Mathematics teachers' stories and their expressed identities as they teach mathematics

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Abstract:

Learner performance in school mathematics has been a global challenge, prompting interventions designed at enhancing teacher effectiveness, with particular attention to addressing the key factors contributing to unsatisfactory learner performance. Proposals emphasise investigating the factors that motivate effective teaching and learning of mathematics particularly from the perspective of teachers' self-perception regarding their profession and classroom practices. This paper examines the teachers' stories about themselves growing up to become mathematics teachers, and their teaching strategies as they teach mathematics in their primary school classrooms. Data were collected through classroom observations, interviews and field notes, and were analysed thematically. The participants' stories reflected both positives and negatives contributing to teachers' development into mathematics teachers. Their classroom strategies suggested certain identities with differing alignments to how these teachers viewed themselves. The study recommends that initial teacher training and continuing professional development programmes should consider how to support teacher trainees and in-service teachers on strengthening their classroom practices on the basis of their experiences growing up as learners and their self-conceptions of themselves; to take advantage of the positives from their experiences as learners.

Keywords:

Classroom practices, Mathematics, teacher identities, teaching strategies.

Introduction

The importance of teaching mathematics or numeracy at primary school level across the globe, particularly growing economies cannot be over-emphasised. Despite this importance, the teaching and learning of mathematics faces significant challenges. These challenges manifest themselves in many forms, including mathematics classroom teaching practices that fail to support effective learner engagement (Moloi, Morobe and Urwick, 2008; Moru, Qhobela and Maqutu, 2014).

Studies on teacher identity have proposed probing the relationship between teacher identities and teachers' classroom practices (Arpaci & Bardakçi, 2016). This relationship may encompass aspects such as teaching strategies, learner interactions and classroom discourse. Recent studies on teacher identities and mathematics classroom practices have grown substantially, identifying areas requiring further exploration. These areas include, but are not limited to, examining teachers' experiences at different career stages and making pedagogical claims that support providing learners with more diverse mathematics learning opportunities (Graven and Heyd-Metzuyanim, 2019). Other studies have revealed gaps in teacher identity research such as limited research from the Global South countries and fewer studies which focus on the primary schools and early years teacher identities (Rushton, Rawlings-Smith, Steadman & Towers, 2023).

In Lesotho, available studies on teacher identity have primarily focused on the tertiary level and not specifically on mathematics education (see Mathe and Hapazari, 2019; Chere-Masupha, 2019). Mathe and Hapazari's (2019) study aimed to describe the work experiences that influenced academics' professional identities. Among the key findings the authors noted that academics tend to identify more with their teaching roles than their roles in research and community service. Chere-Masupha's (2019) study examined how in-service teachers' personal professional landscapes shaped their adoption and integration of technologies for teaching.

The paper reports on the alignment between the teachers' narratives about becoming mathematics teachers and their teacher identities as expressed through their teaching strategies. The research questions were:

1. How do the stories of the selected teachers help express how they grew to become mathematics teachers?
2. What identities are expressed by these teachers' teaching strategies.
3. How do their stories about becoming effective mathematics teachers align with their identities as expressed by their teaching strategies?

Literature Review and Conceptual Framework

Teacher identities and how they are expressed

The definition of the concept of identity has remained elusive (Arpaci & Bardakçi, 2016; Beijaard, Meijer and Verloop, 2004; Beijaard, Verloop and Vermunt, 2000; Lutovac & Flores, 2021). Operationalisation of the concept has also been challenging (Graven & Heyd-Metzuyanim, 2019). Kouhpaeenejad and Gholaminejad (2014) define identity as how individuals view themselves and how others view them. In the classroom context, Beijaard et al. (2000) and Molfino and Ochoviet (2019) conceptualise teacher identity as teachers' perceptions of themselves concerning their subject matter knowledge, and pedagogical practices. While some studies and literature discuss

teacher identities in the context of teachers' views or perceptions of themselves, this paper adopts a perspective of viewing teacher identities from teachers' expressions through classroom practices and in particular their teaching strategies as they teach mathematics. These experiences and hence the identities are checked against the teachers' life stories based on their experiences growing up as learners and teacher trainees (Essien, 2014) to understand how teacher identities are developed and expressed.

Golzar and Fuller (2020) argue that classroom practice is a reflection of teacher identities while Arslan, Haser and Van Zoest (2021) contend that teacher identities are shaped through participation in various communities categorised into three stages: studentship, teacher education and in-service. At studentship level, learners observe, and model teachers based on their interactions and handling of mathematics content. During teacher education, they formally train to become teachers, acquiring both subject content and pedagogies of teaching mathematics. At the in-service level, teachers continue to learn in practice, sharing knowledge and experiences within their teaching profession communities. Each phase involves participation in communities that shape and model the conception of teaching and being a teacher.

