Chapter 10

Researching Mathematics Pedagogy

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Abstract

The Observing Teachers project involved working with groups of middle school mathematics teachers in different regions of Canada to construct videos representing their practice. Groups then worked together to select videos that were typical of their region to be sent to teachers in other regions. The same groups then discussed the videos received from other regions. This research design drew on enactivist principles. In this chapter, we draw on these principles to reflect on some of the challenges that arose in implementing the project. In particular, we refer to three aspects of enactivist research highlighted by Simmt and Kieren (2015): the role of observers, the relationship between ontology and epistemology, and the role of ethics. Thinking about these ideas led us to notice four emergent themes relating to the process of enacting the project: researcher-teacher-learner relationships; unexpected events; learning to be a researcher; and insiders-outsiders. Underlying these themes is the importance of relationships in the conduct of research with mathematics teachers.

INTRODUCTION

In this chapter, we reflect on and theorize some of the many challenges that arose during our work on the Observing Teachers project. The project was particularly complex as it involved multiple researchers and multiple participants in different regions of Canada, each with their own particular points of view on the nature of mathematics, teaching, learning, and research. Indeed, the overall conceptualization of the project was designed to permit us to describe the nature of mathematics pedagogies in different regions of Canada, while recognizing that each of us came to the project with implicit assumptions about this topic. By inviting teachers to observe teaching from regions of Canada other than their own, using videos of lessons selected by teachers in these other regions as, in some way, representative of teaching in their own region, we aimed to examine how these observers would reveal something of their own assumptions about teaching mathematics. This same logic, of course, applies to us as members of the research team. That is, our own observations of the various groups of teachers discussing videos from their own regions and then from other regions are necessarily revealing of our own assumptions about mathematics pedagogy and about research (among other things). Our assumptions are revealed in our implementation of the research design, our interpretations of the data, and our interactions with participants and with each other. In this chapter, then, we examine some of the challenges and dilemmas that arose as a result of our reflexive research design. By making these challenges and dilemmas explicit, our goal is to offer points of reflection for researchers embarking on similar forms of research in mathematics education. We believe that such points of reflection can be productive in the development of our practice as researchers. Reflecting on the issues we discuss in this chapter was certainly productive for us in the development of our own practice.

We begin with an oversimplified history of anthropology. Early research in anthropology involved outsiders observing and describing “exotic” cultures, often with a critical and paternalistic eye. Whether non-European cultures were portrayed positively, as “noble savages,” or negatively, as “primitives,” they were definitely viewed as “other.” As anthropologists became aware that their observations were strongly coloured by their own cultures, they began to focus on measuring material artefacts and other aspects of culture that could be turned into "objective" numerical data, meeting the hoped-for standard of a science. The goal was to bracket out the outside observer's own biases, by reporting only data thought to be immune from influence by those biases. This approach too was critiqued, as it meant discarding many of the essential, but not measurable, aspects of culture. In parallel, participant observation emerged as an approach to studying other cultures by participating in cultural practices, attempting to see them as both an insider and an outsider.

Research in mathematics education has followed a similar path. The first academics involved in mathematics education were not classroom teachers, but were largely professional mathematicians or psychologists who analyzed curriculum and teaching practices from outsider perspectives[1]. A desire for more objective methods led some to concentrate on quantitative techniques, but as in anthropology, this was criticized as leaving out essential aspects of learning that could not be measured. Some mathematics educators turned to participant observation, either as teacher-researchers observing in their own classrooms, or as researchers working in cooperation with teachers. This shift has led to new epistemological perspectives, as researchers have grappled with questions about what it means to know another culture or to make claims about different ways of teaching.

RESEARCHING AS A REFLEXIVE PROCESS

The overarching design for this research project drew on enactivist principles. Enactivism has become influential in mathematics education research, particularly in Canada (see Reid, Brown, Coles, & Lozano, 2015). Although enactivist principles encompass theory, methodology, and epistemology, for this chapter, we focus particularly on the methodological dimensions as a way to make sense of some of the challenges that arose during the conduct of the overall research project. We draw not only on formally collected data, but also on the less formal interactions inherent in any research project. These less formal interactions include our discussions with participants, the interactions within our regional teams, and our regular meetings as a national team. Much has been written about enactivist approaches to mathematics education research (see Reid et al., 2015, for an overview). For this chapter, we draw on three specific aspects or methodological "moves" highlighted by Simmt and Kieren (2015), namely the role of observing and the observer, the nature of meaning-making as bringing forth a world of significance, and ethics.

