

Teachers teaching all-attainment mathematics: What sustains them

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In this paper, I draw on the findings of my doctoral study into all-mathematics teaching in English secondary schools in which I seek to answer the question: *Who are the teachers who introduce all-attainment teaching in mathematics in English secondary schools and what sustains them?* In it I discuss the teachers interviewed and their approach to the curriculum. Something which marks many of them out from many other mathematics teachers is their love of mathematics. All of them are actively engaged in developing their teaching resources both in terms of skills and materials. Interestingly almost all of the teachers are interested in either curriculum development or research in mathematics teaching or more usually in both.

All-attainment; love; curriculum development; research

Introduction

According to Hodgen (2019) as few as 3% of children in England may be taught mathematics in heterogeneous groups. Most children are now taught mathematics in supposedly homogeneous groups organised on the basis of perceived current “ability”. The most common practice is setting. This leads to a situation, despite the best intentions of teachers, which is unjust and unfair, with, for example, the lower “ability” groups having a preponderance of working-class children (Slavin, 1990; Sukhandan & Lee, 1998; Francis, 2018). Support for setting and similar practices is part of the current hegemonic discourse and, despite substantial research evidence to the contrary, finds favour with the vast majority of teachers (Francis et al., 2016). Nevertheless, some teachers reject this discourse and enact all-attainment teaching in their practice. I was interested in understanding more about this and the doctoral study upon which I draw for this paper is an attempt to answer the question: *Who are the teachers who introduce all-attainment teaching in mathematics in English secondary schools and what sustains them?*

The scarcity of all-attainment teaching in mathematics in English secondary schools means it is difficult to find mathematics teachers teaching all-attainment groups. However, I was able to identify six such teachers who believed in, actively chose and were currently engaged in teaching all-attainment groups. I conducted in-depth interviews with each of them and a number of themes emerged (Jackson, in preparation). In this paper I introduce the teachers, talk about their connection to mathematics, their interests in research and/or curriculum development, their relationship with “ability” thinking, their expectations about achievement and what implications this has for curriculum content and what it means in terms of attainment.

Brierley Grove	Pete, Philippa, Akhila
Shortvalley	Bob, Sarah
Duckworth Community School	Adara

Table 1: The schools and teachers

The teachers and mathematics

All of the teachers are well qualified academically. Four have higher degrees or are studying for higher degrees, something which features in the literature on all-attainment (Hallam & Ireson, 2003). A common theme and one which is important in sustaining them in their espousal of all-attainment teaching is their love of mathematics. Some have loved mathematics from an early age but all are passionate about it.

When I was at school, maths has always been my first love ... [I am] one of those lucky people who can honestly say I actually look forward to coming into work every day. [Pete¹]

I really enjoyed maths at school, thought it was something I was naturally okay at. ... By the time ... I was older, I knew I loved maths [Akhila]

I became a maths teacher ... because I just loved maths, I still do and I wanted to convince other people [to love maths too] [Philippa]

I loved maths ... maths was just something I found easy, ... so I partly became a teacher because I loved my subject. [Adara]

Bob is not explicit about his love of mathematics but it can be read into the way he enthusiastically talks about Inquiry Maths, a system in which he has invested much time and effort over many years and which he continues to develop.

Philippa's experiences at university on an education module enabled her to grasp the importance of an exploratory mode of learning. Akhila's experiences showed her the importance of thinking and talking things through.

I think I just really liked maths ... when it came to revision for exams and stuff ... I would find I was able to explain things, I think, in a way that would help other students. [Akhila]

Sarah is the exception to the others in that she 'hated maths at school'.

Maths wasn't taught creatively ... The teacher would model how to do something, then we'd all answer 30 questions ... I wasn't interested in it. [Sarah]

She stumbled into mathematics teaching by accident. She had applied for an inclusion job but did not get it, being offered a job in the mathematics department instead. She accepted and the experience radically altered her relationship with mathematics.

Quite early on I had some experiences where I thought ... I'm not very good at maths. ... After supporting Bob's lessons ..., I thought this was amazing and wish I'd been taught maths this way when I was at school. So then I had to go back and do another degree in mathematics education. [Sarah]

An interest in research and/or curriculum development

All of the teachers are involved in curriculum development while Bob, Pete, Sarah and Akhila are active researchers. Bob recently gained his PhD. Pete has a PhD in mathematics and, with Philippa, has recently done several NCETM funded research projects while Akhila is completing her master's degree. To discover that one teacher was engaged in research might not be that surprising but to find that five of the six teachers were engaged in research is very unusual and to find three of them have engaged in doctoral study is noteworthy.

