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Teaching and Learning Resources and their Influence on Poor Performance in Ordinary Level Mathematics in Glenview-Mufakose District of Harare, Zimbabwe

Chrispen Mawarire[1]* & Dr. Silvanos Chirume[2]
[1]*Principal Material Production Officer, Curriculum Development and Technical Services, Harare, Zimbabwe*
[2]*Senior Lecturer and Programme Coordinator, Department of Mathematics and Statistics, Zimbabwe Open University, Midlands Regional Campus, Gweru*
Corresponding Author: Chrispen Mawarire, E-mail: chrismawa1978@gmail.com

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ABSTRACT

The main purpose of the study was to examine the influence of teaching and learning resources on poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare in Zimbabwe. Two theories, The Constructivist theory and the Systems theory helped the researchers to get a deeper understanding of the contribution of resources to poor performance. This study is pragmatic in nature and this called for the use of both the positivist and post-positivist ontologies. The concurrent triangulation design was used where both data which was qualitative and quantitative were collected concurrently in one phase, analysed separately and then compared and combined. The study sample consisted of twelve school heads, twenty-four parents, forty-eight teachers and ninety Ordinary Level Mathematics learners who were purposively sampled from twelve secondary schools in the district. The total sample was one hundred and seventy-four respondents. The major finding of the study was that many schools in the district were operating without enough human and material resources to teach Ordinary Level Mathematics. The study recommended that the district and parents should avail human and material resources for the improvement of pass rate in Mathematics. Another recommendation was that Ordinary Level Mathematics teachers should use resources which enable learners to be actively involved in the teaching and learning process.

Introduction

In order to empower Zimbabweans for effective citizenry in the 21st century, a great responsibility falls on the Ordinary Level Mathematics education curriculum to educate well and to include all eligible citizens. This can only be feasible if the government provides an equal platform for learning in terms of availing resources, teachers and to motivate learners. In fact, research findings show that Ordinary Level Mathematics Education empowers learners with the most important skills that they need in order to be productive citizens (Smith, 2011). In fact, Mathematics is one of the most important subjects in the curriculum the world over. Learners` academic performance, especially in Mathematics, is crucial for the development of the society (Mushtaq & Khan, 2012). The country`s progress is directly linked to learners` performance and in particular Ordinary Level Mathematics performance. This means that for a nation to prosper, learners should be exposed to an Ordinary Level Mathematics curriculum which enables them to be open minded and to think logically. Lindahl (2005) postulates that Mathematics Education plays a significant role in influencing an individual`s socio-economic circumstances. The researchers have observed shortage of teaching and learning resources for mathematics as an area which needed attention. There are various variables which come into play as regards the teaching and learning of Mathematics but the primary focus of this study was on resources and how they influenced academic performance in Ordinary Level Mathematics in Glenview-Mufakose district. It looked at availability of resources in the twelve secondary schools in the district.

In Zimbabwe students write their Ordinary Level examinations in June and November of each year. The Ordinary Level Mathematics pass rates for November for the ten years 2008 to 2017 were not pleasing. Comparing with other subjects, Ordinary Level Mathematics has always been the most poorly performed of all the subjects. In 2016, Geography had 41% average performance, ChiShona had a mean score of 60%, Physical Science 65%, English Language 33% and Mathematics had 16% (ZIMSEC, 2018). Ordinary Level Mathematics is one of the core subjects in the secondary school curriculum in Zimbabwe and performance in this subject is crucial for learners` admission to universities, scientific and technological professions. There has been persistent poor performance in this subject in secondary schools, particularly in Glenview-Mufakose district. Lerman (2009) pointed out that both learning and teaching resources influence performance to a greater extent. This triggered the researchers into examining resources as a variable which comes into play that causes the poor performance and how to try to minimise and reduce its impact.

Glenview-Mufakose district has twelve secondary schools. The figure below shows the Ordinary Level Mathematics percentage pass rate (overall mean scores) for two consecutive years 2016 to 2017.

