

MIDLANDS STATE UNIVERSITY



FACULTY OF EDUCATION

A baseline study of issues and challenges playing out on teachers in the implementation of the new grade 3 science and technology curriculum at four Primary Schools in Chitungwiza District.

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DEDICATION

This study is dedicated to my parents Mr and Mrs Tsveture, my daughter Beverly, my friends and sisters who have been a great source of encouragement and have shown me the value of education.

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I take this opportunity to express my profound gratitude and regards to my research supervisor Dr Musingarabwi for his patient guidance, encouragement and objective critiques of this study. I am particularly grateful for the assistance rendered to me by Mr Mvududu, his willingness to give his valuable time is very much appreciated. To my fellow Midlands State University classmates, I deeply appreciate the valuable contributions and selfless sharing of ideas. I am grateful to my family and friends for their moral and spiritual support during my study. Above all, I would like to thank God the Almighty, my greatest helper and pillar of strength in this study.

ABSTRACT

This study sought to investigate the issues and challenges playing out on teachers in the implementation of the new grade 3 science and technology curriculum. Further, the study sought to establish the nature of the challenges and how they can be overcome. In order to better illustrate a more detailed picture of the challenges playing out on teachers in implementing the new curriculum, a mixed method research design was implemented where data was collected using both qualitative and quantitative design. A survey was conducted, where twenty teachers from four schools purposefully selected were asked to fill in a questionnaire whilst interviews were conducted with six teachers. From this study, it was found that grade three teachers are facing challenges in the implementation of the new curriculum. These challenges include insufficient learning resources, absence of science laboratories, lack of ICT gadgets, overcrowded classrooms and lack of in service training. Lack of enough funding by the government was one major contributing factor. The teachers indicated that they were failing to cope with the demands of implementing the new curriculum due to these challenges. There was a resolution that Government should ensure that there is adequate funding for the implementation of the new curriculum to achieve the desired goals. Furthermore, there is need for training of teachers to support curriculum implementation.

LIST OF ACRONYMS

ACRONYMS AND ABBREVIATIONS

STEM.....Science, Technology, Engineering and Mathematics

SEITT.....Science Education In-Service Teacher Training

VOCTECH.....Vocational-Technical School

Table of Contents

APPROVAL FORM	i
RELEASE FORM	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
LIST OF ACRONYMS	vi
Chapter One: Introduction	1
1.1 Background to the study	1
1.2 Statement of the problem	5
1.3 Main research questions.....	5
1.4 Sub-research questions.....	6
1.5 Significance of the study.....	6
1.6 Delimitation of the study	7
1.7 Limitations of the study	8
1.8 Assumptions of the study.....	8
1.9 Definition of terms	9
Conclusion	10
Chapter two: Literature review	11
2. Introduction.....	11
2.1 Implementation of a new curriculum	11
2.2 Demands of a new curriculum	13
2.3 Teacher readiness to implement a new curriculum.....	15
2.4 Availability of resources on new curriculum implementation.....	20
2.5. Issues and challenges of implementing a new curriculum.....	22
2.4 CONCLUSION	29
Chapter three: Research methodology	30
3 Introduction.....	30
3.1 Research design	30
3.2 Mixed methods research design.....	30
3.3 Population	32
3.4 Research instruments	33

3.5 Data collection procedures.....	36
3.6 Ethical considerations	37
3.7 Validity and reliability	38
3.8 Data presentation and analysis.....	39
3.9 Summary	39
Chapter Four: Data presentation, analysis and discussion	Error! Bookmark not defined.
4.1 Introduction.....	40
4.2 Questionnaires response rate.....	41
4.3 Interviews.....	41
4.3 Research findings.....	44
4.4 Insufficient learning resources	51
4.5 Absence of laboratories.....	53
4.6 Overcrowded classrooms	53
4.7 Inservice training	54
4.8 Overcoming challenges in curriculum implementation	55
Summary	57
CHAPTER 5: Summary, Conclusions and Recommendations.....	58
5.1 Introduction.....	58
5.2 Summary of the Research	58
5.3 Conclusions.....	61
5.4 Recommendations.....	62
5.5 Recommendation for further study	63
REFERENCES	64
APPENDIX A: TEACHERS' QUESTIONNAIRE.....	68
APPENDIX B: Interview schedule for teachers	71
APPENDIX C: Informed Consent	72
APPENDIX D: APPROVAL LETTER.....	75
APPENDIX E: Authorisation Letter.....	76

Chapter One: Introduction

1. Introduction

The Zimbabwe New Curriculum is driven towards embracing 21st Century skills that will churn out learners who are employable and are able to deliver and implement academic and practical education. Therefore the government has undergone a process of overhauling the 'old curriculum' so as to meet global standards of education and introduced a new curriculum that has been characterised by various issues and challenges. This dissertation is therefore going to investigate on the issues and challenges playing out on teachers' implementation of the grade three Science and Technology curriculum in Chitungwiza District. This chapter is going to focus on the background of the study, statement of the problem, main research questions, significance of the study, limitations of the study, delimitations, definition of terms and concluding remarks shall sum up this chapter.

1.1 Background to the study

In 2016 a pilot programme of the New Curriculum was run by the Ministry of Primary and Secondary Education with the aim of measuring the practicality of introducing a curriculum with different skills set from the curriculum that had been in place since 1980. The year 2017 saw the implementation of the new curriculum across the country. Grades 0, 1 and 3 were to be the pioneers of the curriculum at Primary school level while forms 1, 3 and 5 were to champion the program at Secondary school level. Part of the new curriculum was focused towards the teaching of science and technology at all levels under the STEM program. This study attempts to situate the teaching of science and technology at primary school level with close analysis to the issues and challenges arising from the implementation of the new

curriculum. It attempts to interrogate the issues, challenges and problems that both teachers and learners face in the process of implementing the new curriculum.

The Government of Zimbabwe decided to implement a new education curriculum that is driven by an interdisciplinary and applied approach of Science, Technology, Engineering and Mathematics (STEM). The need for curriculum geared towards Science and Technology is a result of global requirements and 21st Century expectations for education. The world is now driven on a more scientific and technological wheel, hence Zimbabwe cannot lag behind. To be in sync with current developments in education, the local system must be in tune with the global market. Producing learners who are “bookish” (Nyerere,) in a world that calls for the use of practical skills is a futile exercise thus the importance of tailoring the Zimbabwean curriculum in line with global standards is a necessity.

Governments, through their relevant ministries responsible for education, will from time to time review, update and improve education curricula so as to ensure that knowledge and skills acquired are relevant to the ever changing environment. Once curricula has been developed or reviewed, it has to be implemented in the educational system. The implementation of the new curricula is mandatory for teachers under the supervision of ministry officials. Successful curriculum implementation is therefore critical in meeting the ministry’s vision, mission and objectives for the education system. A report by the National Academics Press (2005) cited in Hays (2009) comments that Science and Technology Education became a necessity in the United States to address building concern over the shortage of scientifically and technologically gifted personnel. It points out that

In a world where advanced knowledge is widespread and low-cost labour is readily available, the advantages of the United States in the market place and in science and

technology have begun to erode. A comprehensive and coordinated federal effort is urgently needed to bolster competitiveness and pre-eminence of the United States in these areas (pg.1).

The report further offered recommendations in which the American Government was tasked to “increase the talent pool of America through improvements in mathematics and science education, sustain and strengthen our nation’s commitment to long term basic research, develop recruit, and retain top students, scientists,, and engineers from both the United States and abroad and ensure that the United states is the premier place in the world for innovation” (Hays, 2009). One of the major challenges that the implementation of Science and Technology in American high schools met was, as Hays points out that “many educators do not yet come to the realisation that STEM education is more than simply a new name to the traditional approach to teaching science and mathematics. Nor do they understand that it is more than just the grafting of ‘technology’ and ‘engineering’ layers onto standard science and mathematics curricula”(Hays, 2009). Given this background, it is clear that the implementation of teaching Science and Technology at high school level in America faced many challenges. It is from this point of view that the researcher aims to interrogate if the implementation of a similar program at a lower level, Grade 3, in Zimbabwe, has been met with issues and challenges.

As part of the global drive to a more scientific and technological market there was need for a changed curriculum in Zimbabwe so as to fit and meet global standards. In January 1998, the government of Zimbabwe launched the Presidential Commission of Inquiry into Education and Training (CIET), popularly known as the Nziramasanga Commission whose mandate was to conduct a holistic inquiry into the educational system of the country. This culminated

into the Nziramasanga a Commission Report of 1999. The report tries to integrate theory and practice as it seeks to produce students who are self-reliant and who possess skills that are applicable and relevant in the global market. This has seen the introduction of the new Curriculum which embodies the following concepts as stated by Curriculum Development and Technical Services (2015):

- ❖ STEM
- ❖ SEITT
- ❖ VOCTECH
- ❖ Self- reliance and
- ❖ Entrepreneurship

The new curriculum aims to produce self-reliant entrepreneurs than job seekers. To ensure effective and efficient implementation of the new curriculum, teachers are a central and critical group. It is important to note that awareness training on the new curriculum was given to the teachers, however, the question that arises is whether this theoretical awareness is enough for effective implementation and facilitation of the program? It further explores the demands placed on the teacher in the implementation of the new curriculum, especially, the teaching of Science and Technology at Primary School Level.

In Zimbabwe the New Curriculum has been faced with a lot of resistance from parents, learners and teachers themselves such that its implementation has become an almost difficult process. In the researcher's interaction with fellow teachers, it is clear, from their various complaints, that teachers are not ready and willing to implement the curriculum. The University of Zimbabwe's department of Science and Mathematics, led by Mr J. Mutambara,

carried out an investigation through nationwide meetings with various stakeholders and discovered that in terms of Science and Maths at Primary school, the main concern is that “it creates delivery challenges. This has been worsened by the fact that the weekly learning hours have also been reduced” (Mutambara, 2017). Despite this being the only challenge raised in the Curriculum Review Symposium, in terms of Science and Maths at primary level, teachers continue to indicate that the curriculum is difficult to implement. With this view in mind, the researcher set out to investigate the issues and challenges that teachers are facing in implementing Science and Technology at grade three level.

1.2 Statement of the problem

While the old curriculum has always been embracing the teaching of science and technology in the primary school, not much is known about issues and challenges that teachers are experiencing regarding teaching of the new Science and Technology curriculum. It is therefore, pertinent to find out if there are ensuing issues and challenges facing the teacher in the teaching of Science and Technology at Grade 3 level within Chitungwiza District.

1.3 Main research questions

The Science and Technology Syllabus postulates that the Science and Technology learning area is a primary school course that provides learners with the opportunity for both cognitive and practical experiences that help them to understand, interpret and offer practical and meaningful scientific solutions to their natural world. The main research question is a baseline study of issues and challenges playing out on teachers in the implementation of the new Grade 3 Science and Technology curriculum.

1.4 Sub-research questions

Teaching of Science and Technology at Grade 3 level is centralised on the teacher adopting a learner-centred participatory approach. This approach will emphasise hands on multi-sensory problem identification and problem solving. With the introduction of the new Curriculum in Science and Technology at Grade 3 level, interest in how it is implemented has grown and the following research questions will attempt to guide the articulation of such interest:

1. How are teachers coping with the demands of the new Science and Technology curriculum in general?
2. How capable are teachers in using the teaching approaches required of the new curriculum?
3. How adequate are the resources and materials required for teaching Science and Technology?
4. What are the main challenges that teachers are facing in teaching this area?
5. How can teachers overcome these challenges?

1.5 Significance of the study

This study is significant in that it contributes to the education sector by examining the challenges faced in the implementation of Science and Technology at Primary school level, especially at Grade Three, so as to find possible solutions to the problems and consequently seek out new strategies for the effective implementation of the STEM curricula, particularly Science and Technology at primary level. Interrogating such challenges is critical in finding ways to shape holistic individuals and a nation built by scientifically and technologically aware citizens at national and global levels. This study is important to curriculum planners as

it may expose issues and challenges that impede proper implementation thus allowing them to revisit and re-align affected areas within the Science and Technology syllabi.

Introducing a new curriculum for Primary and Secondary Education meant a change in pedagogy, objectives and aims for teaching and learning. The Science and Information Communication Technology syllabus has been tailor made to augment and corroborate global standards hence the need to understand the teaching of that particular learning area in line with world expectations and techniques. This study is crucial in exploring the teaching strategies used in delivering relevant Science and Technology information and skills. This study is therefore beneficial to classroom practitioners as it explores any challenges related to the strategies used in teaching science and technology, thus allowing the introduction of more recent and effective methods of teaching.

