person with their hand up to answer, even if they gave the same answer as the others, before giving an evaluation at the end. Here they take John's concern about fairness further; everyone with an answer should be allowed to speak. Even where students shared a preference, they often did so for very different reasons. These different responses arise from different life worlds. In each classroom there is an incredible diversity of identity and interests. Nell Nodding suggests that the mathematics classrooms should be politicised (Noddings, 1993). By this she means, in part, transforming them into sites within which students can practice the responsibilities and rights of citizens and so exercise some control over the social practices. The diversity of life worlds present in classrooms indicate some of the reasons why this is a difficult project for teachers to undertake. Students have very different ideas of what classrooms should be like and very different needs and desires. Moreover, there is a tendency for all of us to believe that the life world of others is very similar to our own. Note how Susan writes above of "us getting embarrassed". My interpretation is that Susan believes she is speaking on behalf of the rest of the class or perhaps her interview group, but such enhancement is widespread but not universal in the class as a whole and not even shared by all in her interview group. A recognition of the diversity that exists in a classroom community over a very specific practice such as how should questions be answered helps to reconceptualise the nature of democratic classroom practice. There is no universal ideal that the teacher can implement that will accord with the desires or needs of all. Rather the teacher has the challenge of finding ways of facilitating dialogue between the different life worlds within the community. From this perspective, democratic practice is concerned with creating the conditions for the opening of horizons of understanding (Gadamer 1975) between members of the community. Diversity in classrooms combined with a scarcity of resources leads to conflict in the context of teacher questions, the most important resource is the teacher. It is the teacher who decides what is asked and who answers. Status gained by answering correctly is gained through the teacher, thus the teacher's attention is important. A second resource that is very limited is 'the first right answer'. Once an answer has been given to a closed question then the interaction is over. In Seven B there was frequently competition to answer first. This could lead to students, mainly boys though not exclusively, 'shouting out'. Early on in the year Jill noted that for many boys it seemed more important to be the one to answer rather than necessarily being correct. Within conflict over the teacher's attention may be inevitable in classrooms it is increased when teacher questions are about being right or wrong. It is not enough for some that they are right, some others must be wrong: "If everyone had the right answer it's not going to be fun" Particular circumstances within Seven B meant that the many of the students' emotional responses about not being chosen were frequently displayed. It remains an open question as to whether the social practices around questioning are similar in other classrooms, although similar behaviour on the part of boys have been reported previously (Zevenbergen, 1999). However, even in classrooms where the surface features are calmer, students will still be experience this competitive aspect5. In addition to the competition between individuals, conflict also occurred between groups of students within Seven B, most notably between boys and girls. This again is a reflection of and helps to create different life worlds. Some of the boys complained of the girls getting preferential treatment. Whereas the girls felt that boys were asked more because they would not listen. In Jill's life world she was acting fairly. In terms of what constitutes the community of practice within the classroom all the interactions and conflicts between participants situated within their different life worlds are important. Communities of political practice It is my contention that in order to understand how and why participants' act in the way they do within classroom communities, the micro-politics of the classroom must be considered. In addition such an analysis helps to make closer the political nature of communities of practice more generally. Classroom communities of practice are political in the following ways: They are communities in which individuals or groups hold authority and status that is more or less equally shared and may be contested. There is a diversity of life-worlds, identity and interests. This diversity, combined with a scarcity of resources, leads to conflict. This paper has focused on conflict and diversity. There are other more positive features of political life such as agreement, consensus, shared experience and purpose, respect for diversity or mutuality, empathy and solidarity. These can also be found within the interactions that constitute the social practice of teacher questioning, although I have not had the space to develop these themes here. I have also not been able to indicate the ways in which the process of opening dialogue with the students about their experiences changed classroom practices. The students (and teachers) who participate in communities of practice inhabit life worlds that are formed beyond the individual classroom and bring with them practices from other communities they are part of. This creates boundaries that limit and format the type of practice that occur. However, social practices found within classrooms are also partly the product of the micro-politics of the communities of practice. This means that there is space to act within the boundaries and gives the possibility of transformation through dialogue. Reference