Westaway, Kaiser, and Graven (2020) view identities as the "manner in which teachers express their roles as teachers" (p.1237). On the other hand, Darragh (2016) defines identities as performative, enacted through storytelling, group participation, or specific actions. The data in this report covers narratives about teachers' learning and teaching experiences, as well as their observed classroom activities as they teach mathematics. The narratives reflect personal and contextual factors possibly influencing teachers' actions and perceptions about mathematics and its pedagogy. Therefore, the development of teacher identities is both a personal and contextual issue (Gellert, 2013; Gormally, 2016 and Hsieh, 2010).

Strategies used in teaching mathematics

Effective teaching pedagogies, according to Westbrook, Durrani, Brown, Orr, Pryor, Boddy and Salvi (2013), entail "[t]eaching and learning activities which make some observable change in students, leading to greater engagement and understanding and/or a measurable impact on student learning" (p.9). To achieve these, Polly et al (2013) suggest the selection and use of appropriate teaching pedagogies as crucial in mathematics classrooms. However, Brough and Calder (2012) contend that beyond the selection of teaching pedagogies there should also be "power-sharing" dynamics between the teachers and the learners, fostering a culture of participation. Bennet (2014) highlights the importance of this dynamic, emphasising that teachers should listen, collaborate, and guide learners through questions that promote and extend thinking. This approach requires teachers to be proficient in the mathematics content they teach, which is a challenge some teachers have as noted over time in the literature (Moloi et al., 2008; Spillane, 2000; Venkat & Spaull, 2015). This challenge has a potential to contribute to poor learner performance.

The strategies for the effective teaching of mathematics can be associated with some key principles of teaching. These principles include articulating goals, making connections, differentiating challenges, structuring lessons and promoting fluency and transfer (Sullivan, 2011). These effective classroom strategies, as identified by Matić, Bičvić and Filipov (2020) and Anthony and Walshaw (2009), include:

- Making interdisciplinary connections and using examples to teach mathematics.
- Encouraging learners to share their mathematical ideas while working in pairs and groups, thus providing diverse opportunities for mathematical communication.
- Utilising manipulatives and other tools to actively engage learners in "doing" mathematics.

Appropriate use of these strategies supports the learner-centered approaches to teaching, which promote varied learner participation dynamics (Webb et al, 2019) and the support of productive dialogue, collaboration, and active learning for development of mathematical skills and proficiency.

The paper describes teaching strategies that were evident in classrooms of three teachers of mathematics and explores how their teacher identities which may be understood to be expressed through the teaching strategies could be viewed through the teachers' stories of developing into mathematics teachers.

Conceptual Framework

The conceptual framework used in this study draws first, from Sfard and Prusak's (2005) work, then from classroom practices and teaching strategies as described by authors such as Anthony and Walshaw (2009), Sullivan (2011), Web et al (2019) and Matić et al (2020).

Sfard and Prusak view identity as stories people tell about themselves (first person narratives) and stories other people tell about them, reflecting their personal experiences. These stories are reifying, endorsable, and significant (Sfard and Prusak, 2005). The stories express identities in terms of statements about "being" or "having" and they reflect actual experiences. Gubrium and Holstein (2012) indicated that the shared storytellers' experiences provide a basis for the link between their life stories and their identities. Stories of this study's participants were read to get a sense of what messages they give about who ('being') the participants felt they were, especially developing into mathematics teachers and what they were able to offer or provide ('having') to the teaching and learning of mathematics. These stories would suggest the participants' identities. However, these suggestions would have to be elaborated in line with the participants' teaching practices in terms of the strategies used to teach mathematics which would in this case be experiential expressions of their teacher identities. Hence, the need to also consider the three participants' teaching strategies during the observed mathematics lessons.

According to Matić et al (2020) and Anthony & Walshaw (2009) some key classroom practices that help operationalize conceptualising the identities include: utilizing learner participation to build on prior knowledge, implementing tasks that promote reasoning and problem solving, using mathematical representations and examples, building caring mathematics classroom communities and using language appropriately for teaching and learning. These participants' teaching strategies were checked against these practices to establish what teacher identities were expressed by their teaching strategies.

These practices also relate to some of the components of Adler and Ronda's (2015) Mathematics Discourse in Instruction (MDI) framework. These components of the MDI help explain how meaningful learner engagement becomes through consideration of resource utilisation, collaboration, and cooperative learning. The MDI framework describes four components interacting in a mathematics lesson, being the *object of learning, exemplification* and *explanatory talk* and *learner participation.*

To make sense of the data on teaching strategies used by the three participants, two aspects of the MDI were used. These were explanatory talk and learners' participation. Explanatory talk legitimates what is considered important mathematics to learn while learner participation involves opportunities for engagement through responses and discussion during a mathematics lesson.