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[1] See, for example, this "Historical Sketch of ICMI": https://www.mathunion.org/icmi/organization/historical-sketch-icmi

Observing and Observers

A key guiding tenet for the study presented in this book is Maturana's (1987) dictum that "everything said is said by an observer." What this means is that it is not possible to make claims about the world that are somehow separate from the person making the claim—that is, the observer. This principle has fundamental implications for research about learning or teaching mathematics (or anything else). Research is often thought of as a process of making claims about learning or teaching based on careful analysis of data. The inherent reflexive connection between the observer and the observation, between the knower and the known, recasts this process. Given this perspective, in the Observing Teachers project we were faced with the challenge of researching mathematics pedagogy when we, as researchers, do not have direct access to what mathematics teachers perceive as characteristic of that pedagogy. There is a solution, however, provided the relationship between what is said and the observer who says it is clearly understood. As Simmt and Kieren (2015), referring to work by Maturana (1987), point out: "at the heart of any useful ‘scientific’ observation is a means […] by which the listener to the observation is enabled to understand how the observer “sees” the situation” (p. 308). That is, what people say tells us something about the person saying it. In the Observing Teachers project, we applied this idea in the design of the project, by soliciting teachers’ observations of each other’s teaching, in order to understand something about how the participating teachers “saw” mathematics pedagogy. Of course, this principle also applies to us; we (the researchers) are observers of the observers (the participating teachers). This means that you, the reader, can learn something about how we, the researchers, made sense of the ways that the participating teachers made sense of mathematics pedagogy. At times, these layers of observing, although elegantly conceived within the research design for the project, led to some particular challenges.

Bringing Forth a World of Significance

From an enactivist perspective, actions are determined by the structure of the actor in interaction with the environment. For example, at a given moment in a mathematics class, a teacher acts in a way that is determined by their structure; i.e., the historically accumulated ways of interpreting what students do. This structure changes over time as a result of experience. The reflexive relationship between acting in a given moment, and the structure of the person acting, gives rise to patterns of interaction between individuals or contexts, which are known as structural coupling. For example, the behaviors of students and a teacher in a mathematics classroom adjust to be in some sense mutually aligned, although both will change over time.

Of particular importance is the idea that knowledge is not a fixed entity inside someone’s head; rather, *knowing* is contingent and situated within a context. Indeed, knowing is jointly produced through a process of interaction that involves the use of language or other signs. This process of “jointly doing knowing” through interaction results not in the description of the world (a regurgitation of knowledge), but rather in the bringing forth of the world in each moment. "Jointly doing knowing" means the collective process of enacting knowing through interaction. Thus, in the Observing Teachers project, researchers sat with participating teachers to discuss videos of other teachers teaching mathematics. In these interactions, teachers were not providing objective descriptions of the videos, and researchers were not making objective observations of the teachers. Rather, the group is, in the moment of the focus group, bringing forth a world of meaning relating to the videos. If, for example, the group agrees that some particular pattern of teaching is a common feature in the videos from teachers in a particular province, we see this as a process of jointly producing this feature from the infinitely many details of the videos and the participants' interactions. This process is, of course, conducted through language, which, among other things, serves as a way to clarify and coordinate each individual participant's noticings. Again, there is a layered aspect to the study: as researchers, we also worked together (in subgroups or as a team) to make sense of data collected from the regional groups of teachers. One important implication of this perspective is that our researcher interactions involved us in bringing forth a world of significance in relation to mathematics teachers bringing forth a world of significance about mathematics teaching in their collective discussions about the videos from different regions.

Ethics

The ethical dimension of research, and of human relations in general, arises from the previous set of ideas about the structurally coupled processes of bringing forth a world. To explain the idea of bringing forth a world, Simmt and Kieren (2015) cite Maturana (1988): "Everything that we do becomes part of the world that we live in as we bring it forth as social entities in language. Human responsibility […] is total" (p. 40). By jointly bringing forth a world, we share a responsibility for everything in that world. Varela (1999) devoted a series of lectures to this topic. In them, he described “immediate coping,” in which “the situation brought forth actions from us” (p. 5). These actions stem from the history of our structural coupling with others, and with an environment, and are habitual, in the sense that we are often not aware of making choices or decisions, but are simply being (doing, knowing) in the situation. In terms of ethics, if we see someone fall, we may, in our immediate coping, go to help that person up. We have been socialized into a human world of ethical significance through which such behaviors may become “immediate.” Varela contrasts immediate coping with “deliberate, willed action” (p. 5), in which we make “conscious” decisions after due reflection. For example, we might contact municipal authorities to report a dangerous part of the sidewalk so that people do not fall in the future. For Varela, deliberate, willed action, in which we analyze a situation before acting, is largely used in unfamiliar situations – situations for which we have not yet developed a repertoire of immediate coping behaviors. Neither form of interaction is fully ethical. Immediate coping is largely habitual and hence unreflective, while deliberateness often leads to an over-rigid application of rules or principles. Both can be ineffective in complex situations. Varela argued that a middle position is the basis of “ethical know-how”. Brown and Coles (2012) refer to this position as “non-deliberate readiness-in-action,” which they describe as a form of immediate coping with awareness of the motivations that prompt our actions. This approach requires “an on-going alertness to the detail of what we experience” (p. 223). This non-deliberate readiness-in-action is the basis of ethical know-how:

