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AN INVESTIGATION INTO PERCIEVED MITIGATION STRATEGIES OF CHALLENGES ENCOUNTERED IN THE TEACHING AND LEARNING OF PHYSICS AT ORDINARY LEVEL: A CASE OF SECONDARY SCHOOLS IN GLENVIEW, HARARE.

BY

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RELEASE FORM

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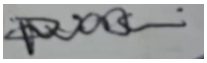

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DEDICATION

This research project is dedicated to my loving family who has been there throughout this research journey. My husband Tapedza Zhou, my daughters Matidaishe and Miriraishe and son Tapedza Junior for your unwavering support, guidance and encouragement which has been instrumental in shaping my research endeavors. Your selfless and love have inspired me to pursue my passions and I am forever grateful.

ABBREVIATIONS AND ACRONYMS

ICT – Information communication technology

CD- compact disc

‘O’ Level- Ordinary level

STEM- Science Technology Engineering Maths

ABSTRACT

The Study was conducted to an investigating into mitigation strategies of challenges encountered in the teaching and learning of Physics at ordinary level focusing at secondary schools in Glenview. The objectives of the study were to find out how well experienced teachers are to teach physics, to identify strategies to mitigate institutional based challenges in the teaching and learning and to find out ways to overcome challenges in learning of physics. Literature review was gathered from local and global scholars and authors to compare what other researchers have done. A mixture of quantitative and qualitative analysis survey methods was used. A total of 20 students and 5 teacher's head of department and a school head were respondents used for the study to capture strategies to mitigate challenges into teaching and learning of Physics. The teachers were able to come up with strategies to deal with challenges and effects, being creative so that they explore experimentation among students, being creative in such a way they will be substitute for experimentation materials ,presenting digitalised activities, and embracing open-mindedness and adaptability in teaching, allowing them to effectively address and identify the difficulties and allowing them to create a more conducive learning environment and promote professional growth and increased motivation among teachers and trigger students to have intrinsic motivation within themselves.

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CHAPTER 1

THE PROBLEM AND ITS SETTING

1.1 INTRODUCTION

Physics education plays a pivotal role in shaping students' understanding of the natural world and their critical thinking skills (Dipolog 2022). However, it is increasingly recognized that students encounter various challenges when learning physics concepts. Understanding and addressing the learning difficulties students encounter in the realm of physics is of importance in shaping the educational landscape and the society at large. This chapter contains information about the background, problem statement, aim, objectives, research questions, and significance of the study. It also highlights the delimitations, definitions of terms, assumptions, and limits of the study.

1.2 BACKGROUND TO THE PROBLEM

Science has an immerse impact to humanity because the application of scientific knowledge plays a crucial role in the satisfying of human needs and also improving the standards of living. Physics which is a branch of science is important in that it generates fundamental knowledge needed for future technological advances. The study of physics means trying to find out what the universe is made of, and how these things move and interact with each other. So, in one sense all the other sciences are built on the knowledge gained through the study of physics.

Brown (2019) states that physics has had an increasingly important impact on the average person’s daily life. For example, physicists played an essential role in the development of the for-example transistor which is the basis of all modern electronics, including radio, television, computers, and telecommunications. The Laser and Laser diodes, now used widely in CD players, grocery bars ode scanners medical treatment and telecommunications. The digital computer, much of the early development have been motivated by basic research. Fibre optics, now finding widespread application in high-speed data and voice transmission networks. The global positioning system, uses satellite and precise timing to allow positions to be allocated to within a few feet

anywhere on the surface of the earth. And others such as the hologram uses of credit cards the World Wide Web, medical imaging techniques, medical treatment techniques and new micro-sensors.

Physics has been introduced in the general school curricula at secondary education levels as an optional subject. the teaching and learning of physics face a lot of challenges especially in secondary schools in Glenview, where there is the believe that these are the third best schools and in terms of infrastructure there are still challenges. Challenges experienced include lack of apparatus and chemicals to carry out physics practical's, lack of teachers who are willing to take up the subject leading to isolating, no proper laboratories to carry out physics experiments, lack of ICT equipment and also the negative attitude of the learners towards the subject, lacking administrative support, lack of expertise with new equipment, difficulty in identifying students' needs. the National Teachers Course Book on Education Cycle (1990) further postulates that other challenges to the teaching and learning of physics have been further worsened by the lack of well qualified physics teachers so in some cases for example a chemistry teacher is assigned to teach physics, the absence of physics textbooks due to high cost in purchasing them, little time being allocated for physics on the school timetable as well as gender influences.

The above-mentioned challenges have hindered the effective teaching and learning of physics at school A in Glenview.

1.3 PURPOSE OF THE STUDY

The purpose of this study was to understand how best teachers and students do so that physics can be a subject to be understood by almost all students at school A in Glenview and to improve the pass rate. This study intends to provide solutions to the school and also to the learner at large so that the student will understand the subject and come up with good grades whilst teachers will use the suitable teaching methods for the betterment of the learner. Ultimately, this research strives to enhance physics education and equip students with the necessary skills for future academic and career success in STEM fields,

1.4 STATEMENT OF THE PROBLEM

Physics seems to have challenges as a subject and this is evident by the low number of students willing to take it up as a subject even if they know that there are many career opportunities related to physics and also most of the learners studying it are boys. Also poorly equipped laboratories, lack of proper support from the school administration, lack of ICT knowledge by the teachers and in some cases unavailable resources for teachers to embrace their knowledge of ICT, lack of qualified physics teachers and negative attitudes of the learners have greatly contributed to the ineffective teaching and learning of physics.

There it is upon this research to find long lasting solutions to the above-mentioned problems.

1.5 MAIN RESEARCH QUESTION

What are the strategies to mitigate challenges in the learning and teaching of physics at school A in Glenview?

1.6 SUB RESEARCH QUESTIONS

- How often are science teachers being capacited by the ministry and the schools at school A in Glenview?
- What are the best approaches in solving the identified problems in the teaching and learning of physics at school A in Glenview?
- How sustainable are the solutions from this study will they be?

1.7 REASERCH OBJECTIVES

The research seeks to:

- To find out how well experienced are science teachers to teach physics
- To identify ways to mitigate institutional based challenges in the learning and teaching of physics in Glenview.
- To identify ways to overcome non institutional challenges in the learning and teaching of physics in Glenview.

1.8 ASSUMPTIONS

It is presumed that physics educators possess the necessary training and competence to use different teaching methods applying the solutions to the strategies which the researcher come up with to effective teaching process also learners to be able to understand physics and come with the desired grades and also increase the number of students taking physics at ‘O’ level.

1.9 SIGNIFICANCE OF THE STUDY

This study will clearly lay out the problems that are being faced at a school A which is in Glenview in the teaching and learning of physics and identify the ways to mitigate the problems so as to solve the problems. The problems that exist have proved to be a stumbling block to the effective teaching and learning of physics at Glenview 3 high and has hindered the attainment of good results in the subject at hand. The research will be very important to both the teachers and learners. Teachers will get an opportunity to understand the role they need to play in making sure effective teaching of physics takes place. For the learners, the research is crucial as they are awarded an opportunity to air their concerns as well as suggest ways to solve problems that are being faced in the learning of physics at school A in Glenview.

1.10 DELIMITATIONS OF THE STUDY

The study was limited to the view and contribution of the school head, 4 science teachers, the head of science department and 20 pupils in this investigation of looking for ways to mitigate the challenges that hinder the effective learning and teaching of physics in Glenview. The study will only use interviews, document analysis, observation and questionnaires as a method of data collection since they provide a better understanding than any other methods. Due to the limited time and financial resources available, the study was limited to only classes which do physics after the streaming at form 3. The results that will be obtained from the form threes and form four classes which will generalize schools in Glenview.

1.11 LIMITATION OF THE STUDY

The study was limited size sample of 20 pupils all from school A this is due to limited time of study as this study was conducted during the spare time of the researcher. Also, financial constrains proved to be a limitation to the study. The research was also limited by some methods used to collect data for example in case study, in that the researcher has to generalize findings after only studying a small sample and in observation method people may act in a different manner because they are aware that they are being watched.

1.12 DEFINITION OF TERMS

Mitigate- according to dictinary.com mitigate means lessen the unpleasantness of a situation, in the context it means to lessen the impact on the teaching and learning of physics to both the teacher and the student.

Investigation- is the systematic and thorough process of gathering information, evidence and facts in order to uncover and understand a particular issue (https://www.dictionary.com/browse/investigation). In this study the researcher will gather information on challenges using different unique research tools to find out challenges as well as ways to mitigate them

Teaching- according to dictinary.com teaching is a process of imparting knowledge this is done by teachers for the process of learning to take place the teacher has to impart the understandable information to suit ordinary level students

Learning-the acquisition of knowledge or skill through study. In the context it is a process which needs the teacher and the student together so that it will take place

Physics - the branch of science concerned with the nature and properties of matter and energy (dictinary.com). This is the subject in question the researcher will look into challenges faced during teaching and learning as well as strategies to mitigate them.

Apparatus- the technical equipment used in science practical's. these are equipment needed for experiments to be successful in a laboratory they are needed for the process of teaching and learning to take place

Laboratory- a room or building with scientific equipment for doing scientific tests or for teaching science or a place where chemicals or medicines are produced. This is a special room where physics experiments take place and where apparatus are kept for safety reasons.

