Students' experiences of ability grouping—
disaffection, polarisation and the construction of failure

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Introduction and background

In the UK there is a long tradition of grouping by 'ability'—a practice founded upon the idea that students have relatively fixed levels of ability and need to be taught accordingly. In the 1950s almost all the schools in the UK were 'streamed'—a process by which students are segregated by 'ability' and taught in the same class for all subjects. A survey of junior schools in the mid-1960s (Jackson, 1964) found that 96% of teachers taught to streamed ability groups. The same study also revealed the over-representation of working-class students in low streams and the tendency of schools to allocate teachers with less experience and fewer qualifications to such groups. This report contributed towards a growing awareness of the inadequacies of streamed systems, supported by a range of other research studies which highlighted the inequitable nature of such systems. Studies by Hargreaves (1967), Lacey (1970) and then Ball (1981) all linked practices of streaming and setting (whereby students are divided into different classes by 'ability' for individual subjects) to working-class under-achievement.

The late 1970s and early 1980s witnessed a growing support for mixed-ability teaching, consistent with the more general public concern for educational equality that was pervasive at the time. But in the 1990s, concerns with educational equity have been eclipsed by discourses of 'academic success', particularly for the most 'able', which has meant that large numbers of schools have returned to the practices of ability-grouping (Office for Standards in Education, 1993). Indeed ability-grouping is now widespread in the UK, not only in secondary schools, but also in primary schools, with some children as young as 6 or 7 being taught mathematics and science (and occasionally other subjects) in different classrooms, by different teachers, following different curricula with different schemes of work. This phenomenon may also be linked directly to a number of pressures from government. The 1988 Education Reform Act (ERA) required schools to adopt a national curriculum and national assessment which was structured, differentiated and perceived by many schools to be constraining. Research into the effects of the ERA on schools has shown that a number of teachers regard this curriculum as incompatible with mixed-ability teaching (Gewirtz, Ball, & Bowe, 1993). The creation of an educational 'marketplace' (Whitty, Power & Halpin, 1998) has also meant that schools are concerned to create images that are popular with local parents and 'setting' is known to be popular amongst parents, particularly the middle-class parents that

schools want to attract (Ball, Bowe & Gewirtz, 1994). The White Paper 'Excellence in Schools' (DFEE, 1997) revealed the new Labour Government's commitment to setting:

> '... unless a school can demonstrate that it is getting better than expected results through a different approach, we do make the presumption that setting should be the norm in secondary schools.' (p.38)

In mathematics however, relatively few subject departments have needed to change *back* to ability-grouping as the majority have remained faithful to practices of selection, even when they have been the only subject department in their particular school to do so. An OFSTED survey in 1996 reported that 96% of schools taught mathematics to 'setted' groups in the upper secondary years (The Guardian, 1996). This has non-trivial implications for students' learning of mathematics. Despite this, our understanding of the impact of ability-grouping practices upon mathematics teachers' pedagogy and, concomitantly, students' understanding of mathematics, is limited.

Previous research in the UK has concentrated, almost exclusively, upon the inequities of the setting or streaming system for those students who are allocated to 'low' sets or streams. These are predominantly students who are also disadvantaged by the school system because of their 'race', class or gender (Abraham, 1989; Tomlinson, 1987; Ball, 1981; Lacey, 1970; Hargreaves, 1967). The majority of these research studies used qualitative, case-study accounts of the experiences of students in high and low streams to illustrate the ways in which curricular differentiation results in the polarisation of students into 'pro'- and 'anti'-school factions. Such studies, by virtue of their value-based concerns about inequality (Abraham, 1994), have paid relatively little attention to the effects of setting or streaming upon the students' development of *subject* understandings (Hallam & Toutounji, 1997). Furthermore, they have tended to concentrate on 'streaming', in which students are allocated to the same teaching group for a number of subjects—what Sorensen (1970) termed a wide *scope* system, rather than on 'setting' which is carried out on a subject by subject basis (narrow scope).

Research in the USA has provided a wealth of empirical evidence concerning the relative achievement of students in academic, general and vocational tracks. Such studies have consistently found the *net* effects of tracking on achievement to be small (Slavin 1990), with evidence that tracking gives slight benefits to students in high tracks at the expense of significant losses to students in low tracks (Hoffer, 1992;

Kerchkoff, 1986). However, such studies have given little insight into the way that tracking impacts upon students' learning of mathematics, the processes by which it takes effect or the differential impact it has upon students. This is partly because quantitative methods have been used almost exclusively, with no classroom observation and no analysis of the mechanisms by which tracking influences learning. Many of the studies into tracking have also focused upon differences in group means, masking individual differences within groups (Gamoran and Berends, 1987; Oakes, 1985).

