Negotiating identity in the community of the mathematics classroom

Hannah Bartholomew, King’s College, UK

This paper reports on a study in which the impact of ability grouping practices on students’ achievement in, and attitude to, mathematics is being investigated. Based in six schools, our work has sought to illuminate these issues through an examination of the learning environment as a whole, rather than try to focus in on specific aspects of students’ experiences. In relating students’ attitudes to, and attainment in, mathematics to the processes taking place within their mathematics classroom, this work has exposed the complex interplay between pedagogy, the grouping practices of the school and individual learning style. In this paper I shall examine these issues through a consideration of the ways in which notions of mathematical ability are constructed and ascribed, and of the implications for students in terms their perceptions of themselves as learners of mathematics, and of what it means to be successful at the subject.

The study

The study on which this paper is based has tracked the progress of students in 6 schools from year 8 until they took their GCSE exams this summer. The schools are all non-selective state schools in and around the London area, but have widely differing student populations in terms of social class and ethnicity. Students’ attainment at GCSE ranges from the upper quartile to the lower quartile nationally. Five of the schools are mixed and the other is a girls’ school. Table 1 summarises these details for the six schools.

School	mixed/single sex	% 5 A*-C	SES and ethnicity of students
Alder	mixed	47%	mainly white, middle and working class
Cedar	all girls	42%	mainly Asian and working class
Firtree	mixed	74%	mainly white and middle class
Hazel	mixed	40%	ethnically diverse, middle and working class
Redwood	mixed	13%	ethnically diverse, mainly working class
Willow	mixed	41%	mainly Asian and African-Caribbean, middle and working class

Table 1: Background information on the schools in the study

At all six schools, students are grouped according to their ‘ability’ in mathematics by the time they are in years 10 and 11, though the organisation of the teaching groups varies from school to school. At Alder, Redwood, and Willow students are set finely, and at the other three schools timetabling constraints or other considerations mean that there is a less rigid system in operation, with a number of parallel classes in each year group. At both Cedar and Hazel the case study cohort is the first not to have been taught maths in

P. Valero & O. Skovsmose (2002) (Eds.). Proceedings of the 3rd International MES Conference. Copenhagen: Centre for Research in Learning Mathematics, pp. 1-11

mixed ability classes throughout the school, and at Cedar students are grouped very broadly, with considerable (and deliberate) overlap between groups, but an attempt to restrict the number of tiers of entry at GCSE within each class to two.

Our work in the schools has included lesson observations, the administration of a questionnaire at the ends of years 8, 9 and 10, interviews with some students during years 9 and 11 and collection of data on students' attainment at various points throughout the study. In this paper I draw in particular on interviews with students in year eleven, though I also refer to other datasets where it is relevant to do so.

Setting and mathematics

'Setting' is becoming more and more prevalent across the curriculum, as a consequence of a range of recent policy initiatives including the marketisation of education, the publication of 'league tables' and the introduction of tiered examination papers at GCSE (Gewirtz, Ball et al. 1995; Reay 1998; Gillborn and Youdell 2000). However mathematics has been widely considered to be particularly unsuited to mixed ability teaching: according to a 1979 DES report (when mixed ability grouping was very much in the ascendant) 80% of maths teachers, compared with only 3% of English teachers, thought that mixed ability groups were inappropriate for teaching their subject (Department of Education and Science 1979). More recent data collected by Ofsted indicate that 94% of students are taught mathematics in setted classes by the upper secondary years (*The Guardian*, 8th June 1996). The notion of 'ability' is seen to be particularly salient in relation to mathematics, and a student's ability is generally taken to be both measurable, and stable over time (Ruthven 1987). These perceptions influence classroom practice, much of which is predicated on the belief that students have very different abilities in the subject, and many will never progress beyond the 'basics' (Committee of Inquiry into the Teaching of Mathematics in Schools 1982). In most secondary schools, therefore, students are routinely classified according to their 'ability', and the nature of the mathematics education they receive is likely to be heavily dependent on where they have been ranked.

