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Learning Mathematics without Limits and All-attainment Grouping in Secondary Schools: Pete's story

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ABSTRACT This article is about Pete's story. It is a story about introducing all-attainment teaching in a secondary school mathematics department and about espousing and enacting a pedagogy and set of practices to enable learning mathematics without limits.

> It was a privilege listening to this man talk. It was incredibly inspiring and thought-provoking and I got a huge amount out of it. So, thank you for that. (Lisa, transcriber, December 2017)

Colin was already aware of the power of Pete's story – its affirmation of education as a transformative, moral enterprise based on mutual respect among human beings, its recognition of the inextricable links between this and social justice – before sending it off for transcription. The unsolicited comment above from the, at that stage unknown, transcriber moved Colin to tears and reinforced for him that he was in the presence of a story that needed sharing. It relates the *why* and *how* of introducing and maintaining all-attainment teaching in mathematics in an English secondary school and is permeated throughout by a faith in the students as learners. We believe that what Pete and his department are doing is quite remarkable, but also practical, down-to-earth and achievable.

Introduction

There is a symbiotic but non-essential relationship between all-attainment [1] grouping and rejecting 'fixed-ability' thinking, with the former not necessarily implying the latter: 'a commitment to mixed ability grouping and teaching does not necessarily imply a radical break with ideas of fixed ability' (Hart et al,

2004, p. 12); and it is certainly possible to be committed to learning without limits and to all-attainment teaching and still struggle to find an enabling pedagogy. In this article we offer one teacher's account of the origins of his thinking about social justice and education and how this led to a commitment to all-attainment teaching. He describes how he was able to implement this in practice, in finding the existing spaces to achieve his intentions within the *realpolitik* of contemporary education ideology, policies and required practices. Further, he articulates his passionately held beliefs in the overall purposes of education which inform his pedagogical principles and underpin his ways of working in the classroom and with his colleagues.

We offer this story because we believe it holds truths that need to be shared and debated in the context of contemporary schooling and because, by relating it here, it can become a 'public resource' (Nixon et al, 2003, p. 87) – that is, a tool with which to think and imagine mathematics education differently. A public resource like this makes available a tale of experience not usually told and certainly not to be found in current policy discourse. We find it a compelling personal narrative, one which inspires and rekindles hope. Because personal narratives have the power to make us (teachers, teacher educators, researchers and parents) *see* the world differently, they also have the potential to help us *behave* differently in the world, offering an antidote to a dehumanised, over-technicised view of teaching and learning, where transformation has been factored out and performance is all. A narrative like this challenges and subverts the current Foucauldian regimes of truth (1979) holding sway within the English school education system.

Jerome Bruner (1987) distinguished between *paradigmatic knowledge* (knowledge through and expressed in logical propositions) and *narrative knowledge* (knowledge through and expressed in stories). He argued that storying is a fundamental way of making sense of the world or, more strongly, that it is characteristically human to think in stories (Clough, 2002). Telling stories helps to shorten the distance between us and keeps the moral dimension to the fore: working with stories can generate 'an unavoidable moral urgency' (Clough, 2002, p. 99) in a period of educational practices set about by performativity and technicism. We hope the story speaks to you in the way it has spoken to us.

The interview on which the story is based was undertaken by Colin as part of his doctoral research. The story was first initially constructed by him, then validated and extended by Pete [2] and edited for this article by Hilary.

Pete's Story

Pete has an educational background as his father was the headteacher of a small primary school in a mining village in County Durham and, perhaps unsurprisingly, education is always something that attracted him. At the time he was growing up, people in the 'mining communities ... in the North-East ... put a very high value on education'. He says:

> When I grew up, the most important thing you ever got told by your grandparents was get an education so you don't have to go down the pit.

As a teenager, he attended a 'good old-fashioned Catholic comprehensive' on the outskirts of Durham in the 1970s. The school was attended by working-class children from the mining community and was led by a headteacher who was a 'good old Labour Party man'. Pete particularly enjoyed his experience in English and mathematics classes, recalling that those subjects, at least, were taught in mixed-attainment classes until years 10 and 11. Even at this early stage he engaged in helping those whose understanding of mathematics wasn't as highly developed as his own. He found working with other children a positive experience – his own mathematics didn't suffer, and the children he worked with benefited from his help.