1.13 ORGANISATION OF THE STUDY

This research will be organised into five chapters. Chapter 1 provides an introduction an introduction to the research topic, outline the research question, and explain the significance of the study. Chapter 2 will review relevant literature on ways to mitigate strategies in the teaching and learning of physics. Chapter 3 will describe the research methodology, including data collection and analysis procedure. Chapter 4 will present the finding of the study. Finally, Chapter 5 will provide discussion, conclusion, recommendation and suggestions for future research

1.14 SUMMARY

This chapter presented the background of study, statement of the problem, research objectives and research questions. This chapter also highlighted the significance of the study and assumptions. The limitations and delimitations were discussed and key terms defined. Basically, the main points of the study were summed up.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents the review of literature related to the study on strategies to mitigate challenges on the teaching and learning of physics. The conceptual framework will present the current strategies being used to mitigate in the teaching and learning of physics, challenges faced by teachers and students in the teaching and learning of physics. Empirical studies are also covered in this section.

2.2 CONCEPTUAL FRAMEWORK

Physics can at base be defined as the science of matter, motion and energy. It is a branch of science that deals with the structure of matter and how the fundamental constituents of the universe interact, it studies objects ranging from the very small using quantum mechanics to the entire universe using general relativity (Dutta, 2019). The benefits of studying physics help us to organize the universe.it deals with fundamentals, and helps us to see the connections between seemly disparate phenomena. Physics gives powerful tools to help us to express our creativity, to see the world in new ways and then to change it. The role of physics in economic development and promotion of individual's power of innovation cannot be over emphasized. Physics being attributed as a prerequisite for developing modern instrumentation of basic physics concepts is underscored, thus, it is a subject that equips students with basic ideas necessary for economic engineering in the modern world (Zaidah, 2019). The interaction between matter and energy with Physics systematically studies, gives the discipline an inestimable importance because matter and energy are paramount in the universe and phenomenal activities of nature (Kola, 2013).

Classroom curriculum as the centre of learning which include methods discussions and lecture methods as well as laboratory exercises provide learners with foundation knowledge in physics practices while preparing them for careers in the engineering industry, natural resources industry as well as the medical industry. Supervised physics experiences provide learners the opportunity to pursue careers in research science, astronomer, biologist, chemical engineer, biomedical engineer, geophysicist, lab manager, nuclear engineer and optical engineer to name

a few. The main objective of primary and secondary physics education especially the practical aspect is to make the teaching of physics more relevant, effective and practical. The objective of practically teaching physics is to make it relevant to the local situation. However, although there are different teaching methods to help physics be understandable, studies however show that few learners are willing to take up physics. Garrity and Linder (2020) states that there are many career opportunities related to the subject less people are willing to take up these careers so it is upon this research to find out solutions to the problems associated with the learning and teaching of physics.

2.3 THEORATICAL FRAMEWORK

Blooms taxonomy is still the benchmark for creating educational outcomes and assessing student learning. Slota (2019) states that the Blooms taxonomy proposed that learning can occur at multiple levels which are knowledge, comprehension, application, analysis, synthesis and evaluation. Knowledge and comprehension levels are associated with recalling and understanding concepts which is more of the theoretical side of teaching physics. The levels of understanding and application are associated with the practical aspects of teaching and learning of physics. However, although the Blooms taxonomy clearly shows the levels of teaching and learning, there are still many challenges associated with the teaching and learning of physics especially in some urban areas which lack resources in Glenview were the enrolment there is more of average learners. The purpose of this research is to find long lasting solutions to mitigate the problem associated with the teaching and learning of physics.

2.4 PREVIOUS RESEARCH STUDIES

Dipolog (2022) have noted some challenges that are associated with the teaching and learning of physics which include attitudes of the learners, teachers attitude as well as the availability of resources. They further explained that in 'O' level physics is to develop learners an appreciation and for a positive attitude towards physics while the goal of senior level physics education is to prepare interest in youth to gain entry in to the university where they career paths that are related to physics.

2.4.1 MATHEMATICS UNDERSTANDING

However, Zaidah (2019) argued that mathematics has been more than a problem-solving tool in physics and that the discussions on several physics' materials are essentially mathematics. Mathematics serves as prerequisite teaching and learning material for physics (Stake, 2015) and mathematics also serves as an essential element in the problem-solving efforts for physics (fadehan and Ademola, 2020). Therefore, if an individual want to study physics then he or she should understand mathematics first. Konkan, Danku and Adzabor, (2020) also argued that it has been very important to identify the mathematics proficiency first in modelling a problem that becomes the main objective of physics teaching and learning

2.4.2 THE IMPACT OF ICT IN THE TEACHING AND LEARNING OF PHYSICS

There has been a growing body of research examining how technology influences students' involvement with and understanding of Physics ideas. Several authors have explored this topic and highlighted the significant impact that technology can have on students' learning experiences. One study by Jones and Moreau (2017) investigated the use of virtual simulations in Physics education and found that students who engaged with these simulations demonstrated improved conceptual understanding and problem-solving skills. The authors suggested that technology, such as virtual simulations, can provide students with interactive and visual representations of abstract Physics concepts, which can enhance their understanding and engagement

2.4.3 THE IMPORTANCE OF STUDYING PYSICS AT ‘O’ LEVEL

Apart from the academic emphasis, junior high schools play a crucial role in nurturing holistic development. Beyond imparting subject-specific knowledge, they aim to foster social skills, emotional intelligence, and critical thinking abilities. Students in this stage undergo significant cognitive and emotional changes, making it an opportune time to instil values, develop interpersonal skills, and encourage personal growth. e essential in nurturing students' emotional well-being. Teachers and educators in junior high schools recognize the significance of this developmental stage and adapt their teaching methods to suit the evolving needs of students (Konkan et al, 2020). Understanding the cognitive growth and challenges faced by early adolescents, educators employ instructional strategies that aim to engage students actively, encouraging critical thinking, problem-solving, and fostering a deeper understanding of the subjects being taught in this case physics.

2.4.4. MISCONCEPTIONS WHILE LEARNING PHYSICS

For instance, studies such as those by Yin (2009) have emphasized the prevalence of student misconceptions in physics, particularly related to fundamental concepts such as force, motion, and energy. These misconceptions, once identified, have become focal points for teachers seeking to enhance instructional strategies and curriculum design. The work of Ajaja and Ajaja, (2020) have explored the cognitive aspects of learning difficulties in physics, particularly the cognitive barriers that hinder the understanding of abstract scientific concepts. These studies have emphasized the importance of considering the cognitive development of ‘O’ level students in designing effective instructional methods to overcome these barriers.

2.4.5. EFFECTS OF TEACHING METHODS AND LEARNING STYLES

Moreover, research studies by Moonda and Chick (2020) have investigated the influence of teaching methods on students' learning difficulties in physics. These studies have highlighted the significance of pedagogical approaches, suggesting that the choice of teaching methods and resources greatly influences students' grasp of physics concepts. Strategies that promote active learning, experimentation, and real-world applications have shown promise in mitigating these challenges. Another vital aspect of the existing literature is the exploration of individual differences in students' learning styles. Studies by Ademola and Adegoke (2020) and subsequent works have underscored the importance of recognizing diverse learning styles and preferences among students. This understanding of individual differences can aid in tailoring

instructional approaches to accommodate various learning modalities, thereby reducing learning obstacles. Educational theories such as constructivism and socio-cultural theory provide a lens through which to comprehend how students construct their knowledge (Edwards, 2020). According to Jean Piaget's constructivist theory, students actively build their understanding of the world through experiences and interactions. In the context of learning physics, this theory suggests that students construct their understanding of scientific concepts based on prior knowledge and experiences. Consequently, misconceptions arise when new information clashes with existing mental models. Similarly, Vygotsky's socio-cultural theory emphasizes the role of social interaction and cultural context in learning. Application of these theories underscores the significance of recognizing and addressing students' prior knowledge and social contexts to build a more effective educational framework in physics. Cognitive psychology offers crucial insights into how students process information and the cognitive barriers they face in comprehending abstract scientific concepts (Konlan et al, 2020).

2.4.6. CURRICULUM DEVELOPMENT IN THE TEACHING AND LEARNING OF PHYSICS

Curriculum development in education is a dynamic process that involves the design, implementation, and assessment of educational experiences. It encompasses the planning and structuring of the content, objectives, methods, and assessments within an educational program. In the context of physics education at the ‘O’ level, curriculum development is particularly crucial in shaping the learning experiences of students. Curriculum development begins with strategic planning (Garrity and Linder, 2020). This involves setting the educational goals and objectives for the physics curriculum. In the case of ‘O’ level physics, the curriculum aims to introduce foundational concepts in physics, promote scientific inquiry, and prepare students for more advanced studies in the subject. Planning includes defining the sequence of topics, determining learning outcomes, and aligning these with educational standards and the needs of the students. The selection and organization of content are central to curriculum development. For physics education at the ‘O’ level, the content encompasses some wide principles such as force, energy, motion, electricity, magnetism, and basic concepts in quantum physics.