Critics of ability grouping have long argued that designating students as being of 'high' or 'low' ability is likely to lead to their achieving accordingly, to the disadvantage of those in low sets (Davies 1975), and this has been shown to occur by polarising the year group, leading to the emergence of pro- and anti-school subgroups of students (Hargreaves 1967; Lacey 1970; Ball 1981). However, in a recent and highly influential study, Boaler found that many of the students in *high* sets were disadvantaged by features of the learning environment (Boaler 1997). In particular, she found that while many middle class boys attained higher grades at GCSE than would be expected given their prior attainment, many girls, and working class students of both sex did less well than expected, and often felt anxious in lessons. Boaler related the negative consequences of being taught in 'top set' groups to the highly procedural approach to teaching that is typical of these classes, and to the sustained fast pace at which students were required to work. A follow-up study, on which this paper is based, suggests that these are common features of top set mathematics groups, and that the associated problems which Boaler described are widespread (Bartholomew 1999; Boaler, Wiliam et al. 2000).

Mathematics is widely perceived as a difficult, hierarchical and highly structured subject, success at which is taken to indicate high intelligence (Ernest 1998). This perception appears to be reinforced by mathematics teaching in schools, which typically involves the 'handing down' of a range of techniques that are known to 'experts'; for the student, there is little scope for creativity or originality (Ernest 1991). In most of the top set maths lessons that we have observed during the course of this study, students' task has been that of learning a series of steps, and becoming fluent at applying them so as to obtain correct answers to closed questions. It has been argued that this presentation of mathematics as a complete body of work is disempowering to learners, who are given little opportunity to 'produce' mathematics for themselves (Burton 1987; Rogers 1995), and it is clear that many students feel alienated by this aspect of mathematics lessons (Boaler, Wiliam et al. 2000), which strips the subject of meaning and limits their access to understanding:

HB So you reckon you're taught in a way that doesn't help you to remember?
D It's like textbook fashion, parrot fashion. They drum it into you.
HB (…) Can you say a bit more about that, about doing textbook work?
D (…) she just bombards us with information and we don't have time to think about it. That was evident in the exams. It was taken for granted that we know how to work with all these formulas, but because there is such a short time to get it all into us, we've got all this information and we don't know how to use it. (Dean, set 1, Alder)

S Mr Davies (…) will write out the whole question with every single process and then he'll say, that's how you do it. He hasn't explained it. All he's done is done the question for you. And say you're sitting there trying to work out a question he'll walk round you and he'll say, you should do it like this and he'll do it for you. The boys in front of us now, they turn around and say, Sir I want to do it on my own. Because he comes round and does it for you. He doesn't help you at all, he doesn't explain it. (…) He just helps you get the answer rather than getting you to think about what the question is asking you to do. (Samantha set 1, Redwood)

HB What do you mean by saying "most things I can do, but I don't understand"?
D Well, sometimes when you're doing an equation you can do it but you don't understand *why* you're doing it or *how* you're doing it. You just do it because you have this hunch. And sometimes you just do it because the teacher's explained it and you use what the teacher's showed you, you use that to do it, but you still don't *understand* it. You're only doing it because you've got an example and when you sit in the middle of a test you don't have that example to look at so you get... you can't do it. (Deema, set 2, Cedar)

Notions of 'brilliance'

Students' feelings about maths cannot be separated from their experiences in lessons, but they are also closely bound up with perceptions of the subject as very difficult and abstract, and of mathematicians as being somehow different from ordinary people. These are the starting points from which students locate themselves—and are located by others—as learners of mathematics, and they are reinforced by grouping practices which sort students according to their ability, and, in many cases, offer a completely different *kind* of mathematics education to students according to where they have been ranked. Evident in the responses of many students was the sense that there is something slightly 'special' about people who are good at maths:

HB You don't think you're very good at [maths]?
D No I'm not, I don't really have a natural gift for it I don't think.
HB But you're in the top set.
D I think the only reason I'm in there is because in the first year we had Mr Williams and he said he wanted to push me. He didn't really think I was up to the standard but with a little push I could. (Dean, set 1, Alder)

F Also people find maths very hard. There is always a psychological thing in your mind that maths is hard. No matter what, everyone thinks maths is hard. So when you're trying to concentrate you're thinking, no, maths is hard, I don't wanna do it.
HB So where do you think that comes from?
F I don't know, people all around. People—you don't see mathematicians being a normal person—they have to be really big and brainy (Fathima, set 1, Cedar)

Jessie, another student in a top group at Cedar, spoke of her frustration at not getting the opportunity to understand maths, and her comments hint at the range of factors which have played a part in shaping her reaction to maths, and of the contradictions inherent in that reaction:

