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Learners' Mathematical Social Identities and Mathematics Learning

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Abstract

I explore and describe learners' mathematical social identities and their implications for the learners' achievements in mathematics learning. A qualitative research method was conducted with a purposeful sample of one school in Gauteng Province, South Africa; a total of ten mathematics learners and three mathematics teachers were interviewed, and the mathematics learners' parents completed questionnaires. The data acquired were presented and critically discussed. It became evident that mathematics learners and others viewed learners' attitudes and beliefs toward mathematics learning as natural. They are however socially constructed. Race and gender, as well as their capabilities, are not significant in the learners' achievements in mathematics learning. The assumptions have been that most theorists' writings on learners' mathematical social identities and their achievements in mathematics learning are very ambiguous and confusing. This worsens the problem. Most theorists have used terminologies like mindsets, beliefs, attitudes, capability, interest, like, dislike, enjoyment, daunting and phobia. These terms make the learners, as well as others, believe that there might be something unique generating the attributes; it is what they are born with, as well as internal psychological phenomena that the mathematics learners either have or do not have. I offer conclusions and recommendations supported by the data discussed for effective mathematics learning and achievement in Gauteng Province, South Africa and beyond.

Keywords

Mathematics, LMSIDs, ML, Race, Gender, Mindsets, Beliefs, Attitudes

1. Introduction

South Africa's educational system has passed through three main reforms of the curricula to rectify past biases and inequalities. The educational reforms have

been historical and political to an enormous extent. The necessity to transform South Africa's educational system was essential. South Africa desperately needed an educational system that shaped and enhanced democracy, human dignity, equality, and social justice. The curricula used during the apartheid era were authoritarian and heavy in content, as well as used rote learning and memorization (Barnes, 2009; Department of Education, 2002; Jansen, 1999; Weber, 2008). Even with curricula reforms in South Africa, mathematics learners' performance in mathematics and its learning has been consistently low in comparison with other school subjects. Mathematics learners' performances at the schools in the rural provinces such as KwaZulu-Natal and Eastern Cape are consistently lower compared to urban schools in Gauteng and Western Cape. There are issues and challenges responsible for the consistent disparities. High school mathematics does not adequately provide either equal education opportunities or the proper educational environment for the mathematics learners (Department of Basic Education, 2014; Department of Education, 2002). This influences the development of the learners' mathematical social identities (LMSIDs) and their achievements in mathematics. There are several aspects of LMSIDs which have an impact on their achievements in mathematics. In this paper, I explored race and gender—two crucial aspects of LMSIDs.

Many learners fear and hate mathematics because they perceive it as being complex, abstract, daunting and that it is only for the proficient (Zakaria, Chin, & Daud, 2010). Boaler (2016) highlights that most learners believe that mathematics learners are either high achievers or not. They believe that learners need a certain "mathematical" brain for them to be high achievers. Boaler (2016) further highlights a situation where learners tell their peers that they cannot learn mathematics, that mathematics is hard and its learning is a daunting task. It is the worst of all subjects. These learners feel comfortable not doing well as they feel that mathematics is impossibly difficult. These negative feelings evince a lack of interest, confidence, competence, perseverance and a very low retention rate. All these factors lead to underachievement in mathematics examinations (Ajagun, 2006; Ali, Bhagawati, & Sarmah, 2014; Bishop, 2012; Kurumeh, Onah, & Mohammed, 2012). Several factors have been posited as being responsible for the learners' low performances in mathematics. These are a poor background in mathematics, a perception that mathematics is difficult and that only some can do it, psychological fears or anxiety about mathematics, and a lack of interest. Some researchers argue that teachers' mathematical content and pedagogical knowledge could be responsible for the learners' low achievements in the subject (Adolphus, 2011; Bishop, 2012; Grootenboer & Zevenbergen, 2008). Grootenboer and Zevenbergen (2008) argue that it was crucial to recognize that structural social issues such as race and gender also prevented access to the achievement and enjoyment of mathematics. Learners' participation in mathematics classes at higher levels continued to reduce. Many mathematics learners held unhealthy and unhelpful views of learning mathematics. More so, many mathematics

learners who are successful in mathematics drop the subject immediately when they can (Bishop, 2012; Grootenboer & Zevenbergen, 2008; Heyd-Metzuyanim, 2013). This might be a result of the high stakes or high status of the subject, and the learners' mindsets toward mathematics and its learning. This could have a strong impact on their mathematical social identities. This, in turn, has an impact on mathematics learning.

1.1. Mindsets

Mindsets are beliefs that individual people hold concerning the nature of intelligent behaviour (Dweck, 2000, 2013a, 2013b, 2013c). Dweck posits two categories of individuals' beliefs of themselves as learners, such as a fixed mindset, and a growth mindset. When people attribute intelligence to fixed traits i.e., they hold a fixed notion of intelligence, they have a fixed mindset (Dweck, 2000). People with fixed mindsets might be scared of failure because this suggests that they are not intelligent. On the other hand, people with growth mindsets believe that "intelligence is not a fixed trait they simply possess, but something that they can cultivate through learning" (Dweck, 2000: p. 3). People with a growth mindset believe that effort and training can change a person's intelligence through learning and practice. They hold a growth notion of intelligence and attribute success to learning. Such people are not scared of failure because it suggests that there is a need to apply effort and time to practice and be conversant with new learning opportunities. Mathematics learners' mindsets are the beliefs learners have of themselves as learners, and these influence their mathematics learning (ML) and their mathematical social identities (Dweck, 2000, 2013c; Vermeer, 2012a, 2012b). A more critical look at mindsets and other depositions (beliefs, attitudes, interests, enjoyment, confidence, competence, perseverance and motivation) reveals their intersection with LMSIDs. This has an impact and influence on mathematics learners' achievements in the subject (Bibby, Moore, Clark, & Haddon, 2007; Heyd-Metzuyanim, 2013). Grootenboer and Zevenbergen (2008) argue that there had been little progress in the direction of improving and tackling issues such as learners' psychological fear or anxiety of mathematics, their lack of interest, confidence, competence, perseverance and low retention rates. These are the factors that prevent learners of mathematics from achieving and enjoying mathematics. The exploration of LMSIDs and their implications on the learners' achievements are the focus of this paper to develop and improve mathematics learning in high schools. In this paper, I have explored the two aspects (race and gender) of LMSIDs that most influence their ML.

1.2. Research Questions

The exploration of LMSIDs and their implications are framed by the following research questions in this paper:

- ✓ What is the role that mindsets play in LMSIDs?
- ✓ What are the relationships between learners' race and gender and their ML

and achievements?