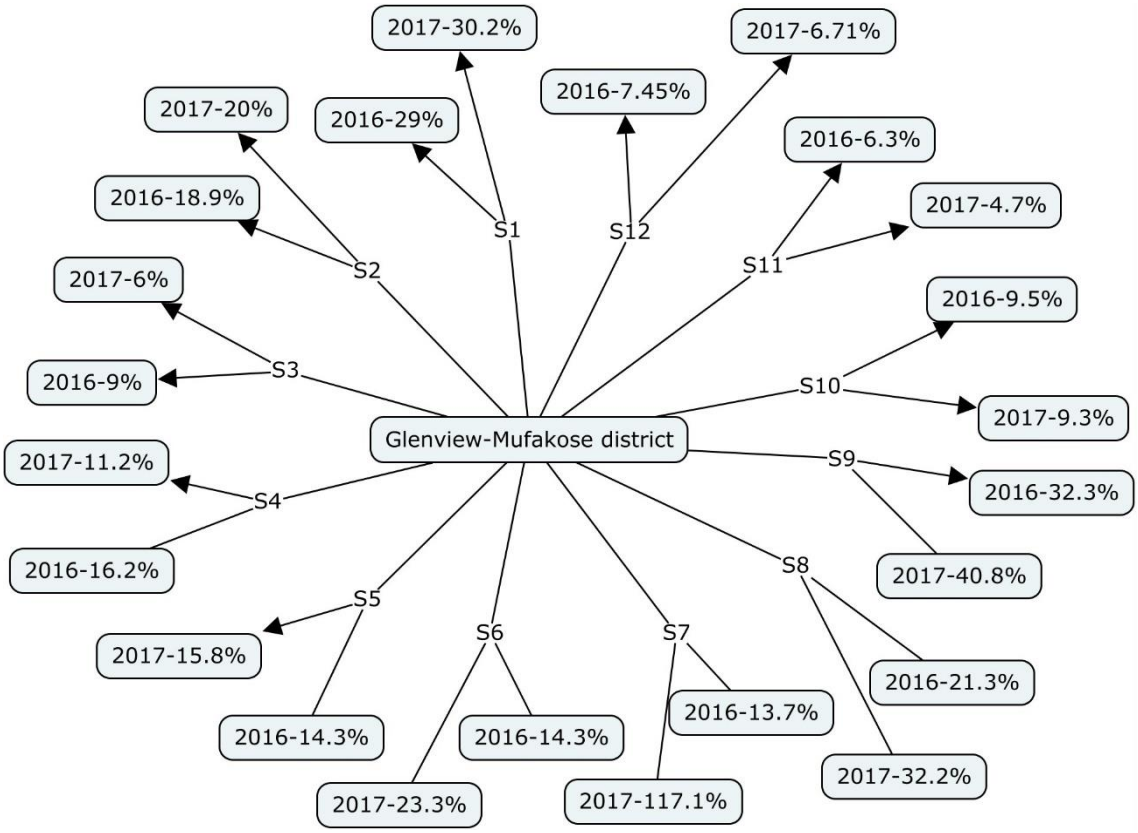

Figure 1.1: Ordinary Level Mathematics percentage pass rate for Glenview-Mufakose district 2016-2017. (Glenview-Mufakose district database (2018) – unpublished).

These statistics show that there is much to be done in terms of how Ordinary Level Mathematics in Zimbabwe should be taught and learnt. The figure above shows an overall mean score rate of 16.1% in 2016 and 18.2% in 2017 for all the twelve secondary schools. The number of learners who wrote Ordinary Level Mathematics examination syllabus 4008 in 2010 was 1 117 136 and the number dropped to 70 801 in 2011, (ZIMSEC, 2012). These statistics seem alarming when coupled with the idea that learners do not possess the Mathematical knowledge that they need to function smoothly in the increasingly technological society. In addition to the low pass rate, the candidature has also been declining. The researchers attribute the decline in candidature to limited resources in secondary schools.

Statement of the problem

Notwithstanding the continued pitiable performance in Ordinary Level Mathematics in Zimbabwe, to the present researchers` knowledge, no study has been carried out in Glenview-Mufakose District of Harare to analyse the impact of resources on poor performance of the learners in this subject. In light of this, the study analysed the influence of teaching and learning resources on poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare in Zimbabwe.

Objectives of the Study

The study seeks to:

a. examine the contribution of resources to learners` poor performance at Ordinary Level Mathematics in Glenview-Mufakose district,
b. establish the learner textbook ratio, computer-learner ratio and calculators-learner ratio in Ordinary Level Mathematics in Glenview-Mufakose district

Research Questions

The study seeks to find answers to the following questions:

a. What resources are contributing to learners` performance at Ordinary Level Mathematics in Glenview-Mufakose district of Harare Metropolitan province?
b. To what extent do resources contribute to poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare Metropolitan province?
c. What is the learner-textbook ratio in Ordinary Level Mathematics in Glenview-Mufakose district?