Methodology

This study was conducted within the interpretivist paradigm, where the world is understood through individuals personal experience, incorporating an element of subjectivity in interpretation (Al-Riyami, 2015; Cohen, Manion and Morrison, 2011). The study adopted an approach where knowledge is personally and socially constructed (Al-Riyami, 2015; Kamal, 2019), as participants discussed and made sense of their experiences in specific settings and contexts. Knowledge is also constructed through making sense of classroom activities. The data collection and analysis methods indicate that the study is qualitative. Quality issues, such as ensuring data validity through triangulation during data collection and analysis, were observed.

Participants and data collection

The study reports on cases of three primary school teachers from different schools, who were observed teaching mathematics in their Grade 6 classrooms. These teachers were also interviewed to share their views and practices related to teaching primary school mathematics. The interviews averaged around 1 hour each. Pre-observation interview questions focused on aspects which included: (1) participants' experiences growing up as learners at different levels of school and at tertiary level and experiences on training to become teachers and on starting the teaching profession, and (2) participants definitions of good or effective teaching of mathematics and contributing factors. Post observation interviews focused on the basis for decisions made in planning and teaching observed in the lessons. The three teachers had varying levels of experience, from 8 years to over 20 years, and their ages ranged from early thirties to early fifties at the time of data collection. The teachers ordered by age and experience from the youngest to the oldest and least to most experienced were Tatolo, Lefa and Katleho. Classroom observations consisted of three visits per school, with interviews conducted before and after each classroom observation. Interview data were collected through audio-recordings, while classroom observation data were collected through video recordings and field notes. Fields notes were recorded in writing with incidents noted chronologically. Field notes helped corroborate data from video-recordings.

Data analysis

All data were transcribed into Word documents, and audio and video recordings were transcribed. The transcripts were first coded based on concepts from the conceptual framework (Creswell, 2013, p. 198). Different colours were used to highlight sections of text related to key constructs associated with the research questions. These sections were labelled in square brackets, with concepts such as *learning environment* and *learner participation* representing mathematics classroom practices. Learning environments included aspects of classroom practice like the use of learning materials, instructional approaches, lesson structure and teaching methods. Texts where teachers shared their experiences and views were labelled as *personal experiences* and *professional experiences.* Personal experiences encompassed life stories and views while professional experiences included career stories and history, learning and development, and professional communities. The analysis process yielded patterns that were organized into categories and then themes (Cohen et al., 2011)

aligning with key constructs from the conceptual framework and the research questions (Catleberry and Nolen, 2018; and Lockmiller, 2021). The analysis explored patterns within the data for each participant to establish patterns of behaviour and practice patterns. Although the data analysis primarily followed an inductive (a priori) approach, a deductive (a posteriori) approach was also used (Creswell, 2007). This allowed the back-and-forth movement between data and themes from research questions and conceptual framework (Creswell, 2014). The inductive approach established themes from data, while the deductive approach checked data against the established themes. The themes drawn from data analysis centred on components of professional identities and features of the mathematical classroom practices and their relationships.

The analysis also explored patterns across data for the three participants to identify similarities and differences, and unique instances in their views and practices. Therefore, the data analysis followed a framework-driven thematic analysis (Lutovac & Kaasila, 2019). The findings reported are not generalizable, as they are specific to the case study approach used.

Findings

What are the stories of the selected teachers about becoming mathematics teachers?

One of the objectives of this paper is to describe how the three participants discovered their teaching careers and how these experiences may have shaped their identities, based on the narratives they provided about themselves.

Tatolo had personal experiences that influenced his career choice. He indicated that, as a Form D (fourth year of secondary education) learner, he had the opportunity to help other learners. This experience made him realize his aptitude for mathematics.

> *At first, I never thought I would be a teacher, but gradually when I was a student in Form D, I used to help my classmates. Then I discovered my ability in mathematics.*

After completing Form E he was unable to pursue his preferred careers, such as accounting, because he did not meet the entry requirements for the institution of his choice. Instead, he was admitted to a teacher training institution to train for a primary teacher qualification. Upon completion of his studies, Tatolo began to view teaching as a "calling" that he entered into unexpectedly.

Tatolo further likened teaching to "parenting", saying:

... a teacher is a parent; a parent is everything to his or her child, is a provider, is everything …; when you need help, when you are happy, anytime, you express your happiness, your emotions to the teacher.