This paper reports upon interim data from a four-year longitudinal study that is monitoring the mathematical learning of students in six UK schools. It develops and expands themes arising from a study of two schools that offered 'traditional' and 'progressive' approaches to the teaching of mathematics (Boaler, 1997a, b, c). Although ability-grouping was not an initial focus of that study, it emerged as a significant factor for the students, one that influenced their ideas, their responses to mathematics, and their eventual achievement. One of the schools in that study taught to mixed-ability groups, the other to setted groups, and a combination of lesson observations, questionnaires, interviews and specially-devised assessments revealed that students in the setted school were significantly disadvantaged by their placement in setted groups. A complete cohort of students was monitored in each school over a three-year period from the beginning of year 9 until the end of year 11 (ages 13-16). The disadvantages affected students from across the spectrum of setted groups and were not restricted to students in low groups. The results that related to setting of that study may be summarised as follows:

- Approximately one-third of the students taught in the highest ability groups were disadvantaged by their placement in these groups because of high expectations, fast-paced lessons and pressure to succeed. This particularly affected the most able girls.

- Students from a range of groups were severely disaffected by the limits placed upon their attainment. Students reported that they gave up on mathematics when they discovered their teachers had been preparing them for examinations that gave access to only the lowest grades.

- Social class had influenced setting decisions, resulting in disproportionate numbers of working-class students being allocated to low sets (even after 'ability' was taken into account).

- Significant numbers of students experienced difficulties working at the pace of the particular set in which they were placed. For some students the pace was too slow, resulting in disaffection, while for

others it was too fast, resulting in anxiety. Both responses led to lower levels of achievement than would have been expected, given the students' attainment on entry to the school.

A range of evidence in that study linked setting to under-achievement, both for students in low *and high* sets, despite the widely-held public, media and government perception that setting increases achievement. Indeed the evidence was sufficiently broad ranging and pronounced to prompt further research in a wider range of schools.

Research design

The schools in our study have been chosen to provide a range of learning environments and contexts. All are regarded as providing a satisfactory or good standard of education and all are partner schools with Higher Education Institutions for initial teacher training. The schools are located in five different local education authorities, all in the London area. Some of the school populations are mainly white, others mainly Asian, while others include students from a wide range of ethnic and cultural backgrounds. The GCSE performance of the schools ranges from the upper quartile to the lower quartile, nationally, and the social class of the school populations range from mainly working-class, through schools with nationally representative distributions of social class, to strongly middle-class. One of the schools is an all-girls school and the other five are mixed.

All six schools teach mathematics to mixed-ability groups when students are in year 7 (age 11). One of the schools allocates students to 'setted' ability groups for mathematics at the beginning of year 8 (age 12), three others 'set' the students at the beginning of year 9 (age 13), and the other two schools continue teaching to mixed ability groups. The cohort of students in our study have completed the end of year 9, which has meant a change from mixed ability to setted teaching for three of the school-cohorts. There are approximately 1000 students in the study. Research methods have included approximately 120 hours of lesson observations, during years 8 and 9, questionnaires given to students in the cohort in the six schools (n=943 for year 8, n=977 for year 9, with matched questionnaires for both years from 843 students) and in-depth interviews with 72 year 9 students. This has included 4 students each from a high, middle and low set in the setted schools and students from a comparable range of attainment in the mixed ability schools. We have also collected data on attainment, social class, gender and ethnicity. This paper will

draw upon questionnaire responses, lesson observations and 72, 30-minute interviews to illustrate the ways in which ability-grouping practices have impacted upon students' learning of mathematics.

Research Results

When students moved from year 8 to year 9 in our study, it became clear from questionnaire, lesson observation and interview data that many students in the setted schools began to face negative repercussions as a result of the change from mixed-ability to setted teaching. Students were chosen for interview by asking teachers of high, medium and low setted groups to select a pair of girls and then a pair of boys who would be relaxed and happy to talk. Teachers were aware that the study was about setting practices. Forty of the forty-eight students interviewed from setted groups wanted either to return to mixed ability teaching or to change sets. The students reported that teaching practices emanating from setting arrangements had negatively affected both their learning of mathematics and their attitudes towards mathematics. Three major issues that were raised by students are discussed below.

A High Sets, high expectations, high pressure

In Boaler's (1997b) study, at least one-third of the students taught in the highest set were disadvantaged by their placement in this group, because they could not cope with the fast pace of lessons and the pressure to work at a high level. The students that were most disaffected were able girls, apparently because able girls, more than any others, wanted to understand what they were doing—in depth—but the environment of set 1 classes did not allow them to do this.

