

**BINDURA UNIVERSITY OF SCIENCE EDUCATION**

**FACULTY OF SCIENCE EDUCATION**

**DEPARTMENT OF SCIENCE AND MATHEMATICS EDUCATION**

**THE ROLE OF LANGUAGE IN THE TEACHING AND LEARNING OF PHYSICS IN MASVINGO DISTRICT AT O’ LEVEL.**

**BY**

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# RELEASE FORM

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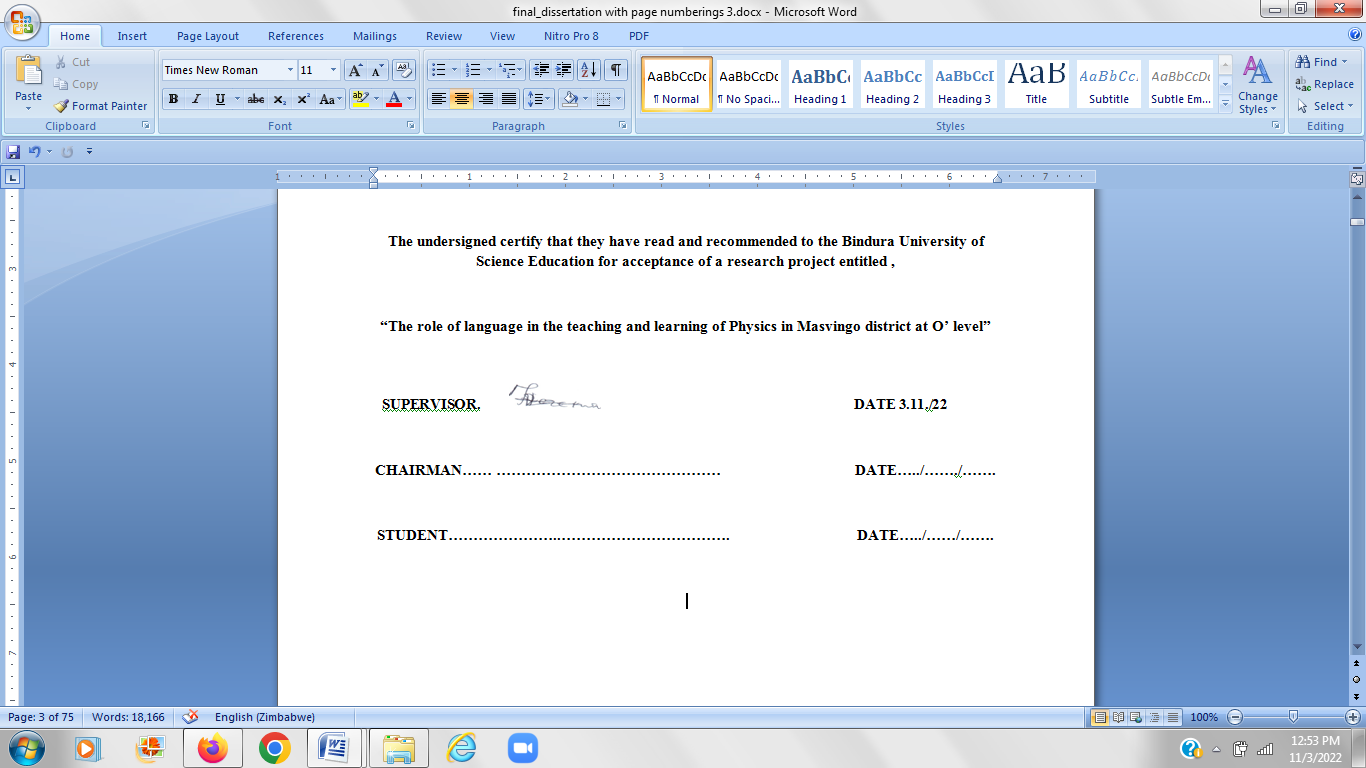
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I Dehwa Mau Mau declare that this project is my own work and has not been copied or uplifted from my source without acknowledgement of the source.

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# DEDICATION

I dedicate this study to my wife Angeline and my 3 sons Joshua, Ottovon and Zenith for their being a shoulder to lean on during this painstaking process. Relatives and friends were also social support renders through encouragement and guidance.

Your support is highly cherished and applaud able. You are my source of vision and strength. Without you I could not have made it.I love you all!

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# ABSTRACT

The study aimed at exploring the role of language in the teaching and learning of physics.It also highlighted the challenges faced by learners who use English as their second language in the learning of physics.It also highlighted possible ways to enhance academic performance of learners with challenges.. The researcher mainly focused on qualitative research method. In this study, eight teachers and hundred and fourteen pupils plus two administrators made up the sample, interviews were carried out and direct observations were carried out in the schools under study. Interview guide, questionnaire and focus group discussion method were used as the research tools. Data was collected from responses from questionnaire interview and focus group discussion. The data was presented and analysed logically through the use of tables , graphs and pie charts, this enabled the researcher to have a wider view of the research problem .The study revealed that both learners and teachers face a lot language challenges in understanding and expressing physics concepts . The study also found that pupils and teachers have a negative attitude towards the use of English language as the language of instruction in the teaching and learning of physics. The research also revealed that learners and teachers are willing to in cooperate indigenous languages in the teaching and learning of physics. As a way of addressing the problem of language of instruction , this research study recommended the in cooperation of indigenous languages in the teaching and learning of physics . The study recommended that government designs policies that enhance multilingual approach to the teaching and learning of physics throughout the country and to promote publication of reading and instructional material in indigenous languages. Government to design a policy to enhance effective inclusion, supervision and monitoring of schools and provision of psychological and social welfare services to give professional evaluations and advice. Learners should be allowed to express understanding of physics concepts in local languages.

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# CHAPTER ONE: THE PROBLEM AND ITS SETTING

# 1.1 INTRODUCTION

The purpose of this chapter as the opening interval is to envelop the background to the study, thus the dramatic environment where the research is being taken, a statement of the problem demonstrating the problems which drove the need for research. Other crucial aspects such as research objectives, research purpose, and aim and research questions will also be covered in the opening episode. The section has also wrapped the delimitation of the study, limitations, definition of terms and a summary.

# 1.2 BACKGROUND OF THE STUDY

Many developed countries of the world owe their Growth Domestic Product (GDP), which is the measure of the country’s wealth, to Science and Technology. Physics is the complimenting subject that helps to enhance the cognitive thinking abilities. The above-mentioned field of learning is a challenge to many people, and it needs to have its challenges eliminated and a larger intake of students accommodated in the Higher Education institutions. There are number of factors that can either promote or hinder teacher-pupils’ classroom interaction and pupil participation in the teaching and learning process. These factors include language of instruction, teachers and learners’ prior experiences, their behaviors, altitudes, pedagogical content knowledge, beliefs, personalities as well as cultural values (Nomlomo, 2010). This study focuses on a thorough investigation on the role of language in the learning of Physics.

Language is an important tool that every human uses as a specific and common means of expression, communication and conveyance of different thought. It is also important as the way of impacting knowledge, instruction, and teaching at in our outside. Language is the most important tool in classroom interaction, as it enables learners to access information through thinking and reasoning. In other words, the language is responsible for the development of the learner’s cognitive academic skills which enable the learner to grasp or master the academic content.

The effectiveness of classroom interaction with active participation of learners depends largely on the learners’ proficiency level in the language of instruction and the extent to which they participate in the learning process. Moreover, familiar language encourages an active learning process, it allows students to express their full range of knowledge and experience and demonstrate their competence (it encourages students to be more active in discussing, debating, asking questions, and solving problems with peers and their teachers). If the language is not familiar to learners, it removes the active part of students. In other words, language and participation are central to classroom interaction (Nomlomo 2004).

Tanzania like most of the other African countries, is a multilingual society of more than 120 vernaculars; however, unlike other African countries it has a unifying language which is Kiswahili, (Brock-Utne 2006). Kiswahili is spoken by more than 95% of rural and urban population and it is both the national language as well as the official language. It is used as the language of instruction at government schools at pre and primary level, it is taught as a subject at secondary and tertiary level, but it is the English language which is spoken by 5% of the Tanzanian population which is used as language of instruction at private primary, secondary schools and tertiary level.

The challenge that engulfed Zimbabwe is the disappointing performance of the learners at the school level in science subjects. It has been recognized for decades that there is widespread underachievement in science education in South Africa (Reddy, 2006). However, problems associated with Science education are not confined to Zimbabwe only, but are international phenomena (Driver, Guesne and Tieberghien, 1995) and international research has shown that issues of language are key areas contributing to high failure rates in these Science subjects (National Centre for Curriculum Research and Development, 2000). In turn, recent research on science literacy suggests that teacher education and professional development strategies should assign a more important role to language in the learning and teaching of science subjects (Yore and Treagust, 2006), while several investigators have reported on strategies for improving reading, writing, discussing and doing science (Marlow, 2005).

Most Zimbabwean learners study a wide variety of school subjects using a language that is not their mother tongue (Probyn, 2004). However, they need to understand what needs to be learnt in all these subjects even though they experience difficulties when they switch from mother tongue instruction to the English language of instruction. Language and thinking are key aspects that are associated with gaining insight to problems that learners must solve in class. In the Zimbabwe, Chishona is the most widely spoken indigenous language and home language to more than 50% of the population, yet the official medium of instruction in most schools from the beginning of ECD to Advanced Level is English (Probyn 2004).

A survey carried out during 1998 in rural Grade 7-12 schools in the Eastern Cape Province of South Africa (Muwanga-Zake, 2007), revealed that teachers did not seem to know their shortfalls in teaching science subjects. For example, teachers claimed that they do not teach science practical activities because they do not have apparatus. The survey results suggested that the teachers' problems, such as the inability to teach practical activities were underpinned by the teacher's lack of understanding of science concepts and processes, the knowledge and skills the teacher is supposed to transfer to learners (Muwanga-Zake, 2007). Understanding of concepts and processes can be directly related to learners being able to read and write (Gudula 2014). The latter statement suggests that there is a deeper concern about language that should be attended to in Zimbabwe.

# 1.4 PURPOSE OF THE STUDY

The purpose of this study is to investigate the role of language in the learning of Physics at Masvingo Christian College. It is the hope of the researcher that the study will contribute a body of knowledge to the field of education, especially to policy makers and other educational stakeholders.