Overall, this study is justified for it also interrogates critical pedagogical issues that may increase value to the study of Science that considers the rationale outlined in the new curriculum and the Science Syllabus for 2015-2022. This may also give new insights to literary writers to expand and refocus their work towards more recent practical skills, teaching techniques and more practical ways of imparting Science and Technology to enable the production of learners who are relevant and can adapt to the ever-changing global environment.

1.6 Delimitation of the study

This study is delimited to the implementation challenges playing out on teachers in the teaching of Science and Technology at Grade Three level in Primary Schools within

Chitungwiza District. Due to Funding and time constraints, the research will be confined to Primary Schools in Chitungwiza District. This is the area which is easily accessible to the researcher. Findings from this research will be used to draw inferences of all Grade Three classes in Chitungwiza.

1.7 Limitations of the study

- The new curriculum has only been implemented 8 months ago and this might not be adequate time for teachers to have fully comprehended the challenges. Consequently, this may compromise the validity and reliability of the findings.
- There may be time constraints and the researcher will not be able to cover all schools in Chitungwiza District. Each of these schools is unique, hence the findings of the Four schools may not to some extent apply to all the schools in the district.

1.8 Assumptions of the study

Before undertaking this study, the researcher made the following assumptions. Practising Grade 3 teachers are aware of the fact that:

1. The Zimbabwean Education system is undergoing paradigm shift, from an academic perspective to a practical-oriented curriculum.
2. School teachers are trained professionals who have the capability to teach and implement the Science and Technology learning area.
3. Learners are not empty vessels but have, inherent in them, an actively scientific and technological mind that requires guidance through creativity, innovation and ingenuity to reach their full potential.

4. School environments and the local environment are at the disposal of implementers to provide a scientific and technological environment for the spear heading of the teaching of Science and Technology at Grade Three level in Zimbabwean schools with particular reference to Chitungwiza District.

1.9 Definition of terms

Curriculum

The Curriculum Framework for Primary and Secondary Education (2015:2) defines a curriculum as “the sum total of all learning experiences and opportunities that are provided to learners in the context of formal and non-formal education.”

Implementation

Execution or practice of a plan or any design, idea, model, specific standard or policy of doing something. As such implementation is the action that must follow any preliminary thinking in order for something to actually happen.

Science

The systematic study of nature and behaviour of the material and physical universe, based on observation, experiment, and measurement, and the formulation of laws to describe these facts in general terms (Science, 2018).

Technology

The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science and pure sciences (Technology, 2018).

Conclusion

This chapter serves as a permeable to the research study. It provided the background knowledge of the issues and challenges teachers are facing on the implementation of the new Science and Technology curriculum which helped in giving a focus on the research. The purpose of the study, statement of the problem, citing research questions in order to segment the study was outlined, significance of the study, limitations and delimitations, assumptions of the study and definition of terms was done. The next chapter focuses on literature review.

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Chapter two: Literature review

2. Introduction

This chapter examines related literature that is linked to the study. An attempt shall be made to analyse the challenges encountered in the implementation of a different curriculum. Review of related literature on issues and challenges playing out on teachers in the implementation of the new Science and Technology curriculum shall be carried out in the following topics:

- Implementation of a new curriculum.
- Teachers perceptions on a new curriculum
- Availability of resources to support new curriculum implementation.
- Main challenges faced by teachers on the implementation of the new curriculum

2.1 Implementation of a new curriculum

The issue of new curriculum is not a new phenomenon globally and there are various researchers who have investigated on different issues that influence and affect curriculum changes. The developmental advancement of science and technology globalisation is becoming a reality and those economies that fail to adjust to this phenomenon will find themselves operating on the periphery of global village (UNESCO , 2005). Therefore if all countries are to fit in this category of global science and technology they are bound to revisit their curriculum so as to engage in education for sustainability which aims at changing the approach to education by integrating principles that will promote critical thinking and problem solving skills and many other skills that will breed learners who will be scientists ,engineers and technologists who make innovative use of knowledge , information and opportunities of international standard.

A report by Henna Richardson on BBC (2015) on the adoption of a new curriculum in England where millions of children were to begin a new tough curriculum stated that there was need for learning computer coding and other related subjects. The association's education policy advisor Jill Stoke said the department of education set its aim with the intention to prepare children for life in modern Britain. The rewritten national curriculum was described by the minister as rigorous, engaging and had tough sets of the framework for what children will be taught between 5- 14 years in England. Former minister Michael Gore has said changes were necessary for England to keep pace with the most successful education systems in the world report (Richardson.H , 2014) Therefore this report gives a baseline support to the need for almost all countries need to adopt new curriculums in a bid to produce a globally literate citizenry which is critical to the nations continued success in the global economy.

Other countries like South Africa (S.A) were not left behind in this bid therefore they sought to also engage in curriculum changes .In the Proceedings of Academy of science of South Africa forum by (Grayson D. J 2009). The state of science and mathematics in South Africa schools has frequently been termed a national crisis .South African learners have fared poorly in comparative tests of science and maths on both international and regional levels. Therefore the Ministry of Basic Education advocated for the introduction of a new curriculum. Professor Robin Crewe President of Science Academy of South Africa made a concrete proposal on how the situation could be improved .

The standing committee of ASSAF chaired by Professor Jill Adler made recommendations based on evidence at what (Shulman .2004) calls for wisdom of practice .The SA education focused on meeting the needs of student who will follow diverse paths after they leave school.SA then focused on key areas on the implementation of the curriculum and comprehensive support that goes with it.

From the above information it is clear that the adoption of a new curriculum was a necessity in the global arena where the countries curriculum must go beyond centred knowledge to include a strong emphasis on 21 first skills development. Zimbabwe in a bid to embrace 21st century skills that will churn out learners who are employable globally underwent a process of overhauling the old curriculum so as to meet global standards of education. . A pilot programme of the New Curriculum was run by the Ministry of Primary and Secondary

Education with the aim of measuring the practicality of introducing a curriculum with different skills set from the curriculum that had been in place since 1980. The year 2017 saw the implementation of the new curriculum across the country. Grades 0, 1 and 3 were to be the pioneers of the curriculum at Primary school level while forms 1, 3 and 5 were to champion the program at Secondary school level. Part of the new curriculum was focused towards the teaching of science and technology at all levels under the STEM program.

2.2 Demands of a new curriculum

A study by Suyanto (2013) on the implementation of a new curriculum in Indonesia found that schools were not ready to implement the new curriculum. The research findings further established that the readiness of the schools was affected by the poor of the resource availability. The results also pointed out that there was a limited number trained teacher and teachers lacked understanding on the learning and assessment process on the new curriculum. The teacher also had difficulties on developing a lesson plan, using scientific approach and implementing authentic assessment. Furthermore, results contented that only few students had laptops and smart phones and teachers had less knowledge on the websites with good information that could be used in the new curriculum.

The research instruments and data analysis method used seem to quite appropriate as they provided varied responses indicated on the findings. They outlined crucial problems on schools readiness which actually point out the demands of the new curriculum that need to be looked into for the attainment of successful implementation of a new curriculum. The researcher will look at to what extent were the schools in Zimbabwe ready to adopt a new science and technology curriculum.

Saudi Arabia implemented a STEM curriculum in which Science, Technology, Engineering and Mathematics were to be taught from primary school. A study by El-Deghaidy and Mansour (2015) found that a major demand on the teacher is that they should have pedagogical knowledge in Science and Technology education. Without the requisite skills and techniques of teaching STEM subjects, teachers are faced with a huge challenge as they fail to deliver knowledge effectively to learners. What this entails is that in implementing a new curriculum the demand on teachers is to employ interdisciplinary teaching methods

rather than individualistic approaches to teaching. This calls for a change in teacher perceptions of what teaching and learning is. It demands that teachers have shared goals and collaboration to ensure success in implementing a new curriculum.

A study by Stoll and Fink(1996) found that collegiality is a strong feature of a positive school culture, and includes shared goals and responsibility for success, continuous improvement, risk taking, lifelong learning, support, mutual respect, openness and humour. While interrogating the challenges facing teachers in implementing a Science and Technology Curriculum ,Stroll and Fink (1996) found that the adequacy of resources in employing teaching strategies for effective implementation of the curriculum and delivery of content is key.

The success of implementing Science and Technology Education lies in an integrated approach (Kelley and Knowles, 2016). It is an approach that does not treat Science and Technology as individual subjects but infuses them into the various learning areas learners encounter in the learning process. The integrated approach ensures that Science and Technology underlies all learning in the school environment. The idea is to create a holistic approach to the effectiveness of Science and Technology as a tool for imbuing 21st Century skills. The question this research aims to answer is whether there any challenges playing out on teachers as they implement the Science and Technology curriculum. It also examines the adequacy of resources needed in implementing this curriculum.

Curriculum development entails that each subject area have aims, objectives and expectations guiding the teaching-learning of that area. In the development of Zimbabwe's new curriculum saw the introduction of new subjects at various levels of education, that is from Primary through to Secondary level. Science and Technology is one of the new learning areas that emerged in the new Curriculum and was introduced at grade three level. Before discussing the challenges met by curriculum implementers on an international, regional and national level, it is critical that the aims, objectives and expectations of the said curriculum be detailed in order to put into perspective the requirements for the implementation of Science and Technology at Grade 3 Level. This will assist in determining if at all there are any issues and challenges associated with its implementation.

2.3 Teacher readiness to implement a new curriculum

In a study by Yildiz-Duban, N. (2013). carried out a research in primary schools in Afyonkarahisar, Turkey to identifying science and technology teachers' views of primary school science and technology curriculum, the study findings stated that the curriculum supports scientific process skills of the students, their understanding about the relationships between scientific topics and daily -life activities, science and technology literacy, and environmental awareness, and that they appreciate with these aspects of the new curriculum. It was also found that “teachers have generally positive views in relation to the goals of the new curriculum.” Regarding the content of the new curriculum, it was found that science and technology teachers regard the curriculum as one in which topics are related with learners day to day lives.

Furthermore, Lee and Yin (2011) also found that teachers may have both positive and negative views with regard to the implementation of new curricula. Regarding the evaluation process of the new curriculum, it was found that participants have both positive and negative views. The characteristics of the evaluation process of the curriculum that were regarded as positive by the participants are as follows: more objective measurement, evaluation of the learning process, and use of various measurement tools. The finding of variety of measurement tools seen as a positive aspect of the evaluation process is consistent with that of the study by Hargreaves and Earl (2002).

Negative views of the participants regarding the evaluation process are mostly related to the following points. It is seen that negative views were about teaching practice and that participants were in a need of professional help. Although the curriculum is effective for some years, there are still problems experienced by teachers. The reason for such problems may be that mostly theoretical courses are given to the teachers rather than practice-oriented ones during their in-service training, and that teachers have some prejudices against the curriculum.

Ogar, Effiong, and Aniefiok (2012) carried out a survey which focused on the challenges of curriculum implementation. The findings of the study articulated on the importance of teachers to the socioeconomic development of any nation cannot be overemphasized. This is because teachers are responsible for the translation and implementation of educational

policies, curriculum or course offerings. Wallace and Loaden (1998) say since what teachers do in their classrooms depends largely on their knowledge, teachers will need to learn a great deal to be able to enact reform based curriculum. The Journal of Education and Practice (2012) further supports the argument when it says, teacher education therefore constitutes a conspicuous element in the totality of organized education, formal and non-formal subsystems. Conversely, the policy that all teachers in educational institutions should be professionally trained appears to be the most unfulfilled goal or policy as teachers from pre-primary to the university level remain largely untrained. A closer look at the above statement in relation to my study can indicate that teachers' readiness to implement a new curriculum may be compromised. Ogar, Effiong, and Aniefiok (2012) further say that the teacher education program appears not to prepare teachers to meet up with the challenges of the 21st century. In this paper, effort was geared towards taking a cursory look at the challenges that has bedevilled the curriculum implementation in Nigerian teacher education institutions.

The introduction of Science and Technology at primary level is government and the Ministry of Primary and Secondary's initiative towards strengthening the country's human resource base in terms of churning out a workforce that is able to fit and integrate meaningfully with industry and society. English, (2016) asserts that when properly implemented Science and Technology education enables graduates to be productive straight out of school. It is also important to note that the modern day world is driven by computing, software, connectivity and science and these areas require a new skills set that should be planted at primary school level. This study interrogates the issues and challenges that teachers encounter in the process of implementing Science and Technology at Grade 3 level.

