Best practice in mixed attainment grouping

Becky Taylor, Tom Francome and Jeremy Hodgen report on research findings exploring the issue of teaching secondary mathematics in mixed attainment classes.

It will come as no surprise to those teaching mathematics in secondary schools in the UK that it is unusual to arrange teaching groups in anything other than 'ability sets'. What is perhaps more surprising is that setting remains so popular, when research has shown that, overall, 'ability sets' are detrimental to learners (Higgins et al., 2015). While high-attaining students may make small academic gains from setting, the impact is negative for lower-attaining students who make less progress and also have lower self-confidence when taught in sets.

There is an alternative to setting. In mixed attainment grouping, mathematics departments set out deliberately to create teaching groups with a broad range of prior attainment. As researchers, we are interested in whether mixed attainment grouping is effective in secondary school mathematics teaching, its impact on students and under what circumstances teachers can make it work.

In this article, we present recent and ongoing research into mixed attainment teaching. First, Becky Taylor reports on findings from the large-scale Best Practice in Grouping Students project that shed light on teachers' attitudes to mixed attainment grouping and why schools may be reluctant to engage with it. Next, Tom Francome shares his findings relating to student and teacher mindsets in two secondary mathematics departments, one using mixed attainment grouping and one using setting. Finally, Jeremy Hodgen and Becky Taylor draw on the Best Practice in Mixed Attainment project to illustrate how some schools manage to buck the trend and use mixed attainment grouping successfully in mathematics.

Why don't schools use mixed attainment mathematics?

Becky Taylor

The Best Practice in Grouping Students project, funded by the Education Endowment Foundation, is designed to explore whether we can reduce or remove completely the harmful effects of setting. Drawing on extensive research evidence, we designed two programmes for schools. Best Practice in Setting is a model for establishing and teaching sets specifically designed to exclude the aspects of setting that appear to cause harm. Best Practice in Mixed Attainment is a model for establishing and teaching students in fully mixed attainment groups.

In 2015 we set about recruiting schools to both projects. Best Practice in Setting, to be evaluated by a randomised controlled trial, required 120 schools intending to group students in sets. Best Practice in Mixed Attainment, a feasibility study with a randomised controlled trial design, required 20 schools prepared to teach both English and mathematics in Years 7 and 8 to mixed attainment groups.

Getting schools on board was hard work. After contact with nearly 1000 schools, we successfully recruited 126 schools to the setting project. However, we only managed to find 17 schools willing to take part in the mixed attainment project. We think this is likely to be because so few schools teach mathematics to mixed attainment groups.

Disappointingly, the next thing to happen was that schools began to drop out. They gave a number of reasons. Some schools had misunderstood what we meant by 'mixed attainment' and weren't willing to give up having a 'top' and 'bottom' group with a 'mixed' middle group. Other schools found that now they were involved in the study, their senior leadership team were not willing to support them and had to withdraw. One school was daunted by the timescale and felt they could not make the changes needed in the time available. Other schools dropped out when their GCSE results took a dip, or when at the last minute a new Head of Mathematics was appointed. Finally, one school agreed to continue, but only with part of their Year 7 cohort as mixed attainment. The result? Where we had hoped for twenty schools, we now had just eleven.

While we were recruiting schools, we were also developing our Best Practice in Mixed Attainment model with the help of four pilot schools. We worked closely with mathematics and English teachers from these schools over the course of the year, visiting the schools to talk with teachers and students, and meeting with teachers in workshops to design and

test materials. We also collected feedback from teachers using questionnaires and interviews, finding out more about their views as to why schools were reluctant to use mixed attainment grouping.

Overall the evidence from our study indicated that teachers were fearful of adopting mixed attainment strategies. Teachers mentioned several factors, which we have grouped under the five heading below (see Taylor et al, 2016, for more detail.)

Stakeholder opinions. Teachers were concerned about the negative reactions of almost all stakeholders, but especially their own colleagues. The teachers we worked with were either already enthusiastic or were won over to the benefits of mixed attainment grouping, but they feared that their colleagues would be hostile. They were also fearful of how parents, students, school leaders and governors would react.

