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Connecting Culture and Mathematics Education and Implications to Learners: Methodological Tensions and Possibilities during Fieldwork Collaboration

By

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Abstract
Methodological literature demonstrates that achieving collaboration largely depends on how the researcher negotiates the inevitable differences and asymmetries between himself or herself and other fieldwork participants. This article gives a detailed account on how the researcher influenced the process of positionality in order to engage participants in a productive collaboration, working in a professional learning community (PLC). The PLC aimed at staff developing teachers on how to connect culture and mathematics education in the context of curriculum reform. Three middle school mathematics teachers participated in the learning community. Cultural activities performed at a cultural village very close to the school were mathematized. The embedded mathematics concepts were indigenised into the Grade 9 mathematics curriculum. Two teaching units on number patterns and transformations were crafted and co-taught by the facilitator and the class teachers in five Grade 9 classes. Data consisted of narratives from the pre- and post-interview transcripts triangulating data from transcripts on mathematisation of cultural activities and lesson observations. Findings from my analysis show some methodological tensions and possibilities experienced during fieldwork collaboration. Participants were in disagreement with the laid-out procedures, bargains were negotiated within the research-site. The notion of positionality was used to capture the researcher-subject relationship. By being a mathematics educator, the researcher declared her "insider" position. The "collective responsibility" given to participants led to some positive collaboration. I argue that insider self-identities are validated through interactions, dialogue and discourse with other fieldwork actors.

Key words: identity, agency, positionality, collaboration, fieldwork relationships, participants

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Introduction

Educational reform is now creating challenges to the teaching and learning strategies. Some education reform policies indicate that education should be connected to learners' cultures. The cultural placement of an educational system is probably the most relevant fact in modern development of education (D'Ambrosio, 1979). Many researchers have argued that teaching must be related to its cultural and geographical context (Bishop, 1988; Kroma, 1996; Ascher and Ascher, 1994; Gerdes, 1999; Mosimege & Lebeta, 2000; Mosimege, 2003; Madusise, 2010 &2013). The common consensus amongst these researchers is that mathematics is being perceived as difficult, uninteresting and irrelevant because familiar subject matter and experiences that could be used to lay the foundations of the discipline, arouse learners' interests and challenge their intellect early in life have been largely neglected (Kroma, 1996). Ascher and Ascher (1994) posit that the more teachers ignore the variety of culture in their mathematics teaching, the less learners will understand what they are talking about.

In Zimbabwe, the principles of teaching and learning in the competence-based curriculum stress that teaching and learning should be connected to learners' cultures. One of the teacher's professional standards stipulates that the teacher is expected to provide opportunities for learners to develop understanding of and respect for the Zimbabwean culture and language (Teacher Professional Standards, 2015). The curriculum framework values indigenous knowledge systems and advocates for teaching based on heritage philosophy (Curriculum Framework for Primary and Secondary Education 2015-2022). In this regard, mathematics may be considered as an integral part of the greater cultural heritage of humankind. For mathematics education, Zimbabwe's competence-based curriculum provides opportunities for educators and researchers to see mathematics in ways that present mathematics as a discipline that has connections to culture.

South Africa's Revised National Curriculum Policy Statements (NCS) for Grade R-9 Mathematics envisage learners who will "be culturally and aesthetically sensitive across a range of social contexts" (Department of Education, 2002:2). The NCS challenges educators to find new and innovative ways to reach learners from diverse cultures in their mathematics classrooms. Valuing indigenous knowledge systems is one of the principles upon which the NCS is based. Part of the teacher's work involves coming to an argument for ethnomathematics as a cultural way of doing mathematics. Therefore, mathematical modelling is expected to provide learners with the means to analyse and describe their world mathematically, allowing learners to deepen their understanding of Mathematics while adding to their mathematical tools for solving real-world problems. The NCS calls for radical teaching practice changes on the part of the

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teacher in order to see mathematics incorporated in the real world as a starting point for mathematical activities in the classroom.

According to Fasheh (1997a), a common misconception in the teaching of mathematics has been, and still is, the belief that mathematics can be taught effectively and meaningfully without relating to culture or to the individual student. In relation to teaching mathematics from a non-traditional approach, Madusise (2013) found that many students gained greater appreciation for mathematics after having learned the subject matter from cultural perspective. This contributed to the students feeling more comfortable and confident about discussing mathematical topics such as number patterns and transformations with their peers. In relation to ethnomathematics and multicultural education, teaching is much more than transferring of knowledge, teaching is a cultural activity that should induce creation of knowledge (Freire, 1998).

