
Teaching Mathematics for Social Justice: Linking Life History and Social Justice Pedagogy

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In this case study, we consider the relationship between life history and classroom pedagogy for one secondary mathematics teacher who participated in professional development to support equitable mathematics teaching. Within this teacher's life history, we identified three primary themes: being the other, being mainstream, and orienting experiences, which we then linked to the teacher's discourse about equity, social justice, and mathematics pedagogy. We found that these experiences informed the teacher's pedagogy and served as a strong motivation for him to address issues of equity and social justice within his classroom.

The increasing diversity of the North American population and a growing achievement gap in mathematics underscores the need for high-quality, equitable mathematics instruction. In many school districts across the U.S. and Canada, teachers are overwhelmingly middle-class and White, while students are much more varied in socioeconomic status and race/ethnicity (Howard & Aleman, 2008). As a result, it is critical to study how teachers (especially those from privileged groups) can learn how to effectively and equitably teach students with a diversity of backgrounds and experiences.

In mathematics, as in other subject areas, teachers' experiences and perspectives (who teachers are) affect how they teach (Wager, 2010). As Wager points out, there are many ways to conceptualize what (equitable) mathematics teaching should look like, and teachers' prior experiences with injustice inform their starting points as they try to take up equitable practices. Foote and Bartell (2011) presented similar results in their study of life histories of mathematics education researchers. Their descriptions of researchers' positionality could equally well describe teachers: "life experiences impact the positionality we bring to our work—they inform the questions we

ask, the data we choose to gather, and the interpretations we draw” (p. 63).

In this paper, we report on one case from a study of a year-long professional development in which teachers used action research to investigate how to teach mathematics more equitably. We sought to understand how mathematics teachers’ personal histories and experiences influenced their discourse on equitable mathematics pedagogy.

Theoretical Framework

We use a sociocultural perspective for this study, in particular drawing on repertoires of practice. Such a perspective considers individual development and disposition within—not separate from—cultural and historical context. (Gutiérrez & Rogoff, 2003).

Repertoires of Practice

The notion of repertoires of practice (Gutiérrez & Rogoff, 2003) is rooted in cultural-historical activity theory. An individual’s repertoire of practice can be considered their toolkit—the skills, knowledge, perspectives, and expertise that they develop over time through their participation in a variety of formal and informal settings and contexts (Gutiérrez & Larson, 2007). In relation to teaching, repertoires of practice might be developed through early experiences with schooling as students, and as teachers in formal and informal educational contexts. Repertoires of practice is an appropriate conceptual tool for this study because it shifts the focus from the individual in the moment to the individual in social and historical context. Further, it considers the ways in which the individual and the multiple contexts in which they operate are mutually constitutive. That is, repertoires of practice allow us to gain insight into the historical experiences and circumstances that are “relevant to an individual’s likelihood of acting in certain ways” (Gutiérrez & Rogoff, 2003, p. 22).

Professional development (PD) has often been conceptualized as a one-way transfer of skills from the PD context to the classroom. However, a sociocultural perspective on PD suggests that an individual’s participation in classroom and PD contexts are co-constitutive

and mutually inform their repertoire of practice (Kazemi & Hubbard, 2008). Further, in keeping with the work of Wager (2010) and Foote & Bartell (2011), teachers' life histories shape the way they engage in the classroom, and the PD, but the way they make sense of their life histories can also be influenced by classroom and PD contexts. All three of these contexts mutually inform one another, as we will show in our data analysis.

Narrative Inquiry

Narrative inquiry is a research method and a way of interpreting data. In this study, we use narrative inquiry in both ways. As a research method, narrative inquiry gives voice to the participants (Riley & Hawe, 2005). They describe their life history and experiences from their own perspective. When interpreting data,

narrative analysis begins from the standpoint of the [participant] ... From here we analyse how people, events, norms and values, organizations, and past histories and future possibilities, are made sense of and incorporated into the [participant's] interpretations and subsequent actions (Riley & Hawe, 2005, p. 229).

By examining *what* events the individual describes, *how* they describe these events, and even what they do *not* talk about, we gain insight into the ways in which the individual makes sense of their experiences and what they value.