In this paper, I explore literature regarding the concepts of identity, race and gender concerning ML, as well as the influence of learners' attitudes and beliefs on their achievements in mathematics. I work with Dweck's mindsets theory—using mindsets as a key component of LMSIDs. Thereafter, I highlight the methodology used in the exploration of LMSIDs; this section consists of the research design, data sources and data analysis. The result and discussion are presented under two broad themes in the proceeding sections, respectively. Finally, the conclusions and recommendations are given.

2. Conceptual Framework

This paper focuses primarily on the concepts of LMSIDs and ML. LMSIDs are the way mathematics learners define themselves and how others define the learners by their (learners) group memberships in the context of mathematics learning. The paper further focuses on how the LMSIDs are influenced by their social interactions, mathematics learners' personal narratives, and narratives of mathematics teachers, mathematics learners' peers, the learners' parents, and communities (Anderson, 2007; Friese, 2000; Vinney, 2018; Wenger, 1998). With these in mind, I reviewed studies in areas such as race and gender concerning ML, and the influence of mathematics learners' attitudes and beliefs on their achievements in mathematics and its learning.

2.1. Identity

Gee (2000) argues that being recognized as a certain "kind of person" in a given context is termed an "identity"; also, Gee connected this notion to a person's own narrative—i.e., the stories a person talks about him/herself. There are various kinds of identities: social identity and others. Social identity is an over-arching distinct identity among these various kinds. One's social positions, for example, race, gender, political, religious, ideological and group membership are usually called social identity. Social identity refers to the social roles of a person where the identity of the person is similar to others, such as having a similar social class or socio-economic status, practising a similar belief, speaking a common language, or living in a common area (Gale, 2008). McLeod (2008) adds that social identity is a learner's sense of who he/she is, based on group membership. It is essential to state here that it is the mindset of a person that influences and shapes his/her identity. Drawing on Gale's assertions on identities, some LMSIDs entail components: mindsets, beliefs, attitudes, interests, confidence and competence which uniquely differentiate individual mathematics learners. LMSIDs can be based on self-perception using reflection and can also be institutional or based on one's affiliation with a group (Gee, 2000). For Bishop (2012), LMSIDs can "reference fixed characteristics—race, gender and socio-economic status (SES) or arise based on social relationships; they can also look toward the past, present, or future" (pp. 37-38). Fixed characteristics are those characteristics that do not

change. It is worthwhile to note that more than one of the characteristics could coexist in a single endorsed identity (Bishop, 2012). However, I would rather posit that the characteristics asserted by Bishop are not fixed because they could also be socially constructed—therefore, they are not so fixed after all. If they had been fixed, then they could not be changed.

For this paper, as well as arising from a critical understanding of all the above definitions, a learner's mathematical social identity (LMSID) is conceptualized as the knowledge and understanding that the learner and others build up about himself/herself as a learner by his/her group membership through his/her prior, current and anticipated experiences in the context of learning the subject. Thus, the way the learner, and how other people view him/herself (learner) in ML will primarily be the function of the learner's mindsets, beliefs, attitudes, and social structures: race, gender and class—with which the mathematics learner engages (Boaler & Greeno, 2000; Heyd-Metzuyanim, 2013).

2.2. Race and Gender Concerning ML

There are multiple LMSIDs that encompass mathematics learners' lives, and which influence their learning. These include race and gender. Racialized and gendered learners' mathematical identities (LMIDs) are socially constructed in the educational system through discourses, dialogue, engagement and negotiation (Robinson, 1999). Parks and Schmeichel (2012) argue that a concern with learners' mathematical social "identity (or in some theoretical traditions, subjectivity) highlights the understanding that cultural markers such as race, gender and class are relevant in making sense of human activities. The effects of 'race thinking and race acting,'" as well as gender issues in ML are necessary objects of study (p. 239).

2.2.1. Race

Parks and Schmeichel (2012) assert that socio-political projects support the focus on racism—the ideology and practice of marginalization of some groups of persons as a result of their race. Parks and Schmeichel (2012) further assert that:

> racism could inform the analysis of a variety of contexts related to mathematics, including the documenting of microaggressions—such as an assumption of a teacher that a book possessed by a Black learner must have been a stolen one; or the analysis of more macro forces—such as the variety of privileges being White affords the learner in most mathematics classrooms (p. 239).

This assumption, if brought to the mathematics classrooms, would presume or use race as an issue in learning, thus creating an avenue for the development of racialized LMIDs, as well as certain perceptions and attitudes towards mathematics learning. In a study with Black and White mathematics learners in America, Lubienski (2002) found that some differences in mathematics learners' mindsets could be related to both mathematics learning and its achievements.

Lubienski found that Black mathematics learners tended more than White mathematics learners to agree with the statements that "there is only one way to solve a mathematics problem", "learning mathematics is mostly memorizing facts" and "learning mathematics is complex, as well as a daunting task" (Tshabalala & Ncube, 2013: p. 6; Uwerhiavwe, 2014: p. 52).

Based on the gap in test scores among Black and White mathematics learners, Lubienski (2002) affirms that there were controversial claims about mathematics achievement gaps between Black and White mathematics learners. Lubienski (2002) further affirms that attempts to statistically equate Black and White mathematics learners were difficult because some differences between their experiences were a matter of quality and not simply degree. Consequently, "achievement tests used as the dependent variable is often biased toward traditionally high-achieving mathematics learners who are disproportionately White" (p. 269). Rohn (2013) argues that based on race, given the same situation, mathematics learners could be expected to experience mathematics education differently as a result of learners' SES, background and other factors. Black mathematics learners tended to experience a lower form of mathematics education—such as less qualified mathematics teachers, fewer course offerings (mathematics content), less culturally responsive mathematics teaching and lower mathematics teacher expectations.

Swanson (2002) argues that Black mathematics learners who were given entry into a high-status school with the support of a Black scholarship program were viewed socially as being disadvantaged. These learners were given scholarships because they showed potential in their urban schools. As these learners were of different SES from the other learners in the high-status school, they were regarded as being disadvantaged. The mathematics learners were therefore socially constructed as being disadvantaged because they were experiencing educational opportunities that had restricted them from effective ML. These mathematics learners thus perceived themselves negatively i.e., learners who were deficient in certain qualities and unable to understand mathematics effectively unlike their counterparts from the high-status school. This affected their mindset, and subsequently influenced and shaped their mathematical social identities negatively. The learners' achievements in ML would be negatively influenced as well. Swanson (2002) further argues that the "constructions of race, educational disadvantage, experiential deficit, cultural and language difference, and poverty were supported and reproduced by the socio-political discourses within the broader social domain that contribute to the legacies of apartheid in South Africa" (p. 1475). It is imperative to note here, that the mathematics learners were not born without mathematical skills, but certain factors such as racial grouping, poverty, educational disadvantages and others socially constructed them that way. Similarly, ensuing from Swanson, the factors often influenced LMSIDs and their achievements in ML included race, gender, class, socio-economic status, poverty, ability, cultural difference and other factors.

