European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejes.v7i7.3168 Volume 7 | Issue 7 | 2020

INDIVIDUAL FACTORS IN THE DEVELOPMENT OF NEGATIVE MATHEMATICS SELF-CONCEPT AMONG GIRLS AT A RURAL SCHOOL IN CENTRAL PROVINCE, ZAMBIA

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Abstract:
This study was centred on ascertaining individual factors which influence the development of negative Mathematics self-concept in girls. The research was based on a single case study and utilized the qualitative research approach. The sample consisted of a total of 18 participants. Thus, a sample of seven grade 11 girls with low Mathematics self-concept, seven parents to the girls and four teachers of Mathematics at the school were purposively selected from Mwabonwa (pseudonym) Girls' Secondary School situated in a rural area of Central Province of Zambia. In-depth interviews were conducted with girls, teachers and parents. A focus group discussion was held with pupils only and a document review to understand pupils' statuses and their past academic performance was employed. Data was analysed with the use of the Interpretative Phenomenological Analysis (IPA) Method. A number of indicators revealed two key individual factors influencing low Mathematics self-concept in girls. These factors include: girls' negative perceptions of Mathematics and poor Mathematics background. In a nutshell, these findings show that to understand the low self-concept girls have in Mathematics one had to appreciate the individual experiences of the girls in the subject.

Keywords: negative Mathematics self-concept; family and community; Interpretative Phenomenological Analysis (IPA)

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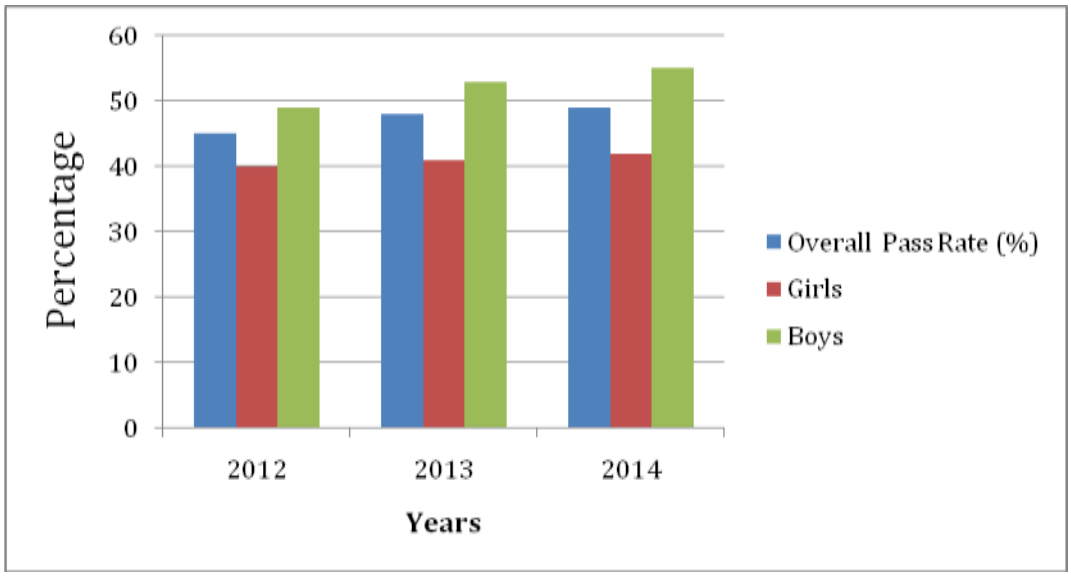
1. Introduction

1.1 Background of the Study

The 21st century has witnessed unprecedented role of Mathematics in socioeconomic development. Tembon and Fort (2008) indicate that the performance of a country's best students in Mathematics and related subjects may have implications on its technological development and overall international competitiveness. Wolf (2002) indicated that there has been a positive change in students' attitudes towards Mathematics over the past decade and that a qualification in Mathematics is associated with greater success in gaining entrance to university, future employment or increased earnings. However, there are wide disparities in student performance in Mathematics and Science subjects between boys and girls in countries, which suggests that excellence throughout education systems remains a remote goal.