2.3.1 The science and technology curriculum in Zimbabwe

For Zimbabwe to be an active participant in the global economy it has operate in line with global expectations and requirements. For the development of its economy, it has to premise its education on the global standard of Science, Technology, Engineering and Mathematics (STEM). CDU (2015:11) points that Science and Technology education is critical in empowering learners with 21st Century skills for effective citizenry and employment, hence the need for school institutions to engage learners with "renewed focus on STEM so that they

can thrive in a knowledge-based economy and society.” In support of the need for Science and Technology, Wagner (2012 cited in CDU, 2015:11) states that

STEM education empowers learners with the most important skills that they need in order to be productive citizens. Such skills include critical thinking and problem solving, collaboration and leading with influence, agility and adaptability, taking initiative and being enterprising, effective oral and written communication and capability to access and analyse information.

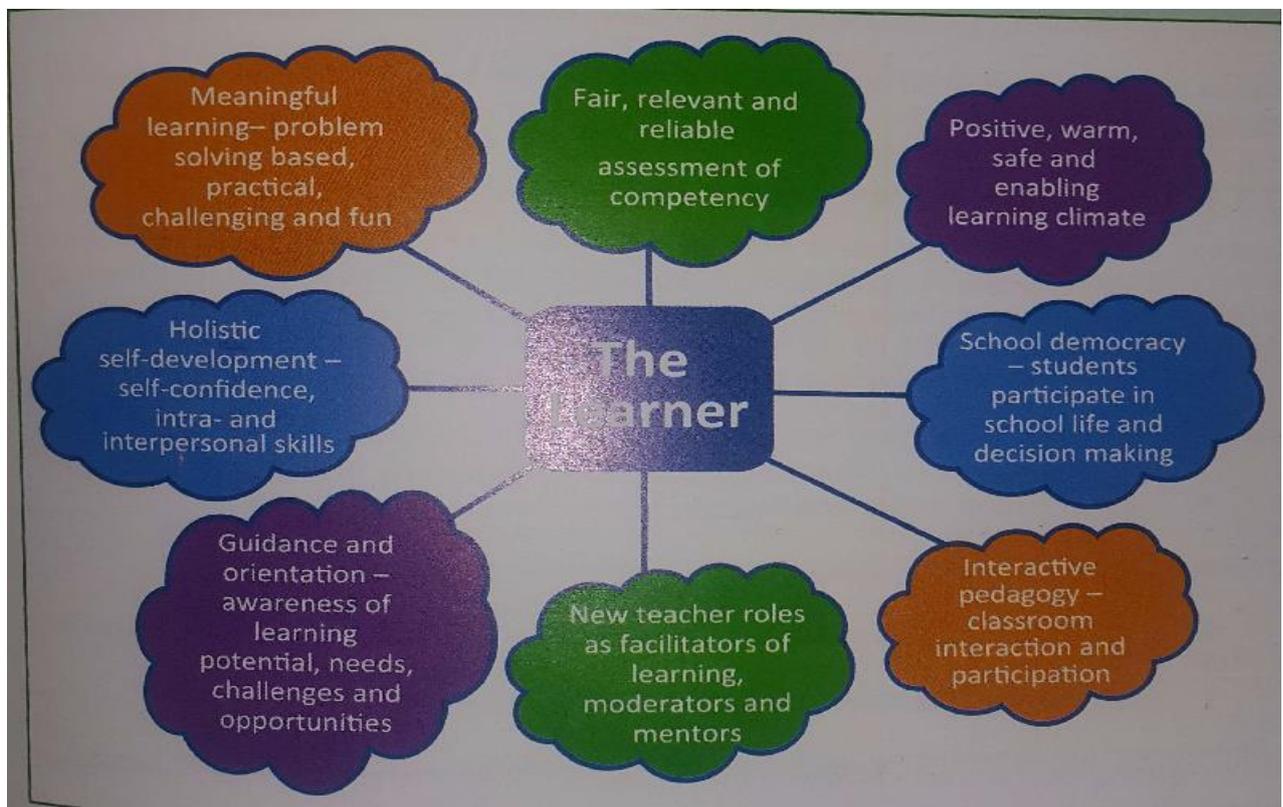
These skills are important as they prepare learners to become positive and meaningful contributors to the economic, political and social future of Zimbabwe in particular and the world in general. It is therefore critical that an examination of the issues surrounding and challenges faced in implementing the Science and Technology curriculum at Primary level be carried out so that solutions can be sought.

The success of implementing Science and Technology Education lies in an integrated approach (Kelley and Knowles, 2016). It is an approach that does not treat Science and Technology as individual subjects but infuses them into the various learning areas learners encounter in the learning process. The integrated approach ensures that Science and Technology underlies all learning in the school environment. The idea is to create a holistic approach to the effectiveness of Science and Technology as a tool for imbuing 21st Century skills. The question this research aims to answer is whether there any challenges playing out on teachers as they implement the Science and Technology curriculum. It also examines the adequacy of resources needed in implementing this curriculum.

Curriculum development entails that each subject area have aims, objectives and expectations guiding the teaching-learning of that area. In the development of Zimbabwe’s new curriculum saw the introduction of new subjects at various levels of education, that is from Primary through to Secondary level. Science and Technology is one of the new learning areas that emerged in the new Curriculum and was introduced at grade three level.

2.3.2 Methodology for teaching science and technology at grade three

While the traditional methods of teaching and learning were heavily reliant on the teacher’s knowledge, the new curriculum has a strong bias towards the learner. Learners have become central to the learning process as they seek out new knowledge. The Curriculum Development Unit (2015:40) stresses that “the focus on learning revolves around learners as they engage in the search and discovery of new knowledge. The teacher acts as a co-explorer and facilitator in knowledge discover in order to arrive at an objective understanding of content and demonstration of skills acquired.” The learner is no longer perceived as an empty vessel and the teacher as an ocean of knowledge, but the learner has free range to explore the environment in search of knowledge and the teacher as a guide in the discovery of knowledge. The centrality of the learner in the teaching and learning process is illustrated in the Curriculum Framework (2015-2022) as follows:



Learner Centred approach (CDU, 2015:41)

The learner-centred approach to teaching and learning is characterised by inquiry-based learning in which the discovery method, project-based learning, problem-solving learning and design-based learning are employed in the quest for knowledge and skills.

In discovery learning, Castronova (2011) postulates that learners are able to solve problems by using knowledge they previously possess or from past experiences to discover facts. It provides “active, hands on opportunities for learners” (ibid: 12). This method also ensures that learners explore and engage themselves in problem solving to “create, integrate and generalise knowledge” (CDU 2015:43). Discovery learning provides learners with an opportunity to interact with the environment and individually discover facts and knowledge about a learning problem or challenge. Individual involvement makes them more focused and motivated to learn. Bicknell-Holmes and Hoffman (2000: 313-314) stress that activities in the discovery method “encourage integration of new knowledge into the learner’s existing knowledge base,” thus, assuring learners of remembering information that they have discovered on their own.

Project-based learning gives learners an extended period of time to interact with the environment, investigating and responding to complicated challenges and questions (CDU, 2015). Learners carry out in-depth inquiry into challenges presented to them. They become actively involved in the rigorous process of seeking out solutions. As they seek out solutions on their own, learners develop skills that are relevant to 21st Century expectations-problem solving, critical thinking, collaboration, communication and innovation. Another teaching approach based on inquiry-based learning is the problem-solving method which according to Savery (2006: 9) “involves empowering learners to conduct research integrate theory and practice, and apply knowledge and skills to develop a viable solution to defined problem.” All these approaches empower students to be independent learners and discoverers of knowledge.

What then is the role of the teacher as stipulated in the new curriculum? The Curriculum Framework for Primary and Education (2015-2022) clearly articulates the expectations on the teacher in relation to the implementation of the new curriculum. The teacher roles stipulated are not subject specific but are cross cutting and apply to all learning areas. Teacher roles spelt out by CDU (2015:44-45) include (i) use of wide range of methods adapted to the learner’s situation and needs in the context of interactive pedagogies. (ii) Possesses

intercultural understanding; life skills; health education; economic and entrepreneurial education; media education; ICT and e-learning. (iii) Facilitates learning for learners and engages them in meaningful activities. This is to mention just but a few.

The teacher roles expressed above, point to a teacher whose role has been transformed from a 'pool of knowledge' to a supporting role in which learners are more involved in the acquisition and search for knowledge. It also speaks to a teacher who must possess 21st century skills and attributes to enable creation of a learner friendly environment. Therefore it is of paramount importance to empower teachers by providing teacher education (The Journal of Education and Practice, 2012) .According to Osuji (2009), Teacher Education refers to professional education of teachers towards attainment of attitudes, skills and knowledge considered desirable so as to make them efficient and effective in their work in accordance with the needs of the society at any point in time. It includes training/education occurring before commencement of service (pre-service) and education/training during service (in-service or on the job). This research study, therefore, aims at interrogating the challenges facing teachers as they implement the Science and Technology curriculum at Grade 3 in view of the above stated expectations, methodologies and teaching content. It explores the readiness and capacity of teachers in implementing the Science and Technology Curriculum

2.4 Availability of resources on new curriculum implementation

Resources are the back borne of curriculum implementation and it promotes the viability of curriculum implementation. Various empirical researches have carried out to establish the importance of resources and the effects of their absence. Salahuddin (2013) carried out a research on Primary level English curriculum implementation in Bangladesh Primary. The main purpose of this study was to find out the challenges of implementing English curriculum at primary level in rural schools of Bangladesh. This research is looking at challenges in English curriculum and it is slightly different in terms of subject but challenges in curriculum implementation of this research can be capitalised by the researcher to see if they also exist in Science and Technology curriculum implementation.

The findings of the study also indicate that most of the rural schools students are poor in English language due to lack of skilled teachers. Another challenge observed in the study was

the of lack of proper teacher training which resulted in them not being able to use proper teaching methods and materials .The results further indicated that there was lack of physical facilities. All teachers claimed that they had no language laboratory facilities for students were unable to do an experiment which is one of the key authentic sources of problem solving skills needed by the new curriculum. The research says teachers also admitted that there is lack of electricity supply, library books and apparatus and so on. As a result English curriculum implementation at primary level in Bangladesh is becoming unsuccessful.

Another research on adequacy of resources was carried out by Yara in Kenya in the (2010).. The study looked at the effect of teaching/learning resources on academic performance in secondary school mathematics in Bondo district of Kenya.The research design for this study is descriptive survey design. This is because the researchers will not be able to manipulate the variables for the simple reason that they have already occurred. The research respondents for this study were students obtained fromstratified random sampling. One validated research instrument was Student Questionnaire on Performance (SQP) designed by the researcher.

The findings of this study shows that classroom and teaching aids are significant. These findings are in consonance with the findings of Yadar (2007) and the report by UNESCO (2008) which that opined that teaching/ learning materials such as textbooks, class rooms, teaching aids (chalk, board, ruler and protractor), stationeries and laboratories affect academic performance of the learners. Also the result of the findings agreed with that of Mutai (2006) who asserted that learning is strengthened when there are enough reference materials such as textbooks, exercise books, teaching aids and class rooms while He further asserted that academic achievement illustrates per excellence the correct use of these materials.

In addition the study outlined that provision of conducive classrooms and laboratories and other learning resources can positively change teachers' attitude to the teaching of mathematics and make the subject to be very interesting, meaningful and exciting to the students and hence will encourage mathematical exploration and manipulation by students will keep them alive and thinking and will also help them to realize the applications of mathematics knowledge to daily lives.

Government financial support was also significant. This purports that without government financial support to the schools, most of the infrastructures like classroom buildings and other learning materials may not be available for use by the students. It is therefore necessary that the government should increase its support both financially and materially towards support of teaching of mathematics in all schools in Kenya.

Lack of trained teachers was found to be significant. Teachers are the curriculum implementers and should be adequately trained for the purpose of performing to their level best during the curriculum implementation. In Zimbabwe teachers are also trained and the researcher using knowledge gained from this study will investigate to what extent they have been trained and how effective is their training in new curriculum implementation. Recruitment of competent teachers to improve teacher-student ratio is a necessary measure in improving performance of students. Birgen (2005) asserted that experience and qualification is the best asset for handling a task. In his findings, teaching is one of the duties that require both qualification and experience for better delivery.

Finally, the study recommended that review of curriculum, in-servicing of trained teachers, recruiting more competent teachers, motivation of learners, improved government support to education, good teaching methods, improved students-book ratio and better remuneration of teachers. This study will use these recommendations to establish if such issues influence the implementation of new Science and Technology curriculum in the Zimbabwean situation.