Martin (2006), Nasir and Hand (2006), as well as Reyes and Stanic (1998) reveal that disparity in mathematics learners' achievements was not attributed to the learners' race per se, but some factors such as beliefs, opportunities and access to ML based on the learners' SES and other reasons. Based on Martin, Nasir and Hand, and Reyes and Stanic's assertions in their studies, it is important to note that Black mathematics learners and Whites mathematics learners' disparities in mathematics achievements are not a function of their race per se, but as a result of the opportunities, access and other factors [due to their SES] to learn mathematics effectively. These assertions by Martin, Nasir and Hand, as well as Reyes and Stanic, apply to South Africa. However, some studies conducted in South Africa emphasize the risks of classifying mathematics learners based on their race, as well as attributing the learners' achievements in ML to their background (Skovsmose, 2005; Swanson, 2002). The three research studies are similar in that they interconnected race and SES to reveal mathematics learners' disparities in their achievements in the subject. The three articles did not acknowledge that given all things being equal, there are Black mathematics learners who are high achievers and White mathematics learners who are low achievers in mathematics.

Despite the controversial claims about mathematics achievement gaps between Black and White learners, there are also some controversial claims about mathematics achievement gaps in connection with the intersection of race and gender—i.e., between Black mathematics learners—Black males and Black females, as well as between White mathematics learners—White males and White females. Blundin (2013) posits that "males are generally more capable in the logical-mathematical category, BUT (this is a significant BUT) females have been gaining ground in these areas—such as having good knowledge of mathematics and performing highly in mathematical learning over the last twenty years" (p. 1).

2.2.2. Gender

I further reviewed studies (Ali et al., 2014; Uwerhiavwe, 2014) on gender concerning mathematics and achievements. Here, low and high achievements of learners in mathematics are attributed to various components of LMSIDs. Though there are several components of LMSID in the reviewed studies, mindsets—which are one of the primary components of LMSID I have explored in this paper, were only discussed in a study of the reviewed studies. However, it was not adequately discussed. I have explored mindsets as discussed and posited by Dweck and the LMSIDs which the mindsets have formed as well. There is also the need for more research on the area of learners' mindsets as posited by Dweck and the LMSIDs which the learners formed consequently as a result of their gender differences.

It is noteworthy that gender is informed by sexist assumptions about the ability of women. The assumption is that women are emotional. Men are rational. This has an impact on their ability to do mathematics (Feingold, 1992; Magaldi, 2015). As such, gender difference is an aspect of LMSIDs. This is another com-

mon and fundamental aspect of LMSIDs which was discussed to a large extent in the above literature. Ali et al. (2014) reveal in a quantitative study that a mathematics learner's gender influences his/her performance in mathematics. They, therefore, confirmed the gender difference. Females' performance was seen as very poor compared to males. Before Ali et al.'s (2014) quantitative study Maliki, Ngban, and Ibu (2009) posit that there was always an indication of the influence of gender on the performance of learners of mathematics. They noted that male mathematics learners obtained a higher mean score than their female counterparts. In contrast, Chisholm and September (2005) assert that a decade after South Africa's democratic elections, research and social action on gender equity in South African education showed that the quality of females' engagement in schooling and their outcomes were far more significant and better overall compared to males. There is a backlash because males are now underperforming in terms of learners' retention, engagement and achievement on the basis of equal access to every aspect of education especially in the zones (for instance, mathematics) where the males dominated (Chisholm & September, 2005; Kenway, 2005; Pandor, 2005).

Uwerhiavwe (2014) reveals in a qualitative study that ML and good or poor knowledge of mathematics was not a function of gender; but attributed to mathematics learners' differences emerging from personal, socio-cultural and other factors, along with parents' educational backgrounds. The personal factors included race, gender, economic factors and approach toward mathematics. The socio-cultural factors were mathematics teachers' responses, learners' beliefs and family income, as well as and learners' SES (Chisholm & September, 2005; Kenway, 2005; Mbugua, Kibet, Muthaa, & Nkonke, 2012; Uwerhiavwe, 2014). ML and achievements are not gender biased. Every mathematics learner [male or female] learns mathematics equally if all things are equal—i.e., if all mathematics learners have an equal opportunity and conditions for mathematics education. It is interesting to note that there are several studies on gender and mathematics which show that "what was once an alarming gender gap in mathematics achievement and participation has been reduced to a few or no percentage points. In school achievement, females now typically fare as well as males in mathematics"—this is a remarkable change from earlier times (Ontario Ministry of Education, 2004: p. 33). Similarly, and regarding the aspect of equal access of mathematics learners to mathematics education based on gender as mentioned, Subrahmanian's (2005) paper on gender in education in South Africa affirmed that "quantitative indicators of progress suggest that gender gaps in access to a variety of public goods are closing. This is broadly true of schooling as well" (p. 29).

2.3. The Influence of Learners' Attitudes and Beliefs on Their Achievements in Mathematics

This section reviews studies on the influence of learners' attitudes and beliefs toward their achievements in the subject. Here, low and high achievements of

mathematics learners in ML are attributed primarily to the learners' attitudes and beliefs. These attributes influence LMSIDs. The studies reviewed in this section focus primarily on the three attributes: attitudes and beliefs, as well as the influence they have on LMSIDs and their achievements in ML. The studies (Heyd-Metzuyanim, 2013; Mbugua et al., 2012; Tshabalala & Ncube, 2013) revealed various reasons for learners' poor achievements in ML. The study (Maliki et al., 2009) found that there was a good achievement in ML and that if a learner had a positive attitude towards mathematics, this would reflect in his/her performance. The two attributes—attitudes and beliefs are briefly discussed below.

2.3.1. Learners' Attitudes

In a quantitative study, Tshabalala and Ncube (2013) found that high failure rates in mathematics could be attributed to mathematics learners' attitudes—for example, the absence of interest, willingness, determination, and anxiety toward mathematics and their grasp of mathematics. The high failure rates are a consequence of the LMSIDs arising from their negative attitudes towards the subject (Uwerhiavwe, 2014). One of the attributes of LMSIDs is attitudes. These could be used to identify and construct some LMSIDs in the study of mathematics. Maliki et al. (2009) posit that attitude predicts behaviour. It can be inferred that the perceived difficulty of ML by some learners is a result of their negative attitude towards mathematics. If a learner has a negative attitude towards mathematics, then this will greatly influence his/her performance in the subject (Maliki et al., 2009). In a quantitative study with an inferential survey design describing existing phenomena, Maliki et al. (2009) found that high achievement in ML could be attributed to the learners' positive attitudes toward mathematics. As mentioned above, mindsets influence mathematics learners' attitudes (Dweck, 2013c; Vermeer, 2012b).