The performance of pupils at School Certificate level is generally poor in Zambia. This poor performance is more pronounced in Mathematics and Science subjects as exemplified in the Ministry of Education, Science, Vocational Training and Early Education (MOESTVEE)-Central Province 2014 Grade 12 Examination Analysis Report of 2015. From the 34 secondary schools in Central Province for example, and from the 27 subjects that were examined in 2014, Mathematics had the lowest percentage of 49. This finding is alarming especially that Mathematics is a key entry requirement to almost all the important careers. The statistics in Figure 1 below, present the Summary of performance in Mathematics at School Certificate level from 2012-2014 in Central Province with special reference to the performance of girls and boys in the subject.

Figure 1: Performance in Mathematics at
School Certificate level from 2012-2014 in Central Province



Note: Adapted from Statistician-Provincial Education Office (Central Province), 2015.

These results indicate that while the overall performance of both girls and boys in Mathematics is low that is 45, 48, 49 for the years 2012, 2013 and 2014 respectively,

girls' performance in Mathematics is much lower than that of boys. For instance, for the year 2014, while the pass rate for boys was 55 percent, girls lagged behind at 42 percent.

Mwabonwa Girls' Secondary School, one of the girls boarding schools in Central Province, has Mathematics and Science subjects performance scenario similar to what is obtaining in many secondary schools in Zambia, particularly in Central Province (see MOESTVEE-Central Province 2014 Grade 12 Examination Analysis Report). Though the school management with the teachers employed strategies to change the situation, the school has continued to record lower distinctions and merits in Mathematics, Science and Biology commonly referred to as masculine subjects as compared to percentages in subjects such as Food and Nutrition, Home Management, English Language, and all the Social Sciences which are considered to be feminine subjects. Note that the school did not only aim at a 100 percent pass in individual subjects, but also at producing quality results, which is grades one, two and three by the school's standards (Chituka, 2013). On the other hand, at Provincial level quality results mean grades from one to six (as shown in the MOESTVEE-Central Province 2014 Grade Twelve Examination Analysis Report). This attitude has been fuelled by the School's motto which reads in *Lenje'Atuume Luteeta'* meaning *'Let us lead the way'.*

In the quest to achieve the set standard of performance, the school in the recent years embarked on various strategic interventions, including high level analytical skills, Evidence Based Planning (EBP), tried and tested pedagogies and teacher motivation (Chituka, 2013). In spite of these and many other strategies employed to try and reverse the situation, the performance in masculine subjects has continued to lag behind the so-called feminine subjects.

As the five-year School Strategic Plan that was drawn in 2011 was coming to an end in December 2015, the new benchmark was to attain 100 percent quality pass, that is, Grades one, two and three for all the six departments in the school as opposed to just a 100 percent pass (see *Mwabonwa* Girls' Secondary School Minutes of the Management Meeting held on 19th February 2015). Interestingly, Food and Nutrition and Home Management which are part of the feminine subjects had set the standard for the new benchmark as both subjects had attained not just 100 percent pass but 100 percent quality pass!

As indicated earlier, the problem here is that while in the so-called feminine subjects, girls scored distinctions and merits, in the masculine subjects' percentages were lower. Thus, questions necessarily follow: Why is it that in spite of the school having strove hard to improve the quality of results in Mathematics and other masculine subjects the scenario continues to be the same? Where is the problem? Could the problem be with the girls themselves? These questions were critical to the current study.

An abundance of research has found that there exists a strong relationship between a student's Mathematics self-concept and a student's performance (Chiu & Klassen, 2008; Hamachek, 1995; Kiamanesh & Kheirieh 2001; Marsh, 1992; Mujtaba, Hodgson & Reiss, 2013; Munsaka, 2001; Wilkins, 2004). Thus, positive Mathematics self-concept means high achievement in Mathematics. Consequently, Low or negative

Mathematics self-concept have been found to be one of the contributing factors to the poor performance of girls while boys have been found to have a higher or positive Mathematics self-concept. What is not clear in research however is how this low Mathematics self-concept among girls is developed?It was the purpose of this study to carry out an in-depth understanding of how individual factors influenced the development of low Mathematics self-concept in girls at *Mwabonwa* Girls' Secondary School.