HB Does that happen a lot in maths? That feeling of I can do it, but I don't know why or I can't do the next one.
J Yeah I get that quite a lot. I can guess an answer and check it and see "oh that's right. Oh I wish it was wrong so that I could have some idea of how I did it." And sometimes I find that I've done something and it is right but I can't quite—my memory is working but the rest of my brain is saying "how does that work?". I suppose I have an enquiring mind and it gets on my nerves when I sit with a maths equation and I do know how to do it but I really want to know how and why. But at the same time I think "I don't care, why do I want to know?"
(…)
J I suppose that is how my mind works in general. I mean if I am at home I think "Ooh, why does this do that?" and I go "Hmm, I think I'll work it out". Or if I think of a word and go "ooh what does that mean?" I'll look it up. But if I think "why does this work?" in maths I go "I don't care."
HB So why? Have you taught yourself to be that way about maths?
J Possibly. I don't know. I suppose I think that if I look it up – I mean, I don't even know how to look up something like that in maths, you can't just look it up in the dictionary – but if I did I think that I'd be really disappointed if I read the

explanation and didn't understand it. Because I feel that that's probably what would happen. (Jessie, set 1, Cedar)

This extract is interesting in a number of respects, but in particular for what it reveals about the conflicting emotions Jessie feels around maths, and her own ability to understand the subject. It is clear from the way she speaks that she finds aspects of the subject genuinely interesting, yet like Fathima (quoted above) the 'knowledge' that maths is hard makes her less inclined to try. Her resistance to the subject appears in places to be almost a principled refusal to get drawn into thinking too much about mathematical questions. Whereas in most contexts she is confident of her ability to find answers to her questions, it seems from her final comment that in maths she is held back by the fear that she might not understand. These interweaving themes run through much of her interview, and while on one level they can be interpreted as a criticism of her mathematics lessons, in which the emphasis is on learning procedures with little encouragement for students to think things through for themselves, it is also clear that her anxieties surrounding her own inadequacies in the subject are sustained by the spectre of mathematical 'genius' in others:

J Sometimes I find myself wondering about philosophical stuff like the whole universe in general. I know that's the deepest, most difficult side of maths—like quantum physics I suppose. And my uncle is pretty much a mathematical genius I suppose, really into it all—the mysteries of Pi—and he'll get me thinking like "wow, why does this work?" and I go "Oh God, how?" and then I think "Why, why, why? Why does it matter?" (Jessie, set 1, Cedar)

Top sets and mathematical ability

Many students, in particular those in top set groups, expressed the belief that most of their class was much better at the subject than they were, and that they alone were struggling in maths lessons. However, while many students of both sex expressed doubt as to their own ability in maths, boys were very much more likely than girls to believe themselves to be very good at the subject. On the questionnaire that students completed at the end of year 10, one of the questions asked them to say where they thought they would be put if someone ranked their class in terms of mathematical ability, and they were given the options very high, in the top half, in the middle, in the bottom half and very low. Across the 5 mixed schools taking part in the study, 44 of the 47 set 1 students who thought their mathematical ability was 'very high' for their group were boys! I then considered only those set 1 students whose attainment (as measured on the exam they took at the end of year 10) placed them in the upper quartile for their group. Two out of 13 girls, and 24 out of 36 boys had rated themselves 'very high' in their class ($p=0.0015$) (see table 2). Thus while it is certainly not the case that all boys have confidence in their mathematical ability, it is clear that substantially more boys than girls see themselves as being very good at the subject.

position in group	all students		students who ranked themselves 'very high' in their group	
	f	m	f	m
1st quartile	13	36	2	24
2nd quartile	20	30	1	7
3rd quartile	13	29	0	4
4th quartile	13	31	0	2
total	59	126	3	37

Table 2: Top set students' attainment relative to their group, by sex.

Elsewhere I have described a distinctive top set culture which, I have argued, tends to marginalise many of the girls who are put in these groups (Bartholomew 2000). This culture both draws on, and reinforces, notions of the elusive nature of 'mathematical brilliance', and of there being a clear hierarchy of mathematical ability among students, and is fuelled by the emphasis on speed typical of top set groups. The top set environment lends itself to easy competition between students, but the climate is one in which success—and therefore 'ability'—is determined by a students' capacity to generate large numbers of correct answers quickly. This reinforces the idea that the students with 'real talent' in mathematics are those who can perform at a high level in lessons without appearing to have to work very hard and, in a reversal of the usual association of bad behaviour with low ability, in top set groups it is often the students who 'muck about' a bit in lessons who are regarded as being the students with most ability in the subject (ibid). This resonates with Walkerdine's finding that, while 'hard-working' is seen as a positive trait by teachers in working class schools, it is viewed negatively in middle class schools, where academic success is expected of all, and students who have to work hard to achieve that success are regarded as lacking ability. Walkerdine also found that, whereas boys are frequently seen to have mathematical 'flair' regardless of their actual attainment, high achieving girls routinely have their success dismissed as the product of plodding hard work (Walkerdine and Girls and Mathematics Unit 1989).

