

How do beginning mathematics teachers in Scotland understand their role in education for global citizenship?

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‘Learning for Sustainability’ (LfS) is an entitlement for every child in Scotland and encompasses three strands: sustainable development; global citizenship; and outdoor learning. This study explored how three beginning mathematics teachers are making sense of global citizenship within their developing identities as teachers. A case could be made for both a narrative and a discourse analysis approach and their possible incommensurability is discussed. Interpretive approaches can be criticized for the researcher extracting data and imposing their own meaning which runs contrary to feminist and decolonial aspirations that align with a critical global citizenship education. An attempt has therefore been made to work differently with the transcripts. The students were asked about their view of mathematics and their decision to become a mathematics teacher. The study suggests that a teacher’s conception of mathematics as a discipline may be a ‘way in’ to discussing how they envisage engaging with LfS.

Key words: global citizenship; Learning for Sustainability; beginning teachers.

The Scottish context of ‘Learning for sustainability’

To qualify as a teacher in Scotland students must demonstrate they hold social justice as a professional and personal value. This includes “Valuing as well as respecting social, cultural and ecological diversity and promoting the principles and practices of local and global citizenship for all learners.” (General Teaching Council for Scotland GTCS, 2019). Global citizenship is one part, alongside sustainable development and outdoor learning of ‘Learning for Sustainability’ (LfS). This ambitious policy defines the role of schools in enabling Scotland to fulfil its commitment to achieving the United Nations’ sustainable development goals (Education Scotland, 2019). The holistic significance accorded to LfS is demonstrated by the following “myth” on the GTCS website.

“I don’t need to focus on Learning for sustainability as its not part of the curriculum that I offer.

Learning for sustainability is embedded across the suite of standards and there is an expectation that all registered teachers irrespective of the sector in which they work, the subject which they teach or the level of post that they hold will make a contribution ... it should be viewed as a way of being and thinking about the world and our actions.” (GTCS, 2019).

Teachers of mathematics might be expected to interpret this requirement in a variety of ways, perhaps depending upon their beliefs about the subject. Mathematics is rarely understood as being socially constructed throughout history and across cultures or as being an opportunity for creative and collaborative practices (Swanson, Yu, & Mouroutsou, 2017; Davis & Hersh, 1981). The prevailing view in Western culture, is

of “mathematics as rigid, fixed, logical, absolute, inhuman, cold, objective, pure, abstract, remote and ultra-rational” (Ernest, 2004, p.13). Such a view could be difficult to reconcile with teaching for global citizenship. There is also a body of life history research that describes how student teachers draw on their experiences to construct a new identity as a teacher (Clandinin 1992; Povey 1997). Individuals might come to very different understandings of their contribution to LfS and the relative significance, for them, of teaching for global citizenship as part of this statutory requirement.

The study

This small study is part of a larger research project to explore the engagement of secondary mathematics teachers with education for global citizenship. The three undergraduates are on a route leading to professional registration which involves studying both mathematics and education (including teaching practice). These interviews fulfilled a piloting role in terms of both data gathering and data analysis. I wanted to find out about their attitudes to global citizenship education, in the context of their developing identity as teachers of mathematics. My intention is to craft semi-fictional ‘pen portraits’ that I can use in future interviews with experienced teachers. This paper outlines some of the methodological issues and presents a snapshot of my intermediate work with the transcripts.

An emerging methodology

The possible significance of life story in this study suggests a narrative approach (Clandinin, 1992) whilst the focus on the construct of global citizenship points to (critical) discourse analysis (Gee, 1999). A narrative approach arguably takes the person as the unit of analysis whereas a discourse approach takes the text as the unit (McMullen 2011). The impact of this seemingly theoretical distinction is explored by Wertz et al, 2011) who analysed the same data from a participant “Teresa” in five different ways including narrative and discourse analysis. Emily MacSpadden who is “Teresa” then read and responded to each of the different interpretations. Her unease at being a “research object” (Stanley & Wise, 1993, p.168) is expressed in terms of the relationship between her identity and her words.