1.2 Statement of the Problem

Profuse research has shown that there is a strong relationship between a student's Mathematics self-concept and a student's performance (Chiu & Klassen, 2008; Hamachek, 1995; Kiamanesh & Kheirieh, 2001; Marsh, 1992; Mujtaba et al., 2013; Munsaka, 2001; Suliman, 2004; Wilkins, 2004). It has also been established in the same researches that girls have a lower self-concept in Mathematics than boys resulting in poorer academic performance in Mathematics. At *Mwabonwa* Girls' Secondary School, the school management, the teaching staff and the Parents Teachers' Association (PTA) have worked diligently to make sure the school performs up to its motto *'Let's Lead The Way'* that is in providing quality grade 12 results among other things. Though the school has succeeded in producing exceptional results in feminine subjects quality results in masculine subjects have continued to be lower even after strategic interventions have been employed, including high level analytical skills, Evidence Based Planning (EBP), tried and tested pedagogies and teacher motivation (Chituka, 2013) to try and reverse the situation. It appears that poor quality results particularly in Mathematics at *Mwabonwa* are influenced by girls' low Mathematics self-concept. Though Mujtaba et al. (2013) have generally and quantitatively advanced factors that influence positive Mathematics self-concept, no in-depth study seems to have been conducted to look at this study qualitatively and holistically. This study, therefore, sought to establish an in-depth understanding of individual factors which might have reinforced the development of low Mathematics self-concept in selected grade eleven girls at *Mwabonwa Girls' Secondary School* in *Chisamba* District of Central Province in Zambia.

1.3 Theoretical Framework

The study was mainly guided by two theories namely; the Ecological System theory and the Self-fulfilling Prophecy (SFP). Bronfenbrenner (1994) argues that to understand human development one must consider the entire ecological system in which growth occurs. Thus, individual self, parents, teachers, peers have a role to play in the development of self-concept. The self-fulfilling prophecy by Robert Merton is a process by which one's expectations about another person eventually lead the other person to behave in ways that confirm these expectations (Merton, 1968).

2. Research Methodology

2.1 Research Design

A single case study design was employed utilizing the qualitative methods. The qualitative approach was critical to this study because there was need to develop deeper insights and understanding of the individual factors influencing negative Mathematics self-concept among girls. The population consisted of all girls, teachers and parents to the girls at *Mwabonwa Girls' Secondary School*. The sample had 18 participants consisting of seven pupils, seven parents to the pupils who participated in the study, and four teachers of Mathematics from the same school.

2.4 Sampling Procedure

All the grade eleven girls at the school were administered with the self-concept scale which was adapted from Ronsenberg (1965). The scale is a 10-item likert scale with items answered on a four-point scale, from strongly agree to strongly disagree. The scale ranges from 0-30. Scores between 15 and 25 are within normal range; scores below 15 suggest low Mathematics self-concept. The actual sample size, therefore, constituted girls with low scores (below 15) on this scale. A total of seven Parents to the girls who were selected from the list of those who were found with low Mathematics self-concept were also included in the sample. In order to study the problem of girls' negative Mathematics self-concept holistically four teachers of Mathematics from the school (*Mwabonwa Girls' Secondary School*) that the girls went to were included in the sample. In line with the IPA method which I adopted in this study as my analytical framework, integrating the individual experiences of girls, parents, and teachers would help deepen and broaden the understanding of the problem of girls' negative Mathematics self-concept.

2.5 Data Collection Techniques and Procedure

Due to the qualitative nature of this study semi-structured interview was cardinal to collect data from girls, parents and teachers.As a study using the IPA method, IPA works with texts generated by participants (Willig, 2001) thus, semi-structured interview technique enabled me to capture the participants' perspectives of the girls' negative Mathematics self-concept problem. To probe each participant's experience further, a free attitude interview technique was implemented. According to Meulenberg-Buskens (1997) a free attitude interview is a non-directive controlled in-depth interview used in qualitative research. When the participant is given the freedom to speak, it allows the researcher to get more in-depth information from the participants.

The interviews were done first with the girls, then teachers and lastly with the parents. These interviews were each between an hour and one hour thirty minutes long. Girls and teachers were interviewed individually in English. While the interviews for four parents were in English, the other two parents were interviewed in *Chinyanja* and one in *Bemba,* the native languages for the participants. This was to allow the

participants to express themselves freely. Though I am not a native speaker of the *Chinyanja* and *Bemba* I am able to communicate effectively in both.