Although these new understandings of mathematics teaching and learning may sound very appropriate, the implementation and impact of explicit instructional strategy may not be widespread and unproblematic. It is a challenge for teachers to incorporate learners' cultures in their lessons, particularly in Mathematics as espoused by Madusise (2013). Textbooks and teacher's guides lack sufficient local cultural mathematics content to enable the making of connections explicit in the context of teaching. Mosimege (2012) reiterates that mathematics teachers lack the ability to make cultural connections in their mathematics classrooms; their indigenous content knowledge is shallow. This article focuses on the methodological tensions and possibilities encountered when connecting culture and mathematics education in a school-based community of practice. These tensions and possibilities were pertinent to fieldwork collaboration.

Statement of the Problem

Methodological literature demonstrates that achieving collaboration largely depends on how the researcher negotiates the inevitable differences and asymmetries between himself or herself and other fieldwork participants. This article demonstrates some methodological tensions and possibilities experienced during fieldwork collaboration.

Relationship between Mathematics and Culture

Mathematics and culture are often interconnected, making school mathematics intimately linked to the society in which it is taught (Seah & Bishop, 2003). An appreciation of the manner in which mathematics has developed over time establishes its origins in culture and needs of society. Mathematics enables creative and logical reasoning about problems in the physical and social world and in the context of Mathematics itself. It is a distinctly human activity practised by all cultures (NCS for Grades 10 -12). Knowledge of mathematical sciences is constructed through establishment of descriptive, numerical and symbolic relationships (Department of Education, 2003:9). Just as a phrase loses meaning or acquires an unintended meaning when removed from its context, so mathematics detached from its rich intellectual setting in the culture of our civilisation and reduced to a series of techniques has been grossly distorted (Kline, 1990).

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Bishop (1988a) views mathematics as a product of investigation by different cultures. This demonstrates quite clearly that mathematics has a cultural history. But whose cultural history are we referring to? Research evidence from anthropological and cross-cultural studies has emerged which not only supports the idea that from different cultural histories have come what can be described as different mathematics. One can site the work of Zaslavsky (1973), who has shown in her book "Africa Counts", the range of mathematical ideas existing in indigenous African cultures. "Just as each cultural group generates its own language, religious beliefs etc., so it seems that each cultural group is capable of generating its own mathematics" (Bishop, 1988:180). Ethnomathematics as an emancipatory movement, is an opposition to any claim of the superiority of Western mathematics (Zaslavsky, 1973). Ethnomathematics can be generally understood as a research programme which is primarily interested in mapping out the so-called cultural mathematics. It is the field of study which examines the way people from other cultures understand, articulate and use concepts and practices which are from their culture and which are described as mathematical by researchers.

Barton (1999) posits that a suitable philosophical conception on which ethnomathematics is based on needs to: 1. refuse the idea of universal mathematics, 2. understand mathematics as context-based, and 3. see individual cultural mathematics as equal to Western mathematics.
These requirements are closely interrelated, the desired result being a culturally relativist picture of mathematics. Mathematics needs to be understood relative to the culture (context-based) it emerged and develops. The relationship between mathematics and culture is significant and considered impossible to ignore by ethnomathematicians (Barton, 1999). To accept these requirements means to refuse the idea of separation of mathematics from its cultural contexts. Barton's (ibid) mission was to show that there is room for cultural conceptions of mathematics within an acceptable discourse in the philosophy of mathematics to be accomplished. Mathematical realism, according to Barton is an "essentially inadequate" conception for cultural understanding of mathematics. Ethnomathematics recognises that all cultures and all people develop unique methods and sophisticated explications to understand, comprehend, and transform their own reality (D'Ambrosio, 1990; Rosa & Orey, 2007b). Therefore, Mathematics, as a result of various mathematical activities, isn't and cannot be universal since mathematical activity, as a product of man, is conditioned by the culture and the society of the place where it is performed (Bishop, 1998).

Theoretical Framework

Theoretical foundation to the study from which the article is premised comes from Wenger's (1998) theory which views learning as becoming a "certain type" of person with respect to the practices of a community. In this view, learning occurs through "social participation" (Wenger, 1998: 4): learning "changes who we are by changing our ability to participate, to belong and to negotiate meaning" (Wenger, 1998: 226). According to Wenger all learning eventually gains significance in the kind of person we become. Scholars within a situative perspective argue that knowing and learning are constructed through participation in in the discourse and practices

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of a community (Lave and Wenger, 1991). Learning is conceived as developing participation in a practice.