Literature Review

Quality Mathematics Education should enable learners to form a positive and appropriate image of Mathematics, (Nyikahadzoyi, 2008). For that to be possible, it should be faithful to Mathematics, both in its content and practices. It should enable learners to understand which needs are met by the Mathematics that they are taught and that Mathematics forms part of a long history linked to the history of humanity in Zimbabwe. Mathematics should be part and parcel of human living. It is life. Is this the case with Mathematics curriculum in Zimbabwe? This is another dimension which this research sought to unpack looking at meagre resources in Zimbabwe.

Mathematics curriculum initiatives frequently fail during their implementation stage due to interrelated factors within the organizational context of the school (Rivkin et al, 2005). Specifically, the contextual factors such as shortage of resources can paralyse the performance of learners in Ordinary Level Mathematics. Ost (2014) has posited that there is greater need for shift in orientation. He suggested that teaching should be learner centred. Learners are supposed to be given resources so that they manipulate them as they work on their own with minimum assistance from the teacher. This calls for availing resources for effective learning to take place.

Keeping the learners busy and excited about Ordinary Level Mathematics can be a tall order. Technology can either make the Ordinary Level Mathematics curriculum easier or difficult depending on whether the technological gadgets such as computers, printers, projectors, calculators and computer software are available to the implementers. If such resources are available, it would be easy for teachers to deliver their lessons well. Learners would even practice on their own with minimum assistance from the teacher. The Mathematics curriculum advocates for the use of white boards, interactive white boards, tablets, clickers, graphing calculators and smart phones in the teaching and learning process (Tarzimah, 2005). However, buying these resources can be very expensive to most of the secondary schools in Glenview-Mufakose district. Most of the secondary schools in the district are high schools without boarding facilities. This on its own means that basic resources like textbooks and computers might be at scarce. Without these teaching and learning resources, Ordinary Level Mathematics teaching would be difficult because they influence learning to a large extent, (Nyikahadzoyi, 2008). Ross (2002, p. 8), discussing how developing countries with limited resources can both improve the quality of Mathematics Education and expand access in their efforts to attain the goals of the Dakar Forum (which include expansion of early childhood care and education, provision of free and compulsory primary education for all and promotion of learning and life skills for young people and adults, among others) says, “Ministries of Education will have to develop effective monitoring and evaluation systems that can be used to answer a very important question”. The question on how to improve the quality of mathematics education. However, the researchers think that Ross (2002) `s idea of monitoring and evaluating systems as instruments of improving the quality of

Ordinary Level Mathematics education can hardly work without necessary teaching and learning resources. Even if administrators try to monitor an Ordinary Level Mathematics program, without these resources (financial and material) learning outcomes can hardly be achieved.

Apple (1995) postulates that a significant proportion of the resources of the education systems are absorbed in schools to help teachers develop learners' productive relationships with Mathematics. This should be the situation all over. Learning best happens where there are resources to aid the teaching and learning process. Typically, Ordinary Level Mathematics learners in Zimbabwe spend three hours with their teachers each week developing such relationships. More accurately, the interest, whether expressed in research reports, in reform documents, in the media or in everyday conversation, is focused on what constitutes "good" Ordinary Level Mathematics Curriculum Implementation which will assist in improving the pass rate of Mathematics at Ordinary Level in Zimbabwe which includes Glenview-Mufakose district in Harare.

Methodology

The main purpose of the study was to analyse the impact of resources on poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare in Zimbabwe. The researchers considered a mixed methods approach in this study.

This study was guided and underpinned by two theories, the theory of constructivist learning and The Systems Theory. According to Mawarire (2013), constructivism is basically a theory based on observation and scientific study about how people learn. It stresses that learning should be hands on and that learners should construct their own knowledge. Learners can do that if they have sufficient and appropriate learning resources at their disposal. System theory, on the other hand, was defined by Patton (2002) as a transdisciplinary study of the abstract association of occurrences, autonomous of their substance, type, or spatial or temporal scale of existence. It investigates both the principles common to all complex entities, and the usual mathematical models which can be used to describe them. This paper aimed at showcasing how the two theories (constructivist learning and Systems Theory) would be applied simultaneously in the Mathematics education system of Zimbabwe specifically looking at the impact resources have on performance in Glenview-Mufakose district of Harare Province.