A focus group discussion for pupils only was conducted. I chose focus group to allow participants to express their ideas or feelings, understand differences, behaviour or motivation. Document review took different forms such as, mark sheets for the girls, School's strategic plan 2010-2015, Grade Twelve Exam Analysis Reports to mention but a few. Necessarily information which fitted in this study was compiled and used accordingly.

All the interviews and focus group discussions were recorded with the use of the digital recorder so as to allow for translation, transcription, and more thorough analysis and interpretation afterwards. Apart from English, I am a fluent speaker of *Bemba and Chinyanja* and so translation and transcription of data was done without any difficulty.

2.6 Reliability of the Study Findings

I decided to triangulate the data collection methods (semi-structured interview, focus group discussion and document review) as well as the data sources (girls with low Mathematics self-concept, parents to the girls, and teachers of Mathematics in the school) so as to increase the credibility of my findings. Willig (2001, p. 30) point out that, "*methods of data collection can also be used in combination to view the same phenomenon from different angles. This constitutes a form of triangulation."* He further argues that case studies integrate information from diverse sources to gain an in-depth understanding of the phenomenon under investigation.

2.7 Data Analysis

I analysed data for this study using the Interpretative Phenomenological Analysis (IPA) approach. IPA is a product of the combination of a descriptive approach (phenomenology) and an interpretative approach (hermeneutics). Thus, this technique enabled me to capture the participants' perspectives of their negative Mathematics self-concept problem. In the first instance, repeated reading was done to familiarize myself with the important issues in the participants' accounts which later helped me to identify and label themes. Further, time was spent to check the emerging patterns of themes as regards to individual factors to girls' negative Mathematics self-concept.

2.8 Ethical Consideration

Each participant was given to read a consent form which gave them the freedom to accept or decline to take part in the study. In the consent form it was explicitly stated that all information provided by the participants would be held confidentially and that participants' names would not be used in the research report. Filled in Participant Information sheets were later given to each of the respondents to provide full information about the research such as the benefits and risks of the research among others. At each interview with the participants and during focus group discussion issues of consent, confidentiality and anonymity were explained first. For the sake of those who could not understand English these ethical issues were explained in

Chinyanja and *Bemba* accordingly. On the whole, ethical considerations which were crucial for this study included informed consent, confidentiality and anonymity, reporting research results fully and honestly.

3.Findings and Discussions

3.1 Introduction

There were basically two themes which emerged indicating how individual factors of girls influenced the development of girls' negative Mathematics self-concept: girls' negative perception about Mathematics and poor Mathematics background. In this study, for the sake of participant identification, I have used pseudonyms for the seven girls which include; Jane, Milimo, Busiku, Twaambo, Faith, Beauty and Lwiche. As regards, parents and teachers I have used numbers as well as gender designation. For instance, the identification of a female parent, number one would appear as, F/P1, where F is for female and P is for parent while that of a male parent with the same designation would appear as M/P1 where M is for male. Note that a P for parent also stood for guardian. A female teacher number two would appear as: F/T2, where F is for female and T is for teacher while that of a male teacher of the same number would appear as: M/T2 where M is for male respectively. This format of identifying participants has been used in order to preserve anonymity and confidentiality.

3.2 Individual Factors

3.2.1 Girls' Negative Perceptions about Mathematics

All the girls during interviews and focus group discussions expressed dislike of the subject as Jane and Milimo quoted here revealed respectively*:*

> *"Mathematics is a very hard subject, it's complicated to understand, numbers and formulas make it complicated and it needs more time. Naturally, boys have a better ability*."

> *"It is good except some topics are meant for boys such as Trigonometry, Earth Geometry and Vectors. Fractions and matrices are very good for girls… I love Mathematics, but I think some topics don't just make sense to me."*

In the above excerpts, the girls seem to indicate that not only is Mathematics difficult but also that there are some aspects of the subject such as numbers and formulas and some topics which make it difficult. One teacher (M/T1) had this to say in part in relation to this finding from the girls, *"Mathematics is abstract in nature, that is to say, it involves numbers that you cannot touch in reality".* To explain this further, I give an example, in Geography, we learn about tangible things like rivers and lakes, but in Mathematics, numbers and formulas cannot be touched or experienced like real life objects. This is apparently a big problem to girls who have grown up in a culture with beliefs that Mathematics is for men. Furthermore, and in line with the findings that

Mathematics was for men, Sayers (1991) in his study found that girls were less confident, more nervous, enjoyed Mathematics less and regarded the subject as being less useful than did boys.