The Study and the Context of Fieldwork

Driven by the proposal of the South African National Curriculum Statement (NCS) Grade R-9 Mathematics, to incorporate indigenous knowledge in mathematics education, the study on which this article is based sought to assist teachers in terms of where to access the indigenous mathematical content knowledge and how to integrate the extracted indigenous mathematical ideas in their mathematics lessons. The NCS evinces weak classification with respect to the inter-discursive relations to allow the incorporation of indigenous mathematical knowledge in Grade 9 mathematics classrooms. However, Grade 9 textbooks and teacher's guides lack sufficient local cultural mathematics content to enable the making of connections explicit in the context of teaching. The aim of the study was to explore the context of a cultural village as a vehicle for mediating culture and mathematics education, interrogating connections between mathematics and culture. Mathematics teachers were then engaged in a school-based professional learning community, basing the teaching of mathematics on the cultural background of the learners, using out-of-school, culturally-based activities. The major aim was to extract mathematical ideas from the environment and embed them within mathematical instruction. Thus, connecting cultural mathematical knowledge to academic mathematics is necessary. Through mathematising culturally-based activities performed at a cultural village, the research team indigenised (i.e. adapted to local culture) two Grade 9 mathematics topics in the South African curriculum. A teaching and learning unit on the indigenised topics was designed and implemented in five Grade 9 classes at the same school. In this article, focus was on teachers' narratives from the pre and post-interview transcripts triangulating data from transcripts on mathematisation of cultural activities and lesson observations. The data were used to determine the methodological tensions and possibilities experienced during fieldwork collaboration. The article traces the experience of negotiating collaboration with the research participants during fieldwork. It addresses the following central question:

What methodological tensions and possibilities, if any, occurred when negotiating collaboration with research participants during fieldwork?

Samples and Sampling Procedures

The sample in this study consisted of three mathematics teachers from one middle rural school in the North West Province of South Africa and their Grade 9 learners. Purposive and convenience sampling was used to select the research sites (Patton, 1990). Merriam (2009) identifies purposive sampling as one appropriate sampling strategy in case-study design. Merriam (2009) further adds that purposeful sampling is based on the assumption that one wants to discover, understand, gain sight; therefore, one needs to select a sample from which one can learn the most. In this case, a cultural village was identified as the research site and mathematics teachers who teach at a school very close to the selected cultural village were focused on. A cultural

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village is a tourist establishment where tourists can view aspects such as the homestead, traditional clothing, food and food-related practices, history and societal structures as well as song and dance routines of one or more of South Africa's cultures (Mearns & du Toit, 2008).

A cultural village was selected with the belief that it is where the community's indigenous knowledge is preserved. The intention was to make the cultural village a mathematics teaching resource centre. A school close to the cultural village was chosen with an assumption that its members (including learners) are quite familiar with the activities taking place at the cultural village.

Teacher Existing Practice

Use of textbooks

An analysis of the teachers' perceptions of teaching revealed that teachers based their teaching on recommended textbooks and other supplied curriculum materials. Their pedagogical strategies were influenced by instructional approaches of the materials (Rey, et al., 2003). Research has suggested that mathematical topics/ideas not included in textbooks are most likely not presented by the teachers (Freeman, & Porter; Rey et al., 2003). All the three teachers said they mainly used textbooks and teachers' guides in their teaching and they regarded them as helpful.

> TR B: Textbooks are helpful because we use them. [Teacher's guides]….We use them also, they are helpful.
> R: So you get much help from the textbooks and teachers' guides. Can you say they actually guide/lead you on what to teach?
> TR B: Yes, yes… [With some emphasis placed]
> TRC: Textbooks and teacher's guides are helpful.
> TR A: When combined the textbooks I am using are helpful. Teacher's guides are also helpful.

TR A said he used many textbooks and other textbooks were used as references. The teachers in the study seemed to be in agreement with Schmidt, McKnight and Raizen (1997, p. 53) who posit that "Textbooks define the domain of the implementable day-to-day curricular possibilities" Therefore textbooks are, in theory and practice and by default and overwhelming demand, the backbone of the "micro" organisation of classroom activities. Being the backbone implies classroom activities are shaped by suggestions found in the textbooks.