Thus, Tatolo highlighted the importance of the time the learners spend at school, emphasising the significant role teachers play in caring for and supporting them, akin to parental roles (Anthony and Walshaw, 2009).

Katleho, on the other hand, had challenging start as a mathematics learner at secondary school level. She said: *At secondary, I obtained a C, but at high school, I did not perform well. I did not pass it at all .... I liked maths and I was so sad the time I realized that I failed maths at high school.*

I loved it and when I was at [1]NTTC, that was the time I was able to show that I can do something in maths. That is the reason why I liked to teach maths.

The evidence here points to a contrast in her experience learning mathematics at the tertiary level compared to her senior secondary (high) school experiences. As she began teaching in a local school, she gained confidence and hence developed a firmer sense of herself as a teacher of mathematics.

I started teaching at [name withheld], closer to home, …. That is where I enjoyed teaching, and I was teaching maths. This is the place where I practiced maths, and I found that, at first, I was struggling, but because my father was on my side, I would always go to him, 'How do I tackle this, what is it that is needed for me to make it a better lesson?'….

Her father was among the professionals who supported and guided her to grow into a teacher of mathematics.

Katleho's story suggests that regardless of one's starting point, whether difficult or humble, self-belief and support from people in one's social circles can help in developing an identity as a teacher and ultimately lead a fulfilling career. Her story also highlights the significant roles played by her father and college lecturers as role models in shaping her self-perception despite her initially negative and uncertain beginning.

Lefa, the third participant, indicated that his encouragement and motivation to become a teacher came not only from his father who was a teacher himself but also from his primary school teacher: *My favorite teacher was one gentleman who started teaching me while I was in Grade 6 or Standard 6 by then. He was very inspiring, and he knew how to explain some of the topics or some of the concepts, which I found tricky. … I did not know how to divide; he was able to help me by using tangible materials.*

The ability of Lefa's Grade 6 (previously Standard 6) teacher to explain concepts clearly using tangible materials seemed to be one of the factors that inspired Lefa to become a teacher. His experience with a mathematics teacher further clarified his view of a model teacher, particularly regarding the teacher's role in classroom activities.

A teacher is also a facilitator, because today, if it is believed that learners should do their … learning and the teacher should only create the learning environment, providing a conducive environment, preparing the materials, … and then allowing learners to do their … learning with his guidance.

Lefa's experience and perspective of a mathematics teacher is an illustration of a possible identity of this teacher; associated with approaches and strategies to teach mathematics. Lefa further identified a teacher as a role model when he said:

A teacher is a role model in his or … her class because the way a teacher does things like walking, dressing, talking, pronunciation, [and] even the attitude influences the learning of the learners in the class.

[1] NTTC stands for National Teacher Training College; now the Lesotho College of Education (LCE)

This way of identifying a teacher indicates multiple perspectives to who a teacher is.

The three participants were influenced by various factors in becoming teachers, including parental and teacher influence and the inability to pursue their preferred careers. They expressed attributes and roles associated with being effective teachers such as demonstrating care for learners, engaging in teaching, and learning practices in the classroom, and conveying their personality through their appearance and communication. These illustrate multiple ways in which a teacher identity can be expressed. The stories of these participants suggested the following: Katleho as a resilient and compassionate teacher, growing in motivation and confidence; Tatolo as a caring and motivated teacher; and Lefa as a resourceful mathematics teacher, depicting a role model in terms of facilitation of classroom activity and how the teacher should express himself/herself.

Tatolo indicated that one of the attributes of a professional mathematics teacher is the ability to teach following the integrated approach and helping learners to develop problem-solving skills to apply outside the classroom. He said:

However, if we are able to let learners to [pause] to integrate all these topics or all these concepts to solve the problems in their lives and if we are able to achieve that, I think we are professionals.

Tatolo further disclosed that he was the mathematics mentor of a mathematics club at his school and that his responsibilities included training learners on problem-solving skills.

Mathematics teaching strategies used by the participants

Lesson facilitation and use of resources

Tatolo taught in a more traditional way. He would explain a concept, provide examples, and then assign a set of questions for his learners to answer in their exercise books and submit for marking while still in class. Tatolo commented thus:

I normally prefer to demonstrate, [and] then mix the sub-groups, …. They stay behind; they do not do anything because it is [a] large [group] and you may find that when marking, if they are given, for example, four numbers to work out, some pupils do only two sums instead of all numbers.

This suggests that the teaching strategy employed may have been influenced by the number of learners being taught. There were 54 learners in Grade 6A and 56 learners in Grade 6C. Although Tatolo expressed aspirations to teach learners to develop problem-solving skills, his approach did not appear as problem solving (PS) since PS entails active involvement in interpreting information, planning, systematic work, result verification and experimenting with alternative solution strategies (Intaros et al, 2014).