Furthermore, the challenge lies in presenting these concepts in a coherent and age-appropriate manner, ensuring they are both engaging and informative for young learners. Developing a curriculum involves choosing appropriate teaching methods and strategies to convey physics concepts effectively. For ‘O’ level students, employing a variety of pedagogical approaches

such as hands-on experiments, demonstrations, simulations, and interactive learning is crucial. These methods facilitate engagement and comprehension, fostering a deeper understanding of abstract physics principles. A well-designed curriculum includes a comprehensive assessment plan to evaluate students' learning (Zaidah, 2019). Formative and summative assessments play a critical role in monitoring student progress and the effectiveness of the curriculum. Assessments in ‘O’ level physics should focus on evaluating conceptual understanding, critical thinking skills, and practical application of physics principles.

2.5 RESEARCH GAPS

Overall, the literature suggests a lot of strategies can be done to mitigate challenges in the teaching and learning of physics like mathematical background, teaching methods and styles, curriculum design, misconception, in the teaching and learning of physics. The process of curriculum development is ongoing and responsive to feedback. Continuous adaptation and revision are necessary to meet the evolving needs of students and align with the latest educational trends. Regular reviews of the curriculum content, teaching strategies, and assessments help in refining and improving the curriculum over time however some of these strategies may vary with the country and location of the school so there is need for further studies which will come up with strategies which will bring the desired results at a specific school. In addition, the implementation of the best strategies to mitigate challenges into the teaching and learning of physics will bring the best and desired results to the school and to the society at large. Addressing issues such training, infrastructure, resistance to change and pedagogical shifts is crucial in overcoming hurdles and creating a more effective and engaging learning environment in physics education. Overall, the literature underscores the challenges into teaching and learning of physics.

2.6 SUMMARY

In this chapter, there is the conceptual framework, theoretical framework as well as previous researches that have been conducted that are related to the current study. The reviewed literature pointed out the problems that have hindered effective teaching and learning of physics to take place and showed that this current research now focuses on finding the solutions to the identified problems

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The chapter presents the methodology employed an investigation into strategies to mitigate challenges to the teaching and learning of physics. The purpose of this chapter is to outline research design, population sampling and sampling procedures. Advantages and disadvantages of the different sampling methods were outlined. Data collection instruments and procedures of collecting the data are highlighted. The advantages and disadvantages of the data collection instruments are stated as well. Methods of presenting, analysing and collecting data are discussed.

3.2 RESEARCH DESIGN

Sanders and Lewis, (2015) define research design as a general of how the research will go about answering the research questions. Furthermore, George, Ladd, Noranha and Yesodharan, (2021) postulates that research designs are mutually exclusive hence they can combine so as to capture the relevant material. The research questions and objectives, the extent of existing knowledge, available time and resources and the philosophical underpinnings of the study are the factors that determine the research design. The research will use a selected school in Glenview and data collection will be done through questionnaires, interviews and observation.

3.2.1. RESEARCH PARADIGM

This study is using pragmatics research paradigm. The pragmatic paradigm is cantered on the idea that the research approach should be driven by the research question, allowing for the use of both quantitative and qualitative methods as needed to gather comprehensive insights. This flexibility makes it ideal for exploring the multifaceted aspects into strategies to mitigate educational setting, where both the measurable outcomes and the contextual, experiential factors are crucial for understanding the full impact

Ontology is a formal representation of knowledge as a set of concepts and relationship within a domain. From pragmatic views, the reality of strategies to mitigate physics education is viewed as dynamics and evolving. Different strategies can be used to mitigate but they are a

lot to be taken into considerations before applying a strategy for the effectiveness of teaching and learning.

Epistemology is how we acquire knowledge through the different strategies to be applied. Pragmatism emphasises the value of practical outcomes as the sources of knowledge .it proposed that knowledge about the strategies to mitigate in teaching and learning physics is gained through empirical research and hands on experiences. This can involve investigating strategies to mitigate teaching and learning, enhance understanding, engagement and application of physics concepts among students. Pragmatism acknowledge that works can vary depending on context such as the strategy`s compatibility, with the curriculum, the teacher´s proficiency with the strategy and the students´ receptivity to teacher-based learning methods

Axiology is the study of values and ethics as they pertain to strategies to use and its impact on society Pragmatism emphasises the importance of outcomes that enhance the educational experience and performance in physics. Its values flexibility, innovation and practical solutions that improve learning outcomes. The strategies to be used for example the use of technology innovation in teaching and learning physics are justified by its ability to make learning more engaging, accessible and effective thereby preparing students better for real world applications of physics.

3.2.2. RESEARCH APROACH

Mixed methods research is a powerful approach that combines both qualitative and quantitative methods within a single study. This allows researcher to gain a more comprehensive understanding of her research questions by triangulating different types of data. For this research, a mixed methods approach was used utilised. This approach combines both quantitative and qualitative research methods to gain a comprehensive understanding of research topics. The quantitative data was collected through questionnaire. While the qualitative data was gathered through interviews and observations.

3.2.3. CASE STUDY STRATEGY

A case study can be defined as an extensive study about a person, a group of people or a unit, which is aimed to generalize over several units (Stake, 2015). Additionally, Gustafsson (2017) defines a case study as an intensive, systematic investigation of a single individual, group, community or some other unit in which is aimed to generalize units. Thus, in general case study is a research strategy and an empirical inquiry that investigates a phenomenon within its real –

life context. Qualitative case study methodology enables researchers to conduct an in-depth exploration phenomenon within some specific context. There are a number of advantages in using case studies. Yin (2009) emphasizes that the examination of the data is most often conducted within the context of its use that is, within the situation in which the activity takes place. A case study might be interested, for example, in the process by which a subject comprehends an authentic text. The researcher must observe the subject within his/her environment. This would contrast with experiment, for instance, which deliberately isolates a phenomenon from its context, focusing on a limited number of variables (Zaidah, 2019).

Second, variations in terms of intrinsic, instrumental and collective approaches to case studies allow for both quantitative and qualitative analyses of the data (Lindvall, 2007). Additionally, some longitudinal studies of individual subjects, for instance, rely on qualitative data from journal writings which give descriptive accounts of behavior. On the other hand, there are also a number of case studies which seek evidence from both numerical and categorical responses of individual subjects. Furthermore, Edwards, (2020) is of the opinion that the detailed qualitative accounts often produced in case studies not only help to explore or describe the data in real-life environment, but also help to explain the complexities of real-life situations which may not be captured through experimental or survey research.

Despite these advantages, case studies have received criticisms. In a case study one cannot generalize from a single case and theoretical knowledge is more valuable than practical knowledge (George et al, 2021). Additionally, Yin (2009) discusses that case study research which are lack of rigor and provide very little basis for scientific generalization since they use a small number of subjects, some conducted with only one subject. The question commonly raised is “How can you generalize from a single case?” (Yin, 2009). Brown, (2019) puts forward that case studies are often labeled as being too long, difficult to conduct and producing a massive amount of documentation. In particular, case studies of ethnographic or longitudinal nature can elicit a great deal of data over a period of time. The danger comes when the data are not managed and organized systematically

3.3 RESEARCH METHODS

3.3.1 POPULATION AND SAMPLING

Population

Ademola and Adegoke (2020) define a population as a group of individuals with the same characteristics. Population is the totality of the items or objects under the universe of the study (Brown, 2019). Target population refers to the entire group of individuals or subjects whom a researcher can base his/her research on. In this research the target population of 66 participants which consists 4science teachers 1 males and 3 females, 60 pupils from form 3 and 4 which are doing physics of is at school A which is in Glenview.

Sampling

Sampling procedures are a description of the strategies which the researcher used to select representatives' respondents from the target population (Riaz, 2019). A sample is a subset of a population which is practicable to who handle as the population may be too large or expensive to cover all the study units. Cresswell, (2019) alludes that a sample consists of selected group of elements or units from a defined population. Purposive sampling was used for the identification of information rich cases related to the phenomenon of interest. Purposive sampling technique was defined by Konlan et al, (2020) as a judgmental or selective s the researcher used purposive sampling to select 8 science teachers, use convenient sampling to choose the school A and stratified random sampling to choose learners. This method involving dividing the learners into subgroup based on their forms. By ensuring that each stratum is proportionally representative sample that reflects the diversity of the population.