Pedagogic factors. Teachers were fearful that their well-honed teaching practices would not transfer from a setted environment to a mixed attainment classroom. They were particularly concerned about the need to differentiate their teaching and how they would meet the needs of both their highest and lowest attaining learners simultaneously. Additionally, there were fears that mathematics was not a suitable subject for mixed attainment grouping.

Workload factors. It was no surprise to us that workload was mentioned. Teachers were afraid that mixed attainment grouping would consume significant amounts of their time in planning and resource development. Teachers who already felt stretched questioned how they could accommodate additional work into their already busy schedules.

Change factors. Teachers were reluctant to initiate change until they were absolutely certain it was the right thing to do. There were also concerns related to how to make mixed attainment work in their school and how to start out on the journey with no models to follow. Some departments were not able to make their own decisions about grouping strategies, as such decisions lay with senior colleagues.

Accountability. Surprisingly, this appeared only to be a concern for department heads. They were specifically fearful of the impact of mixed attainment on their department's results and on judgements made about their departmental practices.

The sociologist Carolyn Jackson (2010) demonstrates the negative effects of fear in education on well-being. Our study demonstrates how fear holds back teachers from mixed attainment teaching, an innovation that would improve equity and, thus, student well-being. Moreover, we identified a vicious circle in which fear of mixed attainment teaching is reproduced and sustained (See figure 1).

Currently, very few schools teach mathematics in mixed attainment groups. This means that there are few resources or exemplars for mixed attainment teaching. As there are few exemplars, there is limited evidence that it can be done successfully and as a result, stakeholders are sceptical about its benefits. Teachers therefore are afraid of mixed attainment teaching and think it is difficult - meaning that few schools engage with it.

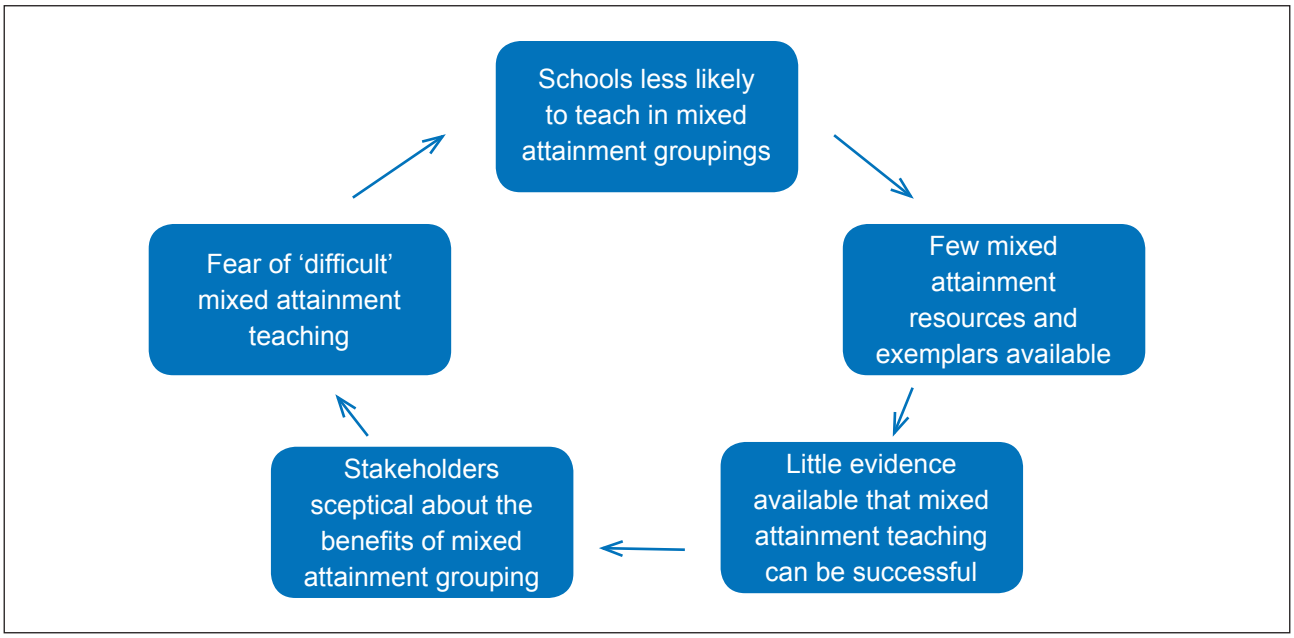

Figure 1: Cycle of fear of mixed attainment grouping.