# 1.5 STATEMENT OF THE PROBLEM

As a teacher of Physics at Ordinary and Advanced Level, the researcher noticed that learners coming to Form One, from different schools, experienced difficulties in understanding science concepts. Some learners show an acceptable level of understanding of English as a language, but they lack a grasp of Physics concepts, and this led to learners failing tests. Learners tended to view the Physics as difficult and many of them did not select it as one of their subjects at Form Three. Learners start their Form One in the secondary school having been in a class of Grade 7 that was in the primary school. Teachers in the secondary school do not know what is happening with the learners in the primary schools and the same learners find it difficult to connect with the syllabus in the secondary level. It has been noted learners show the content knowledge gap when they arrive in the secondary school. This is where this study comes in, to find out about the proficiency of teachers and learners in the language of instruction in the Physics classes. This study seeks to investigate the role of language in the learning of Physics.

# 1.6 RESEARCH OBJECTIVES

1. To investigate the role of language in learning.
2. To explore the impact of the language of instruction.
3. To find out the influence of language in the learning of Physics.

# 1.7 RESEARCH QUESTIONS

* What is the influence of language in the learning of Physics?
* What are the teachers’ perceptions of the influence of language in their Physics classes?
* How can an indigenous language be integrated in the teaching and learning of physics?

# 1.7.1 HYPOTHESIS

Sometimes dissertations and theses should include both research questions and research hypotheses. If the research hypotheses build on and are different from the research questions, it is recommended to use both research questions and research hypotheses (Hambrick, 2007). In mixed method research, having research questions as well as hypotheses helps to explore the problem at hand to the fullest (Creswell, 2014).

**Research hypothesis**: There is no relationship between language and academic performance in Physics.

**Null hypothesis**: There is no significant difference between the academic performance of the control and experimental groups in Physics.

# 1.8 SIGNIFICANCE OF THE STUDY

This study could be significant for several reasons. The outcomes of this study could serve to inform science teachers, curriculum advisors and curriculum planners about the role that the language plays in the teaching of Physics. The study could provide some insight into language and terminology in Physics and add some answers to the concerns of secondary school teachers regarding Physics learners’ language and understanding of science concepts. This study could also add to the baseline data available regarding issues of language and science at the primary school.

Students are the direct recipients of the output of this research. Any improvement of classroom interaction between pupils and teachers as a result of the language of instruction can pave the way to produce better learning and a better performance in their exams and make a better society. It is therefore very important that students and pupils know what it takes to learn through someone’s language and how it affects.

There is no doubt that teachers are directly affected by the language used in the classroom. This study may be beneficial to the teachers who want to effectively convey their knowledge and experience to their pupils. Teachers may discover what type of classroom interaction is conducive to learning. The better the language is understood by teachers, the better the lesson is transferred to the pupils and students.

Parents are very important stakeholders when it comes to the educational development of their children. This research shall benefit the parents of pupils in secondary school both in private and public schools. As parents enroll their children in these educational institutions, they assume that their children are given an education that will make them functional individuals in the society. It is therefore important that they (parents) get to know the advantages and disadvantages of using both foreign and native language as language of instruction.

This research may also benefit those people who plan the curriculum and the policy. It is of great significance that these planners understand what is happening in the classroom in order to come up with new plans and programs. It is therefore that planners should read what research say before doing their planning. And when it comes to the language, planners need to understand all the barriers in transferring education that may arise as a result of the language which is used in teaching and learning.

To the School Administrators, this study will be used as a basis for implementing what has been developed and authorized by the planners. It is hoped that the administrators will learn from the recommendations based on the findings that this research and other research have come up with.

Lastly, the outcome of the study is likely to be beneficial to future researchers. This study may be a basis from which a new theory in learning will arise. For present researchers, the study is helpful in making comparative studies that may say different stories in different contexts but with similar results. For future researchers, this study will act as a basis one can draw from for further studies.

# 1.9 LIMITATION OF THE STUDY

Research projects cannot be done without the existence of some limitations. The researcher might be threatened with some challenges during the research execution. The challenges include the reluctant of key informants in providing the needed information for example some students. The researcher will employ some negotiation strategies to convince the respondents to give out data. In trying to overcome the time constraints the researcher will use the sampling technique to be able to capitalize on time.

Not all respondents may be willing to be disturbed from their day-to-day business to answer questions and some of them will not want to disclose information relating to the current study. The researcher will try to persuade the respondents and assure them that it will be for a few minutes.

# 1.10 DELIMITATION OF THE STUDY

Delimitations define the parameters of the investigation. In educational research the delimitations will frequently deal with such items as population/sample, treatment(s), settings, and instrumentation. This research was undertaken at Masvingo Christian College, a local school in the capital city of Masvingo Province under the jurisdiction of Ministry of Primary and Secondary Education, Masvingo District. The school offers Physics from Form Three up to Form Six.

# 1.11 DEFINITION OF TERMS

Language- is an unmistakable mark of personal identity, and is essential for forming interpersonal relationships, understanding social situations, extending experience, reflecting on thought and action, and contributing to a democratic society. Language is the primary basis of all communication and the primary instrument of thought. Composed of interrelated and rule-governed symbol systems, language is a social and uniquely human means of representing, exploring, and communicating meaning. Language is a code whereby ideas about the world are expressed through a conventional system of arbitrary signals for communication (Madiba, 2014).

Learning- is a complex process of discovery, collaboration, and inquiry facilitated by language.

Physics- is the natural science that involves the study of matter and its motion and behavior through space and time, along with related concepts such as energy and force (Department of Education CAPS document Grade 10 to 12, 2011)

# 1.12 ORGANIZATION OF THE STUDY

Chapter One introduced the study. It provided the background and context of the study which foregrounded the research problem and research questions. It also provided the significance and limitations of the study and gave an outline of the structure of the thesis.

Chapter Two provided the theoretical basis of the study and presented a review of studies in the area of language and science. This second chapter will enable the researcher to build upon already existing literature, clarify the research problem further, improve the methodology of the research and contextualize findings by comparing them with those found in previous studies.

Chapter Three will describe the participants, the data gathering materials and the research procedure used in the study. Explanations on what techniques were used for data collection are going to be discussed in this chapter as well as provide an analysis of results to answer the research question.

Chapter Four will present the discussion of data analysis and findings. Data from the findings will be represented in different formats including tables, pie charts as well as graphs. The results section also provides a discussion that connects the results to the relevant literature and conceptual framework.

Chapter Five which is going to be the last chapter will wrap up with the summary, conclusions and recommendations arising from the study and proposes some areas of future research.

# 1.13 CHAPTER SUMMARY

This chapter dealt with the rationale of the study. The aim was to give an overview of the study in relation to the research question. The context of the study and the research problem leading to the research question were clearly outlined and discussed. The significance and limitations of the study were identified. The next chapter will present the literature review for the study.

# CHAPTER TWO: LITERATURE REVIEW

# 2.1 INTRODUCTION

The literature review chapter provides the theoretical framework of the study and reviews existing literature on the topic of this study. The objective of this chapter is to portray the path of previous studies and how this study is linked to them. It also allowed me to learn from previous efforts and stimulated me to identify gaps and shortfalls in the field. Boote and Beile (2005) put it clear that a good review is one which helps the researcher to learn from other scholars and stimulate new ideas.

# 2.2 CONCEPTUAL FRAMEWORK

The language, which is being used as medium of instruction in different educational institutions, has major effects and consequences on the performance of pupils in various examinations, on their pleasure in learning a specific subject and the way they communicate with each other about the different concepts in a subject. Ehindero (2020) proposed that pupils waste valuable time on both primary and secondary schools in attempting to learn English so that it can used as a medium of instruction in the learning of science. Jegede (2016) highlighting the same sentiments as Ehindero, suggested that the learning of science (biology, physical science, physics etc) should be in languages pupils are proficient in so that they focus their attention on mastering of the science content rather than English language. Therefore, pupils waste time trying to learn a language which they do not need for them to master the content given that there are vernacular languages such as Shona, Ndebele, Kalanga, Venda, Tonga and Shangani which people can speak more fluently.

Vygotsky (2018) posit that language is a tool for learning and an aid to understanding, as such the mother tongue acts as a vehicle for educational development and important for the apprehension and acquisition of knowledge. Harlem quoted in Shumba (2015) finds the importance of language in learning is more than a means of communication but as having a significant part in the development of thought. Vygotsky (2018) describes language development as connected to the cognitive development whereby children require mastery of their first language (mother tongue) as a basis of their thoughts. For the early years of schooling, the use of language in which a child is not proficient results in cognitive difficulties. Kachaso (2014) emphasizes that the human and societal development is dependent upon growth in the communicative competencies. Kuleneka (2014) quoted Aikenhead as saying “in addition to practical, the teacher should encourage talk which can be exploratory, tentative and language is used for thinking problems discussing assignments and clarifying thought.

Since the aims of science education is to construct tentative explanations of natural phenomena therefore an inquiry approach to school science should encompass ways of talking, reading and writing in the language pupils are proficient and comfortable with such that they begin to appropriate the reasoning that transforms data into evidence supporting explanations. (Ehindero, 2010).

Fraser (2014) studied the impact of the using a second language (L2), (in this case English) as the medium of instruction in science learning in secondary school students in Hong-Kong. He concluded that students who received lessons in the Chinese’ mother tongue were found to perform better than those who were given instructions in English. The problems the study highlighted were failure to understand abstract concepts and inability to comprehend the information in the second language. Although the study did not reveal how fluent and proficient these Chinese pupils were in English language, the results gave evidence that the use of second language has serious repercussions in the learning of science. Therefore, it may imply that, learning English as from grade four (in the case of Zimbabwean education system) may not be adequate to give us confidence in using English as a learning tool at secondary school science.

The importance of language proficiency in the learning of since cannot be over emphasized. Several studies have shown that incompetence in the language of instruction is directly related to low achievement in science (Fraser, 2014). Because of this relationship, teachers use both the language of instruction and learners’ mother tongue when teaching. (Wachanga, 2022) and teachers use both languages so that they do not deny students the opportunity to understand science concepts.