We chose to observe set 1 lessons and interview set 1 students in this study to determine whether the environment of set 1 lessons in other schools was similar to those in Boaler's study and whether students were disadvantaged in similar ways. Early evidence suggests that this is the case. Every one of the 8 girls interviewed from set 1 groups in our study wanted to move down into set 2 or lower. Six out of eight of the set 1 boys were also extremely unhappy, but they did not want to move into lower groups, presumably because they were more confident (although no more able) than the girls, and because of the status that they believed being in the top set conferred. Observations of set 1 lessons make such reactions easy to understand. In a range of top-set classes the teachers raced through examples on the board, speaking quickly, often interjecting their speech with phrases such as "Come on we haven't got much time" and

"Just do this quickly". Set 1 lessons were also more procedural than others—with teachers giving quick demonstrations of method without explanation, and without giving the students the opportunity to find out about the meaning of different methods or the situations in which they might be used. Some of the teachers also reprimanded students who said that they didn't understand, adding comments such as "You should be able to, you're in the top set". Before one lesson the teacher told one of us that about a third of his class were not good enough for the top set and then proceeded to identify the ones that "were not academic enough", with the students concerned watching and listening. The following are descriptions of 'top-set' lessons, from students in the 4 setted schools:

School E: Mainly white, working-class school with low attainment

> If we can't answer the question or something, he'll say "Oh yeah, you're not going to be in set 1 next year—you are the set 1 class you shouldn't be doing this, you should be doing this". (Graham, school E, set 1)

> P: *He* likes being successful
> G: He wants to turn up a number 1 set – but he's going too fast, you know, a bit over the top.
> P: He explains it as if we're maths teachers. He explains it like really complex kind of thing, and I don't get most of the stuff. (Paul & Graham, school E, set 1)

> I want to get a good mark, but I don't want to be put in the top set again, it's too hard and I won't learn anything. (Molly, School E, set 1)

School F: Mainly Asian, middle and working-class school with average attainment

> The teacher says "You'd better do this, by like 5 minutes time" then you start to rush and just write anything. (Lena, school F, set 1)

> You don't even get time to think in the maths lessons. (school F, girls, set 1)

> I want to go down because they can do the same work but just at a slower pace, so they understand it better, but we just have to get it into our head the first time and that's it. (Aisha, school F, set 1)

School A: Mainly white, middle and working-class school with average attainment.

A: Sometimes they work too fast for me and I can't keep up with the rest of the class.

J: And all your other friends are in different groups so you can't really ask them for help, because you're the top set and you're supposed to know it all. (Ayla & Josie, school A, girl, set 1)

S: Most of the difference is with the teachers, the way they treat you. They expect us to be like, just doing it straight away.

M: Like we're robots. (Simon & Mitch, school A, set 1)

School C: Mainly White, middle-class school with very high attainment:

L: This year find it really hard and I haven't been doing as well as I wanted to be.

Int: Did you enjoy it more last year? [in mixed-ability groups]

L: Yeah definitely, because it's a whole different process, you're doing different books, you're able to be teached more, you just feel that you're not being rushed all the time. (Lena, school C, set 1)

I used to enjoy maths, but I don't enjoy it any more because I don't understand it. I don't understand what I'm doing. So if I was to move down I probably would enjoy it. I think I am working at a pace that is just too fast for me. (Andrea, school C, set 1)

These are just a small selection of the complaints raised by students in top sets, who characterised their mathematical experiences as fast, pressured and procedural. The four schools that are represented by the comments above were not chosen because of the way that they taught mathematics and the schools are quite different in many respects. Yet the students' perceptions of set 1 lessons were similar in each of the schools. Boaler (1997b) found that teachers change their normal practices when they are given top-set classes to teach, appearing to believe that being a 'top-set' student entails a qualitative and meaningful difference from other students, rather than simply being in the highest-attaining range of students in the school. Top-set children, it seems, do not need detailed help, time to think, or the space to make mistakes. Rather they can be taught quickly and procedurally because they are clever enough to draw their own meaning from the procedures they are given. In questionnaires students in the six schools were asked, "Do you enjoy maths lessons?" set 1 groups were the most negative in the entire sample, with 43% of set

1 students choosing ‘never’ or ‘not very often’, compared with an average of 36% of students in other sets and 32% of students in mixed-ability classes. Students were also asked whether it was more important “to remember work done before or think hard” when answering mathematics questions. The set 1 groups had the highest proportion of students who thought remembering was more important than thinking. In the set 1 classes 68% of students prioritised memory over thought, compared to 56% of students in the other setted groups and 51% of students in mixed-ability groups.