2.3.2. Learners' Beliefs

Some mathematics learners have a strong belief that the subject is naturally difficult, a daunting task. That it is conferred to intelligent and talented learners (Ali et al., 2014; Tshabalala & Ncube, 2013; Uwerhiavwe, 2014). One study showed the influence of positive beliefs of learners studying mathematics. Uwerhiavwe (2014) asserted that most mathematics learners have the belief that when learners are interested and determined, mathematics becomes easy and interesting. In this paper, I explored mathematics learners' beliefs as a key attribute of LMSIDs and the kinds of LMSIDs they construct in mathematics learning. As stated earlier, mathematics learners' mindsets—both fixed and growth mindsets are products of the learners' beliefs (Dweck, 2013c, 2013a; Vermeer, 2012a).

Mbugua et al. (2012) found that mathematics learners' poor performances were attributed to several factors as mentioned earlier: personal, economic, socio-cultural and other factors. In this paper, mindsets are included among the factors. I did not only explore some of those factors and mindsets the way Mbugua et al. (2012) did by relating them to the influence they have had on the

learners' performances but also explored the LMSIDs constructed. This paper is essential as fixed and growth mindsets have been overlooked and inadequately addressed in most previous studies. These are crucial attributes of LMSIDs because they primarily influence LMIDs and their achievements. They are prevalent in one way or the other in the concerns and issues of mathematics learners' achievements in South Africa. I have focused on these attributes in this paper and explored the LMSIDs that they formed and their implications for the mathematics learners' achievements.

The literature has informed an understanding of the construction of LMSIDs. LMSIDs have to be considered as they draw together a range of integral aspects to the in-depth understanding of mathematics contexts and learning spaces. An LMSID is a lens to understand the learning of mathematics (Bishop, 2012; Darragh, 2013; Heyd-Metzuyanim, 2013).

3. Methodology

Neuman (2000) posits that it is vital in an interpretivist research study to understand the meanings, reasons, motives and other subjective experiences of the participants who are time and context bound. Qualitative paradigm focuses on understanding a person and educational phenomena, as well as the knowledge acquired is not objectively constructed, but socially constructed (Cohen, Monion, & Morrison, 2011). As such, this paper adopts a qualitative research design.

3.1. Qualitative Research Design

Qualitative research involves an interpretive approach—it makes sense of phenomena and interprets the phenomena in terms of the meaning people bring to them. It is broadly and particularly useful for inductive approaches to generate novel insights into phenomena that are difficult to be measured quantitatively, as well as to study educational settings and processes, which usually involve direct interaction with the participants (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005; Cohen et al., 2011; Creswell, 2012; Denzin & Lincoln, 2003; Key, 1997). I used qualitative methods of data collection and analysis for this paper because it enables me to develop an in-depth understanding of LMSIDs and their relation to mathematics learning. This is because it is exploratory, largely inductive and involves an interpretive approach that makes sense of phenomena and interprets the phenomena in terms of the meaning people brings to them.

3.1.1. Case Study Research Design

From the perspective of interpretivists, case studies give researchers an in-depth understanding, viewpoints and ample opportunities to identify and note the attributes of LMSIDs that the mathematics learners, the mathematics teachers and the learners' parents assert, as well as the LMSIDs which emerge from the attributes: mindsets, beliefs, attitudes, perceptions, confidence, competence, race

and gender. This paper primarily seeks answers to research questions based on the social interactions of the mathematics learners—that is, relationships between the learners and mathematics. Given that a case study is descriptive, interpretive, enlightening, activating and gives an in-depth understanding of viewpoints, as well as being suitable and fitting for the goals of this paper, I decided to use a collective case study as the methodology as it offered me the opportunity of exploring the two key aspects of LMSIDs and their study of mathematics (Cohen et al., 2011; Creswell, 2012; O'Toole & Beckett, 2010; Creswell, 1998; Uwerhiavwe, 2014).

3.1.2. Context of the Paper and Participants

Identifying the relevant individual and schools [in short, the sample] for this study was critical. It was through a purposeful sampling exercise I obtained the sample for this study (Cohen et al., 2011). A High School in the Gauteng Province of South Africa was the site of the research paper with the Grade 9 learners, their mathematics teachers and learners' parents. I made the choice of this site for exploration based on its convenience and proximity.

For this paper, mindsets, race, gender and achievement in mathematics were the main criteria that were used in the sampling of the participants. I selected ten Grade 9 mathematics learners for the research based on narratives about themselves concerning the study of mathematics. I have identified the two categories of mathematics learners' beliefs of themselves as learners: fixed mindset and growth mindset. As such, I have chosen five mathematics learners who seem to have constructed a fixed mindset and five mathematics learners who seem to have constructed a growth mindset from their narratives. I explained to all the Grade 9 mathematics learners at the school I used for the research, that I was interested in knowing their experiences with mathematics. I further informed the learners that my interest was how they worked in their mathematics classroom and how they saw mathematics. I also told the learners that in the process of the data collection, I would ask them some questions about their views on mathematics; how they interacted with their peers in the mathematics classroom. I then gave a brief questionnaire to the mathematics learners who were interested and willing to fill it out based on their consent. The learners' questionnaire required the learners to fill in their race and gender. This enabled me to categorize them in terms of race and gender. For the level of achievement, teachers assisted me in categorizing the learners as low and high achievers based on their experiences in teaching the learners and the records of their performance in class. To this end, I categorized those learners with marks between 40% and 59% (both inclusive) in mathematics as low achievers because marks below 40% indicated that they were not passing. While those learners with 60% and more in mathematics were categorized as high achievers. Based on these characteristics and attributes, as well as willingness to participate in the research, ten Grade 9 learners were selected from one high school. In Grade 9, there were more Black learners than White learners and more female than male learners in the school.

I, therefore, randomly selected six female and 6 Black learners who satisfied the stated criteria, with five of them as low achievers and five high as achievers. The ten learners provided sufficient information for this paper.

3.2. Data Sources

An interview is an integral part and one of the valuable methods of data collection. A primary form of data collection in this paper was through interviews—formal interviews with the learners (Creswell, 2012). I used semi-structured interviews because this approach gives access to the stories of the study's participants and allows them to tell their stories about vital experiences that are useful to the study. Conducting semi-structured interviews with the learners and their teachers elicited and made explicit their experiences in mathematics and its learning. The ways in which these experiences influenced the learners' mindsets and their implications for mathematics learning were likewise explored through the semi-structured interviews. In this paper, the same sequence of questions was posed to every respondent in the same category (learners and teachers) during the interviews, however, there was latitude to use further questions to explore substantial responses that came up (Creswell, 2012).