Research paradigm

In the context of this study, research paradigms are perspectives of looking at reality and how it is organized. This study followed a mixed methods approach to research because of its pragmatic nature. This was done to better understand the contribution of resources on poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare. The use of the two methods provided a better understanding of research than either approach as a single unit. Haralambos and Holborn (2008) further defined a research paradigm as a principal guideline which guide researchers on how they ought to carry their research studies and their role in the research process. This is the reason why the present study was designed to use the two methods that produce qualitative and quantitative data.

Research Design

The researchers used the concurrent triangulation design to seek an understanding of the extent to which resources impact on poor performance in Ordinary Level Mathematics in Glenview-Mufakose district of Harare in Zimbabwe. This was done through triangulating data from multiple methods. THE MULTIPLE METHODS WERE USED BASING FROM A PRAGMATIC PERSPECTIVE WHICH INCORPORATES QUALITATIVE AND QUANTITATIVE PARADIGMS. The triangulation design, also called convergent design, is described as a design that involves the collection of different but complementary data on the same phenomena (Edmonds & Kennedy, 2013). In this study, both data which was qualitative and quantitative were collected simultaneously in one phase. The data were presented by quoting respondents' voices and in tables and graphs and analysed separately using themes and t-tests and later on compared and combined. This method was used in this study to confirm, cross-validate or corroborate findings.

Population and Sampling

Glenview-Mufakose district has thirteen secondary schools. One of these secondary schools is a privately owned school. The researchers purposively sampled the other twelve secondary schools. One privately owned secondary school in the district had some reservations and the researcher left it out after consultation with the authorities and concentrated on the remaining twelve secondary schools.

The eligibility criteria in this study were that the participants had to be:

- an Ordinary Level Mathematics teacher, in possession of a minimum qualification of a diploma in Education Secondary and teaching in Glenview-Mufakose district in Harare in 2019.
- a secondary school head in Glenview-Mufakose district in Harare in 2019.
- Ordinary Level Mathematics learners in Glenview-Mufakose district in Harare in 2019.
- a parent of an Ordinary Level learner in Glenview-Mufakose district in Harare in 2019.

Data Collection Instruments

Researchers choose which type of instruments to use based on the research questions (Koskei, Tomui & Simiyu, 2015). In this study, the researchers were guided by the research`s pragmatic approach and chose two data collection instruments to assist in gathering the data required for data analysis. Interviews and questionnaires are the two research instruments used for collecting quantitative data to answer research question one which talks about the availability and ratio of resources to the learners. This was done in order to see how many textbooks, computers and calculators were available in schools versus the number of learners in the schools. The reason was to establish the ratio of resources to the learners so that the researchers would have an informed position of the contribution of resources to poor performance in Ordinary Level Mathematics.

Data Generation Procedures

Data generation instruments which were used to collect qualitative data to answer research questions two and three are observations and documentary analysis. Lessons were observed by the researchers using an observation guide developed for this purpose. The researchers also examined records such as learners` exercise books, the syllabuses and calculators, among others in order to triangulate results found. The responses were recorded manually over a period of six calendar months by the researchers.

Data Presentation, Analysis and Interpretation Procedures

The collected and generated data were presented, analysed and interpreted using a mixed method methodology in which the qualitative and the quantitative paradigms were used. Both data which was qualitative and quantitative were collected simultaneously in one phase, analysed separately and later on compared and combined. A t-test, graphs, tables and charts were used to analyse the mixed data.

Results and Discussion

- **Heads' perceptions on contribution of resources to learners' 'performance**

Question number six on the head's questionnaire requested for information pertaining to availability of Ordinary Level Mathematics teachers at the school. The findings from the survey done revealed that there were no enough teachers to teach Ordinary Level Mathematics in some of the schools in the district. Uzewo (2011) indicates that shortage of human resources like teachers has a very strong negative influence on academic achievement of learners in schools.

In responding to availability if teachers in schools, head of school number two indicated that:

> *My school has only eight Mathematics teachers. Of these, four are teaching Ordinary Level Mathematics, that is form threes and fours. Each stream has on average fifteen classes. Imagine four teachers teaching 30 classes, each class having an average of 50 learners. A class is supposed to have six periods of Ordinary Level Mathematics. This is unbearable. We once requested for teachers and we were told there is a circular which talks about freezing posts and recruitment. At the end of it all, we are left no option, and at the end we just let it be.*

It is very difficult for learners to learn on their own without anyone who will be guiding them along the way. It is of no use to send children to schools where they would learn on their own without any assistance from the teachers. The shortage of teachers resulted in bigger number of learners in one classroom which led to over crowdedness which had a negative influence on learners` academic performance in the Ordinary Level Mathematics. Most of the classes in Glenview-Mufakose district were over crowded. This contributed significantly to the poor performance witnessed in the district under review. It also contributed to ineffective monitoring and evaluation of learners` performances by teachers. It was very difficult for teachers with more than sixty learners to monitor them individually and effectively.