¹ The names of the teachers and schools are pseudonyms and all quotations are from interview transcripts

Recently the mathematics department at Brierley Grove, together with a school which put their children into sets, had taken part in a NCETM funded project on the teaching of fractions in year 7. The project was run as a random control trial (RCT) and both schools pre- and post-tested. High attaining children in both schools made progress but the middle and lower attainers at Brierley Grove made much better progress than those at the school which put the students in sets. However, the students who made the best progress were the high attainers at Brierley Grove. Pete said the greatest progress was made by the classes where the teachers were most involved and most convinced by all-attainment teaching but even where teachers weren't so involved the same pattern occurred.

it certainly helped ... convince people in here that ... because the fear ... was if you do mixed attainment teaching, it'll be okay for the weaker and middle kids, but you'll hold the top kids back. [Pete]

Bob has also used research to inform him of potential pitfalls in implementing all-attainment but with a somewhat different outcome.

[Students in the middle] in research, as I understand it – do better in mixed attainment groupings rather than setting situations. [But ours] haven't made as much progress perhaps as the two ends ... We've taken on board the research but then over-compensated. [Bob]

Pete thinks it is important to engage with government reports and academic research so that they can keep up to date with developments in mathematics learning and teaching. He regularly gives the staff papers to read but is realistic about how much people will actually read.

I'd say half the maths staff read quite a lot. ... [it] creates a culture where a greater proportion of your staff are engaging with these issues. ... that gives them some confidence that you sort of know what you're doing. [Pete]

Relationship to "ability" thinking

Unsurprisingly, these teachers do not subscribe to the prevailing hegemonic discourse in mathematics education in England of fixed "ability". This discourse assumes that each of us has a fixed amount of "ability" and this idea is portrayed as common sense. These teachers do not subscribe to this common sense discourse, rather their beliefs echo those expressed in *Learning without limits* (Hart, 2004).

Although not all of them fully embraced a rejection of "fixed ability" thinking in their language, they spoke feelingly about the damage done by such thinking and the subsequent setting practices.

The ethos of the team [at Shortvalley] previously had been very much about protecting and nurturing the higher achievers and the middle-class students ... it felt to me as well that teachers that had been here a long time – the school didn't always have the estate students ... in that things were skewed in favour of the children having the most potential. [Sarah]

Notwithstanding the teachers' beliefs in all-attainment, it was phased in gradually and all of the schools put the students in "ability" groups at some point in their schooling. This gradual phasing-in delayed the feeling of hopelessness and resultant disaffection the students in the lower sets had about mathematics but did not eliminate it, something which was reflected in the behaviour of some students.

[At the end of year 9] they get set and it all goes wrong in my opinion. ... If you teach the C/D borderline ... they all think they're rubbish ... In year 10 it is there ... you especially get it with the bottom foundation group ... Here in my mixed

ability class I very rarely hear anyone ever saying that ... I'd be really upset if I thought anyone thought that about themselves. [Philippa]

I ... kept the weak kids [when we re-introduced setting in year 10 at Duckworth Community School] and created this new bottom set and the change in the handful of kids I kept was phenomenal ... behaviour deteriorated ... [previously they were] working really well along with these great able mathematicians [Adara]

I have definitely disaffected students in my classes ... you definitely see enthusiasm dropping and disaffection much more present when you're kind of going along the sets. [Akhila]

As illustrated above putting the students in “ability” groups had the not unsurprising result that the students in the lower sets believed they could not do mathematics, something the teachers had experienced previously at other schools and which the gradual introduction of all-attainment began to change. In such circumstances the students’ behavioural issues seemed to be aggravated by “ability” grouping, which was also something some of the teachers had experienced previously.

I actually find I'm working harder with my bottom set [than when the students were in a mixed attainment group] because I'm having to impose behaviour management strategies that I never had to before [Adara]

Being placed in a lower “ability” group confirms to the students they are not good at mathematics and poor behaviour often results. In addition, teachers not committed to all-attainment frequently made the equation that poor behaviour indicated a lack of “ability” as described by Sarah.

The other thing that would happen with the maths teachers that had been there a long time ... if someone was messing about ... they would say they can't do the maths. They need to move down a set ... they could be really high-attaining students but the behaviour and the fact that they were performing less well in exams was moving them down into those groups. Then they became very disaffected, disengaged groups of children. With teachers that had very low expectations of what they should be doing and how they should behave as well [Sarah]

When Bob and Sarah arrived at Shortvalley they were concerned about the “ability” grouping practices they found.