> Truly ethical behavior does not arise from mere habit or from obedience to patterns or rules. Truly expert people act from extended inclinations, not from precepts, and thus

> transcend the limitations inherent in a repertoire of purely habitual responses. (Varela, 1999, p. 31)

In the Observing Teachers project, we experienced all three modes of interaction: immediate coping, non-deliberate readiness-in-action; and deliberate, willed action. In some situations, it is clear in retrospect that habitual immediate coping kicked in. In the course of conducting the group discussions, for example, unexpected directions sometimes led research team members to fall back on their repertoire of interviewing behaviors. At other times, we engaged in extended collective reflection about the research and our experiences of implementing the project, particularly during project meetings. We thought and worked deliberately to develop shared interview protocols, for example. On some occasions, non-deliberate readiness-in-action could be inferred, as when awarenesses arising from our project discussions became present in the moment of interaction with research participants, leading to smooth decision-making consistent with project principles, but responsive to the current interaction.

In the rest of this chapter, we share some of the methodological issues that became significant in our conduct of the study. We focus, in particular, on four themes, drawing in each case on examples from the research project presented in the form of first-person vignettes. The common underlying theme is our concern for relationships throughout the project.

RESEARCHER-TEACHER-LEARNER RELATIONSHIPS

As in any complex process, we were each aware of occupying multiple roles during the course of the project. Even within the team, at different times, members led discussions, proposed analyses, or were participants in discussions about the project. During data generating activities involving participants, these roles expanded to connect our research identities with our other professional identities, particularly as teachers. Sometimes these identities were in harmony, in other situations a tension was felt. The first reflection speaks to the importance of the intermingling of these roles in our work on the project.

Christine on Bringing Practice into Research

Much of my work includes training beginning researchers; often when they are asked to comment on ethical issues, they restrict themselves to speak about the questions and responses that are prompted by a research ethics board application form. It is only after doing research for some time that one realizes that every moment of doing research is an ethical moment. The way a researcher recruits participants, the approach the researcher takes on first meeting the participant, the facial expressions of the researcher as he or she stands behind the video camera capturing the teacher's interactions with students, and the way the researcher interacts with the teacher as the lesson or interview finishes, all portray an ethical stance and determine whether the participant feels comfort or judgment.

Engaging in qualitative research is about engaging in relationships, which brings forth values such as trust, ethics, integrity, and respect. The Observing Teachers project leans on research relationships between and among researchers, teachers, and graduate student research assistants. Building relationships between researcher(s) and teachers is at the heart of the research that I do. I value the work of teaching. Teaching is part of my own work and it is not easy work. When I work with teachers, it is important that I build a trusting relationship and that the teacher knows how valuable and complex I think their work is. I am not there to judge but to better understand those moment-to-moment decisions that teachers make as they build relationships with students and interact with mathematical ideas.

So often we hear proclamations of bringing research to practice. My view in doing research is focused on the reciprocal relationship between research and practice. It is not so much about bringing research to practice as it is about bringing practice to research. Or rather, the research seeks to understand the complexity of teaching, to examine those reflective moments and actions that teachers make, and to consider why they make them. It is about respect for the work that teachers do.

I often lean on the idea of both teacher and researcher having a stance of inquiry (Cochran-Smith & Lytle, 2009). Both are trying to gain a deeper understanding of teaching. For the teacher, it is inquiry into their own teaching – it is often those thoughts and replays that the teacher engages in as he or she drives home from school. Those thoughts, such as “When Josh asked that question, I’m not sure I gave him the answer that helped to move his thinking,” or “I wonder if Sarah felt defeated when I suggested she try a different strategy,” plague teachers. However, they also provide them with the opportunity to revisit the day and to reflect on what they did and why, and to think about the instructional moves they will make the next day.