- **Teachers` perceptions on contribution of resources to learners` performance**

Ordinary Level Mathematics teachers are responsible for the teaching and learning of learners, development of schemes of work and lesson plans, managing learners in the classroom and assisting the learners to grasp the Ordinary Level Mathematics concepts. They are also supposed to be involved when resources are being purchased by their schools since they know the resources they want their learners to use. The teacher should plan well for more effective teaching and learning of the Ordinary Level Mathematics concepts. Good planning is associated with availability of resources such as textbooks, manila paper, computers and mathematics software. From the questionnaire survey done by the researchers, the teachers indicated that the Zimbabwean education system is still plagued with many problems like infrastructure, human and material resources. According to these teachers, this had a great effect and impacted negatively on the learners` academic performance in Mathematics. Learners cannot effectively learn when the environment is not conducive for learning. There is no substitute to quality and quality comes about when necessary measures such as availing resources are put in place.

One teacher from school eight was of the view that if schools have adequate resources, the pass rate would improve slightly. She gave an example of her school when she laments that:

> *Adequate teaching staff and availability of resources like textbooks and computers have improved the pass rate in Ordinary Level Mathematics at my school though slightly. We used to experience shortage of human and material resources but for the past four years we witnessed a slight improvement in terms of results.*

- **Learners` perceptions on contribution of resources to learners` performance**

The researchers carried out focus group discussions with the learners and observed that the leaners` poor background, lack of libraries, shortage of textbooks in schools, lack of commitment of teachers and economic downfall were some of the observations made by the learners. Thirty out of ninety learners indicated that they had not seen any textbook at their schools. They said they either use neighbouring schools` textbooks or rely on notes provided by their teachers. The researchers wonder where these Ordinary Level Mathematics teachers were getting the notes from considering that they had no textbooks to refer to. The learners themselves know better the resources they are supposed to use, (Tarzimar, 2005). This would aid the teaching process and improve performance especially in Ordinary Level Mathematics. These findings were in line with the observations from the questionnaire surveys with the teachers and parents.

- **Parents` perceptions on contribution of resources to learners` performance**

The researchers deemed it necessary to solicit parents` views on contribution of resources to learners` performance at Ordinary Level Mathematics. Twenty out of twenty-four parents who were interviewed on the contribution of resources to learners` performance in Ordinary Level Mathematics pointed to economic downfall of Zimbabwe which they said played a negative role on the performance of their children in Glenview-Mufakose district of Harare. Seventeen out of twenty-four parents indicated that their children were relying on textbooks from schools where they go of which most of those schools did not have adequate books for the learners they had. Mathematics at Ordinary Level needs practice and this cannot be achieved without textbooks. These parents emphasised that they cannot afford to buy books for their children because they have been rendered poor by the economy. These findings confirm what scholars like Duke (2000) and Earmon (2005) observed when they indicated that low socio-economic status of parents hinders individuals from gaining access to sources and resources of learning.

The survey done indicated that on average ten learners were sharing a single textbook. Considering that the learners were not boarders, it meant that one learner would use a textbook once in ten days. If resources are scarce, it means the children can only learn when they are still in the school premises sharing those meager resources and no revision is done during their spare time at home since they do not have textbooks to refer to. This lowers the performance of the Ordinary Level Mathematics learners. Nine out of twelve heads pointed out that schools should also hold workshops and seminars for Ordinary Level Mathematics teachers and learners so that ideas are shared which are related to resources and how they can be used to improve performance.

Conclusion

Basing on the participants` responses, the researchers conclude that many schools in the district were operating without enough crucial resources such as textbooks, calculators, the Ordinary Level Mathematics syllabus, and Mathematics software. It was also concluded that mathematics teachers were also scarce in most of the schools. Some schools were operating

without Ordinary Level Mathematics teachers. The teaching of Mathematics at Ordinary Level was very difficult in the absence of such important teaching and learning resources. This came out from an overwhelming number (eighty percent) of respondents who claimed unavailability of such material and human resources in their schools. This had negatively impacted on the teaching and learning of Ordinary Level Mathematics in Glenview-Mufakose district.