Furthermore, teachers use the mother tongue for other reasons such as reformulation of instructions, explanatory ad regulatory purposes, for regaining students’ attention and clarification purposes (Hohn, 2015), for invoking cultural values (Fraser,2014), for communication of beliefs as well as expressing of expectations and disappointments. (Love, 2020). All these functions of language enhance instructional practice. They contextualize classroom discourse and solicit students’ participation (Love, 2013). Reformulating questions and explaining concepts in mother tongue augment students’ understanding, on one hand and on the other the hand reformulation of instructions, regaining students’ attention, expression of disappointments and expectations, all help in class control and management. Also, invoking cultural norms and values would encourage students to participate freely in classroom discourse, an attribute that is highly recommended for science teaching in the 21st century. (Jegede, 2016)

In 2002, The Ministry of Education in Zimbabwe introduced the following language curriculum policy for different educational levels:

* In the first three years of primary education, pupils are taught English as a subject and indigenous languages as the medium of instruction.
* At grade four to grade seven, the stage that is regarded as the transition zone, English is introduced as the medium of instruction for all the subjects except for Shona and Ndebele and all other minor local languages.
* At secondary school and tertiary level, only English is emphasized as a medium of instruction (Education Secretary Circular Number 9, 2002)

The above policy clearly shows that pupils are not encouraged to learn in their mother tongue but in English during their schooling career. Many of our pupils in Zimbabwe are not taught in their mother tongue which they used since birth for perception and learning new things before going to school and they have to change to English language during their schooling career which is contrary to (Mammino, 2001) who says that the learning processes occur smoothly, and concepts are mastered better when they are learned in the language the child understands better. This could be probably one of the major reasons for poor examination results at primary and secondary level. Aggravating the problem is that during instructions, the teachers will be struggling to cope with English language since it will be a second language to them too, resulting in some concepts half explained, a phenomenon which Aikenhead and Jegede called ‘a process of dual translation’ that is... Instruction is in a second language and culture. (Aikenhead, 1996).

Rollnick and Rutherford (1993) observed that primary and secondary student teachers in Swaziland mixed up the indigenous languages although authorities declared English language as the official medium of instruction. The reasons for mixing the languages were that the teachers were not fluent in English and therefore they were not comfortable in using English throughout the lessons. Reinhard (2002) studied the effect of using English language as a medium of instruction to secondary school pupils in Malawi and concluded the English language prevents pupils to excel and comprehend some important concept of science. Important studies in this respect are by Aikenhead, (1996); Jegede, (1996). All suggested one way or the other that learning in the mother’s tongue improves the understanding of scientific ideas.

An analysis of the Examiner’s report from ZIMSEC for the years (2000-2003) physical science examinations revealed that pupils fail to communicate well scientific ideas because:

* Pupils tend to translate directly, vernacular language into English or voce-versa leading to a lot of grammatical and conceptual errors.
* Pupils tend to choose wrong English words in attempting to explain the science
* concepts. The statements they end up writing give different meanings to the intended explanation.
* Introduction of new scientific terms tend to confuse pupils leading to wrong pronunciation and misinterpretation of the scientific terms.

Linking this report and other above-mentioned research, the study tried to answer the question that probes the role of language in the learning of Physics.

# 2.3 THE INFLUENCE OF LANGUAGE ON THE TEACHING AND LEARNING OF PHYSICS

Various studies have been conducted on the influence of language difficulties with meanings of non-scientific words as used in the science classrooms. Gardner in 2012 tested the understanding of 599 words on a sample of about 7,000 learners from 39 different schools across Australia and all the science learners who participated were English first language speakers (Farrell &Ventura, 1998). The results revealed that science learners had challenges in understanding meanings of non-scientific words when used in the science classroom contexts. The study by Gardner was replicated in other countries such as United Kingdom by Cassels and Johnstone (2020); Papua New Guinea by Farrell and Ventura (2018); Oyoo and Semeon (2015); Prophet and Towse (2019) and the results were very similar. The results revealed that Language influences the teaching and learning of Physics and science as learners encounter difficulties with meanings of non-scientific words when used in science classroom contexts regardless of their gender, socio-economic and linguistic backgrounds. This explains why not all learners who are taught science in their second language excel in the discipline. Therefore in line of the study the researcher seeks to found out whether this is true at Masvingo Christian College.

In Britain, Collins (2020) states that language enables learners to interact with one another, getting to know how the one feels, thinks, and wishes for in a particular lesson. It influences the direction of the learning process positively or negatively. This agrees with Neza (2020) who states that without language there is no communication. It is a tool for lesson delivery. This means that it can be rearranged and combined limitlessly and be used to communicate future information. Communication on the other hand is the interchange of ideas, beliefs, thoughts, feelings, and emotions and it can occur through various means, both verbal and nonverbal (Landsberg et. al, 2021). It is a process of sharing information between two or more individuals. In order to communicate one needs to acquire language first.

In South Africa studies conducted by Taylor, Gustafsson, Spaull & Armstrong, (2011) revealed that language as a medium of communication is one of the causes for poor performance in physical science. This is in agreement with Lee (2020) who argues that in South Africa and the effect of the language of science, although rarely given much attention by many researchers, cannot be ignored . This is because everything to be known about physical science is all embedded in the words used in it, or the language of science, which comprises of technical (scientific) words and nontechnical (non-scientific).

In another study by (DBE, RSA, 2011) the physical science classroom language is divided into two categories namely, the technical component (science words) and non-technical terms (non-science words). The technical component consists of science words specific to science subject, like atoms and elements associated with chemistry, and words like voltage, capacitance which are associated with physics (Oyoo, 2012). The non-technical component of science language is divided into three categories namely: logical connectives, metarepresentational terms and non-technical (nonscience) words used in a science context. Logical connectives are words or phrases that serve as links between sentences or between a concept and proposition, for example because, conversely and therefore (Oyoo, 2012). The second category is meta-representational terms which comprises of words or terms that signify thinking. The metarepresentational terms are sub-divided into two namely: metalinguistic verbs and metacognitive verbs. Metalinguistic verbs are words that the place of the words “to say” such as suggest, define, explain and calculate, while metacognitive verbs are words which take the place of the verb “to think” such as analyse, calculate and deduce. The third category of the non-technical component comprises of non-technical (non-science) words used in a science context, which are words that have become part of the typical language of science subjects, but have different meanings in the everyday use of language such as diversity, reaction, open and closed (Oyoo, 2012). According to Oyoo (2012) all these different language components have a great influence on the teaching and learning processes in physics.

In this study the question remains whether physical science teachers’ and learners understanding of meanings of nonscience words when used in science context as well as their ability to differentiate between non-science words and science words. For example, the word “reaction” means the way one feels or behaves as a result of something that happens (Rundell, 2012:1172). However, when the same word “reaction” is used in science context, it describes what happens when two or more chemical substances are mixed. It is the way in which these non-science words acquire different meanings when used in science contexts as opposed to their everyday use which appears to be a challenge to both physical science learners and their teachers. Collins (2020) also declares that physical science language is not the daily languages used in other comtext.

In Zimbabwean schools’ learners have to deal with the new terminology of the subject (Mji and Makgato, 2016) as well as the new language of instruction in which Physics is taught (Van Laere et al., 2014). Teachers are therefore tasked to develop effective ways of teaching both the language of science (Bellens and De Fraine, 2012) and the language of instruction. In a way, Physics teachers face different kinds of challenges in their bi-/multilingual classrooms from English language teachersWhereas. English language teachers have as their goal fluency and accuracy in English. Another study by Shumbayaonda (2020) maintains that Physics teachers have a dual task as they are faced with a daunting task of continuously needing to teach both science and English (where it is the language of instruction) at the same time. In fact, it has been opined that the challenge for many teachers in multilingual Zimbabwean schools is helping learners to move from where they are unable to understand English language (Rowe, 2013) to where they can communicate Physics in English.This therefore suggest that language affect the teaching and learning of physics in schooll. This learners at Masvingo Christian college struggle to capture the concept.

As societies become more culturally and linguistically diverse, many learners enter the classroom with a home language that is different from the language of instruction used at school (Van Laere et al., 2014). 41 In the past, two types of studies have been performed to determine the relationship between language features of test items and concept-teaching and performance of second language learners in content domain assessments, such as Physics. Most of these investigations, however, were conducted in English- speaking countries (Dehn, 2011). The first type of studies compared the performance of native English speakers and English language learners (Skrandies, 2011) on test items with different levels of language demands (Haag et al., 2013). The second type of studies analyzed differences in item difficulty (Nagy and Townsend, 2012) between English language learners and native English speakers (differential item functioning). In studies of the second type, test items that were found to show differential item functioning (DIF) against English language learners were analyzed in terms of their respective language features (Haag et al., 2013).

In the first type of studies mentioned above, most analyses compared the performance of English language learners with that of proficient (native) speakers of English language (Skrandies, 2011). Some of these studies suggest that English language learners score lower (Dehn, 2011; Nagy and Townsend, 2012) on items containing longer item stems than on language- free science items, other studies indicate that English language learners perform worse on items containing more academic language features (Rivera, 2011) than on items with minimal linguistic demands (Haag et al., 2013). This is an indication that performance in Physics of English language learners is affected by the amount of language present in science items, irrespective of its linguistic complexity (Lyon et al., 2012). Therefore the researcher seeks to know if this is the same at Masvingo Christian college. Do learners understand better if indegenous languages are used in the teaching and learning of physics.

Another study by Haag et al (2020) explored the relationship of academic language with the performance of English language learners focusing on both lexical (for example unfamiliar words, words with multiple meanings such as field, concentration, pressure, and pronouns) and grammatical (for example passive voice constructions, conditional phrases, complex sentences) features (Haag et al., 2013). The results from these studies indicated that various linguistic aspects such as grammatical features prevented English language learners from fully understanding science word problems (Van Laere et al., 2014). Similarly other studies by Van Laere et al.,(2014) demonstrated that reducing the linguistic complexity of concepts and test items in terms of lexical and grammatical features tended to improve the performance of English language learners (Haag et al., 2013).