We found Pupil Premium students who had achieved a level 5 in primary school had slipped down to set 4 out of 5, because... of a perceived attitude, I suspect, to learning. And maybe behavioural issues as well. So, the Pupil Premium students were packed into the bottom sets, regardless of their starting point. [Bob]

However, while the spoken discourse is about “ability” there is another unspoken discourse which only surfaces in extremis.

[some students] used to go to a school ... which closed ... it felt like sometimes that the school didn't feel that those children were welcome and ... had preconceived ideas about them before they even came here ... The maths team ... concern[s] always seemed to be about ... the top set children, you know ... So, you end up with a top set of 20 kids in it. And set 4 with 28. [Sarah]

Expectations about achievement and implications for curriculum content

All of the teachers believe that all students should have access to all of the curriculum in contrast to the prevailing orthodoxy in mathematics teaching in England where currently low attainers are given a non-challenging, repetitive and restricted curriculum (Watson & De Geest, 2005). For their students to benefit from this belief they deemed a commitment to all-attainment teaching is necessary.

[The maths department at Brierley Grove] still fight(s) for an ethos about mathematics [which is] to do with offering [all] the students an enriching experience about mathematics, [one] that put(s) the kids first ... I would want to see high expectations put on to the children [Philippa]

Part of a teacher's job is to make students realise [that] they have the potential to do whatever they like. [Akhila]

[Getting] teachers and kids ... fighting for that idea that mathematics is something that can and should be part of everyone's life. And everybody is capable of accessing it in some way. ... The more students that say they like mathematics and enjoy it, and that they feel it's something they can actually do, the better. [Pete]

At the time the research was undertaken Brierley Grove taught KS4 in "ability" groups. Akhila noted that when the students were put in "ability" groups her expectations of the students were lowered in a similar way to how the teachers at Shortvalley treated the students with a pupil premium when Bob and Sarah arrived.

[Despite knowing this she says] I think as soon as you've set a student your expectation of the class does go down even if you don't realise. ... I know when I am teaching mixed ability [at Brierley Grove] ... I'm teaching content which I expect 95% of the class to at least try. ... if you're in a set class you're just immediately thinking I'm not even going to bother [Akhila]

They [the teachers at Shortvalley when Bob and Sarah arrived] would teach them [the students with a pupil premium] differently. So, they would avoid problem-solving, they would avoid reasoning ... there was an approach that the best way to get them to behave was to give them something they could already do and just get them quiet and get them on task ... [Sarah]

Student attainment and enjoyment of mathematics

Mathematics has long been seen as something necessary for advancement but which most students want to drop directly that is achieved (Nardi & Steward, 2003). Students in the lower "ability" groups realise that they have little chance of obtaining a qualification and frequently show this through disaffection and poor behaviour. Where students were in all-attainment groups this was much less of an issue.

I had students who disliked maths previously ... working with far more 'able' students, seeing the groupwork and the discussion and ... being exposed to other students, who were seeing more sophisticated ways of working and behaviour just wasn't an issue 'cos these kids were focussed and on task. [Adara]

The teachers have different approaches to making sure the students participate fully in the learning of mathematics knowing this is a potential issue. Adara, for example, says

What I want from the class is for them to be motivated. I want them to focus, I want them to engage ... to contribute and to feel comfortable enough to ask me for help ... I would love to instil a sense of enjoyment of maths in these kids but for me if that doesn't happen ... [it could be] maths could be... one of those subjects that's just not for you'. [Adara]

But the majority of the teachers interviewed want to imbue *all* of their students with a love of mathematics like their own love of mathematics, they want them to become mathematicians, not students who have to do mathematics.

We have to feel mathematics is something we're inspired about, and our role is to inspire the mathematician that's there ... potentially within every student ... everyone can enjoy mathematics or access mathematics in one way or another. [Pete]

They believe that all-attainment is a prerequisite for that to happen and that this is a requirement for unleashing the learning possibilities of all the students.

Summary

The research reported here suggests that a key characteristic which sustains teachers who believe in, actively choose and are currently engaged in teaching all-attainment groups, is a love of mathematics. All of these teachers are also well qualified mathematically (though there is evidence from one of the schools that if a teacher's subject knowledge is initially weak, provided s/he loves mathematics s/he can still learn to become an effective all-attainment teacher through collaborative involvement with curriculum development at departmental level thereby improving her/his subject knowledge). Similarly, an engagement with research supports these mathematics teachers at departmental and school level. These mathematics teachers do not subscribe to the prevalent fixed "ability" discourse in England. They believe *all* children can achieve, something they actively promote through their espousal of all-attainment. This, in turn, necessitates that all children have access to all of the curriculum. The ultimate aim of these teachers is for their students to love mathematics as they love mathematics.

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