In the same paper, Boaler also argued that the fast, procedural and competitive nature of set 1 classes particularly disadvantages girls and that the nature of high set classes contributes to the disparity in attainment of girls and boys at the highest levels. Despite media claims that girls are now overtaking boys in all subjects (Epstein, Maw, Elwood & Hey, 1998), boys still outnumber the number of girls attaining A or A* grades in mathematics GCSE by 5 to 4. As the vast majority of able girls are taught within set 1 classes for mathematics in the UK (The Guardian, 1996) and the four schools in this study are unlikely to be particularly unusual in the way that they teach set 1 lessons, it seems likely that the under-achievement and non-representation of girls at the highest levels is linked to the environments generated within top-set classrooms.

B Low sets, low expectations & limited opportunities

Students in low sets at the four schools appear to be experiencing the reverse of the students in high sets, with repercussions that are, if anything, even more severe and damaging. Indeed, the most worrying reports of the implications of the setting process for students in our sample came from students in lower groups. These students reported a wide range of negative experiences, substantiated by observations of lessons. These included a frequent change of teachers (in one school the ‘bottom’ set had been taught by 3 different teachers in the first 9 months), the allocation of non-mathematics teachers to low sets and a continuous diet of low-level work that the students found too easy. Examples (in which a new paragraphs denotes a change of speaker) include:

> It’s just our group who keeps changing teachers.
>
> Int: Why?

Cause they don't think they have to bother with us. I know that sounds really mean and unrealistic, but they just think they don't have to bother with us, 'cause we're group 5. They get say a teacher who knows nothing about maths, and they'll give them us, a PE teacher or something. They think they can send anyone down to us, they always do that, they think they can give us anybody. (Lynne, school E, set 5)

R: We come in and sir tells us to be quiet and gives us some work and then he does them on the board and then that's basically it.

J: Even though we're second from bottom group, I think it would be much better if we didn't have the help with it.

R: Because he thinks we're really low.

J: Really stupid or something. (Ramesh & Jack, school A, set 6)

Students were particularly concerned about the low level of their work and talked at length about teachers ignoring their pleas for more difficult work, making students who had finished the work in the first 5 minutes of the lesson sit and wait with nothing to do for the remaining 55 minutes and in some cases students being told "You can't have finished, you're set 5" (school E, set 5 girl). In some lower-set lessons the students were not given any mathematics questions to answer—only worked solutions to copy off the board.

L: We come in, sit down, and there's like work on the board and he just says copy it. I think it's all too easy.

R: It's far too easy

Int: What happens if it's too easy? Do they make it any harder?

M: No we just have to carry on. We just have to do it. If you refuse to do it he'll just give you a detention. It's just so easy.

R: Last year it was harder. Much harder. (Lee & Ray, school E, set 5)

C: He just writes down the answers for us from the board, and we say to him, we say we can do it, but he just writes them down anyway.

Int: So what are you meant to do?

C: Just have to copy them down. That's what we say to him, 'cause a lot of people get frustrated from just copying off the board all the time. (Carol, school A, set 6)

L: We do baby work off the board

N: Yeah it's just like what we already know, you know 1 add 1

L: Say it's three times something equals nine

N: It's easy and it's boring. (Lynne & Nelly, school E, set 5)

In questionnaires 27% of students taught in the lower sets in the setted schools reported that work was too easy, compared with 7% of students in the upper sets and 14% of students in the schools using mixed-ability teaching in year 9. Students in lower groups were upset and annoyed about the low level of the work they were given; in addition to finding lessons boring, they knew that their opportunities for learning were being minimised:

Sir treats us like we're babies, puts us down, makes us copy stuff off the board, puts up all the answers like we don't know anything.

And we're not going to learn from that, 'cause we've got to think for ourselves.

Once or twice someone has said something and he's shouted at us, he's said, "Well you're the bottom group, you've got to learn it", but you're not going to learn from copying off the board. (school A, set 6, girls)

The students' reports were consistent with our observations of low-set lessons, in which students were given answers to exercises a few minutes after starting them or required to copy work off the board for the majority or all of lessons. In response to the questionnaire item 'how long would you be prepared to spend on a maths question before giving up?' 32% of students in the lower sets chose the lowest option —'less than 2 minutes' compared with 7% of students in sets in the top half and 22% of students in mixed-ability groups. The polarisation in the students' perceptions about mathematics questions in the setted schools probably reflects the polarisation in their experiences of mathematics. We have not yet interviewed teachers to talk to them about the choices they make about the level of work but the students were convinced that teachers simply regarded students in low sets as limited:

I: Sir used to normally say, “You’re the bottom group, you’re not going to learn anything.”

Int: He says that to you?

Yeah.

Int: Why?