As a researcher, I also adopt a stance of inquiry and do so on many different levels. As I conduct research, my research questions guide my inquiry, but further than that, I am constantly inquiring about the act of doing the research itself. I revisit the ways that I asked interview questions, responded to the interviewee, captured particular classroom moments on video, and conducted myself as a researcher.

Comment

Christine’s reflection on her participation as a researcher in the Observing Teachers project reflects well the ideas and orientations summarized at the start of the chapter. In particular, her stance involves both teachers and researchers engaging together in inquiry. This stance is in contrast to an approach in which researchers seek to describe and analyze teachers’ practices or experiences. In Christine’s reflection, the mutual observation of each other and of the classroom is part of jointly bringing forth an understanding of what is going on in the videos. Both teachers and researchers contribute to this process in a way that cannot be reduced to separate observations, distinctions, or understandings. Rather, understanding is a joint outcome of the interactions between all participants in relation to the videos. This means that these understandings reflect, in part, Christine's distinctions and experience of mathematics teaching, mathematics classrooms, and so on. They reflect the teachers' distinctions and experiences of mathematics teaching and mathematics classrooms. Christine's stance also reflects the ethical position of non-deliberate readiness-in-action. Through constant inquiry into the research process, including discussions with the research team, Christine illustrates how researchers can avoid "mere habit" and can refine the sensibilities in order to act with sensitivity in working with teacher participants.

UNEXPECTED EVENTS

All research is contingent to some extent, as researchers adjust and adapt to circumstances. How we do this is revealing of how we perceive things. Throughout the project, during research team meetings, unexpected events were the focus of discussion. Participating in these discussions often led us to realize that our perceptions of the research project were sometimes quite different. The following vignette describes an unusual and frightening event that interrupted data collection in New Brunswick, Canada.

Annie and Dominic in Lockdown

We had planned to go to New Brunswick to conduct focus groups within a period of four consecutive days. During the first three days, teachers would observe and select the videos to be shown to teachers in the other provinces. On the last day, they would observe videos from other provinces. The focus groups were conducted on a university campus. Two of the teachers lived close to the university, while two others travelled from elsewhere in the province and stayed in university residence accommodation, as did we.

On the evening of the second day, there was a shooting in town: a man shot three policemen. Because of the shooting, all schools, most businesses, and the university campus were closed, and a big part of the city was on lockdown throughout the third day. The next morning, Annie wanted go to a restaurant because the cafeteria on campus where we had breakfast every morning was closed. The restaurant was, however, in the lockdown zone. Annie thought of walking to a McDonald's restaurant instead, but would have needed to walk through a forest area where the shooter was hiding. Dominic wanted to ask one of the teachers to fetch us, but Annie pointed out that it was not ethical to ask a teacher to put his/her safety at risk. We needed to get out, but our safety was a concern. Another participant offered to go to a store to get us some food, but we declined because we were concerned for her safety. In the end, one of the participating teachers staying in the residence decided to go for breakfast and offered to take us all. That solved our first ethical dilemma: the offer came from the teacher, it was not requested from us.

During breakfast, we looked for solutions in order to continue the focus group, given the fact that we were losing a day of data collection, and one of the participating teachers had to leave at the end of the day. This was a difficult situation, because the videos needed to be selected before we returned to Montreal. We opted to split the third day of research, observing the exemplary lessons, into two days. The first day would be done with the two teachers staying at the residence, and the following day would be with the two local teachers. In this way, the teacher who needed to leave would be able to participate in the whole first phase of the research. We also postponed the second phase of the project for this region until the fall[2].

We had to conduct the focus group in one of the dormitory rooms because the campus buildings were closed. At the end of the process, the two teachers selected the videos they wanted to show to teachers in the other provinces. The next day, we agreed not to tell the remaining two teachers which videos the first two had selected so as not to influence their decision. The school district had announced the day before that schools would be closed on this day as they had not caught the shooter yet. This was a challenge for one of the participants because she was alone with her child and the daycare was closed. She was able to get a babysitter, but only for four hours, so we had to conduct this focus group at a faster rate.

At the end of the final day, both groups had agreed on the same videos to represent an introductory lesson on fractions and an exemplary lesson. Opinions were divided between two videos for a typical lesson. We thus needed to have another short meeting so the participants could make a decision about the typical lesson video. Because Annie and Dominic had their flights reserved at the end of the fourth day, and because the focus groups were held at the end of the school year, we had a short Skype meeting with the four teachers the following September to agree on one of the lessons.