Prior to the interviews, I ascertained the availability of the ten learners and confirmed if they were interested, motivated and willing to be interviewed at school. I meticulously documented and audio recorded the discussions in the interviews with the learners and their mathematics teachers. Before the learners and their mathematics teachers were audio-recorded, I drew their attention to the recorder and told them the reason we were recording the interviews. They gave their consent to be recorded. The learners were comfortable when they discovered that an audio recorder was being used. If they had not been comfortable with the recorder, I would not have used it. I conducted all the interviews with the ten learners. I approached the learners and discussed the study with them since they had given their consent as mentioned earlier. I then made the names of the ten Grade 9 learners' teachers known to the principal as they had given their consent. I likewise liaised with the principal and learners to decide on venues and times for the commencement of the interviews—data collection; I made sure they were comfortable with their decisions. Following this, the interviews were carried out at convenient times for the learners on the school premises.

3.3. Data Analysis

There is no one unique, right way to do qualitative data analysis. Data are assessed in this regard based on how well they meet the objectives of the study (Creswell, 2012; Cohen et al., 2007, 2011: p. 537). In this paper, the qualitative data analysis entailed making sense of transcripts derived from the learners' audio-recorded interviews by identifying and looking for codes that align with the themes to answer the research questions (McMillan & Wergin, 2002). Finding emerging themes, patterns, concepts, insights and understandings of the ga-

thered data is one of the objectives of this analysis (Patton, 2002).

In this paper, I employed the inductive approach to strengthen arguments and make the interpretation of the data explicit and logical. All the interviews that were captured on audio were completely transcribed to convert the raw data into an understandable form. The transcripts were reviewed and reread repeatedly as part of an iterative data coding procedure. Open coding was initially used to code the generated data on a line-by-line basis (Mercer & Ryan, 2010). After that, I used axial coding to further classify the data. This made it possible to fully identify the pertinent codes reflecting the participants' LMSIDs as they evolved in connection with their mathematical learning. As a result, all of the coded information was examined in terms of the themes and connections that emerged.

4. Result

The views of the participants are presented under two broad themes: attitudes and beliefs about mathematics, as well as capability and LMSID. Symbolic names are used for the participants (See Table 1) to ensure confidentiality and anonymity in the paper.

Table 1. List of abbreviations on participants' symbolic names.

Participants' Symbolic Names	Participants' Description
FBGH	Black girl learner with a fixed mindset who is a high achiever in ML.
FBGL	Black girl learner with a fixed mindset who is a low achiever in ML.
FBBL	Black boy learner with a fixed mindset who is a low achiever in ML.
FWGL	White girl learner with a fixed mindset who is a low achiever in ML.
FWBH	White boy learner with a fixed mindset who is a high achiever in ML.
GBGH	Black girl learner with a growth mindset who is a high achiever in ML.
GBGL	Black girl learner with a growth mindset who is a low achiever in ML.
GBBH	Black boy learner with a growth mindset who is a high achiever in ML.
GWGH	White girl learner with a growth mindset who is a high achiever in ML.
GWBL	White boy learner with a growth mindset who is a low achiever in ML.
Mr. T_1	Maths teacher of FWGL, FWBH, GBGH, GBGL and GWGH.
Mrs. T_2	Maths teacher of FBGH, FBGL and GBBH.
Mr. T_3	Maths teacher of FBBL and GWBL.
P_{FBGH}, $P_{FBGL,}$ P_{FBBL}, P_{FWGL}, P_{FWBH}, P_{GBGH}, P_{GBGL}, P_{GBBH}, P_{GWGH} and P_{GWBL}	Parents of FBGH, FBGL, FBBL, FWGL, FWBH, GBGH, GBGL, GBBH, GWGH and GWBL, respectively.

It is crucial to note that brief excerpts of each category are presented as a typical illustrative example across the data set. This is presented below.

4.1. Attitudes and Beliefs about Mathematics

In this study, a mathematics learner's attitude towards mathematics is referred to as the positive or negative actions and feelings the learner has developed regarding mathematics and its learning (Gafoor & Kurukkan, 2015; Marchiş, 2013). FBGH affirmed that she does her mathematics work (assignments) expected of her when due:

> My attitude towards ML is ermm I am very noisy in ML [smiles], but I do the work that is expected of me at the end of the day.

P_{GBGH} indicated that GBGH devotes time to reading and practising mathematics:

> My child's attitudes toward mathematics are that she likes spending time practising it; she can be lazy at times, though, in rare cases; she never liked the subject at first, however, now she does.

Mr. T_1 agreed that some of his mathematics learners have positive attitudes toward the subject:

> I think with what I started this year, their (learners) attitudes towards mathematics are positive. I can say the learners love what they are doing because some of them say they are going to choose pure mathematics—which means they love mathematics. So they (learners) have positive attitudes toward the subject.

Conversely, FWGL revealed that she feels tired and nervous when learning mathematics:

> My attitudes towards ML are ermm I feel tired and nervous to learn it.

In the same vein, FBBL asserted:

> My attitude towards ML is that I do not care to do mathematics problems most time.

P_{FWGL} concurred that their daughter does not have a passion for ML:

> Her attitudes toward mathematics are that she is not passionate about mathematics. She gives up on difficult problems most time. She hates struggling with mathematics. She does not ensure she gets to the root of a difficult problem when stuck.

In the excerpts, it is evident that some mathematics learners have positive attitudes towards the subject, such as doing mathematics assignments when due, spending time practising mathematics and love learning mathematics. On the other hand, some learners have negative attitudes towards the subject and its learning, such as feeling tired and nervous when studying, refusing to do ma-

thematics problems, hate struggling with the problems and give up most times with the difficult problems.

In this paper, a mathematics learner's belief is the acceptance of something without proof that it exists or is true about mathematics and its learning. This primarily grows from the learners' experiences and it influences the effort to learn mathematics as well (Kloosterman, 2002). A mathematics learner believes that mathematics is a subject that can be properly studied if he/she takes time to practise it:

My beliefs in mathematics are that mathematics can be studied; and when one practises it, he/she will understand it very well (GBGL).

A mathematics learner agreed:

> My belief in mathematics also is that you should not say you cannot do it. When you practice and practice mathematics, you shall find out that you can do it; and it becomes interesting. Just like what you, Mr. Abel told us, "practising mathematics makes one understand and have a good grip of it"—this honestly works for me (GWGH).

A parent affirmed this:

> My daughter has the belief that ML is hard but becomes easy only if you are smart. More so, she is of the belief that mathematics is not for all (P_{FBGH}).