After school, Pete went to university in London to do a mathematics degree. He self-identifies as 'being good at maths', such that

> [I would] regularly end-up in the run-up to the end-of-the-year exams basically running mini-tutorials and seminars to several of my fellow students ... [Once towards the end of my degree, I remember] ... having to teach 15 people and ... [thinking] ... actually I'm quite enjoying this, it's a nice thing to do. I feel good about doing this. According to what they were saying, [I wasn't] bad at it either.

Following on from that, he did a PhD in mathematics at the same college. However, although he enjoyed the mathematics,

> [I] wasn't that keen on going into academia [as it] didn't come easy ... [I] didn't enjoy the relative isolation of that work ... the very limited degree of social interaction involved in that.

He considered teaching mathematics, but then the miners' strike happened and he became very involved with journalism and left-wing politics such that it was twenty years before he thought about teaching again.[3]

During those years, Pete had a job which was unrelated to mathematics and could take him a long way from home, sometimes at very short notice. When his son was born, Pete realised that now he had a family he would need a more conventional sort of job. He still loved mathematics, so weighing everything up, he decided to train as a mathematics teacher. He obtained a place at a University of London college, where the tutor emphasised conceptual understanding, the role of history and issues around social justice. This was fine with Pete, whose own secondary school experiences predisposed him to mixed-attainment teaching. The tutor encouraged people to think and read and explore.

> And the more I read, and the more I went into different schools ... the more I became convinced that both philosophically but also in terms of evidence, the evidence that setting was an effective way to

> teach wasn't high. And that there was at least good evidence philosophically ... that there could be a better way to do things.

After qualifying, Pete took a job at a school in east London. Before he took the job, he understood that the school taught mixed attainment at Key Stage 3. He thought:

> This sounds good, mixed attainment, I'm reasonably convinced now from what I've found out and read about, so it would be good to get a chance to try it.

However, he found the reality was rather different. Although the students were taught in form groups, they were organised within the classroom in a similar way to many primary schools: there was a table of students who used the red book, a table using the blue book and one using the green book. He became increasingly unhappy about this and in his second year, seeing a job which was a promotion at a nearby school, Brierley Grove, he decided to apply for it. However, he thought:

> I'll make it clear where I'm coming from and more or less say if you want to give me the job, what I'd like to do is use lots of collaborative activity-based learning ... and I'd like to, at least in Key Stage 3, work towards ... mixed 'ability' or mixed attainment.

Pete got the job. The head of department's attitude was: if that's what you want, since you're responsible for Key Stage 3, you do it for Key Stage 3 and see if it works. Despite major opposition to the introduction of mixed attainment by some of the staff, Pete drove it forward, persuading 'three or four other people to go along with' him. Mixed attainment was introduced into Year 7. Pete did everything, including writing a scheme of work with all of the lesson plans and all of the resources. During the first year one other teacher became quite enthusiastic, which Pete found very helpful.

By the end of that year, several members of staff remained unconvinced, but

> the ethos was better among the Year 7s, the kids were starting to enjoy maths, there was less disaffection, and the lessons were getting a bit more interesting. So, people suddenly thought – not everybody, but quite a layer of people ... maybe this is worth looking at.

The head of department became convinced and made sure people couldn't block it. Mixed attainment was rolled forward into Year 8. Although the classes in years 7 and 8 were mixed attainment, the teachers were free to teach in any way they liked, and they didn't have to use the resources provided.

> Only in a minority of lessons with a minority of teachers did something else begin to happen, but it was enough ... by the end of

> two years having been through it more people began to be convinced.

At the end of that second year, mixed attainment was pushed into Year 9.

During the first two years there had been some staff turnover, so the mathematics department was able to recruit some teachers who shared a mixed-attainment ethos. One of these was Philippa [4], whom Pete describes as a crucial appointment. She had previously taught locally, and they had worked together outside of school on a booklet on proportional reasoning.

> We spent a year working on it, to use it as a model of how to teach mathematics concepts in a ... mixed-attainment setting.