Methods

Data for this analysis were taken from a year-long research project on a professional development (PD) study group. The study group focused on equitable mathematics teaching and action research. Eight teachers and five university researchers participated in the group, which met 9 times from October 2010 to May 2011.

Participants

The teachers were all volunteers. All were White and all worked in schools in Toronto, Ontario and the surrounding area. For this paper, we focus on one teacher, Rico (a pseudonym), a 26-year-old White man.

Rico had attended Catholic elementary and secondary schools and then studied mathematics and physics at a university in his home city. He worked for one year as the Diversity Director for the student union at his university and then completed a one-year initial teacher education program. At the time of the study, Rico was in his first year of teaching. He had been hired on a long-term occasional contract to teach mathematics and physics at a large urban secondary school.

PD Context

The teachers examined their own classroom contexts, identified challenges, then each developed their action research project to address one or more of those challenges.

Rico focused his action research project on his Grade 12 “Foundations for College Mathematics” class. (In Ontario, “college” generally refers to 2-year colleges that focus primarily on vocational and technical skills, so this course was considered to be at a lower level than Grade 12 university-preparatory courses.) In this class, he described challenges with student attendance and motivation. Rico chose to explore the impact of a social-justice context on student motivation and mathematics learning in the data management unit of this course. To begin, he had students participate in an activity called the “power flower” to introduce them to the ideas of power and privilege. Students were then given data, collected by the school board, on racial achievement trends in their school, which they organized and analysed.

Data Analysis

For this analysis, we drew from Rico’s interviews at the beginning, middle and end of the year, his written reflections, and the video

record of his participation in meeting 1, specifically in an activity in which he described his life story to the other PD participants. We examined the data and identified themes in relation to Rico's life history, drawing from and extending the themes found in Wager (2010) and Foote & Bartell (2011). We went through the data multiple times to refine the themes and look for connections among Rico's life experiences as he described them, his stated conceptions of equity and social justice, and his pedagogy. In keeping with narrative inquiry methods, we present our results through Rico's own words, as much as possible.

Results: Rico's Life History

We will begin with a brief description of Rico's life history, elucidating three themes that build on Foote and Bartell's analysis. The three themes that we identified were: being the other (Foote & Bartell, 2011), being mainstream, and orienting experiences (Foote & Bartell, 2011). We will then describe Rico's social justice and mathematics pedagogy, and show how Rico made links between his life history and his pedagogy.

Being the Other

Experiences of being the other involve being stigmatized or marginalized on the basis of some difference from societal norms (Foote & Bartell, 2011). Rico identified as a gay White Canadian man of Italian heritage. He described feeling alone during his K-12 school years:

I think that high school is such a huge part of a lot of people's lives. It wasn't a big part of my life because I had to hide the whole time ... there was regret in me not to get involved in high school, I never did and I never got involved in university because I was kind of scared about everything and how I'd be perceived. (interview 1)

I think that if I would have known that there was someone I could have talked to about it or just seen that, hey there are gay

people out there and they're talking about it with a smile on their face, I would have loved that because my teachers in high school made fun of it. There was open homophobia from the teachers. (interview 1)

Rico struggled with his identity in high school and university and he talked about how he tried to bury himself in mathematics as “a way to escape the reality.” (interview 1)

I learned being in Catholic schools that there are some things that we just don't talk about. I didn't like that; it didn't settle right, but I was struggling with my own identity. I didn't know what to do about it so I agreed with them: let's just not talk about it and things will get better. (meeting 1)

During his fourth year of university, Rico decided that he had to be true to himself and he came out to his parents: “my parents call it the ‘bombshell,’ not anymore, but they call it the bombshell that I dropped on them. But it really did shake up my entire life.” (meeting 1) After this, he set aside plans to do a master's degree and he took a year off to “get to know” himself and decide what he wanted to do. (meeting 1)

Being Mainstream

Being mainstream involves membership within a dominant group, and enjoying the associated power and privilege. Rico grew up in a “predominantly Italian” neighbourhood in a large Ontario city, and attended schools within his neighbourhood. Rico described the population of his elementary school as quite homogeneous and he stated that high school was the first time that he “experienced people of other cultures outside of the television screen.” (meeting 1)

Rico described having supportive parents and he characterized his background as “higher middle class.” (interview 1) He recognized that he was “on the privileged side” (interview 1) in terms of social economic privilege and White privilege.