Recommendations based on the findings of the study

Based on the findings of this study, the researchers recommend the following:

- The district and parents should avail learning resources such as textbooks for Ordinary Level Mathematics, computers, Geo-boards, calculators and Ordinary Level Mathematics soft wares.
- The secondary schools in the district should establish Ordinary Level Mathematics Associations so that their teachers share expertise as they also learn from other Ordinary Level Mathematics teachers in the other eleven provinces.
- The schools should also hold workshops and seminars for Ordinary Level Mathematics teachers and learners so that ideas are shared which might improve performance in the district in particular and in the country in general.

Recommendations for future research

- It is recommended that future researches should be carried out which involve those districts from the rural and farm districts.
- The present research used a mixed methods approach. Thus, if in future a research which is either purely qualitative or purely quantitative may be necessary so that the in-depth knowledge of the factors contributing to poor performance in Ordinary Level Mathematics in Glenview-Mufakose district can be gained.

References

[1] Apple, M. (1995). Taking power seriously: New directions in equity in Mathematics Education and beyond. In W. Secada, E. Fennema, and L. Adajian(Eds.), *New directions for equity in Mathematics Education* (pp. 329–348). Cambridge, UK: Cambridge University Press.

[2] Barnard, T. and Saunders, P. (1994) 'Is school Mathematics in crisis?' The Guardian, 28 December 1994: 18.

[3] Duke, N. (2000). For the rich it's richer: Print environments and experiences offered to first-grade learners in very low-and very high-SES school districts. *American Educational Research Journal, 37(2), 456-457.*

[4] Eamon, M. K. (2005). Social demographic, school, neighbourhood and parenting influences on academic achievement of Latino young adolescents. *Journal of Youth and Adolescence, 34(2), 163-175.*

[5] Edmonds, W.A. & Kennedy, T.D. (2013). *An applied reference guide to research designs: Quantitative, qualitative and mixed methods.* Thousand Oaks, CA: Sage.

[6] Haralambos, M., & Holborn, M. (2008). *Sociology: Themes and perspectives*. (7thed.). London: Collins.

[7] Lerman, S. (2009). *Pedagogy, discourse, and identity*. In L. Black, H. Mendick, and Y.Solomon (Eds.), Mathematical relationships in education: Identities and participation(pp. 147–155). London: Routledge.

[8] Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research. A research paradigm whose time has come*. Educational Research, 3(3), 14-26.*

[9] Koskei, B., Tonui, R., & Simiyu, C. (2015). School – based factors as determinants

[10] of secondary School learners' dropouts in Bomet County, Kenya. *International Journal of Education and Research, 3*(3), 535-548.

[11] Lindahl, M. (2005). Home versus school learning: A new approach to estimating the

[12] effect of class size on achievement. *Scandinavian Journal of Economics, 107*(2), 375-394.

[13] Mushtaq, I., & Khan, S.N. (2012). Factors affecting learners' academic performance. *Global Journal of Management and Business Research, 12*(9), 1-7.

[14] Nyikahadzoyi M. R. et.al. (2008). *Prospective "A" Level Mathematics teachers' perspectives of the concept of a function.* In Cyril Julie and Oyvind Mikalsen (Eds) Some Developments in Research in Science and Mathematics in Sub-Saharan Africa. African Minds. Somerset West. South Africa. pp 107-131

[15] Patton, M. Q. (2002). *Qualitative research and evaluation methods (3rded.).* London:

[16] Sage.

[17] Rivkin, S. G., Hanushek, E. A., and Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417–458.

[18] Ross K.N., and Mahlck L., (1990). Planning the quality of education: The collection and use of data for informed decision-making. Paris: IIEP.

[19] Ost, B. (2014). How do teachers improve? The relative importance of specific and

[20] general human capital. *American Economic Journal Applied Economics, 6(2), 127-130.*

[21] Smith, D. (2011). *Master of Science in Education: School of Education and Counselling Psychology.* San Rafael, CA: Dominican University of California.

[22] Tarzimar, T. (2005). International Conference on Mathematics Education Research 2010, 142-151
[23] Uwezo, K. (2011). *Are our children learning annual assessment report?* London: Sage.
[24] ZIMSEC (2012). 'O' Level Syllabus Mathematics forms 1-4 (2015-2022). ZIMSEC, Harare. Zimbabwe.