2.5. Issues and challenges of implementing a new curriculum.

Curriculum development and implementation is a process that has taken place in many countries the world over. In the case of implementing a totally new curriculum-with new expectations- issues, challenges and problems are sure to emerge.

Makunja (2016) carried out a research in Tanzania. The research paper investigated the challenges facing teachers in implementing competence based curriculum in secondary schools in Tanzania. The focus of this study differs on subject being investigated and the country where the research was carried out however they are both looking at challenges faced

in implementing curriculum. The study employed a qualitative research approach which utilized a case study research design. The sample of the study includes teachers, heads of schools and academic mistresses who were randomly. Questionnaires and interviews were used to collect required information. The collected data were analysed using content analysis. The researcher acknowledged that no single method is self-sufficient or adequate in itself in collecting valid and reliable data (Creswell, 2005). Thus, in this study two methods were used as a means of offsetting the weaknesses or biases which can be found in one method. The study methods of research are appropriate as it gives a balance by using various methods to offset weaknesses which increases the validity of results collected.

The responses compiled from teachers' questionnaire and interviews from heads of secondary school and academic masters/mistresses confirmed that lack of in-service training for teachers, insufficient teaching and learning resources, imbalance on teacher-pupil ratio affected the successful implementation of competence-based curriculum. Having gained this knowledge the researcher will borrow the research methods used in this study.

On the same issue of new curriculum implementation and its challenges, Aldhafeeri & Al-Awidi (2007) carried out a research on the implementation of a new ICT curriculum in Kuwait and commented that "to meet the new demands, teachers need to know more than core subjects". They need to acquire all technical and pedagogical skills that enable them to integrate digital technology effectively and efficiently into the school curriculum (pg.106). They go on to state that the Kuwait Ministry of Education has realised the importance of teacher-readiness in integrating technology in the teaching and learning environment. This is supported by Singh & Chan (2014) who state that successful implementation of any curriculum heavily rests on teacher-readiness and willingness to adopt it and implement it. This means that attitude change is a major demand on the teacher in implementing a new curriculum. This study aims to find out if these are some of the challenges affecting teachers in the implementation of the Science and Technology at Grade 3.

Other curriculum issues are the demand on professional development of the teacher. UNESCO (2016:34) stresses that teachers are critical in curriculum implementation in that "it is teachers who decide and adapt the learning content, activities and pace that the children

need to move through the curriculum in ways that ensure they learn effectively, they should be provided with guidance on how to plan learning and progression, and on the kinds of classroom learning that bring the curriculum to life.” This implies a need for thorough training and resource support for the teacher to ensure successful curriculum implementation. Continuous professional development becomes a critical and necessary demand on the teacher.

The Department of Education in Dublin, UK, carried out a research on the teaching of Science in Primary School and realised that the effective and efficient teaching of Science at Primary school requires teachers who are knowledgeable in Science. In Irish schools, for instance, “a considerable number of the teachers working in Irish Primary Schools at the time of evaluation had not received any pre-service training in science education”(Department of Education, 2006:4). The report indicated that a considerable number of teachers who teach science do not possess the necessary confidence because their knowledge is limited to basic science education. The underscoring realisation is that, teachers require content mastery of Science and Technology if they are to successfully implement the curriculum and provide learners with authentic guidance in their discovery of Science and Technology education. The major thrust of this study is to explore the various challenges that teachers face in the process of implementing the Science and Technology curriculum at Grade 3.

Further issues were revealed in a study carried out in the United State of America on the challenges to successful implementation of STEM curriculum, Ejilawe (2013) compiled the following list of barriers

1. Poor preparation and shortage in supply of qualified STEM teachers.
2. Lack of investment in teacher professional development.
3. Poor preparation and inspiration of students.
4. Lack of connection with individual learners in a wide variety of ways.
5. Lack of support from the school system.
6. Lack of research collaboration across STEM fields.
7. Poor content preparation.
8. Poor content delivery and method of assessment.
9. Poor conditions of laboratory facilities and instructional media
10. Lack of hands on training for students (Ejilawe, 2013: 63-74)

These challenges are generalised across the implementation of the STEM curriculum in America and affect both teachers and learners. This study aims to discover the challenges ensuing the implementation of the new Science and Technology curriculum on teachers in Zimbabwean primary schools in general and in Chitungwiza District in particular.

In Rwanda, after the 1994 genocide, the Rwandan government was faced with the challenge of meeting curriculum demands and improving the learning environment. One of the critical issues it faced and vowed to address is resource unavailability. Commenting on this issue state that “major challenges that Rwandan system of education has to put up with at all levels insufficiency of infrastructure, equipment and lack of didactic material.” They further posit that teachers argue that ineffective teaching and learning is a direct result of the scarcity in resources. Resources are a critical part of curriculum implementation and insufficiency of resources, as in the Rwandan case, has a negative impact on education delivery. In light of the Science and Technology curriculum, there is need for a variety of resources for both the teacher and learners, together with the natural and local environment playing a supportive role, such that for its effective and efficient implementation, resource availability is the backbone of implementation. The teaching of Science and Technology at primary school there is need for a variety of resources. Badeka (1999 cited in Benjamin & Orodho (2014:113) points out that “providing sensory experiences for children in the classroom helps children learn better. In early grades, an opportunity for learning through manipulating objects pays dividends for internalising knowledge by children.” Teachers need to be availed with a variety of resources to ensure that they “motivate learners to create their own knowledge by exploring, analysing and understanding” (Badeka, 1999:16). The importance of resources in curriculum implementation cannot be underestimated because without resources and infrastructure, education for lifelong learning cannot be achieved. HigherLife Foundation carried out a study on STEM education in Zimbabwe and report, from their findings that,

The major thrust of Sustainable Development Goal (SDG4) is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. This SDG is achievable only if the drivers of quality education are put in place of which school infrastructure is one of them. Despite the greater demand of education in the

rural areas of Zimbabwe and net enrolment ratio, the issue of infrastructure is a hindrance to the progression of SDG4 by 2030 (HigherLife Foundation, 2016:23).

This is a categorical statement that places resources and infrastructure as the backbone of curriculum implementation. In terms of Science and Technology, in a research carried out by Zvavahera (2015), the findings show that 90% of schools in Mazowe District do not offer science subjects because they do not have laboratories. In view of the findings aforementioned, this study interrogates the issues surrounding the implementation of Science and Technology curriculum at primary school level, Grade three in particular. It aims to answer whether there are sufficient resources for the effective implementation of Science and Technology and if teachers have the ability to implement the curriculum in question.

Resources are not the only issue surrounding curriculum implementation; content mastery is also a major concern. An analysis of the MALATI project in the Western Cape of South Africa shows that lack of content mastery is one of the major challenges in the implementation process. MALATI is a curriculum and teacher development project in which “teachers do not demonstrate solution methods for problems, but expect students to construct their own strategies, and depend on peer collaboration for error identification and the development of more powerful strategies” (Bennie & Newstead, 1999:2). In their research, they indicate that teachers’ knowledge levels and gaps are a cause for concern in the implementation of any curriculum. Content knowledge influences classroom instruction and the quality of learners’ experiences. In a report on findings of studies commissioned by the President’s Education Initiative (PEI) in South Africa, Taylor & Vinjevold (1999) state that “one of the most consistent findings of a number of PEI projects pointed to teachers’ low levels of conceptual knowledge, their poor grasp of their subjects and the range of errors made in the content and concepts presented in their lessons.” What this implies is that teacher knowledge and content mastery is a major demand in implementing any curriculum hence the need for teacher development in their various learning areas.

Implementing a new curriculum requires that those implementing it change their attitude and create time to put into place, perspective and practice what the curriculum requires. Carter and Richards (1999:5) posit that in implementing a new curriculum there is “a universal issue/dilemma of time, and the teachers’ belief that if they do not spend their time ‘covering the curriculum’ they will be damaging the students.” Teachers may be too afraid to move

into a new area hence they will remain stuck in the old curriculum thus impeding the smooth transition from 'old' to new curriculum. This calls for a change in attitude and time. Are teachers attitudes' ready for the implementation of the Science and Technology curriculum? Do they have the ability to effectively deliver Science and Technology education with the required mastery and skills?

Since the introduction of the new curriculum in Zimbabwe, there have been conflicting perceptions in terms of its relevance, adoptability and adaptability, and demands on the teacher. The debate on the new curriculum even went as far as various stakeholders calling for its removal. Primary School teachers were disgruntled about the introduction of Science and Technology as a learning area, different from the usual general paper. This study aims to explore the issues surrounding the Science and Technology curriculum at primary level? The Programme for International Student Assessment (PISA) in 2003, carried out a research on the effects of new science curricula in OECD countries and discovered that teachers at primary tend to teach Science in a generalised manner rather than "the deep knowledge that underlies knowledge work" (PISA, 2003b). They further state that teachers are afraid of moving from traditional models of teaching and learning every time new methods are introduced. It is this commitment to traditional models that cause both teachers to resist new curricula and causes implementation challenges. The Centre for Educational Research and Innovation (CERI) states that

A set of key findings has emerged from learning sciences research: the importance of learning deeper conceptual understanding, rather than superficial facts and procedures, the importance of learning connected and coherent knowledge rather than knowledge compartmentalised into distinct subjects and courses, the importance of learning authentic knowledge in its context of use, rather than decontextualized classroom exercises and the importance of learning collaboratively rather than in isolation (CERI, 2003:2).

Despite suggestions supported by various research findings, it is clear that teachers are fixated on traditional models of teaching and learning and are unable to quickly adopt and adapt to curriculum changes. This research seeks to find out if teachers have the ability to implement new curricula and if are they knowledgeable enough to move from generalised

superficial facts to the contextualised deeper knowledge as required by the Science and Technology curriculum at Grade 3?

Another researcher on curriculum change and education reforms, Bentley (2009) posits that bureaucratic systems of government inhibit teachers and learners from implementing curriculum changes. He explains that “the familiar model of teaching has become so entrenched that it is simply impossible to overturn it, because of the vested interest and centuries-old habits that hold it in place. Traditional models of bureaucracy are usually characterised as rigid, rule-based, and internally focused” (Bentley, 2009:6). In as much as teachers may want to implement the changes proposed in a new curriculum, they are not given enough room to practice their creativity with learners as they are constantly called in to conform. Dambudzo (2015:16) carried in his research on curriculum issues in developing countries pointed out that the Zimbabwean curriculum is that it should “reflect the Zimbabwe context” and be “consistent with the international trends” implying that the education system must focus on both, Zimbabwe’s development needs and those of the world or global village. The question that needs answering is whether the Zimbabwean system supports this framework In terms of resources required for its successful implementation? Are teachers provided with the necessary latitude to resources or are limited by the red tape system that is rampant in government departments?

Dambudzo (2015), in his research on curriculum issues states that in developing countries, a key curriculum implementation issue relates to how teachers are guided through the curriculum and policy implementation process. What this entails is that teachers be properly appraised and trained on the expectations of the curriculum and the skills teaches must possess to ensure successful curriculum implementation. When teaches are aware of the expectations it is easier to put into place teaching and learning activities that lead to purposeful , meaningful and relevant education. Such an approach will ensure that learners acquire education for sustainable development. With such a background, the researcher intends to investigate what issues arise in the implementation of the Science and Technology curriculum for Grade 3 because it is novel to teachers hence the importance of proper guidance.

The Zimbabwe new curriculum is based on the global Education for Sustainable Development model, hence, requires integration of academics and industry. Learners must be relevant to industry, hence the importance of “extending the classroom to the real world” (Brundiers, Weik & Redman, 2010) or as described by Zuber-Skerritt (2012) from “learning organisation to the learning community.” What this entails is a curriculum that takes into cognisance the role of industry in developing learners for 21st Century expectations. The issue relating to the curriculum as discovered by Dambudzo(2015:18) in his research in developing countries, with Zimbabwe as a case study, is that “ the success of offering such an education system would depend on the presence of components of effective teaching and learning : technological, content, leadership and pedagogical knowledge.” Does the Zimbabwean education system and industry collaborate in providing the kind of education the new curriculum is driven at? In view of the Science and Technology curriculum for Grade 3, the researcher aims to interrogate if there is collaboration between science and technology industries and the education system? Do learners have access to the actual environment in which scientific and technological knowledge is practiced? Are teachers aware of industries that they can collaborate with in the teaching and learning of science and technology to ensure learner involvement and motivation? Based on literature related to curriculum issues around the world, the aim of this study is to interrogate issues and challenges in implementing the Science and Technology at Grade 3 in Chitungwiza District.