Comment

In this alarming situation, Annie and Dominic were clearly (and understandably) in immediate coping mode. They had little previous experience or reflection on which to draw in their decision-making as the situation was so unusual. They did, however, keep in mind ethical principles, such as their concern for participant safety, which informed their thinking as the day unfolded. Their account also gives a sense of how, in a fluid and uncertain situation, the nature of the situation emerged through their interaction with each other, with other participants, and with news and social media. We get a sense of how their understanding of what is sensible and what is best avoided were in flux in response to new information. The decisions they made as the day unfolded were highly contingent. It is interesting, for example, that they were determined to complete as much of the data collection process as possible, despite the circumstances, and that their subsequent actions can be understood with respect to this goal. It is also noticeable that they had different individual awarenesses, based on their different histories. Dominic knew the region and the participants well whereas Annie did not. So, for example, when Annie wanted to walk to get breakfast, Dominic was concerned that she would pass through the area where the shooter may be hiding.

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[2] The first phase of the project included teachers viewing videos of their own teaching; the second phase included teachers viewing videos of teachers from other provinces.

LEARNING TO BE A RESEARCHER

There was a range of expertise in the research team, including seasoned professors and doctoral student researchers occupying different roles. Dominic, originally from New Brunswick and studying in Montreal with Annie, was a doctoral researcher who became an important member of the team. His contributions included data collection in more than one region, as well as recruiting teacher participants in New Brunswick. Subsequent to the end of the data collection, he completed his doctorate and obtained an academic position. His journey through the project, therefore, offers some insight into a transition from “legitimate peripheral” researcher to greater autonomy and expertise.

Dominic’s Journey

During my graduate studies, I participated in many research projects as a research assistant. The Observing Teachers project was very beneficial for me, not only because I used some of the data for my doctoral research, but also because of the various opportunities it brought, such as working with multiple researchers from across Canada, collecting and analyzing data with groups of teachers from different regions, and using focus groups as a method.

When it comes to doing research with teachers, I first realized that the project involved more than simply collecting, interpreting, and analyzing data to enable the advancement of knowledge in education. When participants from the three groups of teachers from which I collected data mentioned that this was the best professional development they received in their profession, I realized that educational research should be more than merely data collection, analysis, and dissemination. I now see doing research with teachers as a collaborative process where both the researchers and participants work together as a community, and all its members should meet their needs and goals. In other words, it is doing research *with* and not doing research *on* teachers. Of course, the researchers' main goal is to collect various types of data to inform the researchers' community. However, I argue that teachers must get something out of the process for their professional growth. Researchers and teachers should all work together and share their expertise. Researchers are experts in various theories and fields in education and in conducting research, but teachers are experts of their classrooms (see, for example, Jaworski, 2003).

Secondly, to build this collaborative research community, I value the importance of creating a safe environment for all participants. This involves not only creating a space in which all participants can freely share their values, reflections, and opinions about teaching for data collection, but where the researcher also uses proper judgment to assure the safety of the participants. I recruited a group of teachers for one region. I knew those teachers very well and felt like an insider when I was collecting data with them. During the first day of focus groups, I was alone with the teachers and felt their safety in sharing their views on teaching. During the second day, however, Annie joined the group. Annie was an outsider as she did not know the participants, and the dynamic changed. Efforts had to be made to rebuild the safe space with the researchers. For phases of the project conducted in other regions, I was an outsider, as I did not know the teachers. I even joined one group only during the second phase. This insider or outsider relationship with the participants made me question the validity of the data, especially in the context of focus groups. What effect does knowing or not knowing the other participants have on the data that participants are willing to share?

According to Berliner (2002), educational research is the hardest science of all, due to many factors, including the difficulty of generalizing results based on classroom settings. From my reflection, added to the challenges of using methodologies that will bring accurate results, I argue that researchers should create safe collaborative communities with the participants, assuring the members' security and freedom to share their ideas. Creating such conditions may bring equitable growth for all members of those communities. This may not be possible in every context, but I suggest that these two ideas be implemented as much as possible. Now that I am at the end of my doctoral studies and have been appointed to an assistant professor position, I will bring those lessons with me into my profession.