I: I don’t know, I don’t think he’s got—maybe you’d call it faith in us, or whatever, he doesn’t believe we can do it. (Imran, school A, set 6)

All four schools that use ability-grouping have told us that the system is flexible and that students will change groups if they are inappropriately placed, but the students in low groups believed there to be little hope of moving to higher groups. They believed that they were trapped within a vicious circle—to move up they needed good end of year test results, comparable with students in higher groups, but they could not attain good results because they were not taught the work that was assessed in the tests:

R: In our class it was very easy and as soon as we got into the SATS, it was just like we hadn’t done it.

L: I want to be brainy, I want to go up, but I won’t go up if this work is too easy. (Lee & Ray, school E, set 5)

In the same way as the ‘top-set’ teachers had fixed ideas about the high level and pace of work students should have been able to do, the teachers of the lower sets had fixed ideas about the low level of work appropriate for ‘bottom-set’ students. The students reported that teachers continued with these ideas, even when students asked them for more difficult work:

N: I say “Oh, I’ve done this before already.”

L: And he says “Well you can do it again”. He’s nothing like “Oh, I’ll set you with some harder work or nothing”. (Nelly & Lynn, school R, set 5)

The students were clearly disadvantaged by the diet of low-level numeracy work that they were given. This problem seemed to derive partly from the teachers’ perceptions about the level of work appropriate for low-set students but also from an idea that is intrinsic to setting policies and will be discussed in the final section—that students in setted groups have the same mathematical capabilities and learning styles and may be taught accordingly.

C Restricted pedagogy and pace

In mixed-ability classes teachers have to cater for a range of students whose previous attainment varies considerably. Most teachers respond to this challenge by providing work that is differentiated either by providing different tasks for different students within the same class ('differentiation by task'), or by giving all students a task that can be attempted in a variety of ways and at a variety of different levels ('differentiation by outcome'). Teachers often let students work 'at their own pace' through differentiated books or worksheets. In setted classes students are brought together because they are believed to be of similar 'ability'. Yet setted lessons are often conducted as though students are not only similar, but *identical*—in terms of ability, preferred learning style and pace of working. In the setted lessons we have observed, students have been given identical work, whether or not they have found it easy or difficult and they have all been required to complete it at the same speed. This aspect of setted lessons has distinguished them from the mixed-ability lessons we have observed. The restrictions on pace and level of work that are imposed in setted lessons have also been a considerable source of disaffection, both for students who find the pace of lessons too fast and for those who find it too slow.

In interviews students talked at length about the restrictions imposed upon their pace of working since changing to setted groups, describing the ways in which they were required to work at the same speed as each other. Students reported that if they worked slower than others they would often miss out on work as teachers moved the class on before they were finished:

> D: People who are slow they don't never get the chance to finish because she starts correcting them on the board already.
>
> S: You don't finish the module. (David & Scott, school A, set 4)

Students also described the ways in which teachers used a small proportion of the students as reference points for the speed of the class (cf Dahllöf, 1971), and the detrimental effect this could have on their learning:

> A: Sometimes you can do it fast, and at the end, you don't really know it.
>
> L: But if she knows some people have finished, then she tells the class, "OK you've got even less time to do the work". She's like, "Look at these 5 people, they have finished, hurry up!" (Aisha & Lena, school F, set 1)

Students also reported that if they worked quickly they were disadvantaged as teachers made them wait for the rest of the class:

> D: Now we are sort of, people can be really far behind and people can be in front. Because it is sort of set, and we have these questions, say 'C', we have to all start.
>
> Int: So you all start at the same, you all start at C?
>
> S: Yeah but then the people who work fast have to wait for the people at the end to catch up
>
> D: Because I finished, nearly before half the class and I had a lesson to do nothing. (David & Scott, school A, set 4)

Again the students linked these restrictions to the norms generated within setted groups:

> C: Last year it was OK but when we finished our work or anything miss would give us harder work to do. But in this year when you finish it you just got to sit there and do nothing.
>
> L: Yeah because in sets you all have to stay at one stage. (Craig & Liam, school W, set 3)

Such problems were not caused by teachers simply imposing an inappropriate pace upon their groups—some students found lessons too fast whilst other students in the same groups found the same lessons too slow. The two boys in school F, quoted above, described the problem well—in mixed-ability classes students would be given work that was chosen for them, if they finished the work teachers would give them harder work; in setted lessons "you all have to stay at the same stage". Being able to teach the whole class as a single unit is the main reason that teachers put students into 'ability' groups, and it was also one of the main sources of the students' disaffection. The students also described an interesting phenomenon —that some teachers seemed to hold ideas about the pace at which a class should work that were independent of the capabilities of the students who were in that set. For example:

> If you're slow she's a bit harsh really, I don't think she really can understand the fact that some people aren't as fast as others. Because if you say that I don't understand the work—she'll just say something like "You're in the middle set, you had to get here somehow, so you've got to do middle set work". (David, school A, set 4).