In contrast to Tatolo's approach, Katleho facilitated learning in ways that encouraged active engagement of learners in their learning process. In addition to assigning learners exercises to do, she also encouraged individual learners to share their ideas with others during the lessons, thus demonstrating an awareness that learning is socially constructed (Bennett, 2014). For example, one learner in one of Katleho's lessons demonstrated how to perform calculations involving multiples of 9 using her fingers. The learner did this as she shared her approach with the class in doing the

calculation. Although Katleho primarily utilised teacher-led activities, she demonstrated flexibility by also actively involving learners in some mathematical activities. Seemingly, Katleho learnt some of the tips of teaching for understanding from her father, who was a teacher. She said:

So, from that time, I learned from him (Katleho's father) that I should not let the kids be going to the formulas; I have to create the environment which will make these learners get the formula themselves by giving them practical work to do.

According to Katleho, her father advised her that instead of often giving explanations and formulas she should allow learners to give explanations or even try to find formulae by themselves.

Similarly, Lefa employed a variety of resources in his lessons. His learners used materials such as mathematical sets of instruments. In one lesson, learners had to draw pentagons for use in the calculation of sums of exterior angles of polygons (pentagons in that lesson). Additionally, learners also used beakers containing water and cuboidal materials to explore the relationship between units of volume and units of capacity. Lefa also used the chalkboard as a resource to reinforce communication of tasks and instructions to learners at a particular time, as indicated in Excerpt 1 below.

Lefa wrote the following on the chalkboard, to reinforce communication:

Division of fractions:

Dividing a proper fraction by a mixed number:

- *Change the mixed number into an improper fraction*
- *Change the sign*
- *Turn the second fraction up-side-down*
- *Multiply*
    - *Simplify, if necessary*.

***Excerpt 1**: Part of chalkboard writing to support communication*

Lefa's strategy resonates with his view that language influences the teaching and learning of mathematics. He accommodated switching between English Language and the home language (Sesotho) in his class. His argument, for code-switching, was:

Mathematics lies mainly in the concept(s), and it has to be explained in a language which one understands, not in a foreign language.

Lefa's argument acknowledges that language and communication play a crucial role in enabling learners to access mathematics. As part of his effort to support learners, he would follow up with them in their groups to assess their progress and to assist them. At the conclusion of each lesson or end of each episode of teaching, he would move to the front of the class to summarize and conclude.

Explanatory talk and what counts as mathematics.

Tatolo's use of mathematical language was at times more colloquial (ordinary, everyday use) than formal. The excerpt below illustrates this:

If you look at your compass (pause), you have […] the black part of your compass, where you hold, you turn here. (pause) You do not hold your compass here (Teacher holding the middle parts of the arms of the compass), but there is a black part that you have to hold ….

Tatolo described the procedure for handling a compass when constructing parallel lines. In the excerpt above, there are phrases, "black part of the compass", "where you hold, you turn here" and "do not hold your compass here". The phrase "black part" referred to the hinge of the compass, connecting the two arms; and the word "here" indicated the part or position of the compass in the second instance while, in the third instance, the word "here" referred to the middle part of the arms of the compass. Tatolo's colloquial use of language failed at such instances to help learners develop formal language use. However, it provided opportunities for more flexible communication with the learners; thus avoiding having language as a barrier in learners' efforts to learn.

As part of classroom discourse, Tatolo primarily posed questions in his first and second lessons that elicited 'yes' or 'no' responses from the learners aimed at confirming their understanding. Commonly used phrases such as "*rea utloana akere*?" and "*akere lea bona*?" were meant to inquire from learners if they understood what the teacher was explaining. In response to these phrases or questions, the learners uttered single words such as "yes" or one-word responses where the teacher's questions required specific answers, not just affirmation of their understanding. He infrequently asked the "how" and "why" questions, that required explanations.

Tatolo dominated the conversation more than his learners did. For instance, while explaining what parallel lines are, he drew learners' attention to examples of materials available in the classroom, that have straight edges emphasising their parallel nature and intending to use them to explain the procedure for constructing parallel lines. Among his explanations, he guided learners to understand the disparity in measurements of items drawn on paper compared to those drawn on the chalkboard, using an example where 2cm on paper represented 20cm on the chalkboard. The following excerpt illustrates these points:

> Teacher: I said you open your compass to two centimetres so now you do as I do. …This is twenty centimetres. On your own compass, you are going to make how many centimetres?
> Learners (in chorus): Two.