Comment

In Dominic's account, he describes his changing perceptions about what researchers (can) do and what their role can be when conducting research with classroom teachers. It is interesting to compare his summary of his initial perceptions with those of Christine earlier in this chapter, who is a researcher with long experience of working *with* teachers. Dominic makes a new distinction (in his world) between research *with* and research *on.* This distinction emerges from observing and interacting with other members of the research team and leads to a new way of being and doing in the context of research with classroom teachers. This account is an illustration of how reflection on initially habitual responses, and on behavior largely guided by our established research protocols, leads to new ways of being and doing, particularly when shared with other members of the team. Dominic does not simply come to see doing this kind of research differently; it becomes different – his world has changed. This process is continuous, of course, with Dominic identifying goals for his future work, which will lead to further opportunities for reflection and new forms of research practice.

INSIDERS-OUTSIDERS

Our final theme concerns a long-standing issue in qualitative and ethnographic research, particularly when that research is focused on culture(s), including regional forms of mathematics pedagogy. This issue concerns the nature of a researcher's access to a culture if they are or are not members of the community that reproduces it, often referred to as the insider-outsider question. As illustrated in the two reflections that follow, the insider-outsider dichotomy is simplistic: researchers may be a bit of both, and the question of who constitutes an insider is also complex. A researcher with teaching experience may be considered an insider to the teaching profession, but an outsider to a particular school, for example. The question of who counts is a version of the observer principle: Insiders are insiders if people who share a culture perceive them as such. Questions also arise about the value and legitimacy of research conducted by researchers perceived as outsiders.

Elaine on Moving between University and School Settings

As I write this, I am trying to understand why I interacted with the teachers in my region, Alberta, the way I did. Although we, as a research team, had agreed on a process, I found myself working outside of our agreed upon processes. Recall that we video recorded three lessons, then asked teachers to watch their videos and select 20-minute clips to share with teachers from other regions in Canada. They were then asked to take those clips and watch them with the other members of the research study to choose three lessons from among the collection to share with others. At that selection process, we were to video record the teachers discussing the selections and use that as data for our study. Then they would watch the videos of teachers from other regions and that discussion would also be recorded to be used as data for the study.

None of this went as planned. The first violation/mutation of the process involved a research assistant taking the hour-long lessons and extracting 20 minutes from the tapes that focused on the teachers' actions. Then those tapes were offered to the teachers to individually select from to share in their regional group. The second was the teachers deciding they would like to create a mix that involved multiple lessons. The third was that the facilitator (I just wrote that word rather than *researcher* – what does that say) was an active participant in the discussions, posing questions, commenting, and sometimes explaining. I offer a brief account of my history as a teacher, teacher educator, and researcher to help unpack some of my actions.

My perspective within the regional pedagogies project was based on my history of interactions in schools. I am a former secondary school teacher and researcher, and I have conducted multiple projects in mathematics classrooms with local teachers in the region I studied. Some colleagues in the project view me as an insider in relation to the classrooms and teachers who participated in my region. Their assertion is likely accurate. I have participated in curriculum development in this province, I am a teacher educator in the largest pre-service program in Alberta, and I have been involved in hundreds of hours of professional development for teachers in this region. I am up-to-date on teacher quality standards and certification requirements, and I understand the distinct roles of the Ministry of Education and the professional organization that impact the day-to-day lives and instructional practices of mathematics teachers. Although my own teaching and teacher education experience is firmly rooted in this region, for the last fifteen years, I have been involved in international education projects; most of my work has been in East Africa, South Africa, and the Persian Gulf.

My insider status is more than just the fact that I was a teacher; it is also that I am an insider in terms of my relationships with teachers. I do not do research on them. My work with teachers often involves doing things with them (and sometimes for them) in their classrooms, facilitating professional development workshops for them (and sometimes with them), and when doing research I am most often a participant observer. I have taught a school mathematics class for a year and researched the classroom interactions; I have worked on curriculum resources with teachers and observed the implementation of those resources. I have co-researched with a classroom teacher as she enacted a particular emphasis she was interested in.

In the Observing Teachers project, I worked with three teachers, one of whom I knew prior to the study and had great respect for, and two of whom I immediately respected based on their experience in the classroom. When I first met the teachers, I learned that they agreed to participate in the study as a form of professional learning. Was it this combination of my history as a teacher, as a teacher educator, as a researcher, as a participant-observer, and as a person who understood the participants not as participants but as colleagues who had particular motivations to participate that resulted in the data collection looking as it did (and the themes that I am writing about)?