3.3.2. DATA COLLECTION INSTRUMENTS

Research instruments are techniques by which data is to be collected (Zaidah, 2019). This study used semi-structured interviews, participant observation and questionnaires for data collection. Three research methods were used for triangulation. Garrity and Linder (2020) define triangulation as a method used to increase the credibility and validity of research findings. Credibility refers to trustworthiness and how believable a study is; validity is concerned with the extent to which a study accurately reflects or evaluates the concept or ideas being

investigated. The researcher used three research instruments in the research study so as to ensure that fundamental biases arising from using one research instrument are overcome

QUESTIONNAIRE

According to the oxford dictionary, a questionnaire is "a set of printed or written questions with a choice of answers, devised for the purpose of a survey or statistical study". A questionnaire usually a pen and paper instrument that respondents complete and has a set of questions with fixed working, sequence of presentation and precise indication of how the questions should be answered. Questionnaires are flexible and adaptable to a variety of research designs, populations and purposes. George et al, (2021) explain that the reliability of questionnaires depends on the frankness of the respondents' responses. Questionnaires can make use of both closed and open-ended questions. The questionnaires will be distributed to all the participants in the study. Questionnaires have a lot of advantages they are restively quick to collect information as the researcher will distribute them be it hard copy or softy copy and the respondents will answer them and return. They are free from the bias of the interviewer since there is no direct contact and will remain anonymous thereby respondents will express their feelings freely. Cresswell (2019) states that questionnaires allow the respondents enough time to give well thought answers as the respondent will be able to respond at his or her spare time, they are also economical and allow data accuracy, they reach people quickly and also put less pressure on the respondents. However, Stuckey (2013) argues that questionnaires have a possibility of dishonest answers as respondents will be responding them more like fulfilling a task. Sometimes it's hard for the respondents to convey their feelings and emotions as some questions will not allow that. There is a possibility of leaving unanswered questions and there is room for differences in understanding ad interpreting questions. In some cases, respondents may have a hidden agenda which will disadvantage the research. To mitigate the advantages that come about in questionnaire, the researcher will use face to face interviews which have high strength of response, flexibility on language differences and also gives room for probing.

INTERVIEWS

Fadehan and Ademola, (2020) define an interview as a two-person conversation initiated by interviewer for the specific purpose of obtaining research relevant information, and focused by him/her on content specified by research objectives of systematic description, prediction or explanation. George et al., (2021) explains that an interview is a result of joint between the interviewer and interviewee and is about what they talk together and how they talk to each other. Hence an interview is a planned and structured conversation with specific objectives that must be achieved by the end of interview. Triangulation was done to gain a deeper understanding of the research topic. Dutta (2019) defines triangulation is the use of multiple methods or data sources to develop a comprehensive understanding of phenomena. Triangulation can also be viewed as a research strategy to test and improve validity through the gathering of data from different sources

Interviews are more appropriate for complex situations and are useful for collecting in depth of information (Stuckey, 2013). Questions can be rephrased, explained, and allows the interviewer to probe or make a follow up. According to Edwards (2020) the participants tone or gestures can be identified, and the interviewer is the one who is in control and can keep the interviewee focused and on track to completion. Interviews allow participants to explain issues based on how well they know them

As any data collection method interviews has some limitations that include that they are costly in terms of time and personnel, requires skill and have possible biases from interviewer, respondents, or situation (Dutta, 2019). Furthermore, the quality of data received often depends on the interviewer. The researcher uses interview with a selected group of teachers and students. The interview aimed to explore their experiences, perception and attitudes towards the adoption of technology in physics.

OBSERVATION

The oxford dictionary defines observation as a process were the researcher closely monitors something or someone. During observation, the researcher watches closely activities so as to get information relating to the study. In order to minimize the researcher's bias from data collected from teachers, the researcher used participant observation. Participant observation involves the immersion of a researcher into the environment of their subjects (Babatunde and Akingsbade, 2020). Additionally, observation' does not just involve vision: it includes all our senses, although in practice sight and sound will be those which predominate in most research. Cressswell (2019) put forward than no observer simply absorbs the visual or aural data that impinges on her sense organs: psychology has taught us that perception involves information processing, so that the pieces of data can be organized into something recognizable. Observation is a way of gathering data by watching behavior, events, or noting physical characteristics in their natural settings. Observations can be overt (everyone knows they are being observed) or covert (no one knows they are being observed and the observer is concealed). In this study the researcher used classroom observation was conducted to observe the implementation of different teaching methods and learning styles in physics classroom and to gain insights into the teaching strategies employed. Brown (2019) is of the view that an observation enables the researcher to observe the interaction between participants or participants and materials. An interview, for instance, only show a person's views at one time. Observation involves the study of situations over time, thus, revealing changes and all the stages involved.

3.3.3 DATA ANALYSIS METHOD

The quantitative data collected through the survey questionnaire was analysed using descriptive statistics to summarise the responses of the participants. The results are presented in the form of tables and graphs.

The qualitative data collected through interviews was analysed using Cronbach Alpha analysis. The transcripts were read and re-read, and themes were identified and coded. The themes were then organized into categories, and the findings were interpreted in the context of the research question.

3.4 VALIDITY AND RELIABILITY

To ensure the validity and reliability of the study, several measures were taken. Firstly, the survey questionnaire and interview question were carefully designed based on the existing literature and expert opinions. Pilot testing was conducted to assess the clarity and appropriateness of the questions. Additionally, triangulation of data sources (surveys, interviews and observations were employed to enhance the credibility and trustworthiness of finding. In qualitative studies validity is enhanced through triangulation and triangulation is a method that compels researchers to rise above their personal biases that stem from the use of a single methodology (Moonda and Chick, 2020). Various strategies are used by qualitative researchers to enhance validity but Dutta (2019) mention triangulation, writing extensive notes, member checking, peer review, reasoned consensus, and audit trial as the most common strategies used for this purpose.

With regards to reliability Zaidah (2019) says that reliability in qualitative research means dependability or consistency. Stake (2015) indicates that reliability is viewed as "the fit between what is recorded as data and what has actually occurred in the setting under study". Stake (2015) further elaborate on reliability and say reliability refers to stability of research over time, the consistency through repetition and the extent to which the research findings can be replicated by another researcher in order to ensure reliability pilot testing of the research instruments was done as well as the use of multiple data source and research instruments. The researcher utilized interviews, questionnaires and participant observation to collect data from the respondents.

3.5 ETHICAL CONSIDARATIONS

Creswell (2019) asserts that the researcher has an obligation to respect the rights, needs, values and desires of informants. Therefore, appropriate steps were taken to adhere to ethical guidelines to uphold to participants' privacy, confidentiality, dignity, rights and anonymity. The researcher explained the purpose of the research to the participants. All the information collected was treated participants confidentially. The researcher explained to them about their right participants during the data collection exercise such as not forcing the respondents to accept the research document if they were not interested. The respondents were free to tackle the questions on interviews and no intimidation was applied by the researcher. The respondents' privacy was highly respected. Safety of participants was also ensured through coding of participants.

3.6 SUMMARY OF THE CHAPTER

This chapter provides a background on how the research will be conducted. Showing the methods that will be used to provide data as well as showing the advantages and disadvantages of each research tool.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents an analysis of the research results. The main question of the study was to investigate strategies to mitigate challenges to the teaching and learning of physics at Glenview 3 high. Tables and figures were used to present a summary of the results.

4.2 DATA PRESENTATION ANALYSISAND DISCUSION

TABLE 1.1: ALPHA VALUE SCALES

Comment	**Scale**
Excellent	0.93- and above
Strong	0.91- below 0.93
Reliable	0.88- below 0.91
Robust	0.76- below 0.88
Fairly high	0.73- below 0.77
Good	0.71- below 0.76
Acceptable	0.61- below 0.76
Not satisfactory/ unacceptable	0.6 and below

The table 1.1 above shows the Cronbach Alpha value scales used to establish the extent to which items in the questionnaire would measure the same concept or construct and continue to produce the same result. The questionnaire had 17 different statements on a 5point scale. The statements in the questionnaire were grouped into 3 categories that represents the study objectives. Each of the statements were analysed using the Cronbach Alpha () reliability tests and the following are the results

TABLE 1.2 CRONBACH'S ALPHA STATISTIC

Category	**Cronbach's alpha**	**Number of variables**
To examine how well experienced science teachers are to teach physics	0.912	10
To identify strategies to mitigate institutional based challenges in the teaching and learning of physics at Glenview 3 High school	0.816	10
To identify strategies to overcome non institutional based challenges in the teaching and learning of physics at Glenview 3 High school.	0.794	10

Table above shows the results of the theoretical values of the Cronbach's Alpha statistic. The values vary from 0 to 1. If alpha is 0, then the scale items are independent entirely from one another and not correlated, or share no covariance. If all the values have a high coefficient, then the alpha value approaches 1 as the number of items in the scale approaches infinity (Ajaja and Ajaja, 2020). In the context of this study, all the values in the different categories were more than 0.6 Cut off point indicating that the degree of consistence was very strong (Ajaja and Ajaja, 2020; Saunders, 2015; Creswell, 2019;) and that the instrument used to measure the independent variables were very reliable. Creswell, (2019) recommends that the higher the coefficient, the higher the level of consistence and thus confirming that the results of this study were good to allow the researcher to proceed for further analysis.

4.3 RESULTS OF QUESTIONNAIRES AND INTERVIEWS

TABLE 1.3 RESULTS OF QUESTIONNAIRES AND INTERVIEWS

Instrument	**Possible frequency**	**Actual response frequency**	**Response rate**	**Failure**
Questionnaires	22	19	87%	13%
Interviews	22	18	81%	19%

The study applied Saunders (2015)'s assertion that a minimum of 33% is a justified sample for a population of less than 1000 to establish a sample size. In this light, the sample population was therefore established as 33% of the population size since it was a small population.

33% x 26=8.58

So the sample size of 9 was used.

The table shows that questionnaires had a response rate of 87% and interviews had a response rate of 81%. On average, the response rate for both interviews and questionnaire was above the acceptable range of more than 50%. Questionnaires had a failure rate of 13% whilst interviews had a failure rate of 19%. This result shows the study was successful because the majority of targeted respondents participated. Brown (2019) reinforced that the response rate of 50% and above in any research is fair, credible and justified. The implication of the study received a very positive response rate and was therefore a success.