The teachers of the top sets also exemplified this phenomenon with the frequent remarks they made to students in the vein of:

> "You are the set 1 class, you shouldn't be finding this difficult" (Peter, school E, set 1).

It seems that the placing of students into 'ability' groups creates a set of expectations for teachers that over-rides their awareness of individual capabilities. This is a particularly interesting finding given that the main argument that the Prime Minister, Tony Blair, and other government ministers have given for supporting setting is that children need work that is at an appropriate pace and level for their particular 'ability'.

But the process of ability-grouping did not only appear to initiate restrictions on the pace and level of work available to students, it also impacted upon the teacher's choice of pedagogy. Teachers in the four schools in our study that used ability-grouping responded to the move to setted teaching by adopting a more prescriptive pedagogy and the same teachers who offered worksheets, investigations and practical activities to students in mixed-ability groups concentrated upon chalk-board teaching and textbook work when teaching groups with a narrower range of attainment. This is not surprising given that one of the main reasons mathematics teachers support setting is that it allows them to 'class teach' to their classes, but it has important implications for the learning of students. When students were asked in their questionnaires to *describe their maths lessons*, the forms of pedagogy favoured by teachers in the schools using ability-grouping were clearly quite different from those in the schools using mixed-ability teaching. We coded a significant numbert of students' responses to this question as 'lack of involvement' because students wrote such comments as "lessons go on and on" or "maths lessons are all the same". Twelve per cent of responses from students in setted groups reflected a lack of involvement, compared with 4% of responses from students in mixed-ability groups. An additional 12% of students from setted groups described their lessons as 'working through books', compared with 2% of students in mixed-ability groups whilst 8% of setted students volunteered that the "Teacher talks at the board", compared with 1% of mixed-ability students. Fifteen per cent of students in setted groups described their mathematics lessons as either "OK", "fun", "good" or "enjoyable", compared with 34% of mixed-ability students.

In a separate open question students were asked how maths lessons could be improved. This also produced differences between the students, with 19% of students taught in sets saying that there should be

more open work, more variety, more group work, maths games or opportunity to think, compared to 9% of mixed-ability students. Eight per cent of setted students said that lessons should be slower or faster, compared to 4% of mixed-ability students, and 4% of setted students explicitly requested that they return to mixed-ability teaching.

The influence of ability-grouping upon teachers' pedagogy also emerged from the students' comments in interview. The following comments came from students across the spectrum of setted groups:

> Int: What are maths lessons like?
>
> J: Rubbish—we just do work out of a book.
>
> Int: How does that compare with other lessons in years 7 and 8?
>
> M: They were better. We did more fun work. (Janet & Molly, school E, set 1)

> Int: What would be your ideal maths lesson?
>
> L: I would like work that is more different. Also when you can work through a chapter, but more fun.
>
> N: It would have to be a bit more different.
>
> L: Could do a chapter for 2 weeks, then the next 2 weeks do something else, an investigation or something—the kind of stuff we used to do. (Nelly & Lynn, School E, set 5)

> R: Last year it was better, 'cause of the work. It was harder. In year 8 we did wall charts, bar charts etc, but we don't do anything like that. It's just from the board.
>
> L: I really liked it in year 7, because we used to like do it from the books. Like at the end of the year we used to play games. But like this year it's just been like work from the board. (Ray & Lee, school E, set 5)

> D: In year 8, sir did a lot more investigations, now you just copy off the board so you don't have to be that clever.
>
> S: Before, we did investigations, like *Mystic Rose*, it was different to bookwork, 'cause books is just really short questions but those were ones sir set for himself, or posters and that, that didn't give you the answers. (David & Scott, school A, set 4)

> In year 7 maths was good. We done much more stuff, like cutting out stuff, sticking in, worksheets and all stuff like that. Now, every day is copying off the board and just doing the next page, then the next page and it gets really boring. (Carol, School A, set 6)

The change in teaching approach that appeared to be initiated by setted teaching could simply reflect the increase in students' age and progression towards GCSE, but similar changes did not take place in the mixed-ability schools. The implications of such changes for students' learning of mathematics are discussed below.

Discussion

The students interviewed from our setted schools create an image of setted mathematics lessons that reflects disaffection and polarisation, which is broadly substantiated by our observations of lessons and by questionnaire data. It seems that when students were taught in mixed-ability groups, their mathematics teachers gave them work that was at an appropriate level and pace. When the students were divided into ability groups, students in high sets came to be regarded as 'mini-mathematicians' who could work through high-level work at a sustained fast pace, whereas students in low sets came to be regarded as failures who could cope only with low-level work—or worse—copying off the board. This suggests that students are *constructed* as successes or failures by the set in which they are placed as well as the extent to which they conform to the expectations the teachers have of their set. In particular, within top sets, students are constructed as successes and failures according to the extent to which they can cope with the highly procedural approaches adopted by teachers of those sets. Other notions of success in mathematics, such as those which emphasise depth of understanding, which are arguably much closer to the concerns of professional mathematicians (Buxton, 1981, Burton, 1997) are ruled out.