In their extensive study of textbooks, Valverde et al. (2002) proffered that textbooks mediate between intended and implemented curriculum, and as such are important tools in today's classrooms. However, when asked to comment on the coverage of indigenous mathematical knowledge in the textbooks they were using, teachers in the study said the textbooks they were using were not covering much of indigenous mathematical knowledge. Therefore, the textbooks were not satisfying their expected role of translating policy into pedagogy (Valverde et al., 2002). On the other hand, the recommendations by the reviewers of

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the implementation of the NCS in 2009 encourage teachers to use nationally approved textbooks and teachers' guides, for both planning and classroom teaching, to ensure that the curriculum is covered, supporting appropriate content coverage, sequencing and pacing (p.50). Now if the recommended textbooks do not cover much on indigenous mathematical knowledge (according to the interviewed teachers), one wonders whether mathematics education is being connected to the learners' cultures at all.

Improvising Teaching Materials

Teachers in the study said they were not improvising any teaching materials on indigenous mathematical knowledge. They said they used recommended textbooks, but on the other hand they said textbooks did not cover much on indigenous knowledge. One then wonders whether the learners were learning anything from their cultures.

> R: Now we have talked about this culture thing and said there is not much in our textbooks covering on local cultures. My next question is, in that case have you ever tried to improvise your teaching materials to meet the demands of NCS?
> TR B: I can improvise materials on other aspects…. For cultural knowledge we use recommended textbooks and other textbooks as references.
> TR A: To improvise! ... No, I find it difficult. I find it difficult really. I always refer to what is in the textbooks.
> TR C: No!

To go beyond the text requires that the teacher possesses sufficient mathematical knowledge and concern for innovation to enable the preparation of activities and content not found in the textbook (Chiappetta et al., 1991). Unfortunately, many teachers seem unwilling or unable to make these innovations, compounding their reliance upon textbooks (Garcia-Barros et al., 2001). Teachers in this study indicated that they could improvise teaching materials for other aspects but not for cultural mathematical knowledge, sending a message that the teachers did not improvise materials on cultural knowledge because they did not possess sufficient content on indigenous mathematical knowledge. If the textbooks the teachers were using did not cover much of the indigenous mathematical knowledge (as revealed by the carried out textbook analysis) and teachers did not improvise teaching materials (according to the above analysis), the conclusion one can draw is there was limited connection of mathematics education to learners' cultures. Therefore, the teachers needed to be professionally developed on how to connect culture and mathematics education.

Studies based on the concept of cultural differences make an assumption that students coming from culturally diverse backgrounds will achieve academic excellence if classroom instruction is conducted in a manner responsive to the students' home culture (de Beer, 2010).

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Collaboration with Fieldwork Partners

Genuine collaboration between the researcher and research participants is critical for collection of ethical sound and trustworthy data in qualitative research. Methodological literature sufficiently demonstrates that achieving collaboration largely depends on how the researcher negotiates the inevitable differences between himself or herself and other fieldwork participants (Chereni, 2014). Pezalla et al, (2012) argue that the researcher is a critical instrument in the research process. One might assert that genuine collaboration depends largely on the role of the researcher. For example, existing literature demonstrates that a researcher can potentially achieve genuine collaboration by assuming multiple positions or identities during fieldwork (Henry,2007 & Lapum, 2008). In this article I reflect on how I positioned myself in the community of practice with mathematics teachers. I detail the nature of responses participants provided to me, particularly the research procedures they suggested, and the kind of knowledge they wanted to know from me and how they wanted to assist me in the research process. I also present the snapshots of my fieldwork experiences emphasising the obstacles to collaboration that I encountered during data collection. In addition, I describe the strategies which I employed to gain access to data.

In the initial meeting with the teachers to discuss fieldwork procedures for the intended community of practice at their school, the researcher explained the research procedures to the participants. It was clear that the teachers were not prepared to go to the cultural village with the researcher.

> TR C: Do you want us to go to the cultural village with you? I do not think we have the time (my underlining). Our teaching programme is very tight. We are expected to cover schemes of work from the Department of Basic Education. Most of our afternoons are occupied. Every Monday we go to another meeting with the subject advisor from the Department of Basic Education.
> TR B: We are familiar with the activities at the cultural village; even our learners are also familiar with the cultural activities which take place at that village. Some of our learners participate in the cultural activities such as dancing, at the cultural village.