4.4 GENDER OF RESPONDENTS

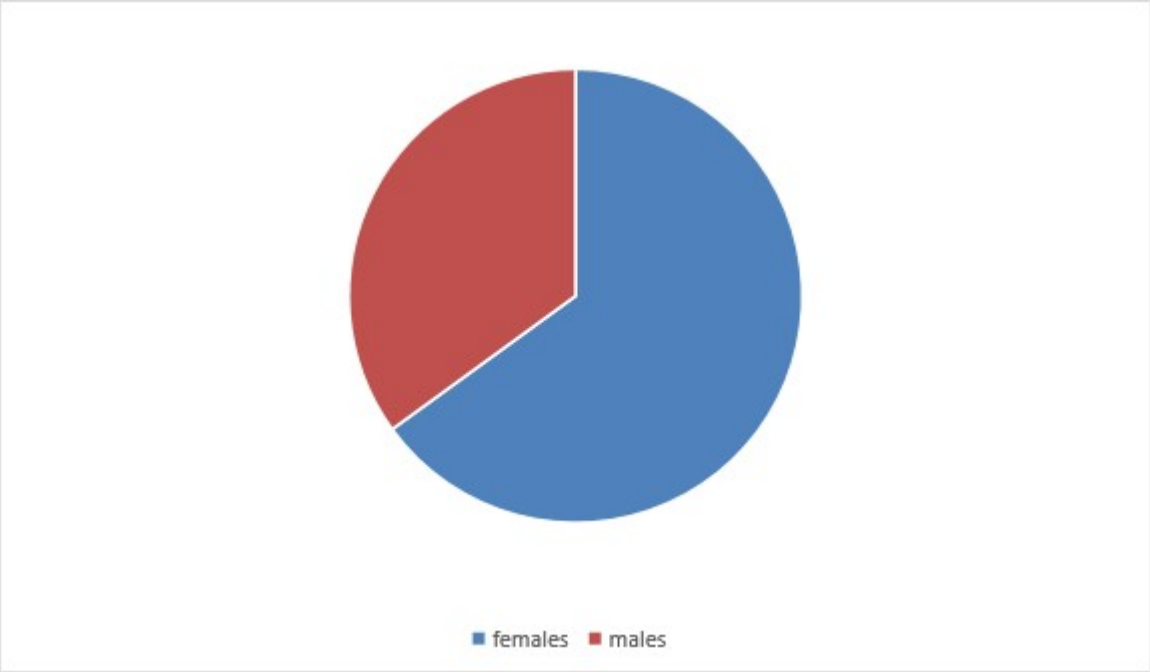

FIG 1.1 SHOWS GENDER RESPONDENTS

65% of the respondents were females while 35% were male respondents. This shows that more females participated in the study than females. The study implication was that there are more females in schools than males meaning education sector is dominated by females as the main stakeholders. The result shows that both men and women were seriously considered in the study and it was not gender based despite the differences in numbers.

TABLE 1.4 SHOWS AGE OF RESPONDENTS

Age range	Number or respondents
10-20 years	10
21-30 years	1
31-40 years	6
41-50 years	1

It shows that the people in the 10-20 age group range formed the majority of the respondents and it was the opposite in the 41-50 age group range were there were the least respondents. So the research included more learners than the teachers.

TABLE 1.5 EDUCATIONAL QUALIFICATIONS OF THE TEACHERS

Educational qualification	**Number**
Diploma	**4**
Degree	**2**
Masters	**1**
PhD	**0**

The table above shows that most of the teacher were diploma holders, only 2 teachers had degrees, one with masters and no one with PhD. This shows that although all teachers were qualified to teach physics but only four were better qualified to teach physics.

4.5 TEACHERS' LEVEL OF EXPERIENCE

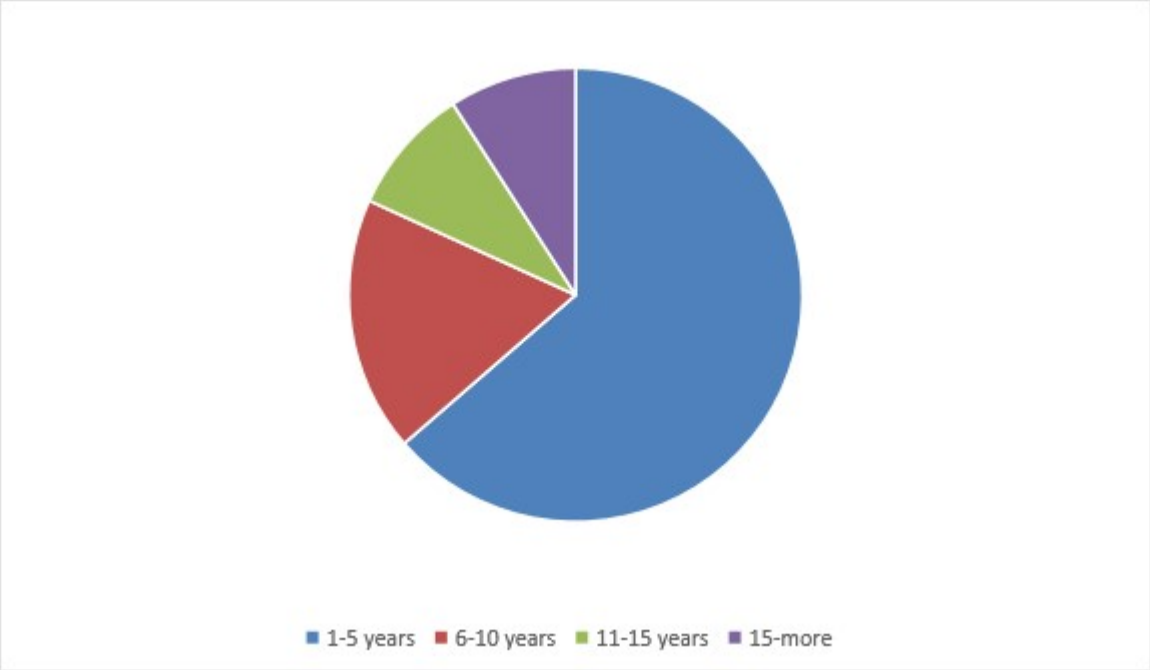

FIG 1.2 SHOWS LEVELS OF EXPERIENCE FOR THE TEACHERS

the pie chart shows that there are more teachers with between 1-5 years teaching experience and even a smaller number of teachers with 15 years or more teaching experience. This shows that most teachers had been in the teaching service for a few years and this greatly affects their teaching experience.

4.6 ANALYSIS ON QUESTIONNAIRES

The research on an investigation into strategies to mitigate challenges to the teaching and learning of physics in Glenview has yielded insightful and multifaceted findings, shedding light on the specific challenges' students encounter in comprehending physics concepts.

4.6.1 OBJECTIVE 1

To find out how well experienced teachers are to teach physics

From the research more of the teachers that taught physics had between 1 to 5 years teaching experience in the teaching of physics. Joshua Lawrence (2018) states that there is a relationship between teacher experience and learner achievement and it has been noted that learners that are taught by teachers with more experience tend to achieve higher grades than those that are taught by less experienced teachers. It has been discovered that the effectiveness of a teacher increases with experience.

George et al, (2021) postulates that although experience is very important but it is experience that takes learning to a different level. According to Konlan et al (2020), it is through experience that a teacher acquires the ability to convey ideas clearly as to avoid misunderstanding, being able to convey ideas clearly so as to avoid misunderstanding, being able to create a conducive environment for learning and also being able to develop and maintain good relationships with learners, parents and colleagues. These are very crucial in the teaching and learning of physics. Lawrence (2018) asserts that experience gives room for trial and error which may show teachers the best ways to deal with situations which include teaching methods and further states that statistics show that an example is that a teacher with 18 years teaching experience is more effective in teaching than those of less than 8 years. Teachers gain experience and also by seeing the positive results obtained through the teaching methods they use.

4.6.2 OBJECTIVE 2:

To identify strategies to mitigate institutional based challenges in the teaching and learning of physics

The researcher got responses from both learners and teachers on best they mitigate institutional based challenges to the teaching and learning of physics. Responses that were received are summarised below:

First, the curriculum should be improved in terms of material sequence and time allocation. According to Edwards, (2020) multiple prerequisite materials of mathematics and physics that have not been synchronized should be reordered so that the mathematical supportive ability toward physics will be more optimal. In addition, the teaching and learning period-time allocation per week is deemed very limited or insufficient and is imbalanced compared to the amount of teaching and learning materials that should be taught. Even if the teacher what to use ICT for example this will limit the teacher as the time is limited and doesn't require any innovations. These problems become worse when some students have not mastered the prerequisite materials; as a result, the teachers should review these materials which spend some more time.

Second, the role of mathematics as a foundation of science should be returned so that the stipulation and the development of the teaching and learning materials may be adjusted to the needs of other teaching and learning materials such as physics (Dipolog, 2022). Since it was shown that mathematics is a foundation subject to physics mathematics teachers and science teachers to always liaise to each other so that as early as form 1 and form 2 level the mathematics teachers has to instil the critical thinking and problem solving skill to students so that as they reach 'O' level to start physics they will be having a very good mathematics background.