Multilevel hierarchical regression analyses show that the home language and literacy in the language of instruction play an important role in Physics achievement at the learner level (Van Laere et al., 2014) From studies cited earlier on, it is evident that learners with a home language that is different from the language of instruction experience difficulties with science subjects, Physics included. Moreover, the higher the learners’ performance on reading comprehension and self-assessed proficiency in the language of instruction, the higher their score on Physics achievement tests (Van Laere et al., 2014). Competence in the language of instruction should not be underestimated when it comes to Physics achievement (Maerten- Rivera et al., 2010), to acquire scientific knowledge and skills learners need to master Physics literacy (Taboada, 2012). This means that it is important to become familiar with the cognitively demanding and decontextualized language that is commonly used at school (Van den Branden, 2020), particularly as learners will be confronted with more content area texts, such as Physics texts (Van Laere et al., 2014).

English language learners are faced with the double challenge of acquiring academic knowledge and skills through a language that they have not yet fully mastered. Although it is generally assumed that learners who are able to converse in the language of instruction can also think abstractly in that language (for example in the domain of Physics), this should not be taken for granted (Van Laere et al., 2014). This is in agreement with Martin(2020) who states that the decontextualized language needed for school is an obstacle for many learners, particularly English language learners, as the language and its vocabulary become increasingly complex and less connected to directly observable scientific context. . Based on studies cited earlier on and their findings, English language learners have more disadvantages than benefits when learning Physics in a language different from their home language. The only benefit is that they tend to be exposed to an international language (in the case of English language). Although they can use some of their home language principles to master the second language, the same cannot be said about academic language. Therefore prior to this study the researcher will seeks to find out if this is true at Masvingo Christian college.

Another study by Woolfolk, (2010) Language is critical for cognitive development as it provides the concepts for thinking and therefore a means for expressing ideas and asking questions. In agreement with this view, it has been argued that people use words to construct their interpretation of experience, and that our experiences shape our language (Fleisch and Shindler, 2017) and in the culture of schools a concept does not exist until it has been named and its meaning shared with others. It can therefore be emphasized that the interplay of language and the development of thinking needs serious attention, not only in language education, but also in all learning areas of physics. These researchers are of the view that teachers can encourage learners to be aware of their own thought processes, and to engage actively inappropriate thinking by using precise terminology, through posing critical questions, clarifying ideas and processes, as well as withholding value judgements (Botes and Mji, 2021).

The focus of high school education has largely been on Physics as a practical subject, often quite rightly, for Physics is partly an empirical subject (Van Laere et al., 2014). But for many learners the greatest obstacle in learning Physics- and also the most important achievement- is in learning Physics (Shanahan and Shanahan, 2018). Hence, Physics teachers are, among other things, language teachers. It should be noted, however, that there is far more to science communication than verbal language that is the spoken and written word (O’Reilly and McNamara, 2017). Words are important, but in Physics more than any other subject, we rely on a combination and interaction of words, pictures, diagrams, images, animations, graphs, equations, tables, and charts (Taboada, 2022). The difficulty the language of Physics poses for many low-literacy learners has long been documented at Masvingo Christian college. This necessitate the need for the study to proceed in order to see the magnitude of the scourge.

Researchers investigating the possible causes of underachievement among language minority learners have distinguished between the use of language in informal daily scenarios and language used in academic situations like teaching of physics(Madiba, 2014 and Makalela, 2015). They argue that reading a textbook or writing a report makes quite different demands on a person compared to talking to a friend. In educational contexts, it was observed that although language minority learners were able to converse in peer-appropriate ways (Lemmer, 2010) in face-to-face situations in a second language (Gu, 2015), the learners encountered difficulties in manipulating language in decontextualized academic situations (Janks and Makalela, 2013). This discrepancy in what has come to be called basic interpersonal communicative skills (BICS) and cognitive academic language proficiency is a useful distinction for today’s teachers (Cummins, 2018). Cummins (2018) suggests that cognitive academic language proficiency (CALP) enables the learner to learn in a context, which relies heavily on oral explanation of abstract or decontextualized ideas, as opposed to basic interpersonal communicative skills (BICS). This is often the context in which high school science is taught (Gibbons 2009), with unfamiliar events or topics being described to learners with little or no opportunity to negotiate shared meaning (Fang, 2016, Miller, 2019). These findings clearly enlighten the researcher on the causes of poor academic performance in physics. It might be the influence of language which learners fail to comprehend.

Research on language in Physics education has focused on a variety of topics, such as the particular functions of language in Physics classrooms (Nagy and Townsend, 2012), the relationship between the language practices familiar to non-dominant learners and those found in Physics classrooms (Barton and Tan, 2009), and the ways in which language in Physics may alienate some learners and preclude them from participating in scientific discourse (Gu, 2014; Van Laere et al., 2014; Shaw et al., 2010)

In terms of assessment, numerous studies document significant links between learners’ level of proficiency in the language of instruction and their performance in content-based assessments (Lambert, 2015; Makalela, 2015; Shaw et al., 2010). Studies focusing on the reading and vocabulary demands of multiple-choice assessments have shown that items with complex syntactic structure, cultural references, unfamiliar vocabulary, and/or multiple meaning words favor native English learners over English language learners (Lyon et al., 2012). If learners are tested in a language that is not their home (native) language, the scores might reflect not only their competencies in the measured content area (for example Physics), but also their mastery of the language (Haag et al., 2013).

Physics problems entailing linguistic demands are expected to impede second language learners (Gu, 2015; Makalela, 2015) from fully understanding the items and, hence, from demonstrating their scientific ability (Haag et al., 2013). Native speakers, in contrast, are more likely to possess the language skills necessary for understanding linguistically challenging Physics word problems. Thus, items with high linguistic demands (for example long and complex instructions) may measure construct- irrelevant language competencies (Haag et al., 2013). These items could be disproportionally more difficulty for second language learners (Lesaux et al., 2014) and, thus, less appropriate for capturing their scientific competencies than native speakers of the respective language (Haag et al., 2013). Hence given the inextricable link between language and assessment, the assessment of English language learners is one of the thorniest difficulties in educational policy and practice (Shaw et.al 2010). The same authors (Shaw et al., 2010) go on to state that for all test takers, any test that employs language is, in part, a measure of language skills. Such confounding variables may be mitigated by the use of accommodations such as customized dictionaries (Lyons et al., 2012).

Shumbayaonda (2020) argues that in many schools that have linguistically diverse populations faulty practices abound in the education of second language learners. Some of these practices include the fact that learners are: considered to have little or no language nor cognitive abilities because they are not able to demonstrate these abilities in English, expected to achieve proficiency in English through English language classes which are taught using the methods of first language instruction with no second language reinforcement in the regular classroom, expected to function in all subject areas as if they are native English speakers with no adjustment to instructional methods. Mangwiro (2020) supports the same aspect and declares that learners are also tested and assessed using tests which are not culturally sensitive and which are not presented in English, actively discouraged from speaking their first language in class, on the playground or at home, taught by teachers who have no knowledge of the home language of learners hence are notable to translate concepts into the learners’ home language. The needs of all language minority leaners in our schools will only be addressed by a school environment which supports the language development of both first and second languages in a rich variety of contexts and not only in the formal classes. It renained clear that language influences teaching and learning of Physics.

# 2. 4 TEACHER PERCEPTION ON THE TEACHING AND LEARNING OF PHYSICS IN SECOND LANGUAGE.

Collins (2020) provides an understanding of physical science teachers’ perceptions about meanings of non-science words when used in the science context in terms of their ability to differentiate between scientific and non-scientific words, herein referred to as technical and non-technical words respectively. The scientific knowledge is embedded in the words used in science and these words constitute the language of science; science teachers’ language use is thus critical in the effective teaching and learning of science (Wellington & Osborne, 2021). This assertion implies the physical science teachers are also teachers of science language in addition to teaching science concepts in the classroom. It becomes apparent that science teachers need to understand and be proficient in the science language use for them to execute this additional role of being language teachers (Msimanga, 2013; Oyoo, 2012). In this study the researcher recognise the role of the language used in the physical science classroom as critical for effective teaching and learning to take place. Therefore, the physical science teachers’ perceptions about the use of language in the science classroom are important for effective teaching and learning in the discipline at Masvingo Christian College.

The language of science can be viewed as a tool that facilitates communication between the teacher and the learners in a science classroom (Scott, Mortimer & Ametller, 2011). Language is vital in bringing across new ideas, testing the learners’ cognitive capacities, and replacing old ideas with new ones to bring about a new understanding in the learners’ minds (Scott et al., 2011). This view is consistent with the pivotal role played by language in concept formation and development (Vygotsky, 2017). Accessing scientific knowledge in classrooms in any language is dependent on the teaching strategy used and the fact that the knowledge is codified in the words of whichever language is used in the learning of science. Thus, the physical science teachers’ perceptions of the discourse about the use of language in the science classroom becomes critical (Oyoo, 2012).

It has generally been assumed that learners perform better in science once they have attained some proficiency in the language of learning and teaching (LoLT). However, this assumption has been put to the test by the common observation that not all learners who are proficient in the LoLT, including those who learn science in their home language, excel in science (Oyoo, 2012). The above assertion suggests that proficiency in the LoLT does play a part in excelling in science but does not guarantee success and excellence in science. This is in contrast t with Neza (2020) who stipulates that among the studies he conducted to understand teachers perception and he discovered that teachers believed tha teaching and learning of physics in local or indigenous language can boost the results but only the fact that teaching and learning in indigenous languages seems passive and backward. In this study the researcher will relie on findings of a study in which he investigated the perceptions of the physical science teachers about the use of language in the classroom. The researcher also investigated the ability of the physical science teachers in differentiating between the technical (science) words and non-technical (non-science) words. The aim of this study was to unravel and explore the physical science teachers’ perspectives on the use of language in the science classroom at Masvingo Christian college.

Oyoo (2011) argues that the attention that has been given to language issues in the learning of science has in the main been with regard to learners’ proficiency in the language of instruction. A number of publications spanning four decades have described the problems of language in the learning of science (Oyoo, 2011). The findings reveal that science words pose a problem of unfamiliarity but learners were seen to be able to cope reasonably well. However, more challenging was the use in science of non-science words, familiar language in a highly specific or often changed and unfamiliar way where a simple word such as “pure” (meaning safe or clean) takes a new meaning when used in physical science (Johnstone & Selepeng, 2021). Learning through the medium of English poses problems for learners whose mother tongue is not English as is the case in the South African context where the majority of learners are second language speakers of English (Rollnick & Rutherford, 2016). This study will help to extend understanding of how the meanings of everyday words are misunderstood by learners when used in science context, regardless of their gender or linguistic background (Oyoo, 2012). In this study we sought to establish whether Masvingo physical science teachers encountered difficulties with meanings of everyday words and science teachers’ ability in distinguishing technical words from non-technical.