A mathematics teacher agreed with P_{FBGH}:

> Yes, the learners say mathematics is difficult. The first thing they say when they come to the classroom and I start teaching them is that mathematics is hard—this is just their belief. The learners' have the belief that mathematics is a big challenge, and it is like a no-go area of learning (Mrs. T_2).

Another mathematics teacher concurred:

> The learners do not want to be part of mathematics anymore. However, I am trying to build them but some of them have the mindset or belief that "mathematics is tough for me', it is difficult and other stuff, yeah. Even some of the learners" parents play the same role; they will tell you "my child is not a mathematics child' when you discuss these attitudes with them (learners' parents). When you correct the learners" parents, they will say, no, no, no that learners can be bad in mathematics; and nothing can be done about it. But I must say here that all these bad notions about mathematics start from their (learners') homes, and are conceived in the mind already as well making the learners unwilling, motivated, ermm interested, determined and competent in ML. More so, I will say that the learners can effectively learn mathematics if they are motivated and have the belief that they can do it because learning mathematics starts from the mind (Mr. T_3).

Given the above extracts, GBGL and GWGH believe that mathematics is a subject that could be studied and understood very well. So, a learner should not

say he/she cannot do mathematics because when they practice the subject, they would discover that mathematics is easy and interesting. P_{FBGH} professed that her daughter believes mathematics is hard, only easy for a clever learner; which suggests that mathematics is not for every learner. Mrs. T_2 agreed by saying that her mathematics learners have the belief that the subject is difficult. This is a big challenge and a no-go area of learning. Mr. T_3 reported that his learners do not want to study the subject. He (Mr. T_3) tried to debunk the learners' beliefs that the subject is tough for them. He tried to change their negative attitudes. Mr. T_3 further reported that these bad notions about mathematics started in the learners' homes. The ideas are firmly fixed in their minds. They are thus unwilling, unmotivated and uninterested. They think that they could not be competent in mathematics.

4.2. Capability and LMSID

In this study, a learner is said to be capable in ML when he/she has the ability, fitness, or quality needed to learn mathematics effectively (Holsbeeke, Ketelaar, Schoemaker, & Gorter, 2009). To this end, one mathematics learner claimed that she is capable to do mathematics:

> I am competent to do mathematics. I think a learner will be capable of doing mathematics if he/she is focused on doing it (GBBH).

Another mathematics learner said:

> I do feel competent that I can do mathematics (FBGH).

FBGH's parent agreed:

> Yes, my daughter is competent in mathematics (P_{FBGH}).

A teacher affirmed this about a few of his mathematics learners:

> Ermm I think what brings competency is skills. Ermm I am still teaching the learners skills. The learners will be competent. Ermm for now, I can say that 20% of the learners are competent (Mr. T_1).

Another teacher noted this about her mathematics learners as well:

> Most learners are competent in doing mathematics, but some of them do not know that they are competent because they are not confident (Mrs. T_2).

In contrast, a learner affirmed that he is not competent at mathematics:

> No ooo, I do not feel competent to do mathematics (FBBL).

A second learner agreed:

> I do not feel competent to do mathematics. I feel that I am not for mathematics. However, I still pass it (mathematics) most times. The thing is, some of us know mathematics, while some of us do not know it (FBGL).

A third learner added:

> Ermm I do not feel competent to do mathematics because I am somehow scared when solving mathematics problems. As I said, mathematics is not my path. I am doing mathematics since it is a must at the moment [smiles] (FWGL).

Also, FWGL's parent reiterated:

> No, she is not competent in mathematics (P_{FWGL}).

A teacher noted that not all his mathematics learners are competent:

> Ermm, not all of them (learners) are competent because mathematics requires hard work, dedication and determination. Not all learners are ready for these as some of the learners are not mathematics type [smiles] (Mr. T_3).

In the excerpts, GBBH and FBGH asserted that they are competent at mathematics. GBBH stated that a mathematics learner needs to be focused to do well. P_{FBGH} noted that FBGH is competent. Mr. T_1 pointed out that skills bring competency, and that he is still teaching his learners these skills, that only 20% of his learners are competent at the moment. Similarly, Mrs. T_2 noted that most of her learners are competent, but some of them do not know that they are competent because they are not confident. On the other hand, there are a few learners who disputed the claims: FBBL, FBGL and FWGL affirmed that they do not feel competent; with FBGL saying that he is not created with good mathematical skills. FWGL is scared to solve problems because mathematics is not her path. She is only studying mathematics at the moment because it is compulsory. P_{FWGL} added that FWGL is not competent. Agreeing, Mr. T_3 noted that not all of his learners are competent because the subject requires hard work, dedication and determination. Not all the learners are prepared for the effort involved.

Citing Santos, Palomares, Normando, and Quintão (2010), as well as South African History (2015) and for my study, a learner's race is a social construct: a group of learners who share unique and similar physical characteristics. In this regard, a teacher asserted that race is not a function of learning mathematics effectively:

> Not really, I do not consider race as an attribute to effective learning of mathematics because race only affects behaviour. Race does not influence intelligence in mathematics (Mrs. T_2).

In agreement, a learner said this:

> Being intelligent to learn mathematics does not have any relationship with one's race because your race or complexion does not change your knowing mathematics or not. Since we have both White and Black learners who are smart in mathematics (FWBH).

Another mathematics teacher affirmed this:

> Race does not influence intelligence. However, I think when you say intelligence; people are born with intelligence to a large extent neh because as I

said, everything is personal. That is individual differences [smiles] (Mr. T_3).

A parent said that mathematics is for all learners:

> Mathematics has nothing to do with one's race. Mathematics is for everyone, no matter the colour. If anyone wants to fully understand mathematics, then he/she must have to put good effort and time into learning it (P_{FBGH}).

Against this statement, a learner affirmed that learning mathematics is a function of race:

> Yes, Sir. I have thought of Race in ML. Being intelligent in learning mathematics does have a relationship with one's race (FBGL).

A teacher concurred:

> I think so, yes! Learners are born with a "special" talent in mathematics—especially White learners. I consider race as an attribute to effective learning of mathematics (Mr. T_1).

In the same vein, another teacher said:

> Learners are born with a special talent in mathematics. Ermm I will be very scriptural on this part. When you look at the book of Exodus. God speaks to Moses. He says you are not to build the terbanacle for me; for I have assigned the people and I gave them the skills to build it. So in other words, God gives some persons certain skills to specialize so that we do not have a deficiency in some particular field or discipline at all. As such, there are some learners with a "special" talent or skills in mathematics. Here again, "special" talent or skill like this is common with the White race [smiles] (Mr. T_1).