The above remarks indicated some tensions at the initial stage of the study. The time factor is very interesting because it highlights how teachers (and not just those of mathematics) still very often see official programming indications (and therefore the hours required to cover them completely) as a strong constraint from which they find it difficult to remove themselves whatever their best intentions maybe. Even the timetabling of the various lessons still seems for some to be insurmountable problem.

As I was concerned about what would happen if all the research participants (teachers) were to withdraw, I quickly came up with an alternative procedure. This was to use the video clips of the cultural activities I had taken during my site seeing visits to the cultural village. However, this did not satisfy one of the requirements for the administration of the study.

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Initially, considering the proximity of the school to the cultural village (approximately 800m) I thought, together with the teachers we would visit the cultural village. It is a mistake – or maybe arrogance – to interpret the notion of collaboration as a one-time method that is negotiated early in the research process. Collaborative approach to research recognises that research procedures are often learned in the field and that participants often influence how researchers practise their craft (Subedi & Rhee, 2008). Consequently, when negotiating collaborative research process, the research interactions with participants become as important as the writing of the research.

Mathematising Cultural Activities

> R: Okay, these are the activities captured at the local cultural village. What we are now supposed to do is to extract the mathematical ideas which they are using… After extracting the mathematical ideas then we find where possibly we can use them… Which topic or topics can incorporate (indigenising the curriculum) some of the extracted ideas in our Grade 9 mathematics content? I am not well-versed with the Grade 9 mathematics content.

By telling the teachers that I was not well-versed with the Grade 9 mathematics content, I was indirectly indicating to the teachers that I expected them to take a leading role. I was thus, giving them almost full responsibility of the mathematising session. This then led to "positive" participation from TR A and TR B. The "collective responsibility" given to the participants also led to an element of "trust", trusting that what they were giving was of value to the researcher as I had indicated the possibility of wanting to also learn about Grade 9 mathematics content.

> TR A: We can see there is quite a lot of counting of steps when they are dancing… There are some geometric figures in their paintings.
> TR B: Shapes, angles and the properties of shapes.
> TR A: We can use the pictures to teach transformations.
> TR B: In fact, there is a lot of reflection in the pictures.
> TR A: There is also rotation.
> TR B: See here at this picture (pointing at the picture), there is translation
> TR A: From these other pictures we can also teach similarities.
> TR B: It's even more to that, we do have some shapes which are exactly the same in shape and size – so we can use these shapes to teach congruence.
> TR A: From those rhombuses and other shapes we can ask learners to identify shapes and their properties.
> TR A: No, we cannot have a lesson where we can say today we want to teach counting but the ideas can be used say when teaching or introducing number patterns, for example, using number of dancers and number of footsteps per dancer, to come up with a number pattern.

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From the above excerpts, the flow of extracted mathematical ideas from TR A and TR B indicated some "enthusiasm", "satisfaction" and "sharing" of ideas in the participation.

> TR B: But if we meet and have discussions like the one we have just held we can benefit. We now know the mathematics those people at the cultural village use. We also know where we can include the ideas in our Grade 9 teaching. We have gained a lot. Now we know what we must do when we go to the class.

TR B's comments, "we can benefit … we have gained a lot" indicate that "collective participation" can be a powerful form of teacher learning. Teachers seemed to be in support of collaborative group discussions on how to integrate cultural knowledge in the teaching and learning process. Critical scholars have advocated the need for researchers to be explicit about research purposes as well as their positionalities and have noted that research then meets the needs of communities being researched (Fine, 1996 & Foster, 1994).

The concepts central to this article are: identity, positionality and agency. By agency, I refer to the researcher's role during fieldwork or what he or she does in order to influence the research process to realise research goals. According to St. Louis and Barton (2002), positionality refers to the relational place one occupies in different contexts. During the extraction of mathematical concepts from activities captured at the cultural village, I assumed the back-bencher position and the research participants took a leading role in mathematising the cultural activities. The term positionality is often used interchangeably with identity. When used in field work accounts, identity generally captures a researcher's notion of self as well as how he or she is recognised by participants during research. Gee (2001) defines identity as "being recognised as a 'kind of person' in a given context. In this context I was recognised as someone who was willing to learn more about the Grade 9 mathematics curriculum.