Third, a forum of discussion for teachers under the same domain should be established. This discussion group might involve the teachers whose subjects are interrelated, such as those from the exact sciences, so that they might support from one to another. Discussion becomes highly important because through the discussion the teachers might discuss the teaching and learning obstacles that occur due to the fact the fundamental lessons have not been taught or due to the fact that the teaching and learning results have not met their functions as the prerequisite teaching and learning materials. Examples of these discussion forums maybe online whereby

government can do these forums and ask physics learned personnel to conduct these discussions so as to help in different areas.

Fourth the availability of resources is very important in the teaching and learning of physics. These resources may include technology, space, laboratory supplies, models, and library materials. These are crucial in the learning and teaching of physics. The school administration should financially support the teaching of physics by purchasing the needed materials needed for effective teaching and learning to take place. Priority should be given to the building of science laboratories and purchasing of apparatus so that have the conducive environment for physics lessons to be conducted. Physics is best taught through hands on activities which include experiments, so it is crucial that resources needed for physics learning be considered high priority. Garrity and Linder, (2020) postulate that the school administration should give maximum support to the science department.

Fifth teachers to have accommodative approach when choosing teaching methods and learning styles bearing in mind that students have different learning abilities, skill and experience. From the research it was gathered that teachers are encouraged to use different methods for effective teaching and learning of physics. Lawrence (2018) asserts that learners have individual learning capabilities so it is the duty of the teacher to accommodate each one. Furthermore, it is explained that some learners are fast learners meaning they easily grasp concepts while others are slow learners. Also, some learners understand concepts by seeing visuals aids which can be pictures or videos while others learn better by hands on activities like experiments, so it upon the teacher to make sure all the learning abilities are accommodated for effective teaching and learning of physics to take place.

Moreover, the use of English as a medium of instruction has greatly affected the effective teaching and learning of physics Glenview secondary school. From the research it was gathered that most learners had difficulty in English and this led to poor performance in physics as they do not understand some concepts because they are explained in English. So, it was suggested that teachers use different methods to teach physics like demonstration to put across the concepts they mean to put across or make use of local language for example Shona to aid in explaining. Furthermore, the use of educational jargon can hinder effective teacher-learner communication since every subject has its own vocabulary and terminology so these also pose

as a barrier in communication so from the research it was suggested that in order to overcome this the teacher needs to learn the native languages of learners, minimizing the use of jargon and using multilingual strategies. By adopting the above suggestions, the problem of language barrier can be dealt with effectively

4.6.3 OBJECTIVE 3

To identify ways to overcome non-institutional challenges in the teaching and learning of physics.

In the teaching of physics there are institution-based challenges likewise there are non-institutional challenges which have affected the teaching and learning of physics. So, there are suggestions that were made to overcome the challenges. These attitudes include parent attitude, learner attitude as well as the teacher attitude and other supporting ways to deal with these attitudes.

The parents' attitude influences their children's' attitude. For example, when a parent develops a negative attitude towards physics it tends to be contagious even to their children. From the research, it was concluded that parent indeed have a role to play. The parents need to be educated on the benefits of physics and be involved in the teaching and learning process so that they have a great understanding of the subject. Parents participation in the learning of physics can be helped by encouraging them to check homework, attend academic programs, providing advice to their children on issues of education, advising study habits, monitoring study habits, discussing academic progress, monitoring out of school activities as well as showing appreciation to the teacher for their hard work. Kasetsart Journal of Social Sciences (2018) explain that parents in have a role to play in cultivating children's interest towards science learning and careers sine their attitude is important in shaping an important role in shaping children's science aspirations. The study proved that students with parents who have a positive attitude towards physics tend to perform very well in the subject.

Learner's attitude also has an influence on the way they perform in physics. At a school used by the researcher learnt that most learners had a negative attitude towards physics and this negatively influenced their performance in physics. From the research to mitigate the problem of negative attitudes in the subject different suggestions were made. The researcher gathered that teachers and parents had a great role to play in moulding learner attitude towards a subject. It was suggested that teachers should create good relations with the learners, plan outdoor activities and also to adopt interesting teaching methods like experiments that draw learners' attention to the teaching and learning of physics. Lawrence (2018) postulates that involving learners in the learning process and encouraging them to do the most work as well as making use of different teaching methods greatly influences learners to develop a positive attitude towards physics. Lawrence further explains that good relations need to exist between the teachers and the learners so that negative attitudes do not develop.

A teachers' attitude towards the subject or the learners greatly influences the teaching and learning of physics. At school A, it was noted that teachers' attitudes also posed as a problem to the smooth teaching and learning of physics. From the research it was noted that negative teacher attitude includes favouritism, intolerance, anger and not understanding to name a few. A teacher having a negative attitude affects learner motivation, achievement and well-being. The researcher gathered suggestions that teachers need to be very sensitive to their attitudes and also that the school needs to provide counselling and staff development programs so as to monitor teachers' attitudes in the teaching and learning of physics. One of the central findings of this research has been the prevalence of misconceptions among 'O' levels students. These misconceptions encompass fundamental areas such as force and motion, energy conservation, wave behaviour, and electricity. The persistence of these misconceptions is noteworthy, highlighting the obstacles that students face in aligning their understanding with foundational principles of physics.

The study has uncovered significant cognitive barriers that impede students' grasp of abstract physics concepts. Cognitive load, stemming from the complexities of abstract reasoning and the incongruence between theoretical physics and students' everyday experiences, poses a substantial challenge. Students often struggle to internalize and visualize these abstract models, hindering their comprehension of fundamental principles.

The research has also revealed shortcomings in pedagogical approaches and curriculum design. Traditional lecture-based methods, lacking interactivity and hands-on experiences, contribute to disengagement and hinder the formation of a robust understanding. A curriculum that lacks real-world applications and fails to cater to diverse learning styles contributes to the development of misconceptions and barriers to learning (Fadehan and Ademola, 2020). Factors such as student engagement and socio-economic influences have emerged as significant contributors to learning difficulties in physics. Disinterest in the subject due to uninspiring teaching methods or a failure to recognize the real-world applications of physics concepts impacts student engagement.

Moreover, socio-economic factors, including disparities in access to resources, can affect students' readiness and engagement in learning physics. These findings have profound implications for educational practices. Garrity and Linder, (2020) argues that the identification of prevalent misconceptions and cognitive barriers underscores the necessity of targeted interventions and innovative pedagogical strategies. There is a compelling need for interactive and inquiry-based teaching methods that integrate real-world applications, thereby fostering a deeper and more comprehensive understanding of physics concepts.

4.7 RESPONTS FROM SOME INTERVIEWS QUESTIONS

4.7.1 Challenges encountered by science teachers in teaching physics

The data gathered during the one-on-one interview revealed the different challenges teachers encountered in teaching physics. however, despite their challenges, they still try to share their knowledge with their students and teach efficiently. The data collected from the interview revealed about six categories for the first statement of the problem, which physics teachers encountered during the teaching and learning of physics. These are the following categories: lack of laboratory materials, negative attitudes from students, difficulty in identifying the student's needs, lack of expertise with new equipment, difficulty in adopting the new curriculum, and lack of administrative support.

Working Alone. During the interview, the participant shared different challenges, and one of the challenges was experiencing isolation; one shared the feeling of experiencing isolation and

a lack of support as a new teacher. The participant mentioned feeling alone in their program and highlighted the absence of senior colleagues who could guide them, unlike other new teachers who benefited from such guidance. As a result, the participant had to independently address issues they faced, such as creating a syllabus and developing learning materials. In line with this category, the respondent said:

> "*As a teacher, I feel isolated in my program due to the challenges I face. Unlike other new teachers who have senior colleagues to guide them, I am the only physics trained teacher. Consequently, I have no one to turn to with my questions or concerns, and I must handle them independently. When problems arise, I am solely responsible for finding solutions since my colleagues are not knowledgeable in physics either." P1*

The participant has already acknowledged that they were the only ones with expertise in that program. They were no choice but to deal with it on their own, task and finding their guides can help them create their own syllabus and appropriate learning materials for effective student learning. Unsupported educational setting that the school provided, the teacher also honestly expressed their feeling during the first year that they had spent at a school A, low self-confidence, limited control over their professional development, and the lack of assistance from the administrators, lack of senior teachers resulting to insufficient constructive feedback and lack of effective mentoring this has led to difficult in conducting physics practical's. Pushing them to establish networks to plan curriculum, instructional methods, and laboratory experiences. (Jones & Moreau, 2017).

Lacking laboratory materials.