In many schools at which students are grouped according to their ability, the composition of the different groups is sharply polarised along social class lines, with middle class students concentrated in the higher sets and working class students in the lower sets (Hallam and Toutounji 1996; Harlen and Malcolm 1997; Sukhnandan and Lee 1998; Gillborn and Youdell 2000). In mathematics, it is also the case that boys are frequently over-represented in top set classes (Bartholomew, op cit). Although within this study, the composition of the top set groups varies considerably from school to school, they are all places where the set of values promoted speaks to a particular middle class masculinity. The rationality of mathematics, the image of the 'great mathematician' and the possibility of being regarded as particularly clever if you can do well in maths without being seen to take your work too seriously, seem to have a particular potency for middle class boys. In most of the set 1 classes we have observed during the course of this study, the students who are regarded as being the ‘best’ in the class are those who display most confidence in lessons, who are quickest to find answers, and who make sure everyone else in the group knows that they got there first—often a group of middle class boys.

Yet these conceptions of success are riddled with contradictions, and it is important to recognise that that the pecking orders established in top set groups do not represent an absolute hierarchy of mathemtical ability; in these classes some things are accorded greater importance than others, and students who do not relate to the value systems of their class are denied acces to the highest status positions. Those who are seen to have real ability are those for whom the subject appears to come naturally, but in practice this is often likely to be those students who are best at suspending their disbelief for long enough to apply the procedure they have been taught. Boaler has found that, while both girls and boys feel that highly procedural top set lessons limit their opportunities for understanding mathematics, in general boys are more inclined than girls to ‘play the game’ (Boaler 1997). Thus while many boys appear able to work through a set of exercises without questioning too much, and to derive some meaning and motivation from competing with their classmates, many girls—unable or unwilling to compete on these terms—withdraw in lessons and are seen to be lacking ability (Boaler 1997; Bartholomew 2000).

Alternative conceptions of success

I am not arguing that the students who are widely regarded as being good at maths are in fact less good less good at the subject than those who are seen to be struggling in lessons. Rather I am suggesting that the culture of top set maths groups, and of mathematics more generally, makes it very much easier for some students to believe themselves to be good at the subject than for others. The case of a student who was able to change significantly her perception of herself as a learner of mathematics illustrates the extent to which the responses of individual students are bound up with the wider context which defines, and constantly reinforces, what it means to be good at maths. In the questionnaire that she completed at the end of year 10, Tania, in set 1 at Willow, appeared typical of many of the students in this study; in response to the question “what do you think are the bad things about your maths lessons?” she had written:

> We go though the topics very quickly, without having enough time on one. A lot of the people in the class are naturally very clever, and it is embarrassing to get something wrong in front of them. (Tania, set 1, Willow)

However, I interviewed her when she was in year eleven, and she began by telling me that her approach to maths had changed completely since the previous term. It is interesting to think about the ways in which she was able to change her perceptions of herself as a learner of mathematics:

HB So something must have changed.

T My attitude. More thinking about myself than what other people know. That instead of what other people know and what I don't know, it's more what I know. Now I'm concentrating on that. (Tania, set 1, Willow)

This sounds like a small step to take—the realisation that by focusing on her own progress, rather than worrying that she is performing less well than others, she could concentrate on the areas where she needed to improve—yet it demanded considerable changes in her understanding about mathematics, and how success at the subject is achieved.

Boaler*et al* argue that useful insights into the nature of mathematics education could be gained from shifting the focus away from the question of 'ability' and rather think in terms of students 'belonging' to the community of practice (Wenger 1998) of those who are succesful at mathematics. They continue:

> Changing the emphasis from 'ability' to 'belonging' (…) demythologises the special status of mathematics. The idea of 'belonging' immediately raises the question of 'belonging to what?" allowing the possibility of multiple communities of practice, rather than a single monolithic edifice. (Boaler, Wiliam et al. 2000)

It is exactly this 'single monolithic edifice' that leads so many students to believe that there is only one way to do mathematics, and the fact that they are unable to compete with the quickest is evidence that they lack that special talent. The dominant image of success is one which many students feel excluded from. In order to incorporate being succesful at mathematics as an aspect of her own identity Tania first had to reconceptualise what it meant to be succesful, and this involved dismantling the hegemonic male-dominated model of the brilliant mathematician, and the belief—so deeply ingrained in many of the students we interviewed—that mathematics is something you either can or can't do. In recognising that different students approach maths in different ways, she was able to demystify the performance of some of the other students in her class, and to begin to feel more confident in her own abilities:

T There were a couple of lessons where it really sort of hit me as like I was really working hard and I really changed my attitude in maths. I found that the people I thought were so clever, I was getting better marks than them and I was more ahead of them in class, while they were just like chatting. So well I thought, you know....