Orienting Experiences

Orienting experiences involve becoming aware, through third party accounts, of the ways in which people are marginalized or oppressed. These experiences may be formal (academic experiences) or informal (conversations or reading) (Foote & Bartell, 2011). During the year he spent getting to know himself, Rico took a job as the Diversity Director for the student union at his university. He described this year:

...that was my first taste of social justice, diversity, and everything that comes along with it. It was an amazing year and I learned unbelievable amounts and I met so many great people. And then I came to [pre-service teacher education] right after; I knew I had to do it. I had to go back into the classroom. I learned as the Diversity Director and at [pre-service teacher education] that we need to be talking about these things—that they're not going to just go away; we need to create some dialogue. (meeting 1)

During his pre-service teacher education, Rico learned more about equity and diversity and he was exposed to Cochran-Smith's (2004) six principles of teaching for social justice. Rico stated that in his teaching, he thought often about the six principles. Rico also talked about the realizations he made during pre-service teacher education about economic (dis)advantage and opportunity, the importance of building on what students bring to school with them, and about race as a potential means by which students are marginalized. He stated, "one of the things that really stuck with me in terms of equity was the idea of responding to the 'isms'" (interview 1) such as racism and sexism.

Results: Linking Life History and Pedagogy

During the year of PD, Rico's conception of equity and social justice seemed to remain relatively stable, although he appeared to formalize his understanding and make firmer connections to Cochran-Smith's (2004) principles. Rico had a good sense of what he wished to accomplish, but expressed that, as a new teacher, he needed support to

learn how to accomplish it. In interviews and at PD meetings, Rico described his approach to social justice and equity pedagogy in detail. Here, we elaborate on three themes that arose in his discussions of pedagogy. We characterize each theme briefly, and then draw connections from the pedagogical theme to Rico's life experiences being the other, being mainstream, and orienting experiences (including the PD).

Being a Role Model

Many times, Rico described the importance of being a role model for his students. In particular, he wanted to be a role model of an openly gay man, and he wanted students to be able to talk to him about issues that are often taboo in high schools (e.g., cigarette smoking).

He directly connected his desire to be a role model with his experiences being the other. He remembered feeling as if he had to hide while he was in high school, and stated that he did not want his students to feel the same. He said,

I made a commitment to myself to bring social justice into the classroom. I wanted to be that role model that I never had in high school for all those unsung kids. (meeting 1)

He also connected his desire to be a role model with his orienting experiences as Diversity Director and in pre-service teacher education. Through these experiences, Rico had come to realize the importance of creating awareness and talking openly about difficult issues. He elaborated,

just talking about the issues, I feel like that's one step to being a role model for the students, even though I'm not necessarily connecting one-on-one with them. They're seeing someone standing up and saying that there are things that need to change and there are people that support you. I think that's a huge step in itself for some students. (interview 1)

Rico did not make any connections to his experiences being mainstream in relation to this pedagogical theme.

Social Justice Issues

Rico felt strongly that it was part of his responsibility as a teacher to address social justice issues and confront the “isms”. He stated, “even though the curriculum may not address it, I think there is always room to discuss these things.” (interview 3) Rico described three ways in which he addressed social justice issues in his teaching. The first way was as a special lesson. He said,

I’ve brought it [social justice] into the classroom sometimes as a special lesson. We talked about anti-homophobia and watched some videos about it, we had class discussions, we’ve brainstormed, and we’ve just talked about how the words affect people. (interview 1)

A second way that Rico addressed social justice issues was by interrupting class when an unanticipated issue came up.