“...there is an undeniable sense that some kind of judgement is being passed on the words, on the telling of an incident, even on you as a participant ... the words were always the key to understanding that which had been lived.” (MacSpadden, 2011, p.351)

I was very conscious that whilst “discourse analysis studies how people use discourse and how discourse uses people” (Potter & Wetherell, 1990, p.213) we need to be watchful that researchers are not always the users and our participants the used. I worked to devise and adapt “analytic manoeuvres” (McMullen, 2011, p.210) that recognise each of the students will be engaged in narrating their own identity project (Povey, Angier & Clarke, 2006) whilst allowing space for me to “notice” (Mason, 2002) the “Discourses” (p.13), “Conversations” (p.13) and “Cultural models” (p.78) (Gee, 1999) they are drawing on. Alongside the transcripts I was keenly aware of the huge amount of uncollected data within my conscious memory “Our consciousness is always the medium through which our research occurs” (Stanley & Wise, 1993, p.157) and this new data could not sit ‘outside’ of my relationship with these students or my previous work with beginning teachers. I brought a characterisation of each

student which remains, for ethical reasons, undisclosed. This limits my capacity at this stage to connect to the students' life stories and I anticipate moving towards a fictional approach (Clough, 2002).

Crafting long narratives

I took some of the emerging "Conversations" (Gee, 1999, p.13) and used these to structure a first long narrative about each student. I wrote my words, built from my transcript markings, and their words, as quotes, into a story with two voices. I wanted to avoid "talking over their voice" (Denzin, 2013, p.574) whilst having the freedom to reorder the text. Writing in this way made me acutely aware of the language of my interpretation. There is an important difference between Paul explains ... and Paul admits ... I retyped the students' words rather than copying and pasting. This prompted me to notice my different positioning with respect to each of them. The following extracts are offered as a contrast to a presentation where the researcher identifies themes which are validated through quotes and citations.

John: Global Citizenship Education (GCE) does not fit into maths

John says very little but there are hints that he has a transmission view of teaching and sees the teacher as the expert authority. His descriptions are very static and deterministic. "*I didn't really consider anything else it was what I always wanted to do ... as soon as I started school.*" John interpreted the question about his view of maths as one enquiring about his capability and he draws on a very well-established discourse of natural ability "*it's always come easy to me.*" He disrupts his own story to give a slightly different narrative about deciding to become a maths teacher which happened in primary 5 so this is actually a long time after he started school "*it was probably when I got to about primary 5 just one day I was the first finished in the class and from then from there that was just it.*" John is using another typical discourse that speed is a measure of mathematical capability. He is also suggesting that the teacher is the person who is best at the subject. There are big gaps here that were not explored and in particular how maths differed or not from other subjects.

John's description of maths is a list of content focussing on abstract topics "*algebra, calculus, analysis ... that much stuff in maths.*" There is no suggestion of maths being applied or of it having any aesthetic element or structural element. There is no sense of a hierarchy, just content. John sees the purpose of learning maths however in terms of both employment and day to day life, drawing on the discourse that maths is ubiquitous but acknowledging that again he was faster to realise this or perhaps born with the understanding. "*whatever age you are you use maths... It doesn't matter what you do as a job you use maths every day of your life ...I've always realised it but probably kids you teach in school wouldn't realise it till much later on*"

John has no problem admitting that he did not know what a global citizen is. He has found and brought a definition with him. "*It's someone who understands the world and their place in it.*" There is a suggestion here in the "*it's*" that John believes in external authority or at least that there is a single answer to be found. When asked for his interpretation of the definition he makes an immediate link to sustainability. "*The way I looked at it was basically like stuff going on like global warming and understanding that you are destroying the planet ... It's important because there's only one planet that we live on and so we've got to look after the planet.*" This is

important and straightforward because there is no suggestion of learners developing their own ideas. *“If you learn that from a young age then it should stay like that for the rest of your life.”* John expresses cognitive conflict when asked to connect global citizenship education and mathematics teaching because he cannot see an answer that makes any sense. The two are like non-overlapping sets in a Venn diagram. *“That’s what I’m not really sure – I don’t really know where it fits into maths as in like where it would fit in the curriculum.”* John sees himself as charged with teaching the maths curriculum as a list of content and this does not fit in.