They had put a lot of effort into it, working on it and trialling it in school, but it had been worth it as the students 'really liked it and the mathematical learning was very good'. That unit had helped other teachers to appreciate what Pete and Philippa were talking about. The appointment of Philippa 'sort of put that heart in the faculty'.

The mathematics department had developed a policy of taking 'lots of [pre-service] students' with the aim of recruiting them if they shared the same ethos and a suitable job came up. Three quarters of the department now shared the same philosophy, agreeing broadly with the department's way of teaching.

> Nobody wants to go back to setting in Key Stage 3. Not a single person ... so in a sense we've convinced enough people that there's now a settled ethos in the department that in Year 7, 8 and 9 people ... prefer to keep mixed-attainment classes. They feel it works.

This philosophy encompassed not only that of embracing mixed-attainment teaching but also a belief that *mathematics teaching was a fundamentally creative and collaborative activity* where people, including teachers, were expected to work together. A lot of emphasis was put on no one planning alone.

> All planning is done collaboratively. We have time set aside where people ... meet regularly ... There are some units we've made and there are some good resources, but ... we've agreed collectively after lots of discussions, we have a broad scheme of work, we're not very prescriptive about the detail, but let's create some lessons and units. Put the emphasis not on creating individual resources or lessons, but creating whole units that make mathematical sense, of a journey.

The department put a big effort into collaborative planning and development of the 'right kinds of tasks for students to work on, which work well in mixed-attainment classes'. The department worked to try to create blocks of joint planning time and the teachers also did lots outside normal hours. Pete reckoned it took two years to create a good-quality resource for a mixed-attainment class.

> I don't think you can start from a single resource. I think you have to start from a unit ... a sequence of a couple of weeks' learning. What might that look like? ... what's the mathematical journey [for] different students? ... what works, what tasks work well? It takes an awful lot of time. But it's worth it, because if you spend the time doing it well, it lasts.

Pete said they were confident enough in their own mathematics that they didn't refer to the National Curriculum but, after departmental discussions, decided what the students needed to know by the time they got to GCSE. They had got rid of lots of content, but also taught material that either wasn't in the curriculum or was taught at A level, including some topics from graph theory which were accessible at any level. They were interested in getting the students to understand the big ideas, the big concepts in mathematics, so they concentrated on 'securing a feeling for number' in Year 7, and they did a lot of geometry and algebra in Year 8, going further in Year 9. If they thought the mathematics was accessible to the year group, they included it. One of Pete's guiding principles was to ask:

> Does this make mathematical sense to you? ... Do you think, if your kids learn this, it's going to equip them to become better mathematicians and be able to think mathematically? If you do, let's play with that, let's explore it and let's talk to each other about it and see if it works. And the proof of the pudding is – does this end up with kids being able to function mathematically across all of the attainment ranges? And obviously, as far as upstairs [the senior management] is concerned, and the kids are concerned, does it lead to better outcomes? There's always that accountability. But so far the evidence we've got is that it works by and large.

In the Year 9 curriculum they had included some spherical geometry which some people had thought would confuse the students, but Pete said:

> By doing both [plane and spherical geometry] simultaneously, their understanding of and retention of the plane geometry ... is much higher because it's more interesting and engaging.

Pete said that although it might sound like hard work as the teachers had to work collaboratively on developing the materials, they liked it.

> People feel some ownership, some creativity, and it's all collaborative – nobody does this on their own. It's all teams of twos, threes, sometimes fours working together ... people like the fact that it's not isolated ... partly because the first year Philippa was here, me and her modelled that all of the time.

Pete and Philippa had got to a point where they had worked together so often that they had reached a level of trust such that they were confident that if they

planned the broad outline of a series of lessons they could confidently split the lesson planning between themselves so that each would only have to prepare the resources for half of the lessons. As time had gone on, this type of working had developed in the department:

> There's more of that where people are working together and developing that kind of trust, where you discuss some things in detail but other things you get a common language and a common approach. It evolves naturally ... over time your workload gets reduced because it's a team.

Pete thought he might not have been able to sustain this method of working if it had just been him. The arrival of Philippa, who shared his approach and his philosophy, had been 'more than helpful'. And when the head of department decided to move on, he and Philippa extended this approach into the leadership of the mathematics department. They had applied to lead the department jointly.