Prior to this study Physical science teachers’ instructional language as a teaching tool has been out of general focus in international science education research (Oyoo, 2011). It becomes apparent that there is an urgent need for more research to focus on the manner in which physical science teachers use the language of instruction in classrooms by placing particular emphasis on the meanings of science and non-science words, which constitutes the language of science. Therefore, the need for this new focus in science education research is justified based on the need for teacher intervention in the learning of physical science and meanings of non-science words when used in scientific contexts.

# 2. 5 HOW CAN AN INDIGENOUS LANGUAGE BE INTEGRATED IN THE TEACHING AND LEARNING OF PHYSICS?

Science plays a central role in society, as it is a catalyst for development and the cornerstone of culture (Van Laere et al., 2014). Because this implies a need for an informed citizenry, education in this area is an important outcome of schooling (Martin et.al, 2012). This is problematic, as different countries worldwide are faced with a serious and persistent gap in academic achievement in Physics, particularly between majority learners (those learning Physics in their home language) and minority learners (Bellens and De Fraine, 2012).

Recent studies suggest that one of the key factors associated with this achievement gap in Physics education is the language spoken at home (Van Laere et al., 2014). Learners learning Physics in their first language have an advantage over minority learners in that minority learners need to master the language of instruction as well as the academic language (Shaw, Bunch and Geaney, 2010). In line with previous research carried out, being proficient in the language of instruction and particularly in reading comprehension is positively related to Physics achievement: the higher the learners’ proficiency in the language of instruction and especially their performance on reading comprehension, the higher their Physics achievement (Taboada, 2012). Competence in the language of instruction, should not therefore, be underestimated when it comes to science achievement (Van Laere et al., 2014) to acquire scientific knowledge and skills, learners need to master Physics literacy (Shanahan and Shanahan, 2008). Regarding the role of first language in Physics achievement, research findings show that minority learners face an extra challenge in performing highly on science subjects (Van den Branden, 2010)

Research on the language demands of Physics and Physics education, especially for learners from non-dominant cultural and linguistic backgrounds, has focused on the relationship between language practices that learners may be familiar with outside of school and those typically associated with the learning of Physics, lexical and grammatical features of the language of science (Van Laere et al., 2014). Some have focused on scientific discourse practices that learners may find alien or even alienating (Maerten- Rivera et al., 2010), and the need for teachers to integrate a focus on Physics content and language (Msimanga and Lelliott, 2014).

In Zimbabwe none of these have documented any literature on the teaching of Physics learners in their home language.Therefore there is a need to proceed with the study in order to understand how the Indigenous languages can be integrated in the teaching and learning of physics.

# 2.6 THEORETICAL FRAMEWORK

The theories considered for this research look at the role of literacy in the language of instruction on Physics achievement, and the challenge of having a home language which is different from the language of instruction. The new literacy that learners need to acquire in order to perform well in Physics is known under different but related names: disciplinary literacy, decontextualized language, and cognitive academic language proficiency (Van Laere et al., 2014). While ‘basic literacy’ refers to the relatively simple process of decoding words (Rowe, 2013), and ‘intermediate literacy’ relates to basic fluency, broad word knowledge and comprehension strategies to deal with texts (Van Laere et al., 2014), ‘disciplinary literacy’ concerns the mastery of specific concepts and discourses used in subjects such as science and mathematics (Fang, 2006). Disciplinary literacy is closely related to the concept of decontextualized language, which refers to abstract language that is distant from the here and now (Rowe, 2013). While children use highly contextualized language in their early development (for example through pointing, labelling, and facial expressions), they gradually develop the capacity to produce more decontextualized language, particularly once they enter school (Van Laere et al., 2014). Learning to master decontextualized language is often very challenging due to associated skills required, such as abstract thinking (Fang, 2006), and underlying assumption of causality (Van Laere et al., 2014), and mastering a relatively complex vocabulary and grammar, all of which imply an advanced level of language proficiency (Garcia, 2011; Gu, 2015).

# 2.6 CHAPTER SUMMARY

Different learner characteristics are significantly related to Physics achievement. Research consulted and cited in this chapter largely demonstrates that speaking a home language that is different from the school’s language of instruction has a negative correlation with academic achievement in Physics. Language undoubtedly plays a pivotal role in academic achievement. Modern day Physics educators should therefore take cognizance of the diversity of their classes by making an effort to accommodate all cultures and languages of their learners. Prior to this study Physical science teachers’ instructional language as a teaching tool has been out of general focus in international science education research. It becomes apparent that there is an urgent need for more research to focus on the manner in which physical science teachers use the language of instruction in classrooms by placing particular emphasis on the meanings of science and non-science words, which constitutes the language of science. Therefore, the need for this new focus in science education research is justified based on the need for teacher intervention in the learning of physical science and meanings of non-science words when used in scientific contexts. In Zimbabwe none of these have documented any literature on the teaching of Physics learners in their home language.Therefore there is a need to proceed with the study in order to understand how the Indigenous languages can be integrated in the teaching and learning of physics. The next chapter outlines the research methodology and design used in this research. This includes sampling techniques to be used, data collection and analysis methods, and statement on ethical considerations.

# CHAPTER THREE: RESEARCH METHODOLOGY

# 3.1 INTRODUCTION

Research methodology is the specific procedures or techniques used to identify, select, process and analyze information about a topic (Cresswell 2014). In a research piece of work, the methodology section allows the reader of the piece of work to critically evaluate a study’s overall validity and reliability. The methodology section answers two main questions: How was the data collected or generated? How was it analyzed?

This chapter discusses the methods employed by the researcher in pursuit of obtaining the information which tries to solve the problem statement. It takes on board the methodology of the research. The chapter also puts into consideration the sample, population, instruments used as well as data presentation. Both primary and secondary data were used for the purposes of this particular research by the researcher with equal weight assumed for both. The researcher needed to come to a fair conclusion and reasonable recommendation from the research data. To select respondents form the population the researcher is going to use the random sampling technique.

# 3.2 RESEARCH DESIGN

A research design is a master plan that specifically identifies technologies and procedures that are used to collect and analyze data of research problems. It is a chronological description of the procedures that are used in carrying out analysis of data collected (Creswel 2014). The research design should be conceptual structure within which research should be conducted. A research design is a structure that glues and holds all the research elements in a research project together. Cohen et al. (2013) views a research design as an analytical plan for data collection, enhancing clear data analysis which answers research questions. This is a way in which the researcher plan and structure the process of data collection.

A survey research design was used to carry out this study. Survey is a generalized means of data collection through the use of interviews or questionnaires. In the opinion of Cohen et al (2013), survey design answers questions pertaining to characteristics of frequencies of occurrences, vital facts of people, their beliefs, opinions activities and behaviors. A survey research design is considered most appropriate because information will be gathered by means of self-report, which could be designed as the subject’s response to questions asked by the researcher. Survey design is appropriate for determining the role of language in learning Physics at secondary level.

# 3.3 POPULATION

Population is all the individuals or units of interest; typically, there is not available data for almost all individuals in a population (Cohen et al 2011). This study was carried out amongst the students studying Physics at From Three and Form Four, teachers of Physics as well as the Administrators of Masvingo Christian College. The target population is distributed as shown below:

**Table 3.1: showing population distribution**

|  |  |
| --- | --- |
| **Target population** | **Population size** |
| School Administrators | 4 |
| Physics Teachers | 2 |
| Students | 114 |
| **Total** | 120 |

Table 3.1 Source: primary data

# 3.4 THE SAMPLE

Creswel (2014) defines a sample as a subject of the total population understudy. It can also be identified as a portion of the population that act as replica of the rest. A sample in this study is, therefore is a smaller group of elements drawn through a definite procedure from the accessible population. Due to limitations such as time and finance, the researcher limited the number of participants. The study employed stratified, purposeful, and convenient sampling strategies. Stratified sampling was used to identify the stratum in the population.

# 3.5 SAMPLING PROCEDURE

Probability and non-probability sampling techniques were both used for obtaining the sample size of respondents (School Administrators and Students) from the target population.

The stratified random sampling technique was carried out. According to Cohen et al (2011), probability sampling is a technique where samples are gathered in a process that gives all individuals in the target population equal chance of being selected. Kelly (2011) defines this process which involves the division of the population into relevant state based on one or several variables. The researcher decided to choose this sampling method because every learner has a chance of being selected and proportional representation is ensured.

Purposive sampling is also under non-probability sampling methods in which the researcher uses his or her judgement in the selection of sample members (Creswel, 2014). This method was used to select the students. The key informants were selected on the assumption that they understand better on the role of language in the learning of Physics. Therefore, the top to average performers in both classes were the key informants chosen in the research. Field work was conducted during June to August 2022 at Masvingo Christian College. The data was gathered through interactions with the students and teachers at the school.

# 3.6 DATA COLLECTION INSTRUMENTS

Data collection instruments used for the study were questionnaire, interview questions, researcher’s diary and checklists. The questionnaires were used to collect primary data from the School Administrators, Teachers and Students while interviews were mainly targeted at Teachers and the School Administrators.

**3.6.1 Questionnaire**

According to Maxwell (2013), a questionnaire is a set of carefully designed questions given in the same form to a group of people in order to collect data about some topic (s) in which the researcher is interested. Questionnaires were designed such that each question was related to a given research question and the topic. Both closed and open- ended questions were used. Open- ended questions were to help supplement the information given in the closed- ended questions and helped in obtaining more complete data. Questionnaires were used because they give clear and specific response and enable the respondent to express themselves freely especially other authorities who may not have enough time to personal interview.