ADDIN EN.Refs
Anderson, J. 2000, "Teacher questioning and pupil anxiety in the primary classroom." British Educational Research Association Conference, Cardiff University, 7–10 September, 2000. Anderson, J., and M. Boylan. 2000. "The numeracy strategy, teacher questioning and pupil anxiety." British Society for Research into the Learning of Mathematics, Loughborough, 2000. Ashworth, P. 1997. The variety of qualitative research, part two: Non positivist approaches. Nurse Education Today: 259–224. Boylan, M. 2000 "The politics of teacher questioning" British Educational Research Conference, Leeds University 13-15th September 2001 Boylan, M., P. Lawson, and H. Povey. 2001. "I'd be most likely to speak in class if..." some students' ideas about increasing participation in whole class interactions." 25th Conference of the International Group for the Psychology of Mathematics Education, Utrecht, Netherlands, 2001, pp. 201-208 2. Danaher, G., T. Schirato, and J. Webb. 2000. Unforlearnding Foucault. London: Sage. Dreyer, H., M. Askew, M. Brown, and V. Rhodes. 2001. "Pupil participation in 'interactive whole class teaching'" 25th Conference of the International Group for the Psychology of Mathematics Education, Utrecht, Netherlands, 2001, pp. 337-344 2. Dillon, J. 1985. Using questions to foil discussion. Teacher and Teacher Education 1:339-121. Dillon, J. 1988. Questioning and Teaching: A Manual of Practice. London: Croom Helm. Foucault, M. 1995/1975. Discipline and Punish: the Birth of the Prison. New York: Vintage. Gadamer, H.-G. 1975 Truth and Method. London: Sheed Ward Hardy, T. 2000. "Thinking about the discursive practices of teachers and children in a 'National Numeracy Strategy' lesson." 24th Conference of the International Group for the Psychology of Mathematics Education, Hiroshima, Japan, 2000, pp. 33-40 3. Hardy, T., and T. Cotton. 2000. "Problematizing culture and discourse for mathematics education research tools for research." Second International Mathematics Education and Society Conference, Monteichoro, Portugal, 2000, pp. 273-280 1. Ivey, K. 1997. "Waiting: Asking questions may lower your mathematical status within groups." Nineteenth annual meeting: Psychology of mathematics education, North America (PME-NA XIX), Ohio State University, 1997, pp. 619-625 2. Lave, J., and E. Wenger. 1991. Situated Learning: Legitimate Peripheral Participation. Cambridge: Cambridge University Press. Mehan, H. 1979. Learning Lessons: Social Organisation in the Classroom. Cambridge, MA.: Harvard University Press. Mindell, A. 1995. Sitting in the Fire: Working with Conflict and Diversity. Portland, Lao Tse Press Noddings, N. 1993. "Politicizing the mathematics classroom," in Math Worlds: Philosophical and Social Studies of Mathematics and Mathematics Education. Edited by S. Restivo, J. P. Van Bendegem, and R. Fischer. Albany: SUNY press, Roth, W.-M. 1996. Teacher questioning in an open-inquiry learning environment: interactions of context, content and student responses. Journal of Research in Science Teaching 33:709–736. Roth, W.-M., S. Bouniaev, C. J. McRobbie, and K. B. Lucas. 1999. One class, many worlds. International Journal of Science Education 21:59–75. Shulman, J. (1991) "Revealing the mysteries of teacher-written cases." Journal of Teacher Education 42: 250–262. Wallerstein, V. 1988. The Mastery of Reason: Cognitive Development and the Production of Rationality. London: Routledge. Wenger, E. 1998. Communities of Practice: Learning, Meaning and Identity. Cambridge: Cambridge University Press. Zevenbergen, R. 1999. "Boys, mathematics and classroom interactions: the construction of masculinity in working-class classrooms." 23rd Conference of the International Group for the Psychology of Mathematics Education, Haifa, Israel, 1999. First published as Boylan, Mark. (2002). "Teacher questioning in communities of political practice", paper delivered at The Third International Mathematics Education and Society Conference (MES3), Helsingor, Denmark, 2002 1, 182-191. 1 One way of approaching the relationship between the 'big' and 'small' politics of the mathematics classroom is through a post-structuralist perspective (Hardy, 2000; Hardy and Cotton, 2000; Walkerdine, 1988). Drawing on Foucault, Tansy Hardy points to the way in which relationships of power between individuals are present in classrooms which are arenas in which power and knowledge are inextricably linked (Hardy, 2000). In this paper I avoid referring to 'power'. I find Foucault's conception of power problematical and not easily related to theories of social practice that have different philosophical roots. A discussion of this relationship is beyond the scope of this paper. However, Foucault's attention to the ways politics is expressed through and about the body, see (Simons, 1995; Foucault, 1995/1975; Danaher, 2000) and is a productive source for understanding the physical expression of interactions resulting from teacher questions, in particular the issue of surveillance. Again this is beyond the scope of this paper as here I am not largely concerned with observational material. My aim in this paper is to indicate ways in which teacher questioning of students is experienced and appears as political rather than to discuss the nature of what it is for something to be political.2 All names naturally are pseudonyms 3 For those not familiar with London's geography Maids Vale is a suburb of London. The boys humour is indicative of the way in which students laugh at each other if they get an answer wrong. 5 Of course it is not simply classroom communities of practice where micro political struggles happen over who speaks and when. Such situations occur in meetings, seminars, family dinners … and many more occasions.