Like Jane in the excerpt above, Faith disclosed that understanding Mathematics needs a lot of time and so other subjects could be disadvantaged if one was not careful. Consider the following statement from her, "*Mathematics is a very difficult subject. The times that I've tried to study it, I saw much of my time consumed and yet the output was poor as I did not understand a thing."* Note that among the girls interviewed, Faith was the only one performing relatively well in all the other subjects including Chemistry and Biology but not in Mathematics. The explanation to this is not quite clear but this can be a research opportunity in future.

Milimo, who seemed to show willingness to change her view about Mathematics, came out to give a reason as to why she thought Mathematics was difficult, *"It is the mentality that we have developed about Mathematics otherwise Mathematics is not difficult…"* Not only was Milimo's performance bad in Mathematics but in all the other subjects. Her desire to improve in Mathematics even when she was performing poorly in all the subjects showed a spirit of determination. After reviewing and comparing all the records about Milimo, it was clear that she was receiving warnings about her poor performance from one of her relatives who happens to be a teacher. It appeared that her uncle told her the way to get started was to start liking all the subjects and actually change the mentality she has towards Mathematics otherwise she was going to be repeated. Against the background of these findings, it seems logical to conclude that all hope is not lost with the person with low Mathematics self-concept. With the right attitude and right support from significant others, the situation can be redeemed.

Twaambo and Faith gave other revelations about what led them to develop a negative attitude towards Mathematics, and here are their respective statements: *"I used to love Mathematics but now I just like it as a subject. My continued poor performance has made me lose interest completely"*, *"Continuous failure in Mathematics made me lose interest and stopped putting in any effort."*

The findings of this study agree with Nherera (1999) whose study about attitude of girls towards Mathematics in selected secondary schools in Lusaka and Mazabuka showed that girls viewed Mathematics as a difficult and masculine subject. He further indicated that consecutive failure experiences in the subject influenced these negative attitudes among others. Thus, it seems that continued failure in Mathematics by the girls in the current research made them lose hope about ever making progress in the subject. The girls' concerns can be summarised in this expression *'Elephant input what comes out is Kalulu input'.* In view of this, teachers of Mathematics should try to encourage small efforts made in the subject rather than completely showing that the girls are too bad to make improvement. For example if a girl in a previous test got 29% and improved to 37% in the next test, it is imperative as a teacher to notice the progress and reinforce it, by praising her instead of just shouting at her for performing poorly andfailing again.

Parents in the study also seemed to agree with the views of the girls about their children's perspective about Mathematics. I cite one Parent (MP1), *"…My daughter says 'Mathematics is very difficult, it is a practical subject, boys are good at practical subjects (meaning Mathematics) while girls enjoy information subjects…"* This revelation is also in line with the findings in the study of the gifted Korean girls (Kim and Lee) in Mathematics but not interested in taking up Mathematics related courses in the university. Lee and Sriraman (2012, p.10) in their study I cite Lee as stating the following:

> *"I think that while men are gifted with logical skills, women are gifted with sensibility. I think that Mathematics has been developed by logical skills and sociology has been developed by sensibility. I liked Mathematics, but I don't think Mathematics is suitable for women."*

This finding by Lee and Sriraman (2012) can be explained also in line with what Nherera (1999) found in his study that the factors that influence attitudes of girls towards Mathematics seem to originate fromindicators which appear to stem from the traditional notions of roles of men and women. This really takes us back to the powerful role cultural values and beliefs play in girls' lives and indeed our lives in influencing girls' negative Mathematics self-concept.