American researchers Kevin Welner and Carol Burris have considerable expertise in this area, and have been at the forefront of investigating 'detracking', moving from setted or streamed classrooms to mixed attainment ones, in the USA. They identify a strategy of 'winning them over' that we suggest can challenge the fear of mixed attainment teaching (Welner & Burris, 2006).

'Winning them over' may be particularly applicable in the English context. Welner and Burris suggest that successful transition to mixed attainment grouping can be achieved by the following:

- Stable and committed leadership in place in schools
- Making steady and determined progress
- Not being put off by setbacks, keeping moving forward
- Having a supportive policy climate
- Having exemplars of effective practice
- Establishing a professional climate that facilitates change.

Student and teacher beliefs about mathematics in mixed attainment groups

Tom Francome

I report on a small scale study (Francome, 2015) which adds weight to existing evidence that teaching mathematics in mixed attainment groups may benefit students in terms of both their motivation and learning. 'Ability grouping' depends on the underlying assumption that ability is 'fixed' and can be accurately assessed. However, it is desirable for learners to believe that mathematical ability increases as a result of effort and effective practice (a 'growth mindset'). The alternative view is having a 'fixed mindset' that must be preserved by avoiding challenging work so no one sees your failures. Many schools see the potential benefit and believe they are 'doing growth mindset' but research suggests setting practices can create fixed mindsets (Boaler, 2013). Teachers' beliefs matter and teachers tend to possess fixed mindsets, believing for example 'top-set' students ought to understand methods given without explanations, "You should be able to, you're in the top set" (Boaler, Wiliam, & Brown, 2000, p. 640).

My study compared beliefs and practices in mathematics in two schools: School A teaching in mixed attainment groups and School B teaching in setted groups. Data was collected from 12 teachers and 286 Year 7 students via questionnaires (student and teacher), lesson observations and interviews.

Teachers of mixed attainment groups believed more strongly that attainment could be increased through effort than those who taught sets. Though students in both schools reported having a growth mindset, this belief tended to be stronger for students in mixed attainment groups who had a stronger view of intelligence as improvable, were more strongly motivated by learning goals and held stronger beliefs that their own effort could make a difference to their attainment. Students in both schools wanted challenging work where they could make mistakes and learn through discussion with others. Data suggested students in mixed attainment groups were more likely both to believe that this would help them learn and were more likely to be given these tasks.

Effective teachers tend to believe almost all students can learn mathematics and that "a rich network of connections between different mathematical ideas" is required (Askew et al., 1997). Teachers in both schools in this study held such beliefs but students experienced differentl pedagogical approaches in the mixed attainment and setted groups. Mixed attainment lessons tended to involve students discussing ideas collaboratively in pairs or small groups; included substantial tasks accessible at different levels and mistakes and misconceptions were planned for and used as learning opportunities. Lessons in setted groups tended to involve students working mostly on their own, using a method shown by the teacher and following a textbook or worksheet closely.

Typically, students in the mixed attainment groups enjoyed this approach and felt that they benefited mathematically. One said:

> I like discussing my answers with other classmates because I like to see if we came up with similar strategies.

Students taught mathematics in setted groups thought lessons could be improved. One suggested:

> Instead of miss just explaining everything and us writing it down in our books. It would help us in tasks and activities to show what we know, and then learning from our mistakes.

Another student in a 'low-set' suggested:

> (The teacher should) … try doing different things and not the stuff we done in primary.

Observations corroborated student reports that

students in the mixed attainment groups spent a far greater proportion of lesson time working collaboratively (57% vs 10%) and less time working alone (3% vs 46%). This study offers some evidence that grouping practices could influence students' and teachers' mindsets and teachers' beliefs and practices when teaching mathematics. Students taught in mixed attainment groups had stronger growth mindsets, while their teachers held more 'connectionist' beliefs and had stronger growth mindsets. This study suggests that a fear of mixed attainment teaching and the fixed view of mathematics 'ability' can be challenged by departments who buck the trend and teach in mixed groups. As one mixed attainment teacher said:

> I think the most important lesson for anyone to learn in mathematics is the harder you work at it, the better you'll do.

Bucking the trend: what enables some schools to teach mathematics to mixed attainment groups?