(…)

T I think that with some people, like the people in my class—the ones people feel threatened by—those kind of people, I find that they'll just stick to it like this is it, this is how you have to do it and you always have to do it like this. Whereas me, I can't do it like that. That's why I bring in old work because I won't be able to answer the question like how they do it. So I'll try and bring in everything I know and try and find an answer.

(…)

HB So, what do you think it is that they do?

T It's like—imagine we're doing an equation or something and we're trying to find a solution to it, they'll say "Here's the formula, this is what you do." Where I would probably go "If I look back at this topic, I can use that to solve this bit" and then I'll do that and then I'll get an answer like that. (Tania, set 1, Willow)

Conclusion: mathematics and identity

The students taking part in this study were, when they were interviewed, nearing the end of compulsory schooling, and were at a point in their lives when they were faced with a number of choices and decisions regarding future study or employment. They were also at an age when their identities were developing rapidly and they were becoming increasingly reflexive and self-aware (Head 1997), and their aspirations and ambitions were likely to be forming and taking shape during this period. Not surprisingly, they spoke with most enthusiasm about the subjects which they perceived as relevant to their lives outside school, and often contrasted this with their feelings about mathematics, which many felt was pointless:

D	I'm in a band at the moment, so I'd really like that to take off. (…) I've always liked music, I think stuff like English and art helps with music, like writing lyrics and stuff. (…) That is why I'm aiming for literature and arty subjects. (Dean, set 1. Alder)

HB	It sounds like you can't see the point of it so much anymore.
J	I know there is a point but the point always seems to be to get some letters on a piece of paper to get you into college to do something that isn't really relevant to what you've got. If I want to do art, then my maths GCSE will help me get into art college and I don't really understand that.
(…)
J	I just feel they teach you stuff that you only need to know if you become a maths teacher. It's a bit of a silly circle. (Jessie, set 1, Cedar)

The subjects that these students are most interested in are those which affirm their identities in some sense; they are the subjects that relate to their lives outside school and their aspirations for the future, and those which give them the opportunity to express themselves creatively. Their experience of learning mathematics is that it is rigid, impersonal and of no relevance to their lives, and even among those students who could imagine using maths in the 'real world', few saw a place for mathematics as they learnt it at school.

HB	You said that you want to do interior design and that you're gonna have to use maths in that-
D	-yeah-
HB	-so how do you feel about the idea of using maths in your work? Do you think that will be as boring as what you're doing now?
D	I don't think its gonna be *as* boring because you're gonna have, you're doing it for a different reason. You've got like an aim, to find out the length of a room, so you can fix something to make it into a proper room, or whatever. You're using it for a different *reason*, not just doing it to find out an *answer*. And then give it to the teacher to see if you're right and throw away afterwards. (Deema, set 2, Cedar)

For many of these students, being successful at maths represented something with which they did not identify: "perceptions of [mathematics] as abstract, absolute and procedural conflicted with their notions of self, of who they wanted to be" (Boaler, Wiliam et al. 2000). Yet while for the majority of students involved in this study, being succesful at maths neither appealed nor felt accessible, there was a small number for whom success at maths clearly was important. Despite finding maths boring, often, and failing to see its relevance to their lives, for this group of students—“the ones people feel threatened by” as Tanya put it—the status that came from being regarded as good at maths, and of being able to compete succesfully with other students was sufficient to motivate them in lessons.

It is ironic, at a time when a ‘laddish’ culture is being blamed for boys’ relatively poor academic performance, that the culture of top set mathematics classes, in which boys continue to outperform girls, is in many ways extremely laddish. Indeed, insofar as mathematical ability is seen to be associated with not having to work too hard, it is the students whose behaviour is most ‘laddish’ who are likely to be seen to be best at maths. In this sense, boys (and it is predominantly middle class boys) who perform highly in top set maths classes are uniquely positioned to combine high attainment with a ‘laddish’ identity, thus re-affirming, for themselves and others, both their intellectual status and their masculinity (Lucey and Walkerdine 1999). The situation for girls in these classes is rather different. Griffiths talks of feelings of inauthenticity experienced by people who, in order to belong in one group are required to suppress aspects of their identity (Griffiths 1995), and combining success in the top set environment with an acceptable feminine identity is likely to be a much more complex matter. It is notable that Tania changed her feelings about her own mathematical capabilities, not by beating the group of boys who dominated her top set lessons at their own game, but by recognising that she wanted to play a different game.