One of the challenges common to most participants shared is that a lack of laboratory materials is one of their challenges in teaching physics subjects in the case of Glenview 3 the proper laboratory is yet to be built. Laboratories' unavailability of the needed materials during experimentation can hinder the students from exploring independently during experiments and learning and grasping the concepts. It also decreases the teachers' efficiency as they lose hope of carrying out a successful experiment with the students due to the lack of materials, resources, and equipment. With this category, the respondents narrated:

> *"My main challenge in teaching physics is the need for more resources. It becomes difficult for me to explain my lessons effectively to my students because we need to conduct experiments for them to understand the lessons better for*

example this other day I wanted to do a demonstration on how a Vernier callipers works and also a micrometre screw gauge but this was not possible since neither Vernier callipers nor micrometre screw gauge were available. Only a few managed to understand the difference since it was one using the old way and it affected my lesson" P3

"thes*e challenges would affect teachers' efficiency when they need more resources especially considering the fact that some of us we are from the mathematical background lack of resources will affect our lessons considering the fact that these students are not even interested to study physics they need a motivated teacher with all resources to use." P4*

As explained by P3 lack of laboratory materials come as primary challenge instead of students to enjoy physics due to this shortage physics will be more theoretical instead of being more practical also this will hinder the ability of the teacher to conduct experiments showing how real physics is to students, hands on experiments practical demonstration and all these are crucial for reinforcing learners conceptual understanding. Laboratories help teachers facilitate active physics learning and produce an adequate education, allowing students to think creatively and critically while solving real-world problems. However, due to inadequate laboratory facilities, science equipment, malfunctioning laboratory equipment, and insufficient learning materials. Both teachers and students need help teaching and learning science concepts (Edwars,2020). The availability of instructional materials allows students to engage in hands-on learning experiences, enabling them to actively participate in the learning process. Students can explore and experiment by interacting with the apparatus, fostering a sense of curiosity and discovery (Riaz 2019). Uninterested students.

One of the challenges the teachers have dealt with is getting their students interested in physics, some students tend to have a lesser interest than other students since they consider it optional for their future programs because of this they will lose interest. This student attitude will affect teachers'' teaching strategy as the teacher will now be forced to look for teaching strategies which will try and persuade these students to have interest in physics therefore the teacher has to back to basics.

> "*Since most students lack interest in physics, it affects how I handle them, especially 'O' level it will be difficulty to control them they won't be attending lessons. Those in form 3s i should present them with higher-order questions and activities again this will increase their loss of interest. However, I need to teach them again the basics of science for them to understand better and grasp the main points I am trying to convey for the form 4 with the help from the admin they should attend lessons." P2*

Physics teachers acknowledge the fact that they face challenges tying to adjust when conducting experiments in their physics classes due to a need for more laboratory equipment and exposure there is need for the teacher to be innovative so that at the end of the day students learn and understand the topic. The lack of support from the administration lack of facilities, and training could not hold these teachers from becoming more creative to the needs of the students and making sure that the topic taught has been understood by all they do all they can to be creative in thinking of differentiated activities for their learners. They, too, are very supportive of considering making individualized learning materials for their students (Babatunde & Akingabade 2020).

Difficulty in identifying the student's needs it is important to identify student's needs so that the teacher will be able to implement suitable techniques and strategies based on their learning aids. This indicates that the participants recognise that each student has unique learning needs and has to be dealt with differently. The respondent narrated:

> *"each student has unique requirements it is essential to understand them Identifying these needs helps me to apply or to use the correct technique and strategy to their specific learning need." P3*

From this it is a complex task for teachers to understand and identify the needs of students of which it is not easy. However, this recognition of students' needs underscores the importance difficulty in identifying students' individual needs. Teachers can show their teaching techniques and strategies to accommodate the specific learning challenges area of each student. By identifying unique learning needs suggests a student-cantered approach that recognizes the variety of learners by so doing this gives approach to personalized education and its importance is to encourage the development of learning and understanding concepts. As the teacher keep

on identifying students' needs and keep on working with them separately this will cultivate individual abilities, inner drive, and the pleasure of acquiring knowledge thereby teaching and learning physics will be easy. Students have diverse learning styles and preferences, but educators may only sometimes provide content and learning opportunities that align with students' ways of learning (Dutta, 2019).

Lack of expertise with new equipment highlights the challenges related to the inadequacy of laboratory equipment and also this is cause by lack of exposure even during study due to limited time and crush problems so some teachers doesn't have the know-how on other apparatus this will pose challenge to the teaching and learning process. The participant admits to needing to be an expert in physics and mentions the difficulties faced in conducting experiments due to the lack of expertise and availability of necessary equipment. This implies that the teacher might feel less confident facilitating hands-on learning experiences, which are crucial for science education. In this category the respondent narrated:

> "*There is inadequacy of laboratory equipment and there is no the actual laboratory set up, therefore it is now more challenging for me since I am not an expert and need more expertise in physics. Unlike before, it is more difficult to conduct experiments now because of many requirements and demands off which experiments need to done since from 'O' level during their final exams there are now supposed to actual practical." P4*

From the statement it shows that there are challenges of insufficient expertise with new laboratory equipment. The respondent brings out the idea that there is need for expertise in their field of study, emphasizing the difficulties encountered in conducting experiments due to limited knowledge and the unavailability of necessary equipment. In this view it suggests a potential hindrance to the teacher's ability to facilitate hands-on learning experiences. The lack of confidence resulting from these challenges may impact the overall quality of the learning environment and the student's practical understanding of scientific concepts. This issue needs to be addressed for the process of teaching and learning to take place smoothly. Gaining proficiency in operating laboratory equipment requires extensive practice, making it easier for students to navigate the equipment with prior experience (Riaz., 2019).

Difficulty in adopting the new curriculum.

The researcher's interview data reveals that it is evident that the respondent needs help implementing the new curriculum. This difficulty can be indicated by a respondent teaching for more than 20 years during which traditional curriculum was used over and over again. Adapting to change for her is now difficulty she is used to teach using her old ways with less hands on activities, this prolonged exposure to the conventional curriculum may not give opportunity to different teaching methods and content delivery approaches, making it harder for her to embrace the changes associated with the new curriculum. There is need for the government to take note of the transition to the new curriculum and intervene by additional support, training, and resources to help the respondent navigate the unfamiliar territory and effectively integrate the latest teaching methods into her instructional practices. With this category, the respondent said:

> *"Since I have been used to use the old curriculum for the past 20 years, trying to implement the new curriculum in terms of the teaching strategies and the learning styles is a struggle to me." P6*

It is a challenge to adapt to a new concept since the teacher is accustomed to using the traditional curriculum, adapting to a new curriculum will be difficult due to the comfort gained from years of teaching old curriculum. The teacher may need to unlearn specific methods and teaching strategies while simultaneously learning and implementing the new curriculum. This process requires time, effort, and support to effectively integrate the new curriculum into the teacher's instructional practices again the support has to come from the admin in terms of training or within the department so as to improve the teaching and learning process. Modifications to curriculum development necessitated embracing fresh cognitive obligations (Jones & Moreau, 2017).

Lacking administrative support

With the above challenge it is now necessary for administration to support necessary trainings when necessary and resources that can help alleviate the teacher's difficulties, ensuring a smoother transition to the new curriculum. The likes of inadequate provision of essential resources like text books apparatus even the laboratories for proper experiments to take place and limited promotion of programs. Lack of support from administrators directly impacts the teachers' ability to deliver a high-quality education to their students as the teacher will be defending himself giving blame to inadequate resources there is need for provision of more

resources for effective teaching and learning. Additionally, the absence of program promotion undermines the visibility and impact of educational initiatives, further impeding the overall quality of education. The respondent on this issue said;

> *"There should be support from the administration, and there should be a laboratory available. Since science is all about exploration, actual learning should be emphasized." P6*

From the research findings it highlights the crucial role of administrative support in ensuring the quality of teaching and learning. It is important for the administration to support the sciences department this will help during the purchase of resources and also training programs where affiliation is needed it is the duty of the administration to pay. The adverse consequences of inadequate support for exceptional education staff encompassed minimal notification regarding schedule changes, consolidation of students with different disabilities into a single class, elimination of effective programs or supports for both teachers and students, implementation of ineffective programs or supports, and the existence of an unfavourable school atmosphere overall (Konlan, Danku and Adzabor, 2020). The administrators must prioritize providing necessary resources and actively promoting educational programs for effective teaching and learning with this empowerment teacher will deliver high quality education and create a conducive learning environment for students.

4.7.2 Effect of the Challenges in Teaching and Learning Science

The gathered data revealed the effects that comes from the stated challenges in the teaching and learning of physics and are grouped in five categories. Which is Difficulty in performing the suggested experiment, Science is not adequately recognized or valued by students, compromised learning outcomes due to limited subject proficiency, Absence of actual learning and students' restricted progress, and Enhanced professional growth and increased motivation.

Difficulty in performing the suggested experiment

The researcher's interview data reveals that the need for more materials significantly impacts physics teaching. Physics as a science subject which rely heavily on experiments to reinforce theoretical concepts, teachers need help delivering those lessons with concepts which are a bit complex, when they cannot conduct experiments due to defective materials, equipment, and apparatuses, this limitation directly affects the quality and effectiveness of their teaching methods. As long as the necessary materials are available, teachers can provide practical examples or hands-on experiences essential for students to grasp physics principles fully and also cultivate the hidden interest to physics. The lack of practical experiments has an impact on students as it prevents students from actively participating in the learning process, impeding their grasp and practical application of physics ideas in their day to day activities if applicable. The respondents narrated in view with this idea;

> *"These challenges affect my teaching with my students, especially with the experiments imagine trying to explain a concept of oscillation without some pendulum students will be left suspended." P1 "It affects my teaching especially trying to explain a concept which was supposed to be demonstrated I will use many teaching strategies instead of just demonstrating and give questions. This will lead to misunderstanding of some concepts by some students hence hinder the teaching and learning process of that topic." P3*

Experiments are important in teaching and learning of physics since it gives a practical understanding of the concepts and it helps the students to understand more about the lesson. The unavailability of apparatus and materials impacts physics lessons because the students are only given theoretical knowledge and sometimes it might not make sense. By providing students with concrete experiences, experimentation increases student engagement, motivation, interest in physics and provide students with concrete experiences. It fosters resiliency, flexibility, and the ability to learn from errors while assisting kids in comprehending the iterative nature of science. Furthermore, experimentation develops students' teamwork, collaboration, and communication skills, enabling them to share ideas and effectively express their findings. Since it includes diverse activities to improve students' comprehension of complex topics, the laboratory within the educational context is crucial in encouraging the overall development of students (Garrity and Linder, 2020).