**3.6.2 Advantages of Using Questionnaires**

The responses are gathered in a standard way, so questionnaires are more objective. The researcher got standard results by using questionnaires. Generally, it is relatively quick to collect information using questionnaires. It did not take long for the researcher to get the responses. Large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost-effective way. The results of the questionnaires can usually be quickly and easily quantified by either a researcher or using software package (Beeman, 2013)

**3.6.3 Interview**

Bell (2011) defines an interview as a process which involves an interviewer, who co-ordinate the process of the conversation and asks questions, and an interviewee who responds to those questions. It is a verbal conversation between two people with the objective of collecting information for the purpose of research. An interview guide was used to collect primary data. Semi structured face-to-face interview guide were set up with sets of outlined questions about issues to be explored. The outlined questions were meant to guide and make sure that all the relevant topics are covered. Interview permitted the researcher to probe and guide the respondents for detailed information and help keep interaction focused. Interviews were suitable for the teachers and the School Administrators since they had limited time to respond to questionnaires and verbal interaction with them helped in detecting biased answers

**3.6.4.1Advantages of Using Interviews**

Interviews can be done face to face. This is a direct advantage to the researcher as the researcher can meet with the respondents and see their body expressions. Interviews allow the researcher to collect people’s ideas, opinions, values and beliefs about the research. Interviewees can be given a sample of questions to prepare for the interview. They are useful to obtain detailed information about personal feelings, perceptions and opinions. They allow more detailed questions to be asked. They usually achieve a high response rate. Respondents’ own words are recorded. Ambiguities can be clarified, and incomplete answers followed up (Bell, 2011)

**3.6.4.2 Disadvantage of Using Interviews**

They can be time-consuming, setting up, interviewing, transcribing, analyzing, feedback and reporting. They can be costly in terms of setting up, time and resources. Different interviewers may understand and transcribe interviews in different ways (Bell, 2011)

**3.6.5 Focus group interviews**

Focus group interviews were carried in order find out the various views from the learners on the e-impact of language in the teaching and learning of physics. The researcher first explained to the sudy before interviewing them. Chiromo (2009) cited in Muchochomi (2016) asserted that focus group interviews allows the respondent to express themselves in groups with some discussion unlike when using questionnaire to collect data. Edesiri et al (2014) suggested that when conducting focus group interviews, the researcher has control over the pacing and proceedings of the interview discussion. In addition, Muchochomi (2016) alluded that conducting focus group interviews is less costly to the researcher since less printing is required rather than when questionnaires are being used to collect data. Focus group interviews also enable in-depth analysis of the topic under study.

# 3.7 VALIDITY AND RELIABILITY

Validity refers to the degree to which the measuring instrument measures what is supposed to be measured Kelly (2011). The researcher shall seek assistance from the relevant authorities in the instruction of interview questions. Creswell (2013) argued that it is critical for instruments to consistently measure whatever they are supposed to measure. To establish the validity the instruments were subjected to the scrutiny of experts who evaluated the relevance of each item in the instruments to the objectives. The experts rated each item on the scale. Their recommendations were used to finally modify questions and the format of the tools that had the ability to solicit the expected data. According to Cohen et al (2011) reliability is the degree to which assessment tools produce stable and reliable results. Questionnaires also have the danger of respondents not telling the researcher the truth but what they think the researcher want to hear. To ensure the reliability of the questionnaires, the response rate was tested and the researcher got a result of 95% response rate, this implies that the questionnaires were reliable.

# 3.8 DATA COLLECTION, PRESENTATION AND ANALYSIS PROCEDURES DATA COLLECTION PROCEDURES

The researcher acquired a written introductory letter from Bindura University of Science Education introducing the researcher to the respondents. The questionnaires were administered to the targeted authorities and collected after one week. This technique enabled the researcher to approach all the targeted respondents more easily. The researcher sought appointments from the School Administrators as listed in the population for interviews. The interview guideline questions were used in order to get appropriate data. The interview questions guided the interview process and made sure that all the relevant questions were covered through the face- to- face exchange of words in personal interviews. The researcher managed to get closer answers to the questions.

# 3.9 DATA ANALYSIS AND PRESENTATION

Creswell (2014) defines data analysis as the computation of measures along with searching for patterns of relationships that exist among the data groups. The researcher therefore inspected, cleaned and transformed, and modelled data with the goal of highlighting useful information suggesting conclusion, and supporting decision making in relation to the topic under investigation.

The study used Microsoft excel program in data analysis. Data which was collected using questionnaires was analyzed first checking for competences in filling the instruments. All questionnaires were filled in. That could not affect the results of the study. The questions were coded as they were already pre-coded and data entered into the computer. Open ended questions and those from the interview were transcribed, data categorized, themes established and then coded and entered into the computer for analysis. Both the quantitative data and qualitative data were analyzed using descriptive analysis tools such as frequencies and percentages. The findings were presented in the form of tables, pie charts and graphs.

# 3.10 ETHICAL CONSIDERATIONS

The researcher sought fully informed consent from the District Headquarters of the Ministry of Primary and Secondary Education and the School Head with clear explanation of the expansion of the research to Masvingo Christian College where the research was to be conducted. The researcher explained the purpose of the research to the respondents, ensured the privacy of and anonymity of the participants, as well as the privacy of data, in a responsible and sensible manner as per the ethical prescriptions of an academic research. Furthermore, the researcher informed participants about their right to withdraw from participation at any time. Participants were informed of their right to complete or return the uncompleted questionnaire if they wished to. The researcher exercised sensitivity regarding to information offered by participants. In order to increase the level of trust, the researcher fully revealed her identity and background. The researcher posed no physical, emotional, intellectual or social threat to the respondents, community and the environment (Creswell, 2014).

# 3.11 CHAPTER SUMMARY

The chapter has been used to describe the research methodology, research design, target population, sampling, research instruments, data presentation and analysis procedures all in a bid to gather sufficient data. Data will be collected from both primary and secondary sources. The next chapter will focus on analysis, presentation and interpretation of the data gathered from the field research using the above methodology.

# CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

# 4.1 INTRODUCTION

This chapter looks at the presentation, analysis and interpretation of data gathered through primary methods in form of questionnaires. The research techniques are highlighted in the previous chapter and the findings are linked to the research objectives outlined in chapter one and the findings of the authors that were reviewed in chapter two. Tables, pie charts, bar and line graphs, and other data presentation techniques are used in presenting and interpreting data.

# 4.1 DISTRIBUTION OF RESPONDENTS BY GENDER

**Table 4.1: distribution of respondents by gender**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Respondents category** | **Female** | | **Male** | |
| **Frequency** | **Percentage** | **Frequency** | **Percentage** |
| School Administrators | 2 | 50% | 2 | 50% |
| Teachers | 1 | 50% | 1 | 50% |
| Students | 60 | 53% | 54 | 47% |

**Source: Primary data**

Table 4.1 indicates that there were more female respondents which had 63 (53%) than male which had 57 (47%). This then translates to the fact that more females dominated in the research.

# 4.2 DISTRUBUTION OF RESPONDENTS BY QUALIFICATION

The employee respondents were asked to indicate their level of education. Table 4.2 represent the data on employee qualifications.

**Table 4.2: Level of Education**

|  |  |  |
| --- | --- | --- |
| **Level of education** | **Frequency** | **Percentages** |
| National Diploma | 1 | 17% |
| Bachelor’s Degree | 1 | 17% |
| Master’s Degree | 3 | 50% |
| PHD | 1 | 17% |

Table 4.2 Source: primary data

Table 4.2 shows that 1 (17%) of the respondents possessed a National Diploma, 1 (17%) of the respondents are holders of a Bachelors’ Degree and well trained in the Physics discipline, 3 (50%) of the respondents had a Master’s degree and finally 1 (17%) of the respondents is a holder PhD. Generally, it can be concluded that majority of the respondents at Masvingo Christian College are qualified since they attained the least of the basic education are not laymen as far as the role of language in learning, especially Physics, is concerned. It was important to establish the education level held by the study respondents in order to ascertain if they were equipped with relevant knowledge and skills on teaching. These findings implied that most of the respondents were qualified to understand the nature of the study problem. This concurs with Thamrin (2012) that during research process, respondents with technical knowledge on the study problem assist in gathering reliable and accurate data on the problem under investigation.

# 4.3 QUESTIONNAIRE RESPONSE RATE

Of the 116 questionnaires dispersed, 2 targeted the Physics teachers and the remaining 114 were for the Physics students in Form Three and Form Four. Table 4.3 below stretches a summary of the questionnaire response rate. The total number of the questionnaires distributed was 116 and 100 of the questionnaires were completed which translate to a response rate of 86%.

**Table 4.3: Questionnaire Response Rate**

|  |  |  |  |
| --- | --- | --- | --- |
| Respondents | Questionnaires Distributed | Questionnaires Completed | Response Rate |
| Physics Teachers | 2 | 2 | 100% |
| Physics Students | 114 | 98 | 84% |
| Total | **116** | **100** | **86%** |

Table 4.3 Source: primary data

According to Mugenda and Mugenda (2003), the statistically significant response rate for an analysis should be at least 30%. In the same vein, Gordon (2012) proclaims that a higher response rate is better, he went on to proclaim that60% would be marginal but 80% is good as it reflects a wider range of the respondents view. The 16/116 (14%) who could not respond to the questionnaires had tight schedules due to CALAs and some were not at school on the time of collection of the questionnaires. The rate of response in relation to the total population was therefore 86% which is also reasonable and enough to give an accurate reflection of the whole population. Hence the response rate of 86% was sufficient to justify the study and therefore gave credibility to the findings that were presented.

# 4.4 DATA PRESENTATION AND ANALYSIS

The analysis of the variables included which have a great impact on the role of language in the learning of Physics was done to bring out the most important features that each might have, this was done by looking at the factors that affect the smooth running of the learning process.

# 4.5 THE INFLUENCE OF LANGUAGE IN THE TEACHING AND LEARNING OF PHYSICS.

Information obtained from both questionnaires and interviews on the influence of language proficiency of teachers and pupils and whether or not they code switch and code mix during classroom interaction, the School teachers and learners agreed that the teachers English proficiency is fair, they speak fluent and they have no problem with communicating in English however only the fact the language some confuse the learners. During interviews teachers admitted that some pupils’ English language proficiency is relatively low, especially in the Form Three because they do not have a good background in English though they study English as a subject, and it is average in high classes. Some of the teachers states that use of English language as a medium of communication in the teaching and learning of Physics is a stumbling block for all learners to understand and capture some of the concept. This finding is in line with information obtained from the focus group discussions. Most of the learners states that they do not understand anything when their teachers explain in fluent English language without use of indegenous languages. These findings are in line with Collins (2020) who declares that because of the different linguistics backgrounds learners sometimes fail to understand the concepts in the teaching and learning of Physical sciences.

