

Primary school teachers tackling social justice issues whilst teaching mathematics: Findings from the Primary Maths & Social Justice research project

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We report on initial findings from the Primary Maths and Social Justice (PMSJ) research project which we carried out in 2021-22. We adopted a model of participatory action research in working collaboratively with a team of six teacher researchers from two primary schools in Greater London. The main aims were to explore how primary school teachers can maintain and build on their initial interest in addressing social justice issues through their teaching of mathematics, and to consider how to help students develop their critical understanding of mathematics and collective mathematical agency. We present and discuss three themes that emerged from the thematic analysis of transcripts from research team meetings and interviews with the teacher researchers: teachers' appreciation that young children can engage with mathematics and social justice; teachers' varying and developing relationships with mathematics; and students growing appreciation of how mathematics can be used to argue collectively for change.

Keywords: primary mathematics; social justice; critical understanding; collective agency

Introduction

There have been increasing calls recently from inter-governmental policy-making organisations, such as the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2015), for a revised school curriculum that cultivates the critical understanding and collective knowledge and agency that learners need to address the social, economic and environmental challenges facing global society. Given the critical role that mathematics has to play in solving real life problems and tackling the crises currently facing humanity (Skovsmose, 2021), any review of the school curriculum must include consideration of the way mathematics is taught. Teachers often cite an interest in social justice issues in deciding to become a teacher in the first place. However, they often lose sight of these interests when confronted with the reality of the classroom situation and the pressure to raise the mathematical attainment of their students in high-stakes tests (Wright, 2021).

The Primary Maths and Social Justice (PMSJ) research project set out to enable teachers in primary schools (age 5 to 11) to re-engage with their commitment towards social justice whilst exploring how mathematics might be taught in a way that contributes towards the type of humanistic curriculum aims outlined above. The project focused on the following two research questions: How can primary school teachers maintain and build on their initial interest in addressing social justice issues through their teaching of mathematics? How can primary school teachers help

students develop their critical understanding of mathematics and collective mathematical agency?

Methodology and research design

The PMSJ research project adopted a model of participatory action research (PAR) aimed at building and maintaining teachers' agency and self-efficacy in developing their practice (Wright, 2021; Wright et al., 2022). The three authors collaborated with six teacher researchers in two London primary schools by establishing a research team based on PAR principles. We held a series of research team meetings over the course of one academic year (2021-2022). These meetings focused on discussing theory and how this relates to current practice, agreeing the research design including the data collection tools and protocols, and planning and evaluating two research lessons. We drew on a conceptualisation of teaching mathematics for social justice that we had developed through our previous work (Wright, 2016; 2017; 2021).

Interviews were conducted by the authors with the teacher researchers to capture their experiences of participating in the project and their reflections on its impact on students. These were held near to the start and finish of the project. Data were collected through audio-recording and transcribing these interviews as well as the discussions in research team meetings that focused on evaluating the two research lessons. Thematic analyses were then carried out on these transcripts (Braun & Clarke, 2022). Selected findings from these analyses are reported in the next section. The six teacher researchers were assigned the following pseudonyms: Aidan, David, Emma, Kate, Layla, Rose. Note that Year 1 students are aged 5 to 6, Year 2 students are aged 6 to 7, Year 5 students are aged 9 to 10, Year 6 students are aged 10 to 11.

Findings

There were several themes that emerged from the thematic analysis and three of these, which we consider to be key themes, are reported below. The quotes from teacher researchers are examples from the data on which the findings are based.

Theme 1: Teachers' appreciation that young children can engage with mathematics and social justice

The Teacher Researchers (TRs) recognised the challenges of engaging younger students in social justice issues, particularly within mathematics lessons, although they developed a greater appreciation of the importance and benefits of doing so:

I think it's got me thinking about, even though they're five and six-year-olds, they have opinions, they have quite good ideas. And, like, getting them involved in classroom decisions, I think, is very beneficial, even from that age. And I think, beforehand I, maybe, dismissed slightly, of them being so young, that maybe they won't understand. (Emma, Year 1 teacher, Interview 2)

The TRs articulated increasing confidence in incorporating social justice issues within the mathematics curriculum and described how they were able to make these accessible for younger students:

So, it's opened my eyes, I guess, a bit more to ... not kind of pigeonhole, you know, seven-year-olds into "they won't understand that or that, this isn't relatable to them at their age". Actually, to be more ambitious, if you like, to think actually they can do more than you realize, you just need to give them the right framework to be able to do it. (David, Year 2 teacher, Interview 2)

The TRs demonstrated a growing appreciation of the need to establish genuine links between mathematical concepts and issues of social justice. They described how their students were able to engage successfully with relatively complex ideas:

I've been surprised at how children can deal with quite, like, complex issues. I knew they could, but just some of the suggestions have really surprised me ... it's made me think "Well, how can I make this work with younger children?" (Rose, Year 5 teacher, Interview 2)

Theme 2: Teachers' varying and developing relationships with mathematics

The TRs described varying relationships they had with mathematics based on their own differing learning experiences. Some of the TRs had negative attitudes and anxiety towards mathematics, often resulting from prescriptive teaching approaches they had experienced themselves as learners. In some cases, this inspired them to want to generate more positive learning experiences for their own students:

As someone who didn't like math at school, I think any opportunity to, kind of, make maths more meaningful, and accessible to all, is going to have a benefit on the classroom. (Rose, Year 5 teacher, Interview 1)

In contrast, Layla had a much more positive relationship with mathematics:

I'm passionate about maths ... and anything I feel that can promote it in any way is great. (Layla, Year 6 teacher, Interview 1)

Over the course of the project, the TRs developed broader views of mathematics. They articulated a need and desire to go beyond the perceived constraints of the current schemes of work and to provide a richer and fuller mathematics curriculum that employed more exploratory and discursive teaching approaches:

I always thought that was something I had done in all my maths lessons anyway. I was trying to make it, kind of, real life if possible, using things that are tangible, relating it to things that are going on in the world and stuff. But I guess, after the first interview, I was a little bit taken back by "Oh well, maybe they haven't kind of grasped this" ... I put a lot more emphasis in, not just in the kind of standalone lessons, but in my lessons in general, to make a point of maybe stop and take a moment to have a bit of a longer discussion, rather than having that like brief introduction of how this is relevant to the world. (Aidan, Year 2 teacher, Interview 2)

The TRs began to recognise the need to challenge students' beliefs about mathematics and to make the subject more meaningful and purposeful for students by relating it more closely to their everyday real-life experiences:

It's not a case of "We're going to do fractions today", it's a case of "Why is it important that we know how to do fractions?" or whatever the specific learning intention might be. So, I think that always relates to the children and their world, and their future world. ... And that's a regular thing through the lessons. (Layla, Year 6 teacher, Interview 1)

Theme 3: Students' growing appreciation of how mathematics can be used to argue collectively for change

The TRs described how students engaged enthusiastically with the collaborative problem-solving activities tried out during research lessons, for example by entering into heated debates with others:

... there was some really passionate debate and lots of really good, sensible kind of comments and examples being put forward by the children ... And in the

lesson that we taught, they were just really passionate about putting across their opinions as well, which is quite nice to see. ... It was nice to see kind of the teamwork aspect of it work quite well. (David, Year 2 teacher, Interview 2)

The TRs were impressed with the extent to which students embraced the opportunity to use mathematics collectively in arguing for change. They described how students exhibited a growing appreciation for how mathematical reasoning can be used to strengthen their arguments and became more confident in doing so:

So, we saw that, when they went off doing their independent task ... the children had a better overview at the end and were able to feedback during the plenary, and actually give answers that had reasoning behind them, rather than just: "This is the answer and that's it." ... the children have more to say about social justice, or fairness, equality, doing the math, where it made an impact on their own lives ... (Emma, Year 1 teacher, Meeting 5)

Two of the TRs (Emma and Kate) reported how students became even more enthusiastic when they were informed that their arguments (in this case around their proposals for a fairer and more equal way of allocating the use of a new play area) would be presented to the school's senior leadership team for their consideration:

[We told them] "you're going to take this to ... the senior leaders and perhaps they might put it into practice". ... I think they didn't realize. They thought: "Oh, you know, it's all about us and we can do this". (Kate, Year 1 teacher, Meeting 5)

Discussion

Much of the research into teaching mathematics for social justice has been conducted with older students, for example in secondary (age 11+) schools in England (Wright, 2021; Wright et al., 2022) or high schools in the US (Gutstein, 2006). There has been less research into developing a socially-just mathematics curriculum for younger learners, with some notable exceptions (Hudson et al., 2015). One reason for this may be that secondary teachers of mathematics tend to be mathematics specialists, whilst primary teachers of mathematics tend to be generalists who teach a wider range of subjects to their own group of students (which is certainly the case in England).

As generalists, primary school teachers are less likely to find time to reflect on broader questions relating to the purpose and place of mathematics within the school curriculum. They are less likely to challenge the myths and discourses surrounding school mathematics, such as claims that mathematics is neutral or value free. This is ironic given how common it is for primary school teachers in England to tackle social justice issues, for example around fairness, respect, human rights, equality and the environment, in their classrooms. There is evidence, however, that primary school students tend to draw mainly on their own personal experiences and the experiences of others, such as family, friends and accounts in the media, in making sense of social justice issues they encounter (Jerome et al., 2021). Without the support of teachers, they are unlikely to draw on the disciplinary knowledge that they learn in school, including mathematical knowledge, in tackling these issues (ibid).

The findings from the PMSJ research project demonstrate the efficacy of a participatory action research approach, focused on a theoretical framework for teaching mathematics for social justice, for enabling primary school teachers to tackle social justice issues whilst teaching mathematics. Through identifying and developing authentic links between mathematics and social justice in the classroom, the teacher researchers began to appreciate the extent to which younger children could access relatively complex ideas (see Theme 1 above).

Interestingly, due to the relatively prescriptive and content-laden nature of the ‘mastery’ schemes of work followed in both schools (Williams, 2020), mathematics lessons were not viewed by the teacher researchers as the most appropriate site for these developments to occur. Instead, they focused on how students might apply the mathematical knowledge they had learnt in designated mathematics lessons to the social justice issues that were already routinely tackled through cross-curricular projects in the classroom. In doing so, they began to rethink their prior assumptions about teaching and learning mathematics, for example in developing a greater appreciation for the benefits of group work and discussion, and the importance of relating subject content to students’ everyday real-life experiences (see Theme 2 above). This, in turn, impacted on the teaching approaches they adopted, and the examples they drew upon, during designated mathematics lessons.

There was evidence that students responded very positively when provided with the opportunity to apply mathematical ideas in tackling social justice issues. As well as generating greater enthusiasm and higher levels of engagement, the approach taken by the teacher researchers appears to have enabled students to develop their critical understanding and collective agency in applying mathematics to generate an argument for change (see Theme 3 above).

Conclusion

We believe that developing students’ capacity to apply mathematical knowledge effectively to argue collectively for social change, which we describe elsewhere as ‘socio-mathematical agency’ (Wright, 2022), warrants further exploration. We argue that the approach taken in this research project offers a model with significant potential for developing the socio-mathematical agency of students, particularly that of younger learners. We believe that this could be a vital element in moving towards a ‘world-centred’ education (Biesta, 2021) that will enable future generations to make sense of the world around them and to address the increasing social, economic and environmental challenges facing global society.

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