In his third lesson, focused on calculating the sum of angles in a triangle, Tatolo began to incorporate questions that required learners to formulate phrases or sentences. However, learners' participation remained minimal with little discussion occurring. In one episode, Tatolo asked learners to explain how they obtain a missing angle in a triangle with two angles, 60° and 40°. One learner articulated the procedure as: "*add 60 and 40, get 100, subtract from 180 to get 80*".

Tatolo's instructional approach primarily elicited short answer responses. Learner participation predominantly involved individual work on class assignments and seldom working in pairs or small groups. While the teacher demonstrated examples, learners were expected to observe and occasionally confirm their comprehension of the presented material. Consequently, Tatolo appeared

to emphasise individualised learning among students, potentially hindering the exchange of ideas and collaborative learning work among the learners, which compromises sharing of ideas and learning from one another. Thus, teaching tended to be more teacher centred.

Language usage in Katleho's classroom appeared to serve a dual purpose: communication of mathematical concepts and cultivation of mathematical vocabulary. Both colloquial (everyday use) and formal language were employed within and across lesson episodes. In one episode, following collaborative work with learners to generate a sequence of triangular numbers, Katleho transitioned to another sequence involving the differences between consecutive triangular numbers. She initially reviewed the use of terminology associated with "difference" by posing the following question:

Aha! We want to know the difference. When we talk of the difference, what comes into our minds? What is it we can expect when we are talking about the difference? When we talk of the term 'difference', … Where does it come from?

Katleho then guided her learners in a brainstorming activity on words used in the context of subtraction. The excerpt below shows the teacher's summary of the brainstorming session:

You will come across the words minus, borrow from, difference, subtract, subtrahend, take away. Those are the terms that you always meet when you are dealing with subtraction, ok? So, I need the difference between three and one. 'Three', take away 'one'.

Although words or phrases such as "borrow from" and "take away" appear to be colloquial (Adler & Ronda, 2015), they carry mathematical meaning for subtraction in this context. Words or phrases, such as "subtract" and "difference", are formal mathematical terms that carry meaning for subtraction.

While there were instances of use of ambiguous terms used in Lefa's lessons, there were also instances of appropriate terminology usage. In one lesson he employed pronouns such as in 'this line', referring to lines drawn to extend the sides of a polygon to form exterior angles. Nonetheless, he still ensured that learners had the opportunity to visualise those lines. In another lesson there were occurrences of the appropriate use of mathematical terms and phrases. For example, he said:

If capacity is the total amount of substance the container can hold, what about the volume? … Volume is the actual amount that is contained.

He also attempted to illustrate how capacity could be perceived, with reference to the markings on the container, indicating the maximum level a liquid substance reaches when the container is full. He said:

And when we mean the capacity, we mean where there is a line 'mona' [Here]? There is a line here that is where the capacity is, 'akere?' [isn't it?]?

Even though there were incidents of colloquial use of words in some episodes, there were still instances where there were attempts to use mathematical language appropriately.

Across all lessons observed for Lefa, definitions of terms stood out as one of the important aspects of teaching and learning of mathematics. The following was part of the exchange between the teacher and one learner:

Teacher: What is the polygon? Do we understand this exterior and polygon? What is exterior? Who can find the meanings of these words? ... Where is your dictionary? …..
Learner (reading from the dictionary): A polygon is a noun, a figure with many sides such as hexagon or octagon.

As illustrated from the excerpt, learners could read the meanings from the dictionary to provide definition of the term polygon as part of their learning.

Learners' seating arrangements and participation in classroom activity.

The seating arrangement in the three teachers' classrooms differed and seemed to support teaching strategies each teacher wanted to use.

Learners in Tatolo's lessons sat in rows facing the chalkboard. More often they listened to the teacher's explanations and watched him as he worked on some problems on the chalkboard. Learners answered questions from the teacher verbally and through writing in their exercise books when instructed so. The learners worked either individually or in pairs, but rarely in groups of three or more. Their seating arrangement, with all learners facing the front of the class, was testimony to the inflexibility of the classroom setup and hence how learners participated in class. In Katleho's lessons, learners sat in what appeared to be a permanent group seating arrangement with each group consisting of mixed-ability learners seated facing each other in two rows per group. This seating arrangement contributed to how Katleho's learners flexibly participated in classroom activities. Learners with lower abilities worked together with at least one more able group member, who was responsible for assisting those who were less able. The other role of the more able learner, as Katleho indicated in the interviews, was to report to the teacher, at a later stage, any cases that needed extra attention by the teacher, based on their observations. Katleho described group arrangements and their benefits in the following manner:

I have arranged them in such a way that in each and every group, learners who experience difficulty in learning are mixed with other learners. So, [by] the time I move around, I want to make sure that those whom to me are my targets, I can identify maybe the problems that they encounter, and the group will have to see to it that they address that.