2.4 CONCLUSION

In this chapter existing and related literature on curriculum issues around the world was reviewed. The existing research studies highlighted on issues related to demands, challenges, expectations and requirements, and resource availability in implementing a new curriculum. The review explored how these issues impede or aid the successful and efficient implementation of any new curriculum. In the next chapter, research design and research instruments will be discussed showing how these are relevant in analysing the data.

Chapter three: Research methodology

3Introduction

This chapter discusses the research design adopted in this research including sampling population, research instruments, data collection and data analysis processes.

3.1 Research design

Babbie and Mouton (2001) define a research design as a plan, structure and strategy for achieving the research objectives and controlling variables. In this regard, a research design provides the programme upon which the researcher is guided in the systematic analysis of observed facts (Bless and Higson-Smith, 1988). When conducting a research, the researcher should adopt a systematic approach to finding answers to the identified research problems (Saunders et al, 2003) the credibility of the research findings depends on the validity and reliability of the data collection and analysing methods used. In this research, the researcher used the qualitative research supplemented by quantitative designs with questionnaires and interview schedules as the main research instruments. No one design is completely exclusive to a particular research .Therefore the mixed methods research design was used. The basic rationale of this design is that one data collection form supplies strengthens to offset the weakness of the other form (Creswell ,2009).

3.2 Mixed methods research design

A mixed method research design is a procedure for collecting, analysing and “mixing” both qualitative and quantitative methods in a single study or series of studies to understand a

research problem (Creswell and Plano,2011). The basic assumption of the researcher is that the use of both qualitative and quantitative methods in combination provides a better understanding of the research problem and question. The research collected data using both qualitative and quantitative design but the overall design will still emphasise qualitative approaches (Cooper & Schindler, 2001).

The results are more effective at recording outcomes of the closed ended questions than identify through interviews only on how individuals are experiencing the process of the new curriculum implementation. Although the researcher used mixed method and since the design will still emphasise qualitative approach which is the Phenomenological approach.

This qualitative research is approached from a phenomenological view. Moustakas (1994 cited in Creswell, 2009:13) defines phenomenological research as:

A strategy of inquiry in which the researcher identifies the essence of human experiences about a phenomenon as describe by participants. This description culminates in the essence of the experiences for several individuals who have all experienced the phenomenon. This design has strong philosophical underpinnings and typically involves conducting interviews.

Teachers as a group have experienced the new curriculum hence the use of a phenomenological approach in conjunction with the qualitative method has been chosen in this study. The aim of this study is to explore their experiences and understand their perceptions of the new curriculum, particularly Science and Technology at grade three. Through understanding their views, the researcher will be able to ascertain what the issues and challenges are in relation to the implementation of the said curriculum. Mixed method design is fitting for this study because it aims to explore phenomena and describe

experiences, thus is more flexible in terms of the research instruments used and questions asked which are both open-ended and closed ended rather than being restricted to particular answers of a research method. This approach to research is also important in acquiring subjective and personal experiences and opinions of the respondents in the study. This research is an investigation into the issues and challenges playing out in teachers in the implementation of the new curriculum in Science and Technology at Grade 3 level in schools in Chitungwiza.

3.3 Population

A population is defined as any aggregate of individuals, not necessarily animate, subject to a statistical study (Adams, 2004). It is a total collection of individuals who share common characteristics in which the researcher is interested, from which a sample will be drawn for the purpose of research. For this research, the population consists of 30 Primary schools in Chitungwiza District. From those 30 schools, a population of 180 Grade 3 teachers provided a pool of participants from which I selected my sample. Of the 30 schools, the researcher purposively selected 4 schools based on proximity to the researcher so as to save on both cost and time. The researcher chose this method because it allowed her to move easily to schools to collect data.

3.3.1 Sample and sampling procedure

A sample is defined by Millan (2010) as a selection of items from a population. It is a representative group whose characteristics are common to the population. A sample has to be selected using any of the number of techniques available in research. A sampling technique is a procedure used when selecting elements of study from a chosen population (Boyd, 2001).

For this study, purposive sampling was used. Family Health International (2005:5) state that “purposive sampling groups participants according to preselected criteria relevant to a particular research question.” The technique was chosen because the researcher needed to reach a targeted sample quickly and only a particular group of teachers (Grade 3 teachers) who are at schools in the district were relevant to this study. The researcher targeted 4 schools, two government schools, one council school and one church owned school. Pseudo names Kudu, Buffalo, Impala and Sable were used for ethical reasons to identify the selected schools. Out of the 4 schools, a total of 20 teachers were used as the sample. 20 teachers completed the questionnaire and 6 were interviewed for the purposes of methodological triangulation of data.

3.4 Research instruments

A research instrument is a tool for collecting data in a research. Various tools are at the disposal of the researcher to collect data during a study and these include questionnaires, interviews, observations, focus group discussions among many. For purposes of this study, the researcher used questionnaires and interviews.

3.4.1 Questionnaire

The questionnaire as a research instrument has advantages as well as disadvantages. A questionnaire is one of the research instruments which is widely used by researchers to obtain data from respondents. Annum (2017:1) defines a questionnaire as “a form of inquiry document, which contains a systematically compiled and well organised series of questions intended to elicit the information which will provide insight into the nature of the problem under study.” The questionnaire can either be structured, close form or unstructured, open

form. In this case the researcher administered both unstructured, open form questionnaire in conjunction with structured-closed questionnaire to ensure that respondents provide honest and undirected opinions, perceptions and attitudes towards the problem under study. Questionnaires are a time-efficient way of collecting data from many people. Closed-ended questionnaires can easily be analysed in a straightforward way.

The main disadvantages of the questionnaire as stated by Akbayrak (2000) relate to issues of flexibility, reliability, response rate and validity, however the advantages outweigh the disadvantages in that the questionnaire saves time and cost and the easiest tool to administer. The unstructured questionnaire also provides respondents with an opportunity to respond to question without bias or influence from the researcher as in the structured questionnaire (Patton, 1990). The responses provided are not controlled by the provided answers but are well thought out answers that reflect the respondents' real emotions and opinions, hence, it was chosen as one of the main instruments for data collection. The questionnaire is also easy to answer and can be hand delivered to respondents saving on time and cost. Since questionnaires are time saving, easy to administer and allow respondents to give their perceptions freely, it was for these reasons which inspired the researcher to choose using both structured and unstructured questionnaires.

Questionnaires were administered to Grade 3 teachers at the selected schools. Out of the sample chosen for this study, 20 teachers answered questionnaires and 6 teachers were interviewed.

3.4.2 Interviews

An interview is a two way conversation initiated by a researcher or interviewer to obtain information from one or more respondents. Kvale (1996:14) regards interviews as “an inter

change of views between two or more people on a topic of mutual interest, sees the centrality of human interaction for knowledge production, and emphasizes the social situatedness of research data.” Interviews, therefore, help participants to talk about their views, opinions and interpretations of given phenomenon. Gray (2004) posits that interviews are ideal for collecting research data because they increase the chances of getting highly personalised data, there are more chances for probing, the return rate is good and they cater for participants who are unable to read or write. Interviews can either be structured, semi structured, unstructured or non-directive. In this research semi- structured, face to face interviews will be used. Semi-structured interviews are used when one does not want to test a specific hypothesis and are not standardised (David & Sutton, 2004). In this form of interview, the researcher does not use a list of pre-determined questions but has a list of themes, topics and questions to be covered within the interview.

The researcher has an interview guide but has the free range to ask any other questions that may arise in the course of the interview. In this study, semi-structured face to face interviews are ideal as the intention is to interrogate the issues and challenges teachers are facing in implementing Science and Technology at Grade 3. This requires an in-depth analysis of their opinions and views thus requires a data collection tool that allows the researcher to dig deeper. Although semi structured interviews have their drawbacks especially when the interviewer has no experience, s/he may fail to probe into a question thereby missing out relevant data (Kajornboon, 2005).

The major strength of semi-structured interviews are that the researcher can prompt and probe deeper into a situation. The researcher can ask more detailed questions as they are not confined to a structured research guide. Patton (2002) in support of semi structured interviews

explains that they are ideal for qualitative analysis because they present more flexibility as the interviewer can change the order of the questions based on the responses of the interviewee. Semi-structured interviews allow the researcher to explain and rephrase questions if the respondents are not clear. The researcher tape recorded the interviews in order to ensure that all the information provided by the respondent was captured. Recording interviews afforded the researcher an opportunity to concentrate on listening and responding to the interviewee rather than capturing information.

3.5 Data collection procedures

The research was carried out in three primary schools in Chitungwiza District under the province of Harare. The researcher applied for permission from the Ministry of Education authorities, the Provincial Director and school heads to conduct the research in schools and it was granted.

Robson (1993) defines data collection as the procedures taken into administering instruments and collection of data from respondents under study. The main types of data to be collected in the mixed method design is the administering of questionnaires and interviews.

The researcher interviewed six teachers two from each school one on one situation so as to get first-hand information directly from knowledgeable informants who are grade three teachers who are administering the new Science and Technology curriculum. The researcher intends to obtain a special kind of information and investigate for herself what is going on in the respondents' mind. The point is that the researcher cannot observe the informants'

feelings and thinking, so that interviewing is a key to understand what and how people perceive and “interpret the world around them” (Burns .1999).

The researcher went to selected schools and distributed questionnaires to the supposed respondents who completed them in the presence of the researcher to avoid influence of other teachers but to obtain only information from the appropriate respondents. These instruments were administered simultaneously that is to say interviews and questionnaires were administered on the same day at each school to avoid lapping of questions which would produce distorted information that would compromise the validity of the study.

3.6 Ethical considerations

Ethical considerations in research are critical. When conducting mixed methods research, it is important to adhere to principles of qualitative and quantitative research ethics (Creswell 2013).Chiromo (2006) views research ethics as principles of right and wrong that govern the operations of researcher during the research process. The handling of these ethical issues therefore has a great impact to the integrity of the research. There are many ethical principles that can be considered in educational research examples include informed consent ,confidentiality, anonymity, deception, privacy and plagiarism (Chikomo 2006). Confidentiality has to do with the people who will have access to data collected (Tuckman (2008).The researcher is going to protect the integrity of the research by observing anonymity and confidentiality by protecting the research participants through not including names on questionnaires and any identity details. The researcher made sure that the gathered information would not be made available to anyone who is not directly involved in the study.

Cohen and Manion (1996) view informed consent as the procedures in which research participants are free to choose to take part or not to take part after being adequately supplied with relevant facts that have a high probability of influencing his or her decision. The researcher will fully explain procedures to be followed in the data collection and the purpose of the research so as to allow the participant to make a decision on whether to participate in the research or not.

3.7 Validity and reliability

Coolican (2004) postulate validity as the extent to which instruments measure what they intend to measure. Coolican further explains validity as the extent to which a research effect can be trusted as real as not contaminated or confounded.

According to Babbie (1998) in Rukuni (2001:6) “reliability is a matter of whether a certain technique when applied repeatedly to the same object will produce the same results each time.

Generally, there are various procedures of collecting data. The main instruments used in this research was the mixed method research which consists closed-ended, open-ended questionnaires, interviews. These different ways of gathering information can supplement each other and hence boost the validity and dependability of the data (Creswell 2013).

However, the critical point is that when designing a questionnaire, the researcher should ensure that it is “valid, reliable and unambiguous” (Richards & Schmidt, 2002, p. 438). To ensure the validity of the questionnaire the researcher has used closed questions on issues that may bring ambiguity. As a matter of fact, closed-ended questionnaires would

provide the inquirer with quantitative or numerical data and open ended questionnaires with qualitative or text information.

The fact is that each type of questionnaire has its own strengths and weaknesses. Seliger and Shohamy (1989) are of the opinion that closed-ended questionnaires are more efficient because of their ease of analysis. On the other hand the important issue in open-ended questions is that the responses to these types of “questions will more accurately reflect what the respondent wants to say” (Nunan, 1999, p. 143). Therefore, it is better that any questionnaire include both closed-ended and open-ended questions to complement each other which will comprehend their validity and reliability.

The researcher also administered instruments simultaneously to people so as to acquire data are more identical, correct and standard. The researcher also sought permission to carry out this study from the Ministry of Primary and secondary Education for the purpose of making the research a valid document.

3.8 Data presentation and analysis

The data collected by questionnaires was first grouped and coded into themes based on the responses given by the respondent. This was done to summarise the data into specific categories for analysis. Data from the interviews was transcribed for the purpose of easy content analysis and capturing all useful points. A descriptive analysis of data was carried out.