Challenging Interactions

In the planning session there were some challenging interactions between myself and the teachers. These were due to some tensions between my proposed research procedures and the participants' expectations. (All underlining is my own)

> TR C: Are you supposed to teach all the Grade 9 classes? I suggest you pick a few kids and test with a few kids, say twenty. Why can't you use about twenty learners?
> R: The idea is to do it with all the Grade 9 learners so that if it means learners will benefit, we won't disadvantage other learners.
> TR B: For us we can teach all of them but for you, for your research, you can have a handful of them and then…

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> TR C: Why can't you select a few then **you teach** them (emphasis added). What I am saying is if you select a few kids and you are with them that mean you will have less time.
> R: It's not …that is what I am not encouraging. I thought we could plan together and implement the plans together. The idea of the study is to co-teach. Yes I can teach some of the lessons and you may also have to teach others.
> TR B: If you use her proposal of selecting a few kids you will have less time doing your research at this school.

TR C suggested that I was supposed to pick a few kids and teach them in disagreement with my suggestion of using all the Grade 9 learners. TR B used the word "but" to articulate what they disagreed with. The word "if" was used to suggest alternative reasoning against my proposal of using all the Grade 9 learners at the school. The remarks by teachers raised the following issues: the first issue was on time factor. Teachers thought lessons like the ones discussed in the meeting would need time and they could not commit themselves to that. Secondly teachers were not sure whether their learners were going to benefit from the study, therefore they suggested using a small group of learners. In return I tried to use intellectual virtues to counter the presented suggestions.

> R: Oh, on my side I am not worried about the time I can spend here but I am worried about the results we are going to get. In fact, I think the more time I will spend here the better the results we can get because learners will end up seeing me not as a visitor but as a staff member. (My underlining)
> R: The idea of the research is for us mathematics educators (you and me) to try to implement the extracted ideas together. I thought we should all play the teaching role and the observer's role. I teach a lesson while the class teacher observes and make comments. The class teacher also teaches another lesson whilst I do the observation as well or maybe we can teach the same lesson together. Then after the teaching we will have reflection meetings, reflecting on the taught lessons. (My underlining)

My first remark was meant to counter TR B's argument of trying to reduce time spend at the school. The second remark was given in response to TR C's argument to reject co-teaching. The underlined phrases represent what I thought was relevant information in the argument (intellectual virtues) to try and reject the "flimsy reasoning" given by TR B and TR C against the proposed research procedures. The intellectual virtues were presented immediately upon the participants stating their disagreement. The heated debate which took place sent a message that sometimes research entry requires "deep negotiation" with research participants, this goes beyond just hand-shakes and completion of consent forms.

The various ways in which the participants responded to my request for their participation made me more aware of the conditions they were offering for their involvement. By

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giving intellectual virtues I was constantly aware that I was to be in that school and classrooms due to the teachers' generosity, so I tried to be as accommodating as possible and not to make undue demands on teachers' time without compromising the research purpose of being there. Many reflexive fieldwork accounts convincingly illustrate that both the "insider" and "outsider" statuses are neither simply granted nor achieved: they are very fluid constructions (Eppley, 2006, Palmer, 2006; Soni-Sinha, 2008; Watts, 2006). A key insight apparent to these conversations is that fieldwork identities are discursively produced in on-going fieldwork interactions and they are neither stable nor coherent (Eppley, 2006). For these reasons, the term "positionality" has become the preferred notion to capture the researcher-subject relationships during fieldwork. By indicating to the participants that I was also a mathematics educator like them, I wanted them to identify me as an insider with a common goal – mathematics educator. Thinking of identity in this way helps to show that self-attributions of the researcher-as-participant (McCall, 2006) may remain nothing more than a claim to membership of the group one studies, in the absence of corresponding recognition from participants. Since qualitative research generally strives to understand social life from the viewpoint of those who live it, the insider researcher has been viewed as better positioned to access fieldwork participants and to generate trustworthy data with relative ease (Merriam et al., 2001; Revees, 2010). In much the same way, researchers cannot declare themselves absolute outsiders since one can always find some subject position with participants, not least mutual acquaintance (Eppley, 2006).

Participants' Conceptions of Research

Concerning their understanding of research, TR B and TR C made the following statements.

> TR B: I think why she keeps on saying you are wasting our time is because other researchers who came here before, just gave us questionnaires and said 'tomorrow I will come and collect the completed questionnaires'. Even our APPO… (not clearly audible) they just give us questionnaires and say we will come and collect the papers some other time.
> R: I think maybe it's because of the type of researches.
> TR C: The same thing!