Paul: Maths does not fit into GCE.

Paul explains that he *“hated maths to start with”* because *“society gave me the impression I didn’t want to do maths.”* He does not give himself any agency or critical faculties with which he might have challenged this discourse. Paul eventually suppressed his negative view to please *“one of my teachers ... he helped me through school, so I put in the most effort into his class ... I didn’t like the subject at the time I liked the person who was teaching it.”* He was motivated to change his attitude to sustain a relationship and not as a response to the curriculum or classroom organisation. *“I think me putting in the effort showed to him that I cared about his subject which in turn meant he would help me more.”* The idea that teaching and learning mathematics is embedded in relationships often struggles to be heard against a technical managerialist discourse of instructional practice based on so-called brain research.

Paul recognises the power maths has as a gatekeeper *“for anyone who’s wanting to go and be half successful in the world ... it’s important for ...well ... 90% of jobs.”* He emphasises its importance for what he situates as personal financial well-being in terms of *“people who want to make sure they’ve got the right wages at the end of the month.”* He does not see an opportunity to discuss social justice issues connected to earnings. Paul’s *“interpretation of a global citizen is someone who knows their place in the world ... and knows how they can contribute.”* Global citizenship education starts at home where *“family values are transferred from generation to generation.”* Schools *“have only a small part to play ... they can introduce how to be a good citizen in a classroom environment ... which can then be projected onto a wider society.”* Citizenship is conceived as interpersonal relationships and behaviour, not as a curriculum which reflects the ‘way of being’ described by the GTCS above. *“The teacher has a role to play”* but *“I don’t think it’s subject specific.”* What matters is that the teachers form a consistent power bloc where *“it shouldn’t matter who’s at the front”* because *“as long as every teacher is singing from the same hymn sheet that way they are all trying to teach the same values and standards”* of *“good manners ... and respect.”* The use of a metaphor for a common instruction text and the situating of all the teachers at the front suggests a deeply undemocratic community. The mechanism of teaching however is envisaged as role modelling rather than direct instruction. *“It doesn’t matter whether I’m talking to maybe my head of department ... or a pupil ... or anyone that comes to the door.”* The teacher should demonstrate how to be *“respectful and kind”* to everyone.

Liz: Reflecting and reformulating in real time

Liz’s epiphany came when watching a school-based reality TV show and she sets herself apart from other people in her reaction to it *“I know most people are put off...”*

but I was like I really want to do this” Her developing identity as a teacher is around transformation. “I could maybe change things ... get more people to enjoy it [maths] change people’s attitudes and help people get better...help students to be what they can be... help them realise their potential and then also to change the view of maths as well.”

Liz’s first mention of maths is a throwaway, suggesting it is an obvious given *“I loved maths anyway.”* She sets herself apart again in her appreciation of the subject *“obviously I’ve always viewed it one way”* which is that maths is *“ugh! so broad”* whereas *“many people would classify it as just one thing.”* She recognises that she has studied far more maths than most people and positions herself in that professional world not because of her attainment but because of her study. *“I wouldn’t say that I’m you know up there with the big mathematicians but ... I’m classing myself as one because I’m learning all of these theories and stuff.”*

Liz is candid about not knowing what global citizenship education is and describes both discussing with others and researching it online to find *“everybody in the world is together ... whatever you’re doing your life is contributing to the world in general ... you’re in that ... economical growth ... you know helping people out ... even if that’s just buying a house that’s helping the area you’re living in ... to bloom.”* This reading of citizenship as engagement in the global project of capitalism by supporting the local economy is a neoliberal version of ‘think global act local.’

During the interview Liz is thinking on her feet and developing her ideas in real time. *“I mean just by generally incorporating it into your vocabulary and questions it might make them more aware ...I think that links back to responsibility and where you want to go ... you might be able to broaden the horizon for your students.”*

Discussion

In writing the longer woven narratives I was constructing stories that were constrained or triangulated by the transcripts, my knowledge of the students and my knowledge of the literature. The process has helped me to map out the terrain for the next stage of my research project.