> We modelled this collaboration by insisting to the school that we're not having this hierarchy any longer. Me and Philippa will be joint heads of faculty ... so now we just share everything with everybody.

They consulted the rest of the mathematics team on issues such as the timetable and the budget. Not that everything was plain sailing**,** however:

> It doesn't mean you don't have arguments with people ... but the point is at the end of the day, if you try and force people to do things it's not going to work. You have to convince, persuade, show ... but at the end of the day, there isn't a shortcut. It will only work if people want to work here, within this ethos, and feel that they're a valued part of the team.

During the time since mixed attainment had been introduced, no one had left the department because they disagreed with the current environment, although some people had left because of personal factors. The department's ethos wasn't simply about mixed-attainment teaching, it was also about 'what mathematics education should be about, what teaching should be about'.

The department had recently taken part in some research on the teaching of fractions in Year 7 with another local school where the children were in 'ability' sets in mathematics classes. The results had shown that all children in both schools had made progress. The middle and lower attainers at Brierley Grove had made much better progress than those at the school which setted. However, the students who had made the best progress were the high attainers at Brierley Grove.

> What's interesting, that's true of every class ... every single class without exception – the same pattern.

Pete said the classes where the greatest progress was made were the classes where the teachers were most involved and most convinced by mixed-attainment teaching – it made a difference – but even where teachers weren't so involved the same pattern occurred.

> I'm not claiming this is any great piece of research, but it certainly helped convince people here ... because the fear that was always expressed 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.

Before the research, at least half of the department were convinced that the research would show the opposite of what it actually showed – that is, that the high attainers would do worse when they weren't in sets. Pete got the head of department from the other school to come and present the findings. He said:

> People were shocked when they saw it ... [it] shifted people to the point where, okay, this is how we do things now ... it was useful.

Another worry of teachers was about producing lessons that engage all of the students. Pete and Philippa had modelled the teaching of the fractions unit and people had been convinced once they had seen what it could look like.

> You can have lessons which engage all kids where there's kids of different attainments working together and they all bring different things to the tasks of whatever you're working on, and they may be working at all sorts of different mathematical levels, but they can learn from that and it can make them feel that they're capable of learning mathematics and the buy-in becomes very high.

Pete and Philippa didn't tell the other teachers just how much work they'd put into making the lessons work as they knew that people needed to have some 'physical, real examples in front of them', but once they were convinced it could work, the teachers were then willing to give it a try and work a bit harder to make it work for them.

For Pete, a good mathematics lesson entailed a lot of talking, not by the teacher, but by the students as they engaged and grappled with something mathematical.

> It might be they're exploring something, investigating something. It might be they've already learnt something and they're trying to apply it to a new problem ... The general one for me has to involve dialogue of pupils and then doing some actual mathematics in the course of the lesson and the teacher shouldn't talk too much.

However, this wasn't something that just happened. Starting in Year 7, Pete said that you built up the expectation of the students that they would

> come into a classroom, be posed some mathematical questions, which you have to carefully construct, but then the main

> responsibility was then on them to discuss and argue and explore those.

The teacher would be there to guide and help them if needed, but it was the students who had to do the mathematical thinking. The students would all be working in teams on the same problem; some would have more mathematical tools more readily available, and the teacher would need to have a

> whole set of questions ready to probe and target at different kids ... All students are engaged in real mathematics and developing real mathematical ideas in a mixed-attainment setting, but in a way that they're all engaged essentially in the same task.

There was a lot of trust between parents and the school. Pete strongly believes that mixed attainment done well is of great benefit to the students and says the evidence is that the highest-attaining students do particularly well.

The department had had a recent Ofsted inspection in which 'their key focus was challenge and stretch for the most "able" students'. The inspectors were 'more than happy with what they saw'. Moreover, Pete expected that the students sitting GCSE this year would achieve at the highest grades, significantly above the national average. The department also entered students for a bridging unit between GCSE and A level. Most schools entered only those students they were confident would get the very top grade, but Brierley Grove never entered fewer than 35, telling the students the results were not the point, the experience would help them in their future studies. Mathematics was now the most popular subject at A level.