The requirement to work at an inappropriate pace is a source of real anxiety for many students, particularly girls, and is not confined to top sets:

> M: I get really depressed about it, and I don't want to ask, but then again like it really depressed me, the fact that everyone in the class is like really far ahead and I just don't understand.

L: Yeah 'cause like especially when everyone else understands it and you think "Oh my God I'm the only one in the class that doesn't understand it". (Maggie & Linda, School C, set 3)

These students were not talking about minor feelings and peripheral details but issues that go directly to the heart of their experiences, and which have a profound impact both on their attitudes towards, and their achievement in, mathematics.

The major advantage that is claimed for ability-grouping practices is that they allow teachers to pitch work at a more appropriate level for their students. However, while ability-grouping practices can *reduce* the range of attainment in a class, within even the narrowest setting system, there will be considerable variations in attainment. Some of this will be due to the inevitable unreliability of mechanisms of allocating students to particular sets, but even if the average attainment of students in a set is reasonably similar, this will mask considerable variation in different aspects of mathematics and in different topics, as the students were well aware. Indeed the students held strong beliefs that individuals have different strengths and weaknesses and that it is helpful to learn from each other and to learn to be supportive of each other:

C: I prefer groups when we're all mixed up. There's the clever and the dumb and the dumb learn from the clever and sometimes the clever they'll be learning from the people who don't know as much. Because some things the clever are good at and some things the not so educated are good at.

L: Classes should have a mixture of everyone. And then everyone could learn from everyone, because it's not like the dumb ones don't know anything, they do know it, but the atmosphere around them in lessons means they can't work.

C: And they just say to themselves—what's the point? (Craig & Liam, School F, set 3)

Perhaps the most surprising finding is that setting was not perceived as accomplishing the one thing that it was designed to do—to allow teachers to match the work set to the strengths and weaknesses of individual students. When the students were asked if work they were given was at "the right sort of level", the

proportion of those taught in mixed-ability groups who said that the work set was 'usually about right' for them was actually marginally higher (81%) than that for those taught in sets (77%).

Another consequence of setting that emerged in Boaler's study, and which is beginning to emerge in the our study, is the consequence of set allocation for students' entry to the GCSE. The report of the Committee of Inquiry into the Teaching of Mathematics in Schools (1982), generally known as the 'Cockcroft report', argued that it was unacceptable that the majority of students entered for the school leaving examination would gain less than 40% of the available marks. The report recommended that school-leaving examinations in mathematics should be differentiated, so that students would take only those papers appropriate for their attainment. For the mathematics GCSE, there are currently three 'tiers' of entry, with different syllabuses. Because schools find it difficult to operate with students in the same set following different syllabuses, most schools in the country (and all the four schools using ability-grouping in our study) enter all the students in a particular set for the same tier of the examination. The effect of this is that students in the lower sets will be entered for an examination in which the highest grade they can achieve is a grade 'D', whereas the only grade that is ever specified for recruitment or for further study is a grade 'C'.

In Boaler's study, the students did not become aware of this restriction until their final year of compulsory schooling, year 11, and this discovery caused considerable resentment and disaffection. In our study, only a few students (exclusively in the top sets) are yet aware of the effects of tiering, but it is already a significant issue for those beginning to understand the implications:

> I was reading from the maths criteria sort of thing and it says if you are put in the medium group then you are aiming for a B for GCSE. But I don't think that is fair, it's like saying you can't go higher than a B sort of thing. I think they should give you the work and what you get is what you get. They shouldn't try and aim you for something, because you never know, you could get an A. (Katy, School C, set 1)

There were, of course, some students in our sample (one-sixth of those students we interviewed) who were comfortable with being taught in sets. The majority of these were those taught in intermediate groups, who did not want to move either up (interestingly) nor down, and worked at a pace and level that was

appropriate for them. However, none of these students were aware of any restriction of grades that they would encounter in the GCSE examinations.