According to Katleho, mixed-ability grouping helped to achieve peer support, for learning purposes. The mixed-ability grouping appeared to be a normal practice during her lessons.

Beyond expressing resilience growing into becoming a mathematics teacher, as deduced earlier, Katleho further displayed an element of compassion and readiness to empower her learners, as seen from how she constituted groups in her class and the roles she gave to the learners which allowed for sharing of authority and responsibility to support and learn from one another.

Learners in Lefa's lessons changed their seating arrangement based on the activity. When using the chalkboard and listening to the teacher's explanations, they faced the front (chalkboard side); for group tasks, they formed groups of about four or five members at their tables. Lefa was clear on how to engage learners in learning activities. He followed a structured process: explaining the task, writing instructions on the chalkboard (see Exerpt 1 above), following up with learners in their groups, and he would finally go to the front of the class to summarize what has been discussed in groups.

Lefa explained his use of the chalkboard in the following way:

[T]hat is very useful, because, actually, what is done on the chalkboard can be seen by the whole class. Even those learners who could not understand the teacher might understand better when another learner, a peer, explains or works on the chalkboard and it also gives them exposure and confidence.

Allowing learners to show their workings on the chalkboard enables them to express their thinking to others, providing an opportunity for peer learning. This approach acknowledges that learning mathematics is a social endeavor (Bennett, 2014), where group activity participation and collaboration are important, hence the need for consideration of a seating arrangement that accommodates flexible learner interactions.

Lefa's teaching strategies ensured that he gave learners tasks verbally and in written form on the chalkboard and ensuring that learners got the opportunity to work in their groups using the availed materials with support from the teacher. Lefa shared his perception that a good teacher of mathematics is prepared to learn not only the subject matter but also about the learners to support them both academically and emotionally. Lefa's story demonstrates a resourceful teacher, with attributes that include giving learners the time to work on the tasks, understanding learners' problems and how they do things, and creating a positive attitude among learners in the classroom. This is over and above the professional teacher being a role model and a motivator, as observed from Lefa's story growing up to become a teacher.

Katleho engaged her learners in ways that seemed to support the learner-centered approach, where learners would work in groups on mathematics tasks or one of the learners would share knowledge with others on some solution strategy. Her strategies provided opportunities for faster learners to assist those who struggled. Given her background of having struggled with unsatisfactory performance in mathematics, her approach and teaching strategies as a qualified teacher reflected a teacher who had risen above negative experiences, and turned challenges into opportunities for teaching and learning in her classroom. The story of the support she received from her father and her teachers and lecturers seem to suggest that she built resilience and grew to become an impactful teacher to her learners.

Discussion

Teachers develop identities partly from their experiences as learners (Lutovac, 2020) at the school level and at teacher training. Their experiences as qualified and practicing teachers further shape their identities, with a notable shift in identities from one phase of their career to another (Heyd-Metzuyanim, 2019; Sardabi et al., 2018). Furthermore, the stories of the participants reported here suggest that development of their teacher identities could also be attributed to their experiences as far back as when they were learners at secondary school level, thus conforming to what literature says.

Katleho had negative experiences as a learner, which included the impression she got from one of her teachers that she was a failure and that she would never make it in mathematics. Her experience left her at the edge of giving up on the hope of ever being successful in mathematics in the future. However, her experience studying at a college of teacher training helped rescue her hopes and she began to realize her potential to do well and enjoy learning and later teaching mathematics. The turnaround (Nanna et al., 2021) in her experience possibly helped her to develop an identity of a

compassionate, resilient and an empowering primary school teacher of mathematics, who provides the needed support to her learners including those who struggled in learning mathematics. This turnaround came partly from her father's influence; and how her college lecturers taught and supported her in training to become a primary school teacher of mathematics. Her father and her college lecturers were her role models, through their exemplary teaching strategies among a number of things. Part of her experiences possibly adding to her turnaround was her decision to join a community of practitioners in a district different from the district where she held her substantive teaching post. This helped her to position herself within wider societal discourses (Darragh, 2016), which included, in that case, discourses on primary school mathematics planning and teaching. Her experiences, including failure in mathematics at senior secondary school, became a learning point, so that she is considerate of how she in turn treats and supports her learners in relation to classroom learning experiences (Lutovac, 2020).

In contrast Tatolo and Lefa's experiences getting into the teaching profession did not appear as challenging as those of Katleho. Tatolo had to opt for teaching upon failure to secure a career of his choice; however, he still made the best out of the teaching career, as he reported enjoying it and seeing it as a calling and a career destination against his original plan, which he then began to enjoy. Part of Tatolo's experience as a new teacher was experiencing need to support learners in what he perceived as more of parental role, as learners spend more time with teachers, away from their families.