In the coming year, the department was planning to trial mixed attainment in Year 10. There were going to be eight classes, three of which were going to be taught in their form groups, while the others were going to be set. The tutor groups were going to be taught by Pete, Philippa and Akhila, who were all strongly in favour of extending mixed attainment to the older students; the other teachers were nervous about this because of the potential effect on GCSEs. Pete was fairly confident that there would be a positive outcome, but he didn't know for certain, as it was uncharted territory. If it worked, the rest of the department had agreed that mixed attainment would be extended to all classes in Year 10.

> We're hoping by modelling – look, this is how it can work in Year 10 ... what I'm hoping is that – not by the end, but by halfway through – the evidence might be that both in terms of engagement and happiness of the kids doing mathematics, but also the hard measures of attainment and tests and things like that, that increasingly over the course of [the] year ... we can show to people ... actually it does work. If that happens, the hope is that the following year we'll roll it out to the whole of Year 10.

Pete had not yet written a scheme of work, but he was looking forward to the challenge over the summer. He thought it would be fun and they would enjoy it.

Pete describes himself as:

> one of those lucky people who can honestly say I actually look forward to coming into work every day. I can't remember a day when I didn't enjoy being in work ... Honestly, I go home every day thinking that was enjoyable ... I'm lucky here ... we get a lot of freedom ... nobody tells me what to do. As long as the results are okay, we get through things like Ofsted ... as long as everything is fine and we tick all the right boxes as well, they basically leave us alone ... There's a game you have to play ... but as long as we hit all of those things nobody ever interferes that much in how we do it, so ... compared to most schools I'd say we have a relatively high degree of autonomy.

Pete said that they'd had a deliberate policy of finding and recruiting people who were mathematicians, and in fact all of the staff who had been recruited were mathematicians. They looked for:

> People who are passionate about mathematics ... not just something they're doing as a job, but who genuinely and passionately say that is something that makes them tick.

Pete thinks it is important to the students that they

> can see that their teachers are mathematicians who enjoy doing mathematics ... because if you want to communicate to the kids and inspire them about mathematics as something they can be passionate about and buy into and enjoy and it can be part of life [and] it's not something you do to pass an exam, [then] ... that does mean the staff have to embody that, that actually mathematics is more than that.

He wouldn't employ anyone unless he was convinced by them that they 'were passionate about mathematics'. It was his first criterion.

> Convince me that mathematics is something you're excited about. We'll find out if you can teach and do all that kind of nonsense ... and if you can't, we'll teach you how to do that, but the one thing I can't teach you is to be passionate about maths.

As well as recruiting teachers who were passionate about mathematics, Pete said they put a lot of emphasis on retention:

> If you put a lot of effort into building a team who are passionate about maths and at least have a shared view of how to teach maths, there's no point in doing that if you don't keep them.

So, for example, although Akhila was quite new, they'd given her quite a lot of responsibility and were supporting her in her Master's, which was focused on trialling mixed attainment in Year 10. This was also valuable to the department as it allowed them to experiment. They were also giving Jean, who was newly qualified, opportunities to develop her interest in drama by working with someone from outside to bring some more creativity and imagination into the classroom.

> So we're constantly looking for opportunities. How do you build a team? Keep[ing] it enthusiastic, happy, creative and keep[ing] some stability is quite important.

Half of the team were ex-[pre-service] students who fitted in with the department's ethos and had chosen to stay. Pete hoped that they felt valued and supported. He felt the team was getting stronger with more teachers either choosing to work at Brierley Grove or being head-hunted to work there.

Pete had also employed Fred, who was trained as an art teacher, as a long-term supply to cover for a teacher who was off on a long-term illness. Pete said Fred was:

> not going to start by teaching A level or top set in Year 11 but anything else he's fantastic in. So you don't have to be a maths specialist, but you have to enjoy maths. And Fred does, and he works at it. And he'll sit around and play with maths the same as everyone else. Now we have supported him to develop his subject knowledge to the point where he is starting to teach A level too.

The department did come under a bit of pressure, as the prevailing culture was that you should set, 'as allegedly it was better'.

> We're quite robust about that and challenge people. If you were to argue that, you would have to engage in a heavy debate backed by evidence.