John’s view of maths as a list of abstract maths topics reflects the lack of applied topics in the Scottish school curriculum and is suggestive of teaching as a transmission of content. There is no obvious space within maths for citizenship education. Paul’s view of maths by contrast does recognise the contribution it makes to developing citizens, but he does not label it as such. In his view global citizenship is about relationships and not connected to *any* subject. Liz, whose long transcript is the most under represented here, had the broadest conception of both mathematics and global citizenship. She worked actively in the interview to try to bring them together.

There is very little information in the public domain describing how schools in Scotland are integrating teaching for global citizenship within secondary mathematics. This small study allows a tentative conjecture to be made that the view of mathematics these beginning teachers hold, and their experience as learners, may be important in determining how they (can) imagine themselves developing education for global citizenship in their practice. Acknowledging and embracing diversity within the mathematics teaching community is in line with the ethos of LfS. Using stories with different characters might facilitate discussion as mathematics teachers seek to make sense of the statutory requirement to embed LfS into their practice.

References

- Clandinin, D. J. (2004). Narrative and story in teacher education. In T. Russell, & H. Munby (Eds.), *Teachers and teaching* (pp. 128-141). London: The Falmer Press.
- Clough, P. (2002). *Narratives and fictions in educational research*. Buckingham: Open University Press.
- Davis, P. J., & Hersh, R. (1981). *The mathematical experience*. Boston: Birkhäuser.
- Denzin, N. K. (2013). Writing and/as analysis or performing the World. In U. Flick (Ed.), *The SAGE handbook of qualitative data analysis* (pp.569-584). London: SAGE.
- Education Scotland. (2019). Learning for sustainability. Retrieved from <https://education.gov.scot/improvement/learning-resources/A%20summary%20of%20learning%20for%20sustainability%20resources>
- Ernest, P. (2004). Images of mathematics, values and gender: A philosophical perspective. In B. Allen, & S. Johnston-Wilder (Eds.), *Mathematics education: Exploring the culture of learning* (pp. 11-25). London: Routledge.
- Gee, J. P. (1999). *An introduction to discourse analysis: Theory and method*. London; New York, NY: Routledge.
- General Teaching Council of Scotland. (2019). *Professional standards*. Retrieved from <https://www.gtc.org.uk/professional-standards/standards-for-registration.aspx>
- Mason, J. (2002). *Researching your own practice: The discipline of noticing*. London: RoutledgeFalmer.
- McMullen, L. M. (2011). A discursive analysis of Teresa's protocol; Enhancing oneself, diminishing others. In F. J. Wertz, K. Charmaz, L. M. McMullen, R. Josselson, R. Anderson, & McSpadden (Eds.), *Five ways of doing qualitative analysis* (pp. 205-223). New York: The Guilford Press.
- McSpadden, E. (2011). The participant's response. In F. J. Wertz, K. Charmaz, L. M. McMullen, R. Josselson, R. Anderson, & E. McSpadden (Eds.), *Five ways of doing qualitative analysis* (pp.334-352). New York: The Guilford Press.
- Potter, J., Wetherell, M., Gill, R., & Edwards, D. (1990). Discourse: Noun, verb or social practice? *Philosophical Psychology*, 3(2-3), 205-217.
- Povey, H. (1997). Beginning mathematics teachers' ways of knowing: The link with working for emancipatory change. *Curriculum Studies*, 5(3), 29-343.
- Povey, H., Angier, C., & Clarke, M. (2006). Storying Joanne, an undergraduate mathematician. *Gender and Education*, (18), 459-471.
- Stanley, L., & Wise, S. (1993). *Breaking out again*. London: Routledge.
- Swanson, D. M., Yu, H., & Mouroutsou, S. (2017). Inclusion as ethics, equity and/or human rights? Spotighting school mathematics practices in Scotland and globally. *Social Inclusion*, 5(3), 172-182.
- Wertz, F. J., Charmaz, K., McMullen, L. M., Josselson, R., Anderson, R., & McSpadden, E. (2011). *Five ways of doing qualitative analysis: Phenomenological psychology, grounded theory, discourse analysis, narrative research, and intuitive inquiry*. New York, NY: Guilford Press.