I will often stop classes if someone raises a really interesting point or observation about the way people are acting or what they say to get students to think critically about information. If they saw something in the news or we read something in the textbook that I feel requires a little bit more thinking or there is something deeper inside, I want to spend more time. I think it’s a very valuable lesson for them. (interview 3)

Finally, Rico also sought to address social justice issues by modifying the existing curriculum and resources. In the data management unit, Rico had students explore data, collected at their school, on student achievement by race. In the textbook, he explicitly worked to de-gender problems, using the pronoun “they” in place of “he” or “she,” so as not to reinforce or perpetuate gender stereotypes. He also asked his students to examine their textbooks for gender stereotypes.

Rico connected his social justice pedagogy to experiences of being the other, and of being mainstream. Because of his experience being the other, he was passionate and knowledgeable about addressing issues of gender and sexuality. Because of his mainstream experiences, he felt less comfortable about addressing economic or racial issues. He explained:

Do you start with what's important to you or what's more important to the greater good? Because I think I'm going to focus a lot on gender equity and sexuality, those are something I'm passionate about, so that's something I feel confident to bring into the classroom. But when it talks about social economic privilege or White privilege, I am on the privileged side of those so I have to do a lot of deconstruction on my own side before I can teach it. (interview 1)

In addition to his discomfort addressing economic and racial issues, Rico described other challenges. One big challenge he described was figuring out how to integrate social justice issues into the mathematics curriculum. (interview 1) He talked about the challenge of “getting good math (that was at an appropriate level of difficulty) to work with social justice” (interview 1). Rico was also concerned about “presenting social justice issues and then doing it wrong, or not considering the other side” (interview 1). Rico cited these challenges as a primary motivation for seeking out new orienting experiences such as this PD group.

After describing the lessons he had taught about gender and sexuality, Rico mentioned that there was a teacher at his school who was transgender who conducted “trans workshops” with students. His relationship with this colleague represents an orienting experience that helped Rico develop his repertoire of practice about social justice pedagogy.

Equitable Mathematics Pedagogy

Rico conceived of equitable teaching as meeting students' needs and giving each student the best possible education. In keeping with this focus, Rico sought to get to know his students. He did this in several different ways: he asked students about their future plans and he used surveys, free-writes, and exit interviews. Early in the year, Rico discovered that many of the students in his grade 12 Foundations for College Mathematics course had not chosen to take the class, but had been placed in it due to timetabling issues. He stated that student “motivation is the biggest challenge” (interview 1) and that “attendance is always a big problem” (interview 1). Rico found that

the students “didn’t express math interests” and have “very weak math skills” (interview 1). Many of his students said they planned to go to college, but not for anything math-related.

To meet his students’ needs, Rico had multiple strategies. He used project-based learning that he hoped would emulate the college experience. He tried to address multiple abilities and to make mathematics relevant and useful for students by using mathematics as a tool to better understand social issues. He built in what he called ‘check-points’ to scaffold longer, project-based tasks. Rico tried to address students’ apparent lack of motivation by designing “worthwhile tasks” and by building on what students bring to school with them (here he referred to Principle 2 of the six principles for social justice teaching, Cochran-Smith, 2004). He tried to “work with” students’ inconsistent attendance.

These students did not act as Rico had in high school, when he was a high-achieving, university-bound high school student who enjoyed mathematics. Perhaps this is why he did not refer to his personal experiences as a young person (either being the other or being mainstream) when he described his equitable teaching strategies.

Instead, Rico referred many times to orienting experiences, especially Cochran-Smith’s six principles for teaching for social justice, which he had encountered in pre-service teaching and in the PD. The action research format of the PD itself was also designed to be an orienting experience, in which Rico could take action in the classroom and study the results, learning more about his students and his teaching methods in the process.

In reflecting on the results of his action research project, Rico stated,

The action that I did in class informed me about my students and their preferences. It also offered me a lens into what tasks they found interesting and what tasks are better left undone ... I learned that getting to know how my students are thinking and what works and doesn’t work for them was exactly the answer I was looking for. (written reflection)

Thus, according to Rico, the PD served as an orienting experience that shifted his thinking about who his students were, and what teaching practices might best serve them.

Discussion and Implications

Experiences being the other, being mainstream, and orienting experiences influence the development of an individual teacher's repertoire of practice by shaping their perspectives and by providing models of how to teach or how not to teach. According to Gutiérrez & Rogoff (2003),

An important feature of focusing on repertoires is encouraging people to develop dexterity in determining which approach from their repertoire is appropriate under which circumstances. (p. 22)

We could extend their argument to say that another important feature is helping people identify when they need to seek new orienting experiences in order to expand their repertoire.