3.9 Summary

This chapter outlined the population sample, the research design, research instruments, data presentation and analysis, ethical considerations and the validity and reliability of the

research. The research instruments of a mixed research design were used such as the questionnaires and interview. Chapter four focuses on discussion of data collection.

CHAPTER Four: Data presentation, analysis and discussion

4.1 Introduction

This chapter deals with the presentation, analysis and discussion of data. The data to be presented first are concerned with demographic data followed by the data from the findings itself. For purposes of structuring and organising this work logically the data shall be presented in the order of the research questions. Finally the discussion of the data will also be in cooperated by drawing the findings that were reviewed in the literature comparing them with the findings of the study.

4.2 Questionnaires response rate

Twenty questionnaires were distributed to the targeted respondents in four schools. All the questionnaires were completed and sent back to the researcher representing 100% response rate.

4.3 Interviews

The researcher also conducted face to face interviews to the respondents so as to get a deeper understanding of their views towards the new curriculum implementation and also as way to validate some of the teachers' responses from the questionnaires. The researcher planned six interviews and managed to conduct all the intended six interviews achieving 100% response rate.

4.3.1 .Social demographic data

GENDER

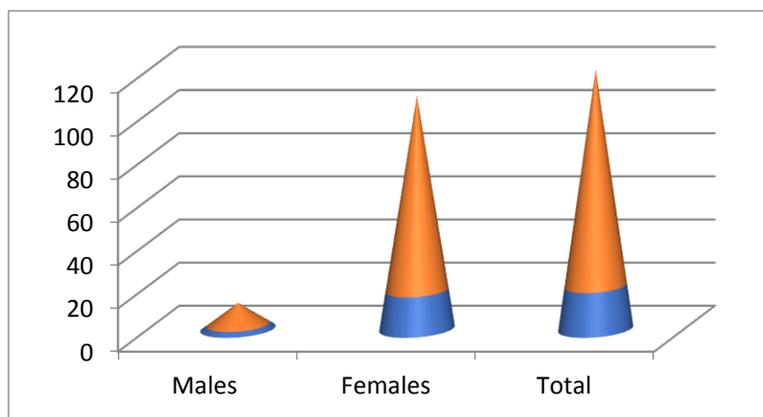


Figure 4.1 n=20

The gender distribution containing the respondents is 10% males and 90% females. This means that the gender distribution gives a bias as more females' perspectives will dominate this is due to the fact that the teaching field is mainly dominated by females that portray gender bias.

Age

<i>Range in years</i>	<i>No of respondents</i>	<i>Percentage</i>
31—40	9	45%
41-50	6	30%
51 and above	5	25%
Total	20	100%

Table 4.1 n=20 Teachers ages

The response rate by age shows that most of the respondents are mature people aged between 30 years and above

WORK EXPERIENCE

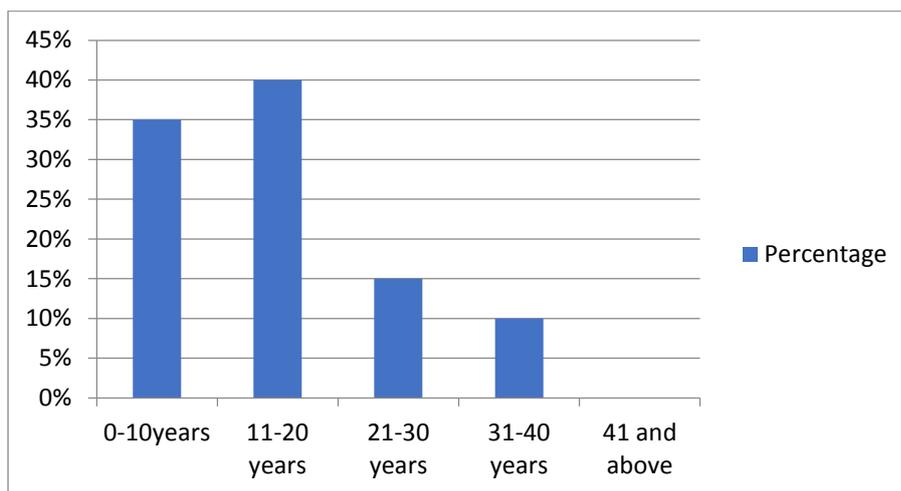


Figure4.2 n=20 work experience

The column graph shows that most respondents are senior teachers who have a lot of experience whereby they have been in the teaching field for 10 years and above. Therefore this can be of influence to the teaching of the new curriculum since they understand the dynamics of teaching.

Academic level

Level of education was another factor used to categorize the respondents as shown.

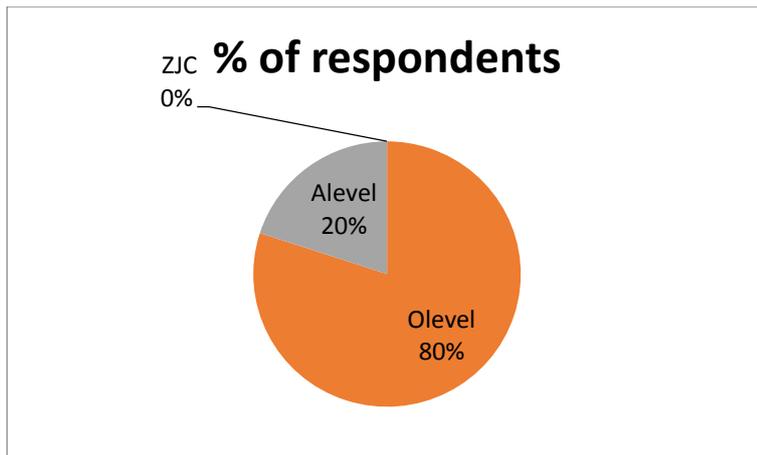


Figure 4.3 n=20 academic achievements

The table shows that 80% of the respondents reached O` Level and 20% reached A` level of education. These levels of education show that the respondents are adequately education to understand the needs, demands and educational concepts of the new curriculum science and technology curriculum.

4.3 Research findings

This section is going to analyse research findings and discuss their implications in relation to literature reviewed.

4.3.1 Coping with the demands of the new Science and Technology Curriculum.

To answer research question number one which says: How are teachers coping with the demands of the new Science and Technology curriculum in general? The interviews and the questionnaire asked teachers to highlight some of the demands of the new science and technology curriculum. Most teachers reported the demands of the curriculum namely, computer literacy, appropriate teaching approaches, adequate resources for teaching and learning. Findings from questionnaires and interviews revealed the common theme that recurred as:

Teachers' inability to cope with the demands of the curriculum.

In terms of the data collected from the open-ended questions in the questionnaire that was completed by 20 participants, was the need for laboratories. 55% of the respondents in questionnaires mentioned the need for laboratories and 50% of the interviewed respondents also confirmed the need for them. In addition, the need for electrified classrooms and computers was one of the outlined demands for the new curriculum in science and technology with interviewee Red actually mentioning that some topics like electricity and electronics needed a hands on approach which needed electricity to achieve the intended goals. These findings are in agreement with the highlighted Nziramasanga (1999) report in chapter two that outlined that the education department had to find adequate resources and electrify 70% of rural schools that do not have electricity to bring qualitative reforms in education.

To expand further, Part .b of question one on the questionnaire asked teachers if they were coping up with the demands of the curriculum. From the findings 75% of the questionnaire respondents and 66% interviewees indicated that they were not coping up with the curriculum demands. Moreover 45% of the respondents alluded that they could not cope up due to lack of resources.

4.3.2 Capability of teachers

To answer research question two which says: How capable are teachers in using the teaching approaches required of the new curriculum? A four point likert scale was used for data

collection and the following results were produced.

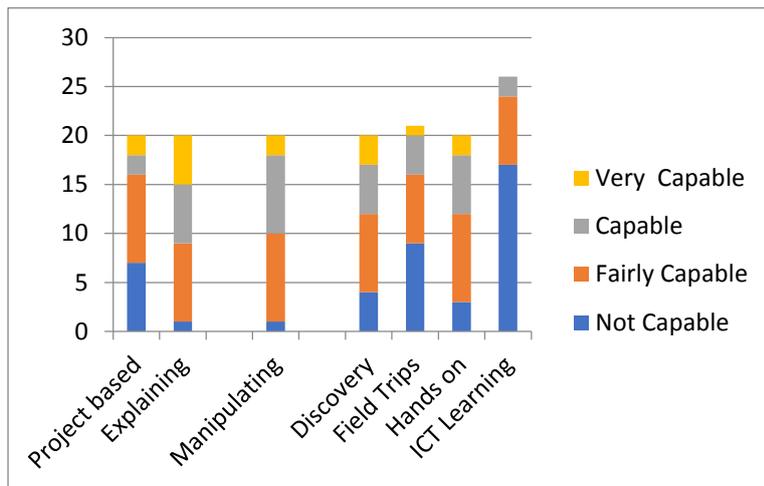


Figure 4.4 n = 20 Teachers capability on using approaches

The figure shows that on project based approach 35% of the respondents were not capable to use it and 65% of the teachers indicated that they were capable of using the project based approach. Out of the 20 twenty respondents in questionnaires 5% are not capable to use explanation whilst 95% of the teachers indicated that they were capable of using the explanatory approach. From the findings 5% were not capable to use manipulating and 95% could use manipulation when teaching. In conjunction with the interview results four out of six interviewees outlined that they were capable to use manipulation.

Findings indicate that 20% were not capable to use the discovery approach whilst 85% were fairly capable to use the discovery approach. On field trips 55% were capable of using field trips and 45% were not capable. In support of the questionnaire results all the six respondents interviewed indicated that they were not able to use field trips due lack of funds by schools to facilitate the trips. The findings indicated that 15% were not capable of using the hands on approach whilst 45% indicated that they were fairly capable of using the hands on approach.

30% were capable of using this approach whilst 10% were very capable of using the hands on approach.

Research findings revealed that 85% of the respondents are not capable in using ICT learning whilst only 15% of the respondents are capable of using. In addition from the interviews 2 respondents indicated that they were capable in using ICT whilst four of them outlined that they were not capable in using ICT learning. The interviewees outlined that they faced challenges in using these approaches mainly due to unavailability of resources needed to facilitate their use and the greatest number could not use ICT because there was no in service training that was done upon the introduction of ICT learning in schools.

The Curriculum Development Unit in Zimbabwe (2015:40) stresses that “the focus on learning revolves around learners as they engage in the search and discovery of new knowledge. The teacher acts as a co-explorer and facilitator in knowledge discovery in order to arrive at an objective understanding of content and demonstration of skills acquired.” To assess the extent to which teachers are capable of using these approaches to facilitate learning the researcher looked at the range of percentages shown on fairly capable and capable whereby, if the percentages of these two ranges are added they gave a percentage that ranged between 55% and 75% in the project based, explaining, manipulating, discovery, and field trips approaches. Therefore, from an introspective look at the results on these approaches they show that to a satisfactory extent teachers were capable of using these approaches in the teaching of science and technology. The remaining few percentages that appear on not capable and very capable can effectively indicate that although they can use these approaches they are not performing to their maximum potential may be due to various reasons that can be

outlined in questions that will explore on the main challenges that they encounter during the implementation of the new curriculum.

A further look at the results on ICT it shows that most teachers are not capable of using ICT in their teaching as 85% indicated that they were not capable and 15% said they were fairly capable .The implication of this is that there a gap that exists in the teaching field that need to be addressed as a matter of emergency as this world because of globalisation is technologically fast moving therefore teachers as imparters of knowledge should be abreast with current systems.. Furthermore, Suyanto (2013) in his study said only a few students had laptops and smart phones and teachers had less knowledge on the websites with good information that could be used in the new curriculum

This concurs with the findings in The Curriculum Framework for Primary and Secondary Education (2015-2022) clearly articulates the expectations on the teacher in relation to the implementation of the new curriculum whereby the teacher should use a wide range of methods adapted to the learner's situation and needs in the context of interactive pedagogies. It also speaks of a teacher who must possess 21st century skills and attributes to enable creation of a learner friendly environment. Therefore the government should make significant efforts to engage in in-service training for teachers in ICT since it is a subject that was recently introduced in schools and it is taught by specialised teachers. This finding should therefore be an eye opener to the government to address the need to increase teacher competency. Aldhafeeri and Al-Awidi (2007) supports this when he said, teachers need to acquire all technical and pedagogical skills that enable them to integrate digital technology effectively and efficiently into the school curriculum.

4.3.3 Adequacy of resources

How adequate are the resources and materials required for teaching Science and Technology?