Information obtained from both questionnaire and interviews shows that the all the teachers agreed that the language used influence the concept mastering of the learners physical sciences concept*.*

*As teachers we avoid ambiguous terms and sometimes we use the language which we think learners can not understand in particular topic. Sometimes we are forced to code switch.*

When the two Physics teachers were asked to evaluate themselves and their pupils regarding the role of language in the teaching and learning of Physics and whether they code switch and code mix during classroom interaction, they had the following to say. One teacher admitted that they normally use the English Language, and his English proficiency is average and does limit him to teach. He admitted that sometimes he is forced to code switch and code mix in different occasions such as during giving explanation for new concepts to improve pupils understanding and some pupils’ language proficiency is low. This is in agreement with Bellens and De Fraine, (2012) teachers are therefore tasked to develop effective ways of teaching both the language of science and the language of instruction through code switching.

The other teacher said her English proficiency is good and has no problem with language and he can communicate well. However, during classroom observation, the researcher observed that the level of English proficiency of the teachers was average as they could not give explanations to some concepts on the subject matter and therefore, they had to code switch and code mix with Chishona in the sessions. The researcher also noted that giving instructions to pupils was also a reason behind teachers’ code mixing and code switching.

When asked to evaluate the pupils’ language proficiency, teachers commented that the language proficiency is low for few pupils and average in many. However, they noted that only few pupils can participate in classroom discussions because some pupils are ashamed to speak which affect their general understanding of the subjects taught. When it comes to code-switching and code mixing by the pupils, teachers admitted that pupils code-switch and code-mix although they are punished when they do so. Teachers try to make pupils speak English.

Physics students were asked to comment on the language proficiency of their teachers and of themselves and whether they code switch and code mix during classroom interaction. Of all the students who completed their questionnaires, 60% of them said that their teachers have good English proficiency and 8% of them said their teachers are facing a language problem, teachers failed to make pupils understand when they are teaching and some time, they code switch to Chishona. To the pupils this could be the indication of poor English proficiency. On pupils’ level of proficiency, forty pupils admitted that their English proficiency was poor while thirty of them said their proficiency was average. Forty-four pupils are quoted to complement each other on their teachers’ English proficiency

Fig 4.1 English proficiency. Primary data source 2022

A student in Form Four had this to write, *“.... Is not good for teachers, they are unable to explain well some concepts in English for us understand when they teach, hence sometimes we do not understand what they teach”* and of the 8%, another Form Three student wrote the following, *“Even teachers have the problem of English, if they do not have a problem, why do they code mix and code switch in the class? ............ .. I think they code switch and code mix because they are unable to explain fully some concepts in English”*

When asked on their own English proficiency, pupils had a say and one pupils is quoted on behalf of others, *“........it is not good, because English is very difficult to understand, I cannot speak well, I just sit quietly in class because I know when I speak in English I will make mistakes and when I speak in Chishona in the class teacher punishes us”.* During classroom observations, it was revealed that pupils’ English proficiency was very poor as they could hardly express themselves freely when wanted to give some simple explanations on simple questions asked by their teachers.

The teachers as well as the School leaners expressed two views about the influence of other languages in the teaching and learning of Physics. They either affirmed the strong positive outcome of students using vernacular in the Physics classroom, or they felt that other languages should only be used in primary school level education. At the same time, however, all the two Physics teachers acknowledged the place of other languages in the classrooms. When the teachers were asked about how they viewed their students’ language practices, teacher 1 explained that allowing their students to use theirvernacular assisted in their learning of Physics. In the same vein, the second teacher expressed a similar view. She mentioned noticing students in the rural school performing more effectively than those in some of the urban schools. When asked why this might be, she explained that the students used their vernacular to translate and interpret the English content. She saw this as an enabling process enhance the physical sciences passrate.

Furthermore, the second teacher felt that there was an advantage for students using their vernacular language in the learning of Physics. When interviewed to that effect, she unraveled that “so what I see is that from [vernacular] language to English is easier with the connection. The way they think enables them to connect themselves and express themselves in their experiments and learning. Although in their speaking it is a bit difficult, especially with the accent and pronunciation of Physics terms. But when they organize their thoughts and put it on paper, [it] is far better than those students who use English.

# 4.6 TEACHER PERCEPTION ON THE INFLUENCE OF ENGLISH LANGUAGE ON THE TEACHING AND LEARNING OF PHYSICS.

Information obtained from teachers on their perception on the use of English reveals that language issues in the learning of science has in the main been with regard to learners’ proficiency in the language of instruction. The findings reveal that science words pose a problem of unfamiliarity but learners were seen to be able to cope reasonably well. However, respondents states that more challenging was the use in science of non-science words, familiar language in a highly specific or often changed and unfamiliar way where a simple word takes a new meaning when used in physical science. Learning through the medium of English poses problems for learners whose mother tongue is not English as is the case in context where the majority of learners are second language speakers of English.The use of English forced teachers to use lecture methods of teaching whereby the students play only the role of listening and coping notes without active participation. This prevented most students from proper acquisition of subject content. This is in agreement with Mazara (2020) who states that it is difficult for some learners to understand when concepts are taught in foreign languages or second languages which they could not understand.

# 4.7 LEANER PERCEPTION ON THE INFLUENCE OF ENGLISH LANGUAGE IN THE TEACHING AND LEARNING OF PHYSICS.

The reason behind the researcher’s wish to find the integration language preference was to see how convenient it is to use a particular language in the teaching and learning process of Physics. The researcher therefore collected opinions from pupils and teachers on which language they preferred and feel comfortable when used in order to encourage interaction in teaching and learning of Physics. Why do they prefer whichever language? Interviews were conducted in both English and Chishona. Twelve pupils andtwoPhysics teachers were interviewed. The findings showed that, teachers’ preference is Chishona, a language that encourages effective teachers-pupil classroom interactions for a better understanding of the subject matters. Pupils had different set of preferences; there are those who wanted Chishona for a better understanding of subject matter and some wanted English for other reasons than classroom interactions and understanding of subject matter.

Graph showing the students’ view of the continued use of English Language as a medium of instruction in the learning of Physics

**Fig 4.2 Language preferences of learners. Primary data source 2022**

Despite of the problems encountered by pupils in using English as the medium of instruction at Masvingo Christian College, 31% of the students preferred to continue using English as language of instruction and 55% of the students had mixed feelings, they preferred using both English Language and Chishona in the learning of Physics while the remaining 14% of them preferred using Chishona as the language of instruction. For those who preferred English, their reason for their choice was that they wanted to learn more English and believed that when they use it as language of instruction, they can learn it faster than when they learn it when it is taught as a subject. They also said, English is the global language. If they go anywhere outside Zimbabwe where Chishona is not spoken, they will communicate easily in English. For them, it does not matter whether it affects their learning, interaction, understanding, knowledge and skills acquisition as far as at the end they are able to speak it fluently. One pupil is quoted***“****Personally I want English because I want to know English as it is an international language such that when I meet the westerner/European I can freely speak it. So I want to learn through English”.*In support of this, another student shared that, *“I would prefer only English. I am used to learn through the English language. If the language would be changed, I will find it difficult because everything I used to read in English. I still need to learn English more because it is the international language****.*** *Learning physics in English makes sense because there are some terms which can not be explained in shona. If teachers use simple English language and clear explanations we are capable of capturing concepts”*

Those pupils who preferred Chishona to be used as language of instruction stated that they have difficulties in speaking and understanding English which hinders their participation and their understanding. The interviewees expressed that there is a problem using English as the language of instruction and they preferred Chishona which is their familiar language so that they can understand in the classroom when the teacher is teaching. One pupil is quoted here:***“****I would like**Chishona ... it is a familiar language, and I would understand the subject in class, I cannot speak English well .... I get trouble in understanding the teacher when teaching is done in English”*

Teachers preferred Chishona to continue to be the language of instruction because it helps better understanding of the subject and knowledge acquisition and for effective participation of pupils. They commented that because Chishona is the mother tongue of many teachers and students, it facilitates their teaching effectively. Their work is simple and saves time because all students understand when they are being taught. The use of Chishona encourages pupils to speak and participate. The information obtained from both learners questionnaire and focus group discussion revealed that of the learners felt and understand better when their teachers explain complex phenomenon indigenous languages which learners are capable to understand. During the focus groups discussion most of learners states that they rather prefer to be taught in local languages. Therefore their teachers end up using code switching. Some have focused on scientific discourse practices that learners may find alien or even alienating, and the teachers try to integrate a focus on Physics content and indigenous languages.

# 4.8 TEACHERS’ PERCEPTIONS ABOUT THE PLACE OF CODE-SWITCHING AND CODE MIXING IN THE TEACHING OF PHYSICS

Code-switching is a common practice in secondary schools. When asked specifically about their views on code switching practices in the classroom, all the two teachers expressed negative views about its effect on students’ learning of academic Physics. This is also somewhat at odds with some of their statements above. In her view, one of the teachers declares that *“Code-mixing or code-switching is the use of more than one language or variety within a single communication event. Various information is signaled by the choice of language or by switching from one variety to another. This may include the structure of the ongoing interaction, the relevant social context, or elements of the speakers' identities highlighted in the interaction.****”*** She went on to explain that code switching as it is used currently in Physics lessons does not lead to competence in either Chishona or English. It is stressed that competence in English and Chishona is beneficial to the learning of Physics. It is thus recommended to improve the teaching of English and Chishona by using qualified language teachers because learners do not know how to express certain concepts either in shona or English for example students, fail to explain that the electricity is something that is stored into the sockets, batteries, and produces a spark of the bulb, an electrical appliance....”. They recognize the existence of this one and its effect but do not know to explain it.in either one of the languages.

# 4.9 THE INTEGRATION OF THE INDIGENOUS LANGUAGES IN THE TEACHING AND LEARNING OF PHYSICS.

Information obtained from both questionnaire and interviews revealed that teachers should first examples from the local environment. During interviews the teachers states that this enables teachers to move from the known to unknown making it clearer for learners to capture concept when indigenous languages are used in the teaching and learning of physics at ordinary level. This is the same reflection from the learners when asked how they think indigenous languages can be taught. The learners revealed that teachers must not use far fetched examples which they do not physically have eye sight on them. This approach helps learners to use their first language to transimit information. This finding is in agreement with Mbereko (2020) who posits that taking relavent examples from the school environment promote visual imageries that enables the teachers and learners to reach a deep understanding of a concrpt when any language is used either first language or second language.