Generally, it seemed that these girls also lack real guidance in the importance of Mathematics and motivation. In line with this I reveal M/P4's sentiments:

> *"My daughter seems not to know the importance of Mathematics; if she did she would not choose careers anyhow from accountancy to clinical officer. This is what has killed her attitude. Besides, she continues to say 'Mathematics is difficult.*

All the teachers indicated generally that girls who performed poorly in Mathematics had a negative attitude towards the subject. They pointed out that Mathematics was viewed as difficult to almost all the girls who were failing the subject. M/T2 emphasised, *"the problem really is that they (girls), come to class with already wrong perceptions about the subject and this shuts their opportunity to learn".* Overall, in as much as this is the problem of the girls the real problem is deep rooted in the culture itself. Girls' weaker identification with Mathematics may derive from culturally communicated messages about the subject being more appropriate for boys than for girls. In this light, Cvencek, Meltzoff & Greenwald (2010) point out that *"Girls don't do Mathematics"* is a widespread cultural stereotype in the United States and that studies with both adults and children show that people in the United States believe that Mathematics is stereotypically a male domain. Additionally, the findings in their study titled *'Math-Gender Stereotypes in Elementary School Children'* have suggested that the Mathematics-gender stereotype is acquired early and influences emerging Mathematics self-concepts prior to ages at which there are actual differences in Mathematics achievement.

3.2.2 Poor Mathematics Background

Six out of seven girls who participated in the study indicated during interviews and focus group discussion that when they started school, Mathematics was not an issue. Things started changing beginning end of primary school through to junior grades and now to senior level. I cite *Lwiche,* to exemplify the girls' experiences with Mathematics from the time they entered school, *"…I used to perform well in Mathematics when I was at primary school but things changed when I wrote my grade seven, I performed poorly and from then on things have not been good…"*

In this light, Deku, Amponsah and Opoku (2013) cite American Association of University Women as pointing out that boys and girls begin school with equal self-concept but by the time they reached secondary school level, the self-concept of girls would have become significantly lower than that of boys. It seems as girls and boys start to grow and get to secondary school level, their interaction with the culture in the society in which they live and the knowledge of the values and beliefs thereof is increased and so are the beliefs that Mathematics is a masculine subject. This knowledge on the part of girls contributes to their loss of concentration and the seriousness that the subject deserves, especially as Mathematics becomes more complex and thus the low Mathematics self-concept. Boys on the other hand, get strengthened by the positive beliefs about them in the society in relation to Mathematics and thus, their high Mathematics self-concept. In view of the foregoing, it can be concluded that the formation of negative Mathematics self-concept in girls permeates all facets of life (including culture) like an unbreakable thread.

Twambo in the next line, points out another reason that could have contributed to poor background in Mathematics and indeed negative Mathematics self-concept, *"…My teacher of Mathematics was rarely in class. We were most of the times all by ourselves…"* In the same vein, Beauty also puts it this way, *"…I personally feel if I had a good teacher (a teacher who would not miss class) in Mathematics like I had in English and other subjects the story would have been different…"* Equally, Twaambo's father (M/P4), who attested to what the girls above said about their Mathematics experiences from the time they entered school, stated:

> *"My child started very well, I didn't even think this would have been an issue now…I just remember that in grades eight and nine, she complained of a teacher not showing up for most of the lessons. I think that period which was lost has contributed somehow to her loss of interest in the subject and thus her poor performance."*

It is important to note that in these study teachers of Mathematics missed classes mainly because they had other responsibilities in the school especially that of school statistician. Generally, when a teacher misses periods, particularly for the primary and junior secondary classes, they might not have time to cover all the topics and as such they might leave out other important examinable topics. This eventually may result in pupils failing Mathematics but because whether one fails Mathematics or not at grade nine (and even at grade 7) as long as one passes any six subjects, one qualifies for the

next higher grade. Because of this, most pupils do not have pressure on them to learn Mathematics, especially where the teacher miss classes. By the time they would want to concentrate on it because they have now realized importance of the subject to their career options, especially during senior grades, it is already too late as the needed background foundation to most of the topics and concepts they are learning at that particular time is not there. This in the long run leads to frustration and consequently psychological withdraw from the subject and hence continued low self-concept, especially at senior level.

Over and above, the revelations by Twaambo, Beauty and Twaambo's father exemplify how both girls and parents viewed the problem of girls' negative Mathematics self-concept. Simply put, the absence of teachers during Mathematics lessons could have contributed to a poor background in Mathematics which in turn led to a low Mathematics self-concept.

Similarly, the change of teachers, especially during primary school, was seen also to contribute to poor Mathematics background. To exemplify what both girls and parents alluded to, Lwiche's mother (F/PT7) reasoned as follows, *"I suspect the change of schools made her change a lot of teachers and this made her somehow lose touch with the subject. From grade seven up to now, she has changed schools four times"* Four different schools in a period of five years means that Lwiche had a minimum of four different teachers, and this was too much for a young mind which is not yet very stable. It is important to note that while the change of teachers can come as a result of a pupil changing schools, sometimes a class can have different teachers of Mathematics in a short period of time as a result of transfers, promotions, study leave and death to mention but a few.