Jeremy Hodgen & Becky Taylor

The barriers to mixed attainment teaching are particularly large in mathematics compared to other subjects. The belief that 'ability' is a natural characteristic and that students are either good or bad at the subject is particularly strong in mathematics (Boaler et al., 2000). This is compounded by a view of mathematics as atomistic and hierarchical (Hodgen & Marshall, 2005). As a result, there are strong institutional pressures towards grouping students by ability. It is perhaps unsurprising that setting is so prevalent in secondary mathematics classrooms in England as to be the norm. However, one outcome of our research study is that some schools and teachers do buck this trend and implement mixed attainment grouping in mathematics with positive results. Here we draw on evidence from two case studies to discuss how and why schools and teachers can do this.

The two schools, Dene and Witham, participated in the pilot study and main trial, respectively. Both were what Ball, Maguire, and Braun (2012) would describe as 'ordinary schools'. However, there were significant differences in how the two schools implemented mixed attainment teaching. At Witham, most subjects were taught in mixed attainment groups and the senior leadership were supportive of the trial in mathematics. In contrast, at Dene, mathematics was unusual in being taught in mixed attainment groups and the senior leadership were highly sceptical of the approach.

In each school, the head of department in mathematics was very strongly, and publically, committed to mixed attainment teaching as a way of improving equity. But, whilst a vision of increased equity may be important, it is not sufficient. Many mathematics teachers have a strong belief in equity and yet feel powerless to implement change. One reason may be that a change to mixed attainment teaching involves changing habits that have been developed over a long period of time. The head of mathematics at Dene highlighted this as follows:

> Anytime where you change what teachers are doing is a difficult thing. Because everyone's developed their habits and coping systems for how they work in the classroom. If you're trying to change even one tiny little thing it's difficult. I remember having a conversation with someone where it was about questioning, trying to change the way that they asked questions, and it was a relatively simple thing. But we worked out that she, as a teacher, had probably asked about a million questions. So if you've done something a million times I think it's fairly difficult.

It is not surprising then that many new initiatives do not produce radical changes to the classroom. Indeed, Larry Cuban's (1993) research in the United States indicates that in general teachers, and schools, tend to interpret new initiatives in terms of the status quo. Yet our two case study schools did implement mixed attainment teaching. So, how did these two schools enable teachers to change their habits and begin to change long established practices? In each case, the head of department adopted the 'winning them over' strategy described above. The change to mixed attainment teaching was treated as one aspect of a wider vision of improving pedagogy and learning. For example, one of the mathematics teachers from Witham described how mixed attainment enabled them to challenge beliefs in a natural ability at mathematics by linking it to the school's work promoting a growth mindset:

> It's quite driven by our school promotes growth mind set and it really supports that and I think if they're taught in Year 7, "Right, you're in set three," or whatever, then they automatically get that feeling of, "I'm never going to be very good at mathematics." It [setting] creates that [negative attitude] that we were trying to combat.

Additionally, in both cases, the head of department actively presented the change as a long term and gradual process in which professional development

as a mathematics team was crucial. As we observed above, many teachers worry about the difficulty of finding sufficient new resources suitable for mixed attainment classes. Resources were certainly a concern for all teachers involved, but more important for these heads of department was the use of resources for sharing and discussing teaching and learning and, thus, to counteract fear of mixed attainment teaching.

Finally, none of the teachers in our project found implementing mixed attainment in mathematics easy or straightforward. In fact, all experienced challenges on a regular basis and the difficulty of addressing a wide range of 'ability' was a constant topic of discussion during our sessions with teachers. However, we were struck by how many of the teachers positively relished and were motivated by these challenges. For example, one teacher from Dene described how he "can't hide from differentiation". In fact, for at least some of the teachers, the 'challenge' of mixed attainment teaching was the very thing that motivated them.

Concluding thoughts

We would like to offer some implications for schools who want to implement mixed attainment teaching based on all three contributions above:

- Subject leadership is crucial. In both case study schools, the Head of Mathematics played a central role in leading pedagogic change.
- Successful mixed attainment teaching needs to be linked to wider changes to teaching and learning.
- Implementation takes time. In both case study schools, mixed attainment teaching was part of a long term process of change.
- Teachers need substantial professional development opportunities to make best use of mixed attainment resources.

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