The pressure was there, but the GCSE results were excellent. As long as that continued to be the case, Pete said they'd be left alone. However, Pete said:

> If the results ever start getting problematic, I suspect those pressures would intensify a lot ... the trouble is, unfortunately, because of the exam-factory thing in schools ... it's a bit like being a football manager. You live or die by your results.

Pete thought the headteacher at the time who'd been in post a few years was in favour of setting. He had broached the subject with Pete when he'd first arrived but had been disabused of the idea as Pete had suggested if he was to go down that path he'd be looking for a lot of new mathematics teachers – who were in short supply in London. That head dropped the idea and didn't mention it again.

Pete thinks it is important for the department to engage with government reports and academic research as another way of coping with these pressures, and also so that they can keep up to date with current developments in mathematics learning and teaching. He regularly gives the mathematics department staff papers to read, but is realistic about how much reading will actually happen:

> 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. And having sensible conversations about them ... even if they don't read all of it ... that gives them some confidence that you sort of know what you're doing.

He also compiles dossiers on research evidence which he gives to the head. He believes it

> sends a message – whether you agree with what we're doing or not, it's not just we've made this up on a whim. People are seriously engaging with research and evidence, so there's a purpose behind this and they're doing it for a well-thought-out set of reasons. If you don't agree with that, well fine, but come and have a proper argument about it.

When, in 2015, Ofsted produced its report 'Key Stage 3: the wasted years?', he and Philippa had read the report and carried out some research on mixed attainment. The newspaper headlines said: 'Wilshaw says you should set'.[5] They went to the headteacher and said:

> Actually that's not what the report says, because if you read the report, what it said was that where it's done well, mixed-attainment – he called it mixed-ability – teaching works well. The problem is most teachers can't do it, therefore you should set.

One of the features of mathematics learning at Brierley Grove was the use of *learning journals*. Every student had to keep a learning journal, the idea being that the students should take 'more responsibility for summarising their own learning'. They had originally taken and adapted the idea from a school in leafy Cambridgeshire which organised its students in mixed-attainment groups in mathematics at Key Stage 3. At first it had been difficult and the first year had been 'quite a battle', but 'now the kids just take it for granted'. Over time they had taken ideas from other sources and the learning journal had evolved over the years, but the department thought it worked quite well. The students had to take 'responsibility to do ... learning notes reasonably regularly'. More generally, education wasn't something that happened to you, it had to be 'something in which you were an active subject'.

Pete doesn't agree with a philosophy that says students only need those skills necessary for the economic needs of the country; he thinks that this vision of schooling is too narrowly focused, and even though students need those

skills and should leave school with them, a different vision is required. He thinks:

> If you don't have a different vision, and you don't struggle, ultimately, you'll surrender to their vision ... You have to fight for that within the current structures and do as much as you can. And not always succeed. But you do little bits sometimes.

One thing Pete particularly enjoys is the residential he organises for the16-18-year-olds. It enables the teachers 'to model for the students a different vision of what education should be about'. The department takes about 40 students away for two or three days to a youth hostel, usually shared by members of the public and without access to social media or TV. The normal rules don't apply, the teachers and students are often on first-name terms and there is no regimented strict bedtime. Although they are there to do mathematics, the students can do other subjects if they want to, so, according to Pete:

> You have to have teachers who are prepared not to be frightened to delve into other subjects.

Despite the freedom, Pete says they all do loads of work and are quite enthusiastic about it. Pete says that 'they never disappoint you, the kids, never'.

Pete thinks that there are two aspects to education. The first is that:

> education should be about primarily enriching and liberating the human personality and spirit ... that the purpose of formal schooling should be to encourage and develop and stimulate people to become the active subject in education for the whole of your life ... it's getting people to the point where [when] they get to adulthood ... they have access to the broad range of human achievement and want to continue that as part of what makes them human for the rest of their lives.

The second aspect is being able to question the world. This entails 'being open to learning', being 'capable of thinking' and so not just accepting authority at face value but challenging and questioning and not simply accepting 'things that are handed down from above'. Pete would like it if schools saw that as their primary purpose but is realistic enough to know that the function of schooling is to 'play a structural role in the modern, industrial capitalist society'. He is realistic about what is possible:

> You can't wave a wand and wish away all of the structure and all of the other pressures, the social realities, that's not possible. But what you can do is to struggle and fight to push back a little bit against that, to create little bits of space ... Is it worth it? Yes, I think. Because the alternative is to surrender and sell your soul. And it helps keep teachers sane and it does in our department, and if it makes at least some kids leave with a slightly wider, better version

> of what education could and should be about than they would otherwise do, then it's worth it.