From the presented arguments, it can be concluded that the participants' conception of research was an activity carried out at schools by outsiders. They did not see the possibility of themselves acting as teacher researchers. According to TR B and TR C, research data should be collected through questionnaires. This is from their past experiences, thus researching from outside. The presented research procedure was rather new to them. However, being a participant researcher, I could not take the suggested data collection method. Similar statements were echoed by the school Principal when I interviewed her.

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> Principal: You are the first researcher to come and stay with us here. All other researchers who came before you just left questionnaires to be completed and collected later.

Bondy (2012) argues that the researcher needs to negotiate multiple bargains throughout the fieldwork in order to maintain access to the field. My fieldwork experiences strengthen this observation: in one way or another, participants demonstrated that what matters for researchers was to collect data using the easiest research instrument – the questionnaire. The way I dealt with the encountered challenges during data collection illustrates that fieldwork bargains are negotiated based on an understanding of expectations of behaviour within the research-sites (Bondy, ibid). In my case my fieldwork mates were not research participants but participant researchers. I had to negotiate vigorously to achieve community of practice requirements.

De-privatising Teaching

Teachers in the study emphasised not being prepared to be observed teaching. The idea of moving teaching from an "isolated" activity to the public sphere of professional learning communities did not auger well with them. It looked like they were not against observing me teaching but they were against being observed teaching. They still wanted to play the "privatisation card", not wanting outsiders to mingle with their teaching.

> TR C: To teach? (Emphasis placed again). We may end up saying you are wasting much of our time, as already mentioned, most researchers just give us questionnaires and say tomorrow I will come and collect the papers.

However, the reluctance might also have been rooted in fear, fear of inconvenience, discomfort or even failure. They expressed apprehension of being observed by the researcher whilst teaching. It became obvious to me that teachers were not going to allow me to observe them teaching. This apprehension of working outside their comfort zone is in line with the HOD's remarks:

> HOD: As we are discussing right now there is a challenge that I am thinking of. The challenge we are having with our educators is dedication and willingness to go an extra mile. Not all of our educators have majored in mathematics. Educators do not want to be embarrassed. But most of all our educators are not committed.

Also, according to the HOD, lesson observations were a thing of the past.

> HOD: I used to do lesson observations on mathematics lessons in the department but it now needs to be revisited. Myself I am now overstaffed. Lesson observations have since been stopped. …. Observations by colleagues are not really happening.

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Therefore, for my research procedure I was suggesting things which were not in line with the culture of the school. Asking to observe teachers' lessons was just like asking them to work outside their comfort zone. The research teachers were reluctant to be observed teaching maybe due to fear of inconveniences or discomfort. In some cases, this reluctance might have been due to fear of failure too. I learnt that it is very difficult to operate outside the school culture, worse if the operation is brought by an outsider. I ended up observing TR B's lessons only.

The researcher needs to be aware of the cultural conditions in the field and use this information to continuously strike bargains as a way to enlist the collaboration of participants (Bondy, 2012). Such bargains may take the form of a give-and-take negotiation where the researcher might be compelled to meet certain behavioural expectations in order to remain there (Crossa, 2012).

Conclusion and Recommendations

Teachers got into the community of practice working at the periphery. In communities of practice, learning arises from "legitimate peripheral participation" (Lave and Wenger, 1991). The suggestion of co-teaching was initially met with resistance. Mutual engagement was evident through the teachers' responses on the extraction of mathematical concepts embedded in the cultural activities. In my own experience with practicing collaboration, because of the ways in which participants interacted with me, I became more reflexive about my identity and my role in fieldwork. Most importantly, I learned to listen and engage with participants about the proposed method of research. I argue that researchers need to create collaborative spaces in research so that they can develop meaningful dialogue with participants. In my effort to engage participants in a community of practice, I learnt that the ways in which participants interpret research can assist researchers to develop ethical relationships in qualitative research. Similarly, research processes are neither objective nor innocent, and a self-reflexive trajectory of research can be "empowering" if researchers critically scrutinise their practices and resist being paralysed by tensions faced in the field. Ethnographic research is a process which is partially driven by the "opportunities (and constraints) met in the field (Boccagni, 2011). My recollections in this article confirm that insider self-identities are validated through interactions, dialogue and discourse with other fieldwork actors.

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