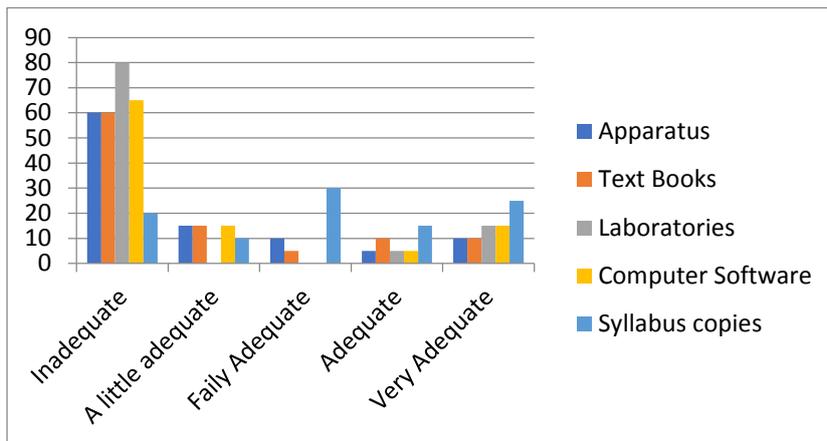


Table 4.5 n = 20 Resource availability

Research findings outlined that 75% of the respondents indicated that they had inadequate apparatus needed in science teaching and 25% of the respondents said the apparatus was a little adequate to a limited extent.

60% of the respondents indicated that textbooks were inadequate whilst 40% said they were a fairly adequate. The interviewed respondents alluded that they had shortages of these textbooks. One of the interview respondents said: *‘hatina matext books nekuti supplier can’t meet the demand and maschools haana enough funds to buy the textbooks’*. (We don’t have textbooks because the suppliers can’t meet the demands from school, and some schools do not have funds to buy textbooks)

The research findings indicated that 80% of the respondents outlined that laboratories were in adequate and 20% said they were adequate. This shows that there was a hindrance in the successful implementation of the new curriculum. A study by Salahuddin (2013) supports this when it outlined that, all teachers claimed that they had no language laboratory facilities for students were unable to do an experiment which is one of the key authentic sources of problem solving skills needed by the new curriculum and teachers also admitted that there is lack of electricity supply, library books and apparatus and so on. As a result curriculum implementation became unsuccessful.

On Computer software 65% of the respondents said it was in adequate and 35% confirmed it was adequate. In collaboration with the questionnaire respondents, interviewees outlined that to a limited extent computer software was adequate but commonly in all schools it was not adequate especially in their schools. The findings show that 20% said the syllabus copies were not adequate and 80% said they were adequate.

The implication of these results poses an indication that there is shortage of resources in the teaching of Science and Technology in the new curriculum. A further look at these results percentages is a clear indication that there are in adequate resources in terms of apparatus, textbooks, laboratories and computer software .As mentioned earlier on in the previous chapters, the importance of resources in curriculum implementation cannot be underestimated because without resources and infrastructure, education for lifelong learning cannot be achieved.

These findings are further supported by a research carried out by Zvavahera (2015) with findings which show that 90% of schools in Mazowe District do not offer science subjects because they do not have laboratories. In view of the findings aforementioned, the government should give great support to the education sector to enhance a successful

implementation of the new curriculum as these findings on inadequacy of resources pose a great challenge to teachers.

4.3.4 Challenges faced by teachers

To answer research question number four which says: what are the main challenges that teachers are facing in teaching this area? Teachers were asked to highlight issues and challenges that they have encountered in the implementation of the new science and technology curriculum. There were several recurring themes that were pointed out such as:

4.4 Insufficient learning resources

Insufficient learning resources have been one of the major challenges that were revealed by teachers in the questionnaires and interviews which hindered the successful implementation of the new curriculum. Text books were one of the issues that raised an alarm as 80% of the respondents on questionnaires indicated they faced a lot of challenges as they started teaching without any reference book since there were no textbooks that tallied with the new curriculum syllabus content. Four interviewees that constitute 67% mentioned that they had no text books and syllabus copies were few due to the fact that the suppliers could not meet the demand and their schools had no funds to purchase the textbooks. One of the interviewees said:

“We have a challenge in text books because our school have no money to buy the needed new text books. It only managed to buy 50 text books which we share all the six classes”.

In this regard the issue of lack of text books is not a new challenge as it has always been an outcry in the education system where by children shared books at a ratio of 1:10 although previous UNICEF had intervened and donated Maths, English and Science text books in the old curriculum throughout all Zimbabwe primary schools. Therefore, the results from the

study have shown that now the situation has worsened since new text books are needed in Science. Moreover rural schools would be the most affected since they have limited funds to purchase these text books and this is going to compromise the quality of education that is intended to be achieved by the new curriculum.

Furthermore the respondents outlined that the content was too much and rather difficult for learners at grade three level. Out of the 20 questioned respondents thirteen (65%) attested that the content in the syllabus was too difficult and too much. They indicated that the content was above the level of learners as some of the words used in the syllabus and text books are too difficult for learners to pronounce and master them worse off without enough text books for reference. One of the interview respondents said:

“The content is too difficult for the learners due to the fact that our learners come from poor families where they are not abreast with modern technology as compared to children in developed countries who interact with the them right on the onset at home such that by the time they come to school they are well versed and familiar to most apparatus used in science. Our learners do not even know a magnet yet we have that content in our syllabus and the schools at times fail to provide the appropriate resources.

The respondents suggested that there was need for relevant content that suit the learners’ needs. Parents also felt the same as they revealed in the social media when interviewed that they were not able to help learners with homework as the matter was too difficult.

On resources another recurring theme was lack of electricity in classes. 70% of the respondents indicated that there was no electricity in their classrooms which posed a great challenge to the implementation of the new curriculum. Response from an interviewee said:

“hatina magetsi muma class saka kuticha topics like electronics kuri kunetsa nekuti vana aite maexperiments” . (There is no electricity in their classes hence the teaching of topics like electronics is rather difficult and doing experiments). Therefore under such circumstances we see that there is a great challenge in the successful implementation of the new curriculum.

4.5 Absence of laboratories

The new science and technology curriculum adopted the learner centred approach that advocate for the use practical skills and discovery learning and this is possible if conducive environments are created to learners. 85% of the respondents indicated that there were no laboratories in their schools where learners could go for practical's and experiments. 15% said they had laboratories but they lacked appropriate apparatus for effective lesson delivery to happen and their apparatus was inadequate as well. They mentioned that this hindered the attainment of the new curriculum goals that aim at producing learners with inquisitive minds and problem solving skills they will help them in their day to day lives during their exit profile.

4.6 Overcrowded classrooms

Questionnaire and Interview responses revealed that overcrowded classes were another issue that posed a challenge to the successful implementation of the new curriculum. In their response 12 teachers (60%) indicated that there was high teacher pupil ratio that was a problem since the new curriculum is based on the hands on approach hence it was difficult for them to manage the children individually as they carry out experiments and projects. Consequently the teachers further more cited that the situation was worsened by time factor

as there is hot seating at their schools which limits the time they will be with learners thereby making it more difficult to manage these overcrowded classes. During the interview one of the respondents said:

“We have more than 55 learners in each class which is above the government requirement of 45 learners per class. This is a challenge in science teaching as we fail to monitor all the learners when using the discovery method since the time is limited as well due to hot seating were we go outside at 12 o’clock to allow another class to start their lessons of that day.

Therefore under such circumstances, it is difficult to apply learner centred approach which needs the use of hands on and discovery learning approaches particularly when there is limited time and limited resources as mentioned earlier on. One of the respondents said, normally this leaves teachers with no option but to resort to lecture method that promote cramming in learners and impede the goal of the new curriculum that puts emphasis on using practical skills that promote problem solving skills in learners. Since most classrooms are not electrified it would be better if laboratories were available as teachers could make use of them.

4.7 Inservice training

15 (75%) of the questionnaire respondents and 4 (66%) interviewees mentioned the need for in service training of teachers. The respondents outlined that they faced a lot of challenges in the implementation of the new science and technology curriculum especially use of ICT and approaches demanded by the new curriculum.

The Zimbabwe government adopted national ICT policy in 2005 .It then employed specialised teachers to teach ICT in schools and also introduced computer training in teachers colleges. In this regard class teachers especially those who had been in the teaching field

already were left out such that even today most of them are not able to use ICT in their teaching and yet learners are far ahead of them in the use of ICT. The demographic data on work experience has shown that most of the teachers used for data collection had work experience between 11—20 years and this clearly shows that they did not have ICT knowledge since it was introduced when they were already in the teaching field. Therefore this has posed a great challenge to the teaching of science and technology in the new curriculum since some of the approaches need use of technology to produce learners who are inquisitive thinkers and possess problem solving skills that are competent in the 21st century. From the results of the study teachers said they needed in service training each time a new policy was introduced so as to keep them abreast with the current knowledge that can be used to effectively teach learners to expected standards. Furthermore they outlined that they needed in service training on the teaching of science and technology that will familiarise them with using the new approaches and also some of the complicated content in the new syllabus.

Therefore, an analysis of the above results on question three and four has clearly pointed out the greatest issues and challenges that teachers are facing in the implementation of the new science and technology curriculum.

4.8 Overcoming challenges in curriculum implementation

To answer research question number five which says: How can teachers overcome these challenges? The teachers were asked how they think these challenges can be overcome to improve the current situation.

Four themes were identified after data collection which include; in-service training for teachers, government providing sufficient resources, adjust content and reduce teacher pupil ratio.

4.8.1 Need for in service training

Study results show that 60% of the respondents outlined that there was a great need for in service training for teachers to equip them with new teaching approaches that need to be used in the implementation of the new science and technology curriculum.

4.8.2 Reduction of teacher pupil ratio

55% of the respondents mentioned that the government should reduce teacher pupil ratio by employing more teachers to promote a manageable number of learners that can be monitored one on one during science teaching. They also advocated for the building more schools to do away with hot seating so as to allow learners to have a full day in class so that the use of exploratory learning is facilitated with adequate time.

4.8.3 The need for government intervention

In the study, question three and four outlined the outcry on lack of resources in the new curriculum implementation hence the teachers suggested that the government should tirelessly and quickly source for funds to facilitate the purchase of the required resources such as text books, apparatus, building of laboratories and making sure that all the schools are electrified to promote the attainment of the new curriculum goals and produce learners who are globally competitive.

4.8.4 Revision of content

Lastly, the respondents mentioned that the Ministry of education should revisit the content so that it suits the level and ability of learners and it is relevant and applicable in the Zimbabwean context .One of the interviewee Yellow said:

“The content is too much and complicated such that the learners are finding it difficult to pronounce and master some of the scientific words and us the teachers are not even able to teach it effectively”.

This statement clearly shows that the issue of content needs a look at it and the teachers as the implementers of the new curriculum should be involved in the process of content review.

Duban (2013) contents with this when he found out that the curriculum cannot be easily developed if prior knowledge of students is not sufficient, and hence, the curriculum content does not address all students with different cultural backgrounds. These differences make the content rather difficult for learners. Furthermore teachers outlined that they need support from school heads so if they are not well versed with the content to be taught resources persons should be availed to assist them to promote effective learning.

Summary

The chapter presented and analysed the research findings on the issues at play in the implementation of the science and technology curriculum. The findings indicated that there are insufficient resources to meet the demands of the new curriculum. Classrooms are not electrified, teachers do not have enough reference materials, there are not enough computers in schools and teachers are failing to cope with the demands of the new curriculum. The findings also indicated that there is not enough funding to sustain the demands of the new curriculum and improvising is very difficult for teachers.

CHAPTER 5: Summary, Conclusions and Recommendations

5.1 Introduction

Chapter 5 concludes the research conducted by highlighting the findings about issues and challenges playing out on teachers in implementing the grade three Science and Technology curriculum. The study was carried out on primary schools within Chitungwiza District. The chapter provides recommendations as well as a summary based on the data collected during the study.

5.2 Summary of the Research

This section offers a summary of the major findings following the order of the research questions

5.2.1 Coping with the demands of the new Science and Technology curriculum

The teachers involved in this study indicated that there are many challenges associated with the implementation of the new science and technology curriculum. Lack of proper infrastructure to support implementation was the main challenge and teachers indicated that the rightful infrastructure is key to the successful implementation of the new curriculum.

The study found that many schools do not have science laboratories and electrified classrooms with sufficient computers to meet the demands of the pupils. The teachers interviewed in the study indicated that science laboratories and computers are key in the implementation of the new curriculum and an absence of them is a challenge difficult to improvise. The respondents indicated that they were failing to cope with the demands of implementing the new curriculum due to lack of resources. The schools that had computers did not have enough to support the number of pupils within a single class setting.