Lisa on Not Knowing the Participants

As I reflect upon my experience in this project, I struggle to articulate how different it felt for me with respect to the sort of research I usually do. My primary research focus is to address issues of equity, with a particular lens of the centering of Indigenous knowledges – ways of knowing, being, and doing – in mathematics education. I usually work within Indigenous research methodologies (IRMs) which require relationality with participants (Kovach, 2009). IRMs take seriously the importance of respect, relationship, reciprocity, relevance, and responsibility (Archibald, 2008; Kirkness & Barnhardt, 1991) and remind researchers that they must consider how their research gives back to the community (Kovach, 2009). My own research in Mi'kmaw communities in Nova Scotia has been guided by a community practice, *mawikinutimatimk* (coming together to learn together), and has emerged from decades long relationships rooted in trust and respect (Lunney Borden & Wagner, 2013). It is because of this relationality that I have confidence in doing the work that I do, and I also understand the importance of doing work that benefits the community, giving back.

In this project, my positioning was very different. I did not have a data collection site and, as such, I did not have a relationship with any of the teachers involved. Instead, I was given transcripts of teacher conversations and invited to make sense of their views on pedagogy from their utterances. I found myself wanting to know these teachers to better understand where their views were coming from and to try to connect with what experiences might have brought them to these understandings. There were moments when I was perplexed by a teacher's statement and wanted to ask for more clarity about the idea or value I saw emerging. There were times when I wished that I had seen what they were seeing as they viewed their videos to better understand the context. I found my position as an outsider in the research to be quite difficult relative to the work I normally do, and I wondered how much of my own views on education influenced how I interpreted the transcripts.

Furthermore, it felt unusual to interpret the data on my own. My normal practice, in using a decolonizing approach, is to invite participants into the process of analysis. We look at data together and try to interpret its meaning. We engage in a shared approach to making sense of data. Being alone with transcripts was a quite unfamiliar feeling. I invited a doctoral student, Ellen Carter, to join in the analysis with me for one of the chapters, which allowed us to engage in a modified version of this approach to data analysis. Being able to engage in conversation aided us in making meaning of the data, yet I still believe we both brought our views of pedagogy to the data. I have worried about how I represented these teachers, with whom I do not have a relationship. My hope is that I have done right by them.

Reflecting upon this experience, I wonder how it differed for my colleagues who were involved in data collection with teachers they knew. Did they interpret things differently due to knowing more about the context and/or participants? Did they see things in the data that I was unable to see because of my outsider status? Ultimately, I wonder about how research can be done well by outsiders and perhaps am increasingly more committed to the relational work that I do.

Comment

In these two accounts, Elaine and Lisa each reflect on aspects of the insider-outsider question. Elaine perceives herself mostly as an insider. She writes of her connections with the teachers, the schools, and the general milieu. She feels comfortable with these connections. Perceiving herself as an insider and perhaps being perceived as such is not simply a question of perspective. Elaine is clear about how this position is connected to her way of being during the research. When reviewing data from other regions, as well as noticing differences relating to teachers' pedagogy, she also noticed differences related to her way of conducting the focus groups as compared with those conducted by other members of the team. These distinctions lead to awareness about the various ways of being in the research setting and the different worlds that are brought forth as a result. For her, for example, the participants are colleagues, worthy of respect.

Lisa, meanwhile, perceives herself as an outsider. It happened that participant recruitment in some regions and languages was unsuccessful. This led to some team members, including Lisa, working with data collected by other members of the team. Lisa reflects on her uncertainty about this process, noticing a difference between this practice and her way of being and doing in her own earlier research. She describes her sense of missing the voices of the participants in conducting her analysis and interpretation of the data. Of course, as an outsider, it is still possible to do analysis, but the resulting findings must be understood as findings from an outsider perspective that reflect the structures and worldviews of the researcher. The knower and the known are always connected.

REFLECTIONS ON RELATIONSHIPS

A couple of themes run through the preceding reflections. The first concerns the insider-outsider question, which is apparent in all of the reflections, and we discussed it regularly during our meetings. The most obvious way in which insider and outsider perspectives are involved in the Observing Teachers project is in the generation of data by having teachers from within a region discuss videos made in their own classrooms. If there exists a regional pedagogy, then these discussions are of insiders discussing lessons made by other insiders. In the ethno-ethnography phase, when the teachers discussed lessons from another region, they did so as outsiders. In our research design, we positioned them intentionally as outsiders, and we were not concerned that their comments on the videos from the other regions would misrepresent teaching in those other regions, as our goal was not to analyze the lessons shown in the videos, but rather the pedagogy of the teachers making the observations. In this case, the teachers' outsider perspectives give us insight into their *own* pedagogy, just as reading ethnographies made by Europeans in the nineteenth century of natives of other lands gives us insight now into the thinking of nineteenth century Europeans.