As we have noted above, many of the disadvantages of setting that we have described are contingent rather than necessary features of ability-grouping, but we believe that they are widespread, pervasive, and difficult to avoid. The adoption of ability-grouping appears to signal to teachers that it is appropriate to use different pedagogical strategies from those that they use with mixed-ability classes. The best teachers are allocated to the ablest students, despite the evidence that high-quality teaching is more beneficial for lower-attaining students (Black & Wiliam, 1998, p42). Curriculum differentiation is polarised, with the top-sets being ascribed qualities as mathematicians, not as a result of their individual qualities, but simply by virtue of their location in a top set. In order to ensure that the entire curriculum is covered, presumably to suit the needs of the highest-attaining students within the top set, the pace of coverage is both increased and applied to the whole class as a unit, and teachers seem to make increased use of 'transmission' pedagogies. For some students, who are able to assimilate the new material as it is covered, the experience may be satisfactory, but for the remainder, the effect is to proceduralise the curriculum until it becomes a huge task of memorisation. The curriculum polarisation results in a situation in which upward movement between sets is technically possible, but is unlikely to be successful, because a student moving up will not have covered the same material as the class she is joining. Finally, because of the perversities of the examination arrangements for mathematics GCSE, the set in which a student is taught determines the tier for which a student is entered, and thereby, the maximum grade the student can achieve. For most students, this decision will have been made three years or more before the examination is taken.

Because all the schools in our study make some use of mixed-ability-grouping in the earlier years, all the teachers in our sample have some experience of teaching mixed-ability classes, for which a variety of strategies are used. Some make substantial use of independent learning schemes which allow a teacher to give each student an individual programme of work. They also use within-class grouping, with students on different tables working on different materials and at different speeds. Most of the teachers in the sample also made some use of more open tasks, which can be tackled at a variety of levels. Although these more open tasks were used infrequently with setted classes, it was surprising how favourably these were regarded by the students. When the students who were taught in sets were asked for the best lesson they

remembered that year, almost every student described a lesson where the whole class had worked on an investigation or a problem that could be tackled in different ways

Within-class grouping, a system which is used by some of the teachers in one of our 'mixed-ability' schools, is much more flexible. It allows opportunities for whole classes to do the same work and allows students that are regarded as weaker to shine in some areas. One student, regarded by her teacher as the 'weakest' in her mixed-ability mathematics class, described her best lesson thus:

> It was last week, we were doing bar charts and pie charts and all that and I think I was the third person in the class who got it properly—we had to make it into a graph, it was good. (Caroline, school B, mixed-ability)

Some degree of within-class grouping also allows teachers to ensure that students are given appropriate work, and, importantly, that the level of assigned work is altered if and when this becomes appropriate:

> We have different books—high books, medium books, low books, so everyone has the right amount of work—no-one's doing nothing too hard or too easy. If you think that it's too hard or too easy you just tell miss and she gives you the right level. (Ruby, school B, mixed-ability)

Of course, within-class grouping does often result in a situation in which the teacher ends up explaining the same idea to different groups at different times, but this seems a small price to pay compared to the alternative. As one boy remarked:

> D: It was just like, in my primary school we weren't in groups for like how good you are in certain subjects. We were just in one massive group, we did everything together. You've got some smart people and you've got some dumb people in the class, so you just blend in, sort of so you don't *have* to be that good and you don't *have* to be that bad. (David, School A, set 4, original emphasis)

Indeed, this student captures eloquently what we found to be the most important, and previously unreported feature of ability-grouping—it *creates* (McDermott, 1993) academic success and failure through a system whereby students "*have* to be that good" or they "*have* to be that bad".

Conclusion

Although there are substantial problems in interpreting the results of international comparisons (Brown, 1998, Wiliam, 1998), there is little doubt that, in a variety of respects, the performance of primary and secondary school students in the United Kingdom is modest by international standards (Beaton, Mullis, Martin, Gonzalez, Kelly & Smith, 1996; Mullis, Martin, Beaton, Gonzalez, Kelly & Smith, 1996). Kifer & Burstein's (1992) analysis of data from the Second International Mathematics Study (SIMS) suggests that the two factors that are most strongly associated with growth in student achievement in mathematics (indeed the only two factors that are consistently associated with successful national education systems) are *opportunity to learn* (ie the proportion of students who had been taught the material contained in the tests) and the degree of *curricular homogeneity* (ie the extent to which students are taught in mixed-ability, rather than setted, groups).

While Bennett, Desforges, Cockburn and Wilkinson (1984) found that primary teachers using within-class ability-grouping tend to *over-estimate* the capabilities of weaker students, and set insufficiently challenging work to the most able, the evidence that we have found in the current study suggests very strongly that between-class ability-grouping produces the opposite effect. Indeed, the strength of the curriculum polarisation, and the diminution of the opportunity to learn that we have found in the current study, if replicated across the country, could be the single most important cause of the low levels of achievement in mathematics in Great Britain. The traditional British concern with ensuring that *some* of the ablest students reach the highest possible standards appears to have resulted in a situation in which the vast majority of students achieve well below their potential. As one student poignantly remarked:

> Obviously we're not the cleverest, we're group 5, but still— it's still maths, we're still in year 9, we've still got to learn. (Lynn, school E, set 5)

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