Teachers also indicated that there were shortages of syllabi and training materials. Most teachers did not have the copies of the syllabi and they indicated that there was no funding to facilitate the production of more copies. The teachers also indicated that the teacher-pupil ratio made it difficult for teachers to implement continuous assessment.

5.2.2 Capability of teachers in using the teaching approaches required of the new curriculum

The majority of teachers who were participants to the study (80%) indicated that they were capable of using the teaching approaches required in the implementation of the new curriculum. The major challenge though was the unavailability of resources needed to facilitate the use of these teaching approaches. The participants who indicated that they were not capable cited the lack of service training to equip them with the requisite skills set upon the introduction of ICT learning in schools.

The study found that to a satisfactory extent, teachers were capable of using the teaching approaches in the teaching of science and technology. However, the absence of Information Communications Technologies gadgets in schools and internet connectivity was cited as a major hindrance. The level of preparedness in teachers is also low as some have not been fully trained and do not have access to syllabi. Other schools were also hot seating and the requirement of the new curriculum for pupils to spend about eight hours daily was a challenge.

5.2.3 Adequacy of the resources and materials required for teaching Science and Technology

The study revealed that there are insufficient learning resources required for the teaching of Science and Technology. Teachers indicated that there are high shortages of reference text

books and apparatus needed in science teaching. Computers and required software was also found to be inadequate. The teachers indicated that the lack of resources is slowing down the pace at which teachers implement the curriculum. The teachers indicated that most schools were citing financial constraints as one of the reasons they had not acquired sufficient resources for the teaching of the new curriculum whilst some noted that the books that go hand in hand with the new curriculum had not yet been published.

5.2.4 Main challenges that teachers are facing in teaching science and technology

The study revealed that insufficient learning resources, absence of science laboratories, overcrowded classrooms and lack of in service training were the major challenges teachers face in teaching science and technology. Teachers indicated that the books to pupil ratio was on average 1:10 and has been a challenge in many schools. Due to this high ratio, books are easily torn and this further increases the ratio. The study found that schools have limited funds to purchase new text books and the situation continue to worsen. The teachers also indicated that the content currently available in the few textbooks is too difficult for learners, most of who come from poor families which do not interact with modern technology.

The teachers indicated that most schools do not have science laboratories which are key in the teaching of key practical skills of science. This hinders the attainment of the new curriculum goals aimed at producing learners with investigative and problem-solving skills. Moreover, classrooms are overcrowded and the hands-on approach on which the new curriculum is based makes it difficult for teachers to manage the pupils to individually carry out experiments and projects. Teachers also indicated that when the government launched and adopted the ICT policy in 2005, specialised teachers were deployed to teach ICT in

schools leaving out those that had been in the teaching field. As a result, some teachers are not able to use ICT in their teaching.

5.2.5 Mechanism to overcome challenges faced in teaching science and technology

The study found that whilst teachers can improvise in certain areas, there are some areas that cannot be improvised. Teachers indicated that there is need for more funding to ensure there is sufficient learning materials, science laboratories and computers in schools. There is also need for teachers to be trained in ICT to enable them to fully meet the requirements.

5.3 Conclusions

Based on the findings of the study, the following conclusions were drawn:

- Literature on the study has revealed that education for sustainable development requires integration of academics and industry. Learners must be relevant to industry and the classroom must be extended to the real world. Thus, a learner centred approach that links with the environment, teachers with technical skills as well as leadership skills is key. Resources are the back bone of curriculum implementation as it promotes the viability of curriculum implementation. Literature revealed that resources are often a challenge in curriculum implementation in developing countries. Learning materials such as textbooks, science laboratories, ICT gadgets and stationery are challenges in most developing countries in the implementation of learner-based curriculum.
- Findings from the study showed that teachers are facing challenges in the implementation of the new curriculum. These challenges include insufficient learning resources, absence of science laboratories, lack of ICT gadgets, overcrowded classrooms and lack of in service training.

- Lack of enough funding by the government was one major contributing factor as often time there are no financial resources to procure critical materials. The teachers indicated that they were failing to cope with the demands of implementing the new curriculum due to these challenges. Teachers who indicated that they were capable of using the teaching approaches required in the implementation of the new curriculum whilst a few indicated that they need in service training to improve their capabilities.
- The study found that whilst teachers can improvise in certain areas, there are some areas that cannot be improvised. As a result, teachers are failing to cope with the demands of the new curriculum.

5.4 Recommendations

In view of the research findings, the study recommended the following:

- Government should ensure that there is adequate funding for the implementation of the new curriculum to achieve the desired goals. Text books and syllabi should be adequate in schools as well as the required resources. Since government is a key player in curriculum implementation, resources for both teachers and pupils should be made available and accessible by the schools.
- There is need for training of teachers to support curriculum implementation. Such training should include all support staff including school heads and district as well as provincial personnel as they are key in curriculum implementation. Training of teachers and awareness of problems facing teachers should be well thought and given priority.

- There is need for electrification of classrooms as well as construction of science laboratories and purchasing of ICT gadgets by authorities. Such infrastructure is key towards the implementation of the new curriculum.
- Teachers should ensure that they raise an awareness of the challenges they face during the implementation of the new curriculum. This will ensure authorities are aware of every challenge being encountered.
- School heads should seek sponsorship from non-governmental organisations to get support for curriculum implementation.
- It is also important for school heads to involve the parents in the implementation of the new curriculum to allay any fears or any form of resistance.

5.5 Recommendation for further study

- Further study can be conducted to find out how teachers can best be motivated to implement the new curriculum without any challenge. This is also an opportunity for further investigation for those who feel that education can only be improved if recurring challenges in curriculum implementation are faced head on and eliminated.
- Further studies may also be conducted to ascertain the perceptions of teachers on the new curriculum as well as the factors influencing teachers' perceptions in the curriculum implementation. This will be an opportunity to overcome negative perceptions of the new curriculum.

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APPENDIX A: TEACHERS' QUESTIONNAIRE

I am a student at Midlands State University studying a Bachelor of Education Degree in Primary Education. I am currently carrying out a research on issues and challenges that teachers are experiencing regarding the teaching of the new Science and Technology curriculum. May you kindly assist by completing the following questionnaire. All the information collected is going to be confidential and is going to be used only for the purpose of the study.

NB. Do not write your name or sign anywhere on this form.

SECTION A(tick appropriate box)

1) State your sex

Male

Female

2) Age

20 years/ below

21-30

68

31-40

41-50

51 and above

3) Work experience

0-10 years

11-20 years

21-30 years

31-40 years

41 years and above

4) Academic qualifications

ZJC

'O' level

'A' level

5) Professional qualifications

Certificate in Education

Diploma in Education

BED

MED

Others

SECTION B

Actual Questions

1) a. Give at least 3 or 4 new Science and Technology curriculum demands?

b. Are you coping up with the demands of the new curriculum in general?

Indicate with a tick

- 2) How capable do you think you are in using the following teaching approaches required for the new Science and Technology curriculum

TEACHING APPROACHES	not capable	fairly capable	capable	very capable
Project based				
Explaining				
Manipulating				
Discovery				
Field trip				
Hands on				
ICT learning				

- 3) Please indicate with a tick your response on how adequate you think the following resources are for teaching new Science and Technology curriculum

	inadequate	a little adequate	fairly adequate	adequate	very adequate
Apparatus for doing experiments					
Text books					
Laboratories					
Computer software					
Syllabus copies					

- 4) Highlight any issues and challenges you have encountered towards the implementation of the new Science and Technology curriculum.

- 5) How do you think these issues and challenges can be overcome to improve the current situation?

APPENDIX B: Interview schedule for teachers

- 1) Highlight some of the demands of the new Science and Technology syllabus.
.....
.....
.....
.....
- 2) Which are the teaching approaches required of the new Science and Technology syllabus?
.....
.....
.....
.....
- 3) How capable are you in using these teaching approaches?
.....
.....
.....
.....
- 4) Are there any challenges you face in using these teaching approaches?
.....
.....
.....
.....

5) How adequate are the resources that are required in the teaching of new Science and Technology curriculum?

.....
.....
.....
.....

6) What are the main challenges are you facing in teaching Science and Technology?

.....
.....
.....
.....

7) How do you think these challenges can be overcome?

.....
.....
.....
.....

APPENDIX C: Informed Consent

INFORMED CONSENT

My name is Caroline Tsveture. I am a third year student doing a Bachelor of Education Primary Degree at the Midlands State University. I am carrying out a research on issues and challenges playing out on teachers in the implementation of the new grade 3 science and technology curriculum. I am kindly requesting you to provide necessary information pertaining to my study.

After you have heard the study explained and your questions answered and you have decided to participate, you will be asked to sign this consent form and you will be given a copy to keep. It should be remembered that participation is voluntary and you can withdraw if you wish to.

Risks

No risk of harm or discomfort that will impact on the participant is fore seen except the questions that will be asked and the inconvenience in terms of time spent.

Benefits

There are no tangible benefits from the study but the information given will help to improve the implementation of the new curriculum.

Alternatives to participation

In case you are not interested in the study, you do not have to participate, no benefits will be lost.

Summary of your rights to participate in this study

You can withdraw from this study at any time.

Confidentiality

The answers you give us will only be known to us and will be kept confidential. The information you give us will only be used for this study. You do not need to give us your name; we shall use a pseudo name or any name you wish to be called.

Authorization to use and disclosure of your information

Signature

Signing below indicates that you have been informed about the research study in which you volunteer to participate; that you have asked the questions about the study and that information given to you has permitted you to make a fully informed decision about the participation in the study.

By signing this consent form, you, do not waive any legal rights. A copy of this consent form will be provided to you

Respondent sign..... Date.....

Name of investigator..... Signature..... Date...

APPENDIX D: APPROVAL LETTER

28 March 2018

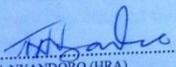
Tsveture Caroline S.
Zengeza 5 Primary
P.O Box ZG 38
Zengeza
Chitungwiza

RE: PERMISSION TO CARRY OUT RESEARCH AT ZENGEZA 5, DUDZAI, ST MARY'S AND NDANGARIRO PRIMARY SCHOOLS: CHITUNGWIZA DISTRICT: HARARE METROPOLITAN PROVINCE

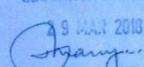
Reference is made to your application to carry out a research at the above mentioned schools in Harare Metropolitan Province on the research title:

"ISSUES AND CHALLENGES PLAYING OUT ON TEACHERS IN THE IMPLEMENTATION OF THE NEW GRADE THREE SCIENCE AND TECHNOLOGY CURRICULUM AT FOUR PRIMARY SCHOOLS IN CHITUNGWIZA"

Please be advised that the Provincial Education Director grants you authority to carry out your research on the above topic in Harare Province. You are required to supply the Provincial Office with a copy of your research findings.


T. N. NYANDORO (HRA)
FOR: PROVINCIAL EDUCATION DIRECTOR
HARARE METROPOLITAN PROVINCE

MIN. OF PRY. & SEC. EDUCATION
DISCIPLINE SECTION
HARARE PROVINCE
28 MAR 2018
P.O. BOX CY 1343, CAUSEWAY
ZIM. TEL. 04-792671/7 798146

MINISTRY OF EDUCATION
CHITUNGWIZA DISTRICT OFFICE
EDUCATION INSPECTOR
28 MAR 2018

P.O. BOX CZA 38, CHITUNGWIZA
TEL. 0270-24672/0270-31204

APPENDIX E: Authorisation Letter



MIDLANDS STATE UNIVERSITY

P. BAG 9055
Gweru
Zimbabwe

Telephone: (263) 54 60404/60337/60667/60450
Fax: (263) 54 60233/60311

FACULTY OF EDUCATION DEPARTMENT OF EDUCATIONAL FOUNDATIONS, MANAGEMENT AND CURRICULUM STUDIES

02 March 2018

TO WHOM IT MAY CONCERN

The bearer TSVENIRE CAROLINE SARUDZAI is a
B.Ed/MED/PGDE student at this University. She / He has to undertake research and
thereafter present a Research Project in partial fulfilment of the degree programme.

In this regard, the university kindly requests both your institution and personnel's
assistance in this student's research endeavours.

Your co-operation and assistance is greatly appreciated.

Thank you

A handwritten signature in blue ink, appearing to be 'C. Manyumwa', written over a dotted line.

Dr. C. Manyumwa

(Chairperson – Educational Foundations Management and Curriculum Studies)