References

Ball, S. J. (1981). Beachside comprehensive. Cambridge, Cambridge University Press.

Bartholomew, H. (1999). Setting in stone? How ability grouping practices structure and constrain achievement in mathematics. University of Sussex, Brighton. British Educational Research Association 25th annual conference. London, UK, King's College London School of Education.

Bartholomew, H. (2000). 'Top set' identities and the marginalisation of girls. Paper presented at King's College London School of Education,.

Boaler, J. (1997). Experiencing school mathematics: teaching styles, sex and setting. Buckingham, UK, Open University Press.

Boaler, J. (1997). “Reclaiming school mathematics: the girls fight back.” Gender and Education **9**(1): 285-306.

Boaler, J. (1997). “When even the winners are losers: evaluating the experiences of ‘top set’ students.” Journal of Curriculum Studies **29**(2): 165-182.

Boaler, J., D. Wiliam, et al. (2000). “Students’ experiences of ability grouping—disaffection, polarisation and the construction of failure.” British Educational Research Journal **27**(4).

Boaler, J., D. Wiliam, et al. (2000). “The Construction of Identity in Secondary Mathematics Education.” .

Burton, L. (1987). “From Failure to Success: changing the experience of adult learners of mathematics.” Educational Studies in Mathematics **18**: 305-316.

Committee of Inquiry into the Teaching of Mathematics in Schools (1982). Report: mathematics counts. London, UK, Her Majesty’s Stationery Office.

Davies, R. P. (1975). Mixed Ability Grouping. London, UK, Maurice Temple Smith Ltd.

Department of Education and Science (1979). Aspects of secondary education in England: a survey by Her Majesty's Inspectors. London, DES.

Ernest, P. (1991). The philosophy of mathematics education. London, Falmer Press.

Ernest, P. (1998). A postmodern perspective on research in mathematics education. Mathematics Education as a Research Domain: A Search for Identity. A. Sierpinska and J. Kilpatrick. Dordrecht, Kluwer Academic Publishers**:** 71-85.

Gewirtz, S., S. J. Ball, et al. (1995). Markets, choice and equity in education. Buckingham, UK, Open University Press.

Gillborn, D. and D. Youdell (2000). Rationing Education. Buckingham, Open University Press.

Griffiths, M. (1995). Feminisms and the Self: The Web of Identity. London, UK, Routledge.

Hallam, S. and I. Toutounji (1996). What do we know about the grouping of pupils by ability? A research review. London, UK, University of London Institute of Education.

Hargreaves, D. H. (1967). Social relations in a secondary school. London, UK, Routledge & Kegan Paul.

Harlen, W. and H. Malcolm (1997). Setting and streaming: a research review. Edinburgh, UK, Scottish Council for Research in Education.

Head, J. O. (1997). Working with adolescents: constructing identity. London, UK, Falmer.

Lacey, C. (1970). Hightown Grammar : the school as a social system. Manchester, UK, Manchester University Press.

Lucey, H. and V. Walkerdine (1999). Boys' Underachievement: Social Class and Changing Masculinities. Combating Educational Disadvantage. T. Cox. London, UK, Falmer Press**:** 37-52.

Reay, D. (1998). “Setting the agenda: the growing impact of market forces on pupil grouping in British secondary schooling.” J. Curriculum Studies **30**(5): 545-558.

Rogers, P. (1995). Putting Theory into Practice. Equity in mathematics education: influences of feminism and culture. P. Rogers and G. Kaiser. London, UK, Falmer.

Ruthven, K. (1987). “Ability stereotyping in mathematics.” Educational Studies in Mathematics **18**: 243-253.

Sukhnandan, L. and B. Lee (1998). Streaming, setting and grouping by ability: a review of the literature. Slough, UK, National Foundation for Educational Research in England and Wales.

Walkerdine, V. and Girls and Mathematics Unit, Eds. (1989). Counting girls out. London, UK, Virago.

Wenger, E. (1998). Communities of practice: learning, meaning, and identity. Cambridge, UK, Cambridge Univ Press.