An expected way in which insider and outsider perspectives are revealed by the project is in the analyses made by the researchers. We analyzed the data primarily as outsiders, but this was not our only perspective. Elaine, for example, describes her previous experience as a teacher in the same province and language as the teachers in her focus group; in her interactions with the focus groups, we can see her operating as a participant observer, taking an active part in the discussions. This is not so evident in the other researchers' interactions with their focus groups, but in our discussions as researchers we have observed that the researchers who were present for the focus group sessions feel more a part of *their* teachers' discussions than the other researchers who have only read transcripts of the sessions, as Lisa describes.

The second recurring theme is about relationships. All of the reflections address the nature of the relationships formed between research team members and teacher participants. The research design had less to say about these relationships in the mechanics of the anticipated data collection. Nevertheless, the enactivist perspective assumes that meaning is made jointly and contingently. The importance of these relationships is clear, for example, in Christine's and Elaine's reflections, which emphasize the importance of considering the teacher participants' learning through the research process, something Dominic also noticed. Relationships are also apparent in Annie’s and Dominic’s concerns for their participants’ safety, while Lisa reflects on the unusual feeling of not having a direct relationship with the participants. Relationships are important in this project for a couple of reasons. The findings emerge from interactions (i.e., relationships) between groups of teachers and a researcher. In addition, these relationships have an ethical dimension. In all the reflections, we see concern for the teachers.

These relationships included relationships within the research team. As the project unfolded, for example, it became apparent that we each had different (sometimes very different) interpretations of our jointly authored research design. A good example of this point is the divergent ways in which the focus groups were conducted. We all agreed on the goals and guidelines for the focus groups in advance. In their enactment, however, they looked rather different. We must emphasize that we do not see this difference as a problem; we were not trying to produce cookie-cutter focus groups with standardized procedures (although Elaine’s reference to a “violation” suggests that we may have thought otherwise). Differences are inevitable as each member of the team brings different histories and ways of being and doing to the project. Rather, then, our growing awareness of our different approaches led to discussions about the value of our data and the nature of our relationships with participants. Is it a problem, for example, that Elaine adopted a manner that she describes as an “active participant” while Annie’s was more of an “expert”? Again, such differences are inevitable and, it should be emphasized, partly a result of our relationships with the participants. Elaine’s role as an active participant was jointly produced with the teachers in her focus groups.

A further layer can be added to this last point. Our awareness of these differences arose from our observations of each other’s research practice. As we each bring different sets of distinctions, so we see each other’s practice a little differently (and so reveal a little of our own distinctions). Many of the discussions within the research team therefore revolved around clarifying these differences and distinctions, in order to better understand each other and ourselves.

What, then, is the value of research findings arising from a team of researchers who used somewhat divergent practices and interpreted data from a variety of individual frameworks? This issue has been explored in enactivist research. The notion of bringing forth a world of significance does not mean that "anything goes" and that we all see what we want to see. Rather, it suggests that knowing is related to the knower. Being aware of different knowers relating to the same object can display convergent features. Hence, researchers adopting different perspectives and bringing different histories may come to observe similar things. This happened in the Observing Teachers project, for example, when Christine and Richard conducted (with others) separate analyses of the same Ontario data (see Chapters 3 and 6). Their different histories led them to make different distinctions in the data (see Simmt & Kieren, 2015). When we compared the two analyses, however, we found that we had identified many of the same moments in the transcripts as being particularly significant. The resulting versions of middle school mathematics pedagogy included samenesses (student voice) and differences (struggling with struggle).

CONCLUSION: ON THE TANGLED NATURE OF RESEARCH ON PEDAGOGY

Researching mathematics pedagogies is not straightforward. As a sort of culture, pedagogies are arguably impossible to observe in their entirety. They only exist as a distributed set of common practices across potentially hundreds of teachers, most of whom do not know each other. Yet commonalities can be observed. Pedagogy is difficult to characterize for an outsider, because the observer may not see features that are important to local teachers.

Pedagogy is also difficult to characterize for an insider, because teachers may not see features that are distinctive when observed by outsiders. The Observing Teachers research design attempted to address this complexity by collecting data of teachers' observations of mathematics teaching in their region and in other regions of Canada. Our analyses of these teachers' observations are, however, inseparable from our own histories and perceptions as researchers. As such, our experience of conducting the project let us reflect extensively on the insider-outsider question. More importantly, it led us to reflect and learn about the nature of the relationships we formed (or not) with participating teachers. We see these relationships as ethical in nature. Through the project we have, we hope, developed greater non-deliberate readiness-in-action (Brown & Coles, 2012) that we will carry forward into our future research.

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