These statements revealed that Mrs. T_2 asserted that she does not consider race as an attribute to effective learning of mathematics. Race does not influence intelligence in mathematics, it only affects behaviour. Similarly, FWBH affirmed that race has nothing to do with mathematics skills. One's race is not a factor, as there are both White and Black learners who are smart at mathematics. Mr. T_3 noted that a learner's race does not influence his/her intelligence. Regarding intelligence, some mathematics learners are born with that aptitude to a large extent. This is personal. P_{FBGH} responded that mathematics has nothing to do with a learner's race. Mathematics is for everyone, no matter the colour. For a learner to understand mathematics effectively, he/she has to put effort and time into learning mathematics. In contrast to these assertions, FBGL claimed that a mathematics learner's intelligence has a relationship with his/her race. Mr. T_1 affirmed that some learners are born with a "special" talent for the subject—especially the White learners. He considered race a factor in effective learning of the subject. Mr. T_1 averred very strongly that some mathematics learners are born with a special talent for mathematics as God assigned the building of His taber-

nacle by saying that He had given them skills to build it, meaning that God gives some persons certain "special" skills so that there will not be a deficiency in some particular fields or disciplines. Thus, there are some learners with "special" talents or skills in the subject. He (Mr. T_1) reiterated that this "special" talent or skill like this is normal for White people.

A learner's Gender refers to the social and cultural differences between males and females, whereas sex refers to the biological differences between them (Karen, 2013; Short, Yang, & Jenkins, 2013). One learner claimed that males are not better at mathematics than females:

> Never! Males are not naturally better at mathematics than females (FBBL).

Another learner said:

> No ooo, males are not naturally better in mathematics than females (FBGH).

In the same vein, a mathematics learner affirmed this statement:

> No, males are not naturally better in mathematics than females because ermm I think we are all equal in ML when it comes to gender capability (FBGL).

On a neutral note, a teacher asserted:

> Ermm I would not agree that males are naturally better in mathematics than females. It is a matter of attitude, not Gender (Mr. T_1).

In the same way, a parent noted:

> Most times, males are always top in mathematics. However, that does not mean that males are better than females in ML as most people think or say (P_{GBBH}).

However, a mathematics learner claimed that males are better at mathematics compared to females:

> Yes, I think that males are better at mathematics when compared to females. This is because females are interested in many things (other things—like other subjects), but most males are very interested in mathematics (GBBH).

In the same vein, a parent said:

> Males are generally better than females in mathematics. This is well known everywhere. As I said, I do not expect my daughter to be excellent in mathematics. She is a female. Females are not expected to be perfect in mathematics (P_{GBGL}).

Similarly, another parent answered:

> Males are better than females when it comes to learning mathematics. However, few females are way more intelligent than males in mathemat-

ics—this is in rare cases (P_{GWBL}).

In the excerpts, FBBL, FBGH and FBGL claimed that males are not naturally better in mathematics compared to females; FBGL further claimed that every mathematics learner is equal in learning mathematics when it comes to gender capability. Mr. T_1 noted that males are not naturally better compared to females; he also said that being smart in mathematics is an attitude, not gender. In the same vein, P_{GBBH} asserted that seeing males on top in mathematics does not mean that they (males) are better than females as most people think. These views were contradicted by the following: GBBH responded that males are better at mathematics compared to females; females are more interested in other subjects, but males are mostly very interested in mathematics. P_{GBGL} and P_{GWBL} affirmed that males are generally better than females. P_{GBGL} further affirmed that they do not expect GBGL to perform excellently in the subject because she is a female—females are not expected to be perfect in the subject. For P_{GWBL}, though males are better than females, there are a few females who are far more intelligent than males—this is rare.

5. Discussion

The presented data are discussed as follows.

5.1. Attitudes and Beliefs about Mathematics

There are beliefs among the participants of this research—they (participants) broadly see mathematics learners' attitudes and beliefs about the subject and its learning as natural. That is, they see mathematics learners' attitudes and beliefs about mathematics and its learning as what the learners are born with [that they did not learn]. In other words, attitudes and beliefs occur naturally; they are not man-made but from God or nature (Lee, 2005; Mill, 1998). This informs the mathematics learners' mindsets. Some mathematics learners have got a positive mathematics mindset, while others have got a negative mathematics mindset.

On one hand, mathematics learners who have a positive mathematics mindset are assumed to be clever, special and gifted in mathematics. On the other hand, mathematics learners who have a negative mathematics mindset are assumed to not be smart, special and gifted in the subject. These are innate assumptions. The participants indicated that many of them do not work with the assumption that mathematics learners' attitudes and beliefs about the subject are what they are born with [that is, God-given]. However, the data indicate that mathematics learners' attitudes and beliefs about the subject are socially constructed [that is, human-made]. All these attributes inform and develop the mindset they have toward mathematics and its learning. For Dweck (2013c) and Vermeer (2012a), mathematics learners' mindsets are a product of their beliefs.

It is paramount to note that a mathematics learner's positive or negative mathematics mindset [i.e., growth or fixed mindset] influences the LMSIDs and achievement in ML. Hence, I am inclined to agree with Dweck (2013c) and

Vermeer's (2012b) notion that mindsets influence mathematics learners' attitudes towards mathematics and its learning. These mathematics learners' mindsets (fixed and growth mindsets) are socially constructed.

I agree with Maliki et al.'s (2009) assertion that high achievement in mathematics is attributed to the learners' positive attitudes toward mathematics and its learning. In an earlier work (Uwerhiavwe, 2014), I indicated that low achievement in mathematics is directly related to the learners' negative attitudes toward mathematics and its learning. I have discovered that this assumption does not need to be questioned. Invariably, low achievement in mathematics is a consequence of the LMSIDs resulting from their negative attitudes toward mathematics and its learning. These learners' mathematical identities and attitudes are a result of what the mathematics learners have experienced. They are socially constructed.

Furthermore, I agree with Heyd-Metzuyanim (2013), Maliki et al. (2009), Mbugua et al. (2012), as well as Tshabalala and Ncube (2013) that low and high achievements of mathematics learners in mathematics and its learning are attributed to and/or influenced primarily by the learners' attitudes and beliefs. These are not something innate. The learners have been conditioned by their background, the milieu of the school and the attitudes of their peers and their own parents. Hence, they are socially constructed.

Generally, the data indicate that mathematics learners' mindsets, beliefs and attitudes are not psychological and individual things. They are constructed in the environment i.e., in the classroom and coupled with their home-based experiences and other experiences. It is worth mentioning that mathematics learners' mindsets are not psychological. They are not internal but a result of their individual experiences—it is the environment, home, school and community that constructs mindsets. Learners' attitudes and beliefs are actively constructed in the learners' experiences (Asante, 2012; Hannula, Maijala, & Pehkonen, 2004; Kloosterman, 2002; Marchiş, 2013).