One of Lefa's teachers at primary school level influenced his choice of a teaching career. Lefa's teaching approach showed signs of efforts to teach effectively. Lefa further indicated his perception of a teacher as that of a role model, as a result of the exemplary teaching strategies and personal expressions by Lefa's former primary school teacher which set a good example.

The three participants had their own role models, including parents and teachers who influenced their decisions to pursue teaching and their professional growth. Cameron and Grant (2017) emphasised the importance of the role of mentoring in supporting teacher professional development in the new teacher. They highlighted this in their study, where they reported on the role of the mentor in either emergence or suppression of teacher identities of beginning teachers.

The three participants' views and experiences were checked against what they were observed doing as they taught mathematics in their classrooms. There were cases of alignment and others of misalignment between the participants' perceptions and experiences of themselves growing to become mathematics teachers and their teaching strategies, suggesting some forms of relations.

Tatolo's story shows incongruity between his teaching strategies and his perception of himself, which includes being an effective teacher of mathematics. While he perceived that good teaching should involve active involvement of learners in ways that support learner-centered approaches, he mostly taught through exposition followed by practice exercises, with little or no time to give learners an opportunity to engage in the exchange of ideas and explaining their understanding of concepts taught. Teaching large classes seemed to be one of the reasons why he mostly used a whole-class approach, teaching through exposition and learners working individually on problems in their exercise books. So who Tatolo was in the classroom seemed to be circumstantial and influenced by his large class.

Some classroom teaching strategies in the three participants' lessons seemed to align with the

prescriptions made by the Curriculum and Assessment Policy (CAP) framework of Lesotho (Lesotho Ministry of Education and Training [MOET], 2009) in suggesting the use of innovative ways to teach mathematics in the primary schools. On the other hand, other strategies seemed to stick to the traditional approach to teaching mathematics (Molefe & Brodie, 2010). The study further established reports on the deviations of some teaching strategies from the intended practices, as spelt out in participants' views and stories of their experiences.

The paper highlights some key attributes concerning the alignment of teachers' experiences as expressed in their stories about their development into mathematics teachers and their expressed identities as observed from their mathematics classroom teaching strategies. These include the need for teachers to know their learners to be able to assist them to develop positive attitudes, flexible use of whole-class and group work approaches in discussions of given tasks, and use of local language(s) and code-switching for clarity in classroom communications. These confirm some of the conditions required for effective learning of mathematics (Brough & Calder, 2012; Westbrooke et al., 2013). Pedagogy in this case recognizes a shift towards strategies for learners' development of creativity, independence, and survival skills. Learners begin to assume greater responsibility in efforts to learn by themselves (MOET, 2009). The promotion of learner-centered approaches is a call by Lesotho Ministry of Education and Training (MOET, 2009) to ensure learners are equipped with knowledge and skills to become lifelong learners and develop independence and responsibility for their learning. The opportunities learners had in explaining their knowledge to others in some of the classrooms observed helped learners to refine their thinking and understanding of the concepts; that might have resulted from the intentions of the teachers (participants) in this study to teach for understanding.

Conclusion and Recommendations

The paper reports on how the three participating teachers attained their careers and developed identities as they became teachers of mathematics at the primary school level. The paper indicates that teacher identities developed and expressed by these participants relate to roles that include parental role and facilitation of classroom activities. The stories and classroom strategies observed for the three teachers suggested the following identities: a compassionate and resilient mathematics teacher, growing in motivation and confidence (Katleho), a caring, traditional mathematics teacher with motivation to do well, however greatly influenced by classroom environment (Tatolo), and a role model, and a resourceful mathematics teacher (Lefa).

Teaching strategies used by these participants were in some areas aligned to teacher perceptions and experiences expressed through these participants' stories. However, there were other areas in which there were no alignments. The paper indicates that the concept of teacher identities does not only manifest itself in the early stages of the teaching career; it continues to emerge as influenced by practice even when teachers gain more years of experience in the field. Therefore, the concept of teacher identity may need to be viewed as a lifetime teacher professional attribute. The study further established certain identities as observed from teaching strategies used by the three teachers. Those identities were evidenced by how the three teachers expressed themselves and handled teaching and learning activities in their classrooms.

The paper suggests that the curriculum on teacher training should incorporate teachers' conceptions and perceptions of themselves growing up as learners and as teacher trainees and how these experiences may relate to their teaching strategies. This recommendation also applies to the

continuing professional development activities, that these activities should be designed to support teachers to be cognizant of possibilities of the interface between who they believe and claim they are as teachers of mathematics and how they may or may not express these in their strategies as they teach mathematics.

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