The respondents also states that, teachers can translate physics words or English words to indegenous languagea which leaners can understand. One of the teachers argues that direct translation is a key when one realize that some learners are failing capture a particular concept. Teaching experiments in shona helps learners to create a inclusive approach as all learners will be able to capture the concept.

The findings also exposed that indigenous languages can be integrated in class discussions, pair work, and group works during the teaching and learning of particular concept or topic. Leaners can discuss using their mother tongues and therefore understanding concepts which they can not capture when second language is used. Code switching can therefore be used and becomes necessary.

It was also revealed that the several steps that should be taken to help improve the integration of indigenous languages in Zimbabwe, including stronger move toward strengthening mother tongue education, provision of solid bilingual training for science teachers, and provision of money by the Zimbabwean government and educational planners for developing indigenous languages in all learning areas leading to inclusivity.

# 4. 10 CHAPTER SUMMARY

This section concludes the data presentation chapter. It aimed at investigating the role of language in the learning of Physics at Masvingo Christian College. The findings show that students and teachers admitted that language of instruction is a very important tool to enhance pupils understanding of the subject taught. If the language of instruction is an unfamiliar it makes hard for an effective interaction between pupils and teachers

# CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

# 5.1 INTRODUCTION

This chapter summarizes the study and gives recommendations for other researchers and research beneficiaries. This study set out to investigate the role of language in learning Physics.

# 5.2 SUMMARY

The research looked at the influence of language in the teaching Physics. The researcher, decide to first find out what the related literature say about the research questions. In the literature review, it has been accumulated that language is essential in the teaching and learning of physics. The methodology guiding the research both qualitative and quantitative approaches as these approaches complement each other. The researcher picked on teacher, and students to assist in the research. Questionnaires were designed for teachers and students to give their views and comments as they filled in the questionnaire. Interviews were also conducted with both the teachers, learners with observations as a way of gathering information. Ethical considerations were also taken into consideration as a way of promoting privacy.

The findings of the study were reported according to the research questions. The findings were presented and discussed in terms of the themes that emanated from the study. The observations from one lesson observed at each of teachers at the schools were presented and discussed. Teachers’ perceptions were obtained in terms of their understanding and interpretations of teaching Physics.

The study reveals that, language is a tool of instruction in the teaching and learning of physics. The choice of language in the teaching and learning of physics determines the learning outcomes. The study also reveals that teachers pupils’ English language proficiency is relatively low hence they do not have a good background in English though they study English as a subject, and it is average in high classes. It was revealed that the use of English language as a medium of communication in the teaching and learning of Physics is a stumbling block for all learners to understand and capture some of the concept. It was exposed that learners do not understand anything when their teachers explain in fluent English language without use of indegenous languages.

The study also reveals that the use of code switching and indigenous languages in the teaching learning of physics can be inclusive as it enables learners who do not understand English language during the teaching and learning processes. The study further exposed that indigenous languages can be integrated. It was revealed that teachers must not use far fetched examples which learners do not physically have eye sight on them. This approach helps learners to use their first language to transimit information. It was agreed that taking relavent examples from the school environment promote visual imageries that enables the teachers and learners to reach a deep understanding of a concept when any language is used either first language or second language. The study also revealed that teachers can translate physics words or English words to indegenous languages which leaners can understand. Teaching experiments in shona helps learners to create an inclusive approach as all learners will be able to capture the concept. The findings also exposed that indigenous languages can be integrated in class discussions, pair work, and group works during the teaching and learning of particular concept or topic. Leaners can discuss using their mother tongues and therefore understanding concepts which they can not capture when second language is used. Code switching can therefore be used and becomes necessary. It was also revealed that the several steps that should be taken to help improve the integration of indigenous languages in Zimbabwe, including stronger move toward strengthening mother tongue education, provision of solid bilingual training for science teachers, and provision of money by the Zimbabwean government and educational planners for developing indigenous languages in all learning areas leading to inclusivit

# 5.3 CONCLUSIONS

Both findings presented, analyzed and discussed in chapter four are used to draw some key conclusive remarks hence it can be concluded that:

* Language has a very critical role to play in the learning of Physics.
* English is clearly a foreign language, hardly spoken outside of school. You do not ever hear the language spoken in the streets or the marketplace.
* Most teachers and pupils expressed feelings of discomfort when communicating in English. Teachers using English as a language of instruction sometimes frustrated the pupils learning efforts instead of facilitating them.
* Due to the use of a foreign language, teachers and pupils do not follow the school language policy during classroom interaction which requires them to speak the language of instruction fluently. Through classroom observation the researcher found a lot of code-switching and code mixing in the classes.
* The use of English forced teachers to use lecture methods of teaching whereby the students play only the role of listening and coping notes without active participation. This prevented most students from proper acquisition of subject content.
* On the other hand, in the use of Chishona in teaching and learning of Physics enhanced effective participations. Participants were free and spoke freely. Pupils were able to ask and answering questions.

# 5.4 RECOMMENDATIONS

There are several recommendations one may draw from this study for the education sectors in Africa and Zimbabwe in particular. The following are some recommendations that could be drawn from this study:

* The Ministry of Primary and Secondary Education should consider the use of a familiar language as the language of instruction in teaching and learning. A familiar language of instruction facilitates an effective teaching and learning environment for both teachers and pupils at all levels of education.
* Several steps that should be taken to help improve the integration of indigenous languages in Zimbabwe, including stronger move toward strengthening mother tongue education, provision of solid bilingual training for science teachers, and provision of money by the Zimbabwean government and educational planners for developing indigenous languages in all learning areas leading to inclusivit
* Schools should consider effective classroom interaction for knowledge acquisition that will be acquired using Chishona and the mastery of English as a language and as a subject. For students to master English language, they need to be taught with professional English teachers, teachers who are experts in teaching foreign languages, in this case English.
* There is more to be done in educating the community on the importance of using one’s mother tongue in teaching and learning. Parents who send children to better schools should be taught that proper education is provided by proper language of instruction. This means learning in an unfamiliar language takes longer than in a familiar language because it prevents teachers and pupils to interact freely.

# 5.5 SUGGESTIONS FOR FURTHER STUDIES

Since this study employed a case study design and a qualitative approach whereby small sample of respondents were involved, a similar study contrasting the government and private primary schools using a quantitative approach would be required to cover a larger sample size in different communities using two different languages of instruction.

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# APPENDIX A- INTERVIEW GUIDE

My name is Mau- Mau Dehwa an undergraduate student at Bindura University of Science Education undertaking the Bachelor of Education Degree. I am in my final year and currently doing a research project on the topic entitled: **AN INVESTIGATION OF THE ROLE OF LANGUAGE IN LEARNING PHYSICS. A CASE OF MASVINGO CHRISTIAN COLLEGE**

In the process of conducting this project, l am expected to conduct interviews and distribute questionnaires as a way of gathering data, views and comments from different individuals that are relevant to my study. I am kindly asking for your assistance in answering the questions below for the success of this project. Privacy and confidentiality is guaranteed so after the completion of this questions do not write your name and l assure you it’s only for academic purposes none other than that.

**INTERVIEW QUESTIONS**

1. For how long have you been a teacher?
2. For how long have you been a head teacher?
3. I would like to know your teacher’s qualification e.g. how many certificate, diploma and degree teachers?
4. How do you find your students’ learning of Physics in English Language in your lessons?
5. What are some barriers for students learning the academic Physics?
6. Tell me about your thoughts on the importance of encouraging students to use the language they are comfortable with.
7. Do you find that your students are confident in using English when speaking in the classroom? Why is this so? Could you elaborate with a classic example?
8. Do you find your students write effectively in academic English? Why do you say so?
9. What language/languages do you think you use whilst teaching the subject Physics? Why?
10. How often do you see yourself using this language? Are you sure you do not use any other languages apart from English?
11. When do you normally use other languages apart from English? Why?
12. Do you switch between languages (code-switching)? How (In what ways do you code-switch)? Why?
13. If code-switching is encouraged in the classroom, how do you think it will affect students’ learning of Physics?
14. What do you understand about the nature of English you need for successful academic study of Physics?
15. Do you see it as important in the students’ learning?
16. Do you think there is a role for languages other than English in the teaching of the Physics curriculum? Why?
17. Any further comments?

**SECTION B: QUESTIONAIRE FOR LEARNERS**

1. Which academic Form are you in?...................................................................................................................................
2. Which language do you normally use to communicate with your fellow pupils in and out classroom? Please explain. (For example discussing academic and non-academic matters) ?..........................................................................................................................................................................................................................................................................
3. Which language do you normally use to communicate with teachers in and out of classroom?

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1. Are there any other languages used while interacting with teachers and pupils in and out classroom?..........................................................................................................................................................................................................................................................................
2. Can you tell me what you think of the use of English/ Chishona language in the learning of Physics?..........................................................................................................................................................................................................................................................................
3. Which language do teachers use in teaching process?..............................................................................................................................................................................................................................................................................
4. Do you participate during the lessons? How do you participate?.............................................................................................................................................................................................................................................................................
5. Do you think Chishona/ English as medium of instruction is a problem in teaching and learning?...............................................................................................................................................................................................................................................................................
6. Which language do you feel should be used by teachers in teaching so as to encourage teacher-pupils interaction and why?.............................................................................................................................................................................................................................................................................

# SECTION C. FOCUS GROUP INTERVIEW QUESTIONS FOR LEARNERS

1. In what academic class are you?
2. Do you face any language problems in the teaching and learning of physics at your school? If yes please explain the nature of the challenges you are facing.
3. What is your view towards the use of english language in the teaching and learning of physics?
4. Are you comfortable with use of English language in the teaching and learning of physics?
5. Do you think traditional languages can express physics concepts more clearly and effectively for to master the subject concepts?
6. Does your teacher clearly explain physics concept?
7. Are you comfortable with the use of English language in the teaching and learning of physics?
8. Which topic if any do you think should be taught in indigenous languages?
9. Are the Indigenous Knowledge concepts fully expressed in English?
10. What do you think should be done by the following groups to address the challenges of language in the teaching and learning of physics?

Teachers

Government

School administors.

***I thank you for your cooperation***