Ensuing from above, mindsets play a crucial role by influencing the LMSIDs, which in turn, have an impact on the learners' achievements in mathematics.

5.2. Capability and LMSID

The data indicate that race and gender are not substantial in mathematics learners' achievements and their ML. They are not significant because it is about the kinds of experiences the mathematics learners have which construct their mathematical identities. What is important is that, if the mathematics learners are given positive mathematics experiences, and if the environment is constructed in a way which supports them—that enables the learners to develop their confidence and capability, whether they are White or Black learners, male or female, then these learners will be able to understand mathematics well and perform positively in the subject. I have noticed that in the literature there is a tendency to psychologize all of these issues. All these issues are more social. I agree with Lu-

bienski (2002) that there are controversial claims about mathematical achievement gaps between Black and White learners. The achievement gaps could be eliminated with proper attention to the issues related to schooling and support. I as well agree with Lubienski (2002)'s claim that the differences between Black learners and White learners are their experiences. Furthermore, I also agree with Reyes and Stanic's (1998) assertion that disparity in mathematics learners' is better understood if race, gender and SES are studied together. The Black learners among the learners are those of a low SES and are under-supported in ML. They do not achieve their potential. A low SES prevents learners from having equal opportunities and access to quality education, coupled with other factors. Learners in a higher SES do not have that problem. The issue then is not so much about race or gender but the extent to which they are supported.

I do not agree with Ali et al. (2014) and Maliki et al.'s (2009) declaration that male mathematics learners' performance is better compared to female mathematics learners' performance in ML. In an earlier work (Uwerhiavwe, 2014), I indicated that learners' performances in ML were not gender-based. I have found that this assumption does not need to be questioned. As such, I agree with the Ontario Ministry of Education's (2004) claim that learners' performances in mathematics are not gendered biased. Good or poor knowledge of mathematics is not gender-based but can be attributed to the learner's differences resulting from socio-cultural and other factors.

The data indicate that social identities (race and gender) are not significant in the learners' achievements in mathematics and its learning. There are however ongoing assumptions about racism and sexism which inform the learners' mindsets. The data indicate that whether the learner is Black or White, male or female, rich or poor when the mathematics experiences are constructed positively, the learners develop a positive mindset. They are likely to relate to the subject better and perform better (Mata, Monteiro, & Peixoto, 2012; Sparks, 2015). I agree with Swanson (2002) who shows that Black learners who were given entry into a high-status school with the support of a Black scholarship program were constructed socially as being disadvantaged. These learners were given scholarships because they showed potential in their urban schools. As these learners were of different SES from their White counterparts in the high-status school, they were regarded as being disadvantaged. They had lacked opportunities to learn mathematics in a good environment. These learners perceived themselves negatively. They were not like their White counterparts from the high-status school. This affected their mindset, influenced and shaped their mathematical identities negatively. It is noteworthy that race and gender become issues in ML, not because they are in themselves an issue, but because of the way they are socially constructed. The assumption is that women cannot think rationally. This is sexist. Another assumption is that Black learners cannot think in abstract terms therefore they know that mathematics studies are difficult for them. This is racist. Race and gender do not prevent learners from achieving what they want

to achieve. Moreover, race and gender have become important variables in education in general and ML in particular because of the socially constructed nature and effects of race and gender. However, if support and opportunities are given to Black learners and women, they will develop a positive mindset toward mathematics and its learning as they can become high achievers. With this in mind, I agree with Martin (2006), Nasir and Hand (2006), Reyes and Stanic (1998), as well as Skovsmose's (2005) assertion that race does not prevent a learner's capability to learn mathematics effectively. Factors such as poor conditions in the mathematics classroom, teachers and the SES of the learners negatively influence the learners' performances in mathematics and its learning. Hence, Mbugua et al. (2012) found that learners' poor performances in ML are attributed to several factors. Economic factors and socio-cultural factors are important.

Drawing on the above, race and gender are not significant in influencing learners' achievements in ML. They only become significant when they are used to not providing support for Black learners or women. In this paper, this was not the case. Therefore, race and gender did not come up as significant. Race and gender will be significant if Black learners or women are deprived of the opportunity and support needed to enable them to achieve in ML. Consequently, there are no significant relationships between learners' race and gender and their ML and achievements—that is, mathematics learners' race and gender are not significant.

6. Conclusion

The assumptions on mindsets, beliefs, attitudes, confidence, competence, capability, interest, difficulty and scariness have made most theorists' writings on LMSIDs and their achievements in mathematics ambiguous and confusing. They are ambiguous and confusing because they give the impression that the assumptions are innate. Most theorists do not see that it is a construction. Most theorists have used terminologies which have led the learners, as well as others, to believe that there could be something unique inside them [which they are born with] which generates the attributes.

More so, theorists use terms like mindsets, beliefs, attitudes, confidence, capability, understanding, excitement, commitment, interest, like, dislike, enjoyment, scary, phobia, daunting, abstract and complex. These are internal psychological phenomena that mathematics learners either have or do not have. With that in mind, there is the need to use clearer language so that learners and others will believe that the attributes (mindsets, beliefs, attitudes, confidence, capability, understanding, excitement, commitment, enjoyment, scariness and interest) are not innate. They are not attributes that people are born with, not God-given attributes. Instead, they have socially constructed [human-made] phenomena. We need to take responsibility for their construction. We are damaging the learners' and others' lives by making them believe that they are naturally not able to do mathematics.

The following research topics are proposed for future exploration based on this paper:

- ✓ Learners' Mathematical Personal Identities and Mathematics Learning.
- ✓ Influence of Learners' Mindsets on their Mathematics Learning.
- ✓ Is Mindset an Appetite for Mathematics Learning?
- ✓ Mindsets: Drivers for Learning.
- ✓ Learners' Mathematical Identities in Urban High School.

7. Recommendation

The following recommendations are made based on the conclusions of this paper—this indicates that:

- ✓ People need to be socialized into the understanding that mindsets, beliefs, attitudes, confidence, capability, understanding, excitement, commitment, comfortable, interest and other components of LMSIDs are not natural [God-given]. They arise from the learners' experiences [human-made]. We need to understand that everyone is capable of learning mathematics given the right kind of opportunity;
- ✓ Mathematics learners and the public should be aware that race and gender are not significant in ML and achievements. Race and gender only become significant when these are used to deprive Black learners and women of opportunity and support to achieve in ML.

This paper alone may not change any kind of contradicting views some people have on mathematics learning, as well as LMSIDs and their implications. Given this reality, it is expedient that further studies are carried out in other Provinces in South Africa and other countries.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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