In view of the above, and as noted earlier, self-concept, and indeed Mathematics self-concept is not only determined by the relationships that a child has with parents, older siblings and peers but also by teachers (Munsaka and Beatrice 2013). Similarly, Deku, Amponsah and Opoku (2013) also assert that self-concept is developed not inherited. According to them, social experiences influence the way boys and girls behave, and this can affect their self-concept development. Thus, a pupil who continues to change teachers may experience instability in the self-concept development and in this case Mathematics self-concept. For instance, if a pupil was always affirmed and validated by his/her teacher regarding his/her ability in Mathematics, that pupil is likely to develop a positive self-concept but, this can be disrupted if he/she changes teachers in thesubject, especially if the new teachers do not affirm and validate his/her Mathematics ability. Ultimately, the new teacher might have altogether different attitudes, beliefs, and anxieties about the subject which may influence the pupil in a negative way hence contributing to a poor Mathematics background and consequently a negative Mathematics self-concept.

Though teachers had no information about the past experiences of the girls in Mathematics, teachers agreed with what the girls and parents said about the girls' loss of interest and hence poor performance due to poor background in Mathematics. One of the teachers (M/T1) said:

"Mathematics is not like Civics or Geography where when you finish this topic you can start another without any connections whatsoever. In Mathematics, all the topics are connected and interrelated. Meaning, once you miss one topic, be sure to get lost as the teacher gets onto a new topic."

M/T3 elaborated on what M/T1 alluded to in this way:

"You know, in Mathematics, the topics at primary school level are important to understand the topics at junior level and these are also helpful for the topics and concepts at senior level. Equally the concepts learnt at senior are important for understanding topics in Mathematics at higher learning. When one misses some topics and concepts at any particular level, it becomes problematic to progress smoothly and this is just how it is with Mathematics."

The two excerpts from M/T1and M/T3 above have led to poor Mathematics background in girls. In relation to what the two teachers alluded to above, Beauty put it this way in trying to justify her continued failure in Mathematics, *"I think why I am still failing is because I fail to connect things. I feel there are some things missing in my learning of Mathematics"* Here, is an illustration to try and elucidate the issue of connectedness and interrelatedness of concepts in Mathematics. A child at primary school who completely misses the concept behind the arithmetic $3 + 4 = \square$ or $3 + \square = 7$, will most likely have problems with equations during later grades. In equations where there is a box in the previous arithmetic problem, it will be replaced with letters such as X and or Y (i.e. 3+4 = X; or 3+Y=7) respectively. Over and above, topics and concepts in Mathematics build on each other, this is to say, one concept learnt at an earlier grade will be built on at a later stage as shown in the example above.

Not overriding the fact that all but one girl in the current study had no problem with Mathematics at primary school level, most teachers at primary level have problems teaching the subject. Part of the problem is that, primary school teachers are trained to teach all the subjects including Mathematics. So, it follows that if a teacher is not interested and has problems with Mathematics, they would concentrate much on teaching other subjects leaving out Mathematics or indeed concentrate on simpler topics and leave out the difficult ones. The result of this is obvious, namely pupils who are half-baked or who have developed a poor foundation in Mathematics and hence have a low Mathematics self-concept.

Ultimately, going by what both girls and parents indicated, a poor Mathematics background can contribute to the development of a low Mathematics self-concept and indeed lead to poor performance of girls in Mathematics, as attested to by what the teachers explained about the connectedness and interrelatedness of topics and concepts in Mathematics.

4. Conclusion

Reflections on these findings seem to suggest that to better understand girls' negative Mathematics self-concept one needs to explore what goes on in girls' lives themselves. Through this study, we have shown that the study of Mathematics self-concept should not only end with mere finding that girls have a low or negative Mathematics self-concept. Instead more in-depth studies need to be conducted in Zambia and elsewhere in the quest to do justice to a phenomenon that is hindering development in this 21st century. It is paramount that future researchers, for instance, consider exploring how families and communities where these girls are raised may influence how they conceptualize Mathematics as a subject.

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