Changing over from setting to mixed-attainment classes had taken a long time because that was only the start of the process.

> Developing how to teach effectively in those classes, that takes a long time. And that's still a work in progress ... Getting rid of sets is the beginning of a journey about what kind of pedagogy and teaching approaches are effective in mixed-attainment classes ... That takes a long time to develop.

Concluding Remarks

Pete's story begins with his commitment to social justice and a profound sense of the possibility of human educability. He conceptualises education as transformative; young people can change who they are, in the sense of rejecting previously imposed limits on what they can achieve. They can be both critical and creative and they can help to make a difference in the world. To quote from his story above, 'they never disappoint you, the kids, never'. It is these starting points that led to his re-conceptualising of pedagogy and his continual striving to enable the enactment of the associated pedagogical principles in his own classroom and the classrooms of his colleagues. The starting points are fundamental. As Susan Hart notes, 'the search for pedagogical possibilities only *begins* once we have freed ourselves from deterministic notions about existing patterns and limits of human achievement' (Hart, 1998, p. 160, original emphasis).

We believe Pete's story allows us to see the three key purposes (Hart et al, 2004, p. 179) behind teaching that works for learning without limits:

- *affective* purposes, which include joy in learning, confidence, happiness and engagement;
- *social* purposes, which include classrooms based on mutuality, working together, collaboration and co-learning; and
- *intellectual* purposes, which include enquiry, creativity, criticality and grappling with deep (mathematical) ideas.

It is our intention that this article contributes to the ongoing conversation about what a socially just education system might look like; about understanding more deeply what it is for learning to happen without limits; and about how to try to set about achieving social justice and learning-without-limits goals in practical ways in the secondary mathematics classrooms of the here and now.

Postscript to Pete's Story

As we saw above, Pete, Philippa and Akhila next began extending all-attainment teaching into years 10 and 11, initially on a trial basis with half of

the year group, and, as ever, seeking to convince both by example and by hard measures of attainment. Colin kept in touch with Pete, who reported by email what happened next. The evidence from the trial was convincing in that students of all attainments made more progress in the mixed-attainment classes, particularly the highest attainers, again contrary to the usual expectations. This allowed Pete and Philippa to convince both teachers and school leadership to extend mixed attainment to the whole of Year 10 the following year. Pete noted, 'Now, already, it seems completely natural to both students, who prefer this way of learning, and teachers and it would be difficult to imagine going back.' The mathematics department was now thinking about keeping teaching in mixed attainment in the first term of Year 11 and only after the December mock examinations moving to 'exam preparation' classes for the last term.

The department had also found a knock-on effect from 11-16 teaching to A level. The department has very high recruitment to A-level mathematics. Particular students who have come to enjoy mathematics a lot but may not have been the highest attainers at GCSE are now doing A level. Several students who got a borderline 'pass' grade at GCSE are succeeding at A level because they love the subject and work at it – including one who was on course to do the lower-tier paper until a month before her GCSEs, but who started really loving mathematics and now is doing very well in her A-level class.

Notes

[1] We use the term *all attainment* rather than *mixed ability* because we believe that any group of learners will be mixed and, in terms of attainment/ability, all we ever really know about someone is their previous attainment. We do not regard this previous attainment as a fundamental predictor of future attainment, let alone as evidence of any sort of fixed limit to what can be achieved; rather, as in the call-out for this set of articles, we espouse instead an 'unlimited vision of human educability'.

[2] A pseudonym. The existence of this article is, of course, completely dependent on 'Pete', but, unsurprisingly given the current educational climate and his frankness, although he would be happy to 'go public', he prefers to remain anonymous for the sake of his colleagues.

[3] In 1984/85 the majority of British miners went on a protracted strike against the pit-closure programme of the Conservative government.

[4] All the names used for teachers in Pete's department are pseudonyms.

[5] Michael Wilshaw was the chief HMI/Head of Ofsted at the time.

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