Kazemi & Hubbard (2008) theorized that teachers' participation in classroom and PD contexts co-evolved, such that teachers' participation and experiences in the classroom influenced their involvement in PD and vice versa. Wager (2010) and Foote & Bartell (2011) found that individuals' life histories, particularly the ways in which individuals make sense of their life histories, influence their practice. We propose a model (see Figure 1) that synthesizes both of these findings. This model shows how individuals' life histories, PD, and classroom experiences mutually influence one another and shape the development of individuals' repertoires of practice.

Whether they are aware of it or not, teachers' life histories influence their classroom practice. In Rico's case, his experience being the other allowed him to know directly what it is like to be marginalized. His orienting experiences (in his role of Diversity Director and his

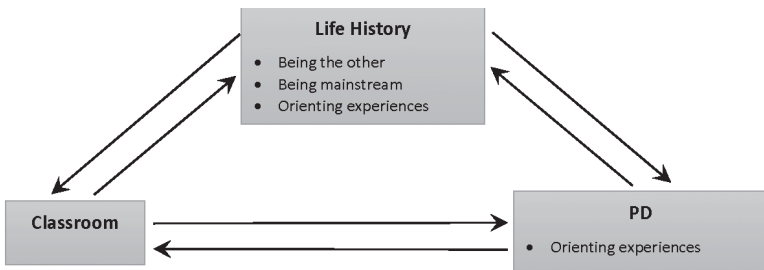


Figure 1: Interdependence of life history, PD, and classroom experiences.

pre-service teacher education) introduced him to other ways in which people are marginalized. Together, these experiences informed his pedagogical decisions. When Rico privileged social justice goals over math goals in this particular class, he cited his experience being the other as a strong motivation for this pedagogical choice. Perhaps this choice was reinforced partially because of his own experience (being mainstream) as a high-achieving mathematics student (who did not need much support with mathematics). Another reason he cited for this choice was that, having gotten to know his students and their identified goals and interests, he felt this approach was appropriate for these particular students (orienting experience through teaching and PD).

Life history also influences teachers' engagement with PD. First, life experiences may motivate teachers to seek out PD. For example, from his experiences a student, Rico did not have a good model of how to teach equitably. His experience in pre-service teacher education gave him the beginning of a model and he sought PD to help him develop further. Second, life history shapes teachers' participation in PD. For this PD, Rico sought to learn effective ways to bring social justice issues into the mathematics classroom and to learn more about other ways that people are marginalized.

The influence of life history on teachers' classroom practice and their engagement in PD is not unidirectional. Experiences in the classroom or in PD may offer a teacher a new perspective or insight into their own life experiences, providing a means for them to reinterpret the meaning of their experience or reevaluate the importance of a particular experience.

According to Kazemi & Hubbard (2008), teachers' "experimentation in classrooms changes the nature of their conversations in PD and their changing participation in PD leads to new enactments of practice" (p. 432). It is particularly helpful when the PD structure is designed to align with teachers' classrooms. This allows teachers to make sense of the PD in terms of their own particular teaching context and to transform theory learned in PD into classroom practice. Rico's participation in this PD allowed him to realize the importance of getting to know his students better: their strengths and weaknesses, interests, and motivations. Rico also made connections between the iterative nature of action research and the process of changing his classroom practice,

The action helped me get to know the students in this particular class. Then with the lessons learned, it will help inform my teaching in the next classes. And the cycle goes on. (written reflection)

This study shows that it is important and useful to have teachers articulate and reflect on their own life experiences (direct and indirect) with equity and diversity. Given the relative homogeneity of the teaching population and the relative heterogeneity of the student population, it is also useful to design professional development that provides teachers with orienting experiences. This will afford teachers opportunities to identify and reflect on any mismatches between their own life experiences and those of their students and allow teachers to better meet the particular needs of their students. Further research will allow for deeper understanding of the interdependent influences of life history, PD, and the classroom experiences.

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