Science is not adequately recognized or valued by students.

The gathered data revealed the issue of uninterested students' presence which significantly impacts teacher's effectiveness. Recognizing the need to engage these students and cultivate their interest in learning physics, regardless of their primary academic focus, this requires time and a positive attitude from both the learner and parents. The respondent narrated that in view of this point;

> *"It is indeed a challenge for teachers, including myself, to motivate students to learn physics, especially when some are not interested in the subject, mainly if it is not their primary. If it is not their major, they may not recognize the importance and value of studying physics and this will just need the student to have the inner drive to be part of physics class." P4*

The absence of hands-on experiments hinders students' active involvement in learning, thereby making physics more difficult and students will lose interest. The teacher will need to invest her time effort so as to cultivate interest in students to do physics. Teachers can as well implement different strategies to try and motivate these learners to see the impact of physics despite the fact that some students will be having their major.

Compromised learning outcomes due to limited subject proficiency

The data collected shows that due to the lack of proficiency, the participant admitted needing more expertise in the topics and concepts in the new curriculum this will lead to low self-confidence at the end the physics lessons will end up being more of theory than practical therefore hinders the smooth flow of teaching and learning. The teacher's limited knowledge and understanding of the subject make it challenging to provide accurate and comprehensive explanations to students at the end of the day the process of teaching and learning will be distorted. In relation to this the respondent said:

> *"With these new demands on the new curriculum, I am no longer an expert now; I currently lack expertise in physics, unlike before. Teaching right now has become a challenge there are many demands and challenges."* P6

For a high-quality lesson to be produced there is need for the teacher to be knowledgeable if this is limited, they will be challenges in offering accurate and comprehensive explanation to

the students and hinders their learning experience. Addressing this issue necessitates focused efforts to help the teacher to be well equipped in physics provision of support so that the teacher does all it takes to have the knowledge about physics so that the students will benefit from him.

One of the participants revealed that due to the lack of support from the administration it will be difficulty for teachers to perform their duties as smoothly as they may want to. The teachers need help to perform and teach the concept and topics in a way that the students will understand for this to happen teachers need a lot of resources to use so that the lesson come out as planned. Some cases require proper laboratory equipment and material. Still, due to needing more support, the teacher cannot suggest doing laboratories, resulting in students not having actual learning and hands on activities and restricting their learning progress. The respondent narrated:

> *"There should be support from the administration since I as a teacher and my students will be engaged, and there should be a laboratory for proper practical's to take place hands on is the way to go for physics. However, due to the lack of support, students need actual learning experiences, and their knowledge needs to be improved." P6*

Teachers require assistance in effectively delivering concepts and topics that students can understand this can be effective only if the administration is actively involved in departments so that they will be able to know what is best for science department. In some instances, proper laboratory equipment and materials availability is crucial. However, teachers cannot offer laboratory activities because of inadequate support and limited resources, thus denying students crucial hands-on learning experiences necessary for their educational advancement. The teachers emphasized that the most crucial factors for their effectiveness were support from the administration and the effectiveness of their team (Dutta, 2019).

Enhanced professional growth and increased motivation.

During the one-on-one interview, the participants were asked about the effects of their challenges in teaching science subjects. Most of the data concluded adverse effects, but one positive effect prevailed. The participant (P5) stated:

> *“These challenges helped me grow professionally, and at the same time motivated me to give more and beyond what is due for the student and also be creative always so as to produce a proper lesson which will benefit students. "P5*

Despite the typically negative impacts associated with challenges, the research participant, in this case, views them as beneficial for professional growth and gives this participant a room to increase his innovation skills. The respondent recognizes the value of overcoming challenges, as they provide personal and career development opportunities. The research participant can enhance their professional skills and abilities by embracing and navigating through challenges taking every challenge as a way to move to another step-in terms of lesson planning. Teachers' dissatisfaction with their teaching and students' learning drove their professional development (Ajaja and Ajaja 2020).

The participants were asked about strategies to overcome these challenges during this research In response to these findings, the research highlights the urgency for curricular reforms that integrate practical demonstrations and real-world contexts, catering to diverse learning styles. Targeted interventions aimed at rectifying misconceptions, enhancing student engagement, and addressing socio-economic disparities are imperative in creating a more inclusive and engaging learning environment in physics education

4.8 SUMMARY

The fourth chapter had presented, analysing and interpreting data that was collected for the study. This chapter has looked at the major findings of the research and went on further to analyse and discusses those findings in relation to the set research objectives and research questions. It commenced by looking at the questionnaire response rate for the respondents in the research. The findings generated from the researched information generally shows and agree with the literature review.

CHAPTER FIVE

5.1 INTRODUCTION

This chapter presents a summary, study conclusions and recommendations. Information in this chapter is based on study results obtained from the previous chapter.

5.2 SUMMARY

The main purpose of the study was to look for strategies to mitigate the challenges in the teaching and learning of physics at school A in Glenview. Twenty-eight research participants were recruited to provide information and the sample included teachers, school head as well as learners. The study was a descriptive research design and qualitative research method was applied to enable a comprehensive research method. Questionnaires and interviews were used as the key research instruments, and the response rate was very high. The study had its own limitations of time and funding, but the researcher had to use extra resources to meet needs of the research. The findings of the study were that strategies to mitigate the challenges to the teaching and learning of physics include:

- Adequate and proper teacher training
- Making resources needed for the teaching and learning of physics available
- Use of different teaching and learning methods
- Use of different languages to make physics concepts be understood
- Development of positive attitude from the parents, teachers and learners

5.3 CONCLUSION

In view of the above findings, the following were the study conclusions:

5.3.1 OBJECTIVE 1:

To find out how well experienced teachers are to teach physics

The study conclusion was that most teachers from the research had between 1-5 years teaching experience in the teaching of physics. Also, from the study it was observed that the effectiveness of the teacher increases with experience. It was noted that experience is very important because by having vast experience a teacher acquires skill and experience on the

teaching methods, communication skills as well as maintaining good relations with learners, parents and colleagues.

5.3.2 OBJECTIVE 2:

To identify strategies to mitigate institutional based challenges in the teaching and learning of physics.

The conclusion of the research is that in regard to institutional based challenges

Teacher training

There is need for proper and adequate teacher training and development programs so that teachers get better qualifications to teach physics.

Resource availability

There is need for resources to be available in the teaching and learning of physics. Resources needed for the teaching and learning of physics include laboratory supplies, apparatus, models, library materials as these are essential for the teaching and learning of physics.

Teaching and learning methods

Teachers need to use different teaching methods so as to accommodate all learners. Different learners have different learning capabilities thus different teaching methods need to be used to accommodate all learning.

English as a medium of instruction

The use of English as a medium of instruction has posed as a hindrance to the teaching and learning of physics. Thus, from the study it was noted that teachers need to use different teaching methods including demonstration and also make use of the local languages for example Shona to aid in explain physics concepts.

5.2.3 OBJECTIVE 3:

To find out ways to overcome non-institutional challenges to the teaching and learning of physics

The study conclusion was that the parents', learner' and teachers' had to develop positive attitudes for effective teaching and learning of physics to take place at Glenview 3 high school.

Parents attitude

From the study, it was observed that parents' attitude influenced their children's attitude. Parents that have a negative attitude towards physics will influence their children to also develop the negative attitude to the subject and opposite is also true.

Learner attitude

Learners need to develop a positive attitude towards physics since a negative attitude poses as a hindrance to the effective teaching and learning of physics at school A in Glenview. Learners with negative attitude performed badly in physics while those with a positive attitude usually scored high marks. So, attitude is a contributor to the teaching and learning of physics in secondary school in Glenview.

Teacher attitude

Just like learners, teacher's attitude contributes to the teaching and learning of physics. Teachers need to develop a good attitude towards physics and by having a good attitude they influence learners to have the zeal to learn physics. A good teacher attitude influences the selection of good teaching methods which makes the teaching and learning process interesting.

5.4 RECOMMENDATIONS

This research carries the following recommendations:

This research recommends that teachers with more experience should mentor and provide guidance to the less experienced teachers because there is a relationship between teacher experience and learner achievement. Slotta, (2019) states that teachers with more experience

usually have students who achieve higher grades as compared to those that are taught by the less experienced teachers. Brown (2019), further explains the importance of teacher experience so as to take the teaching and learning of physics to a higher level. Therefore, the more experienced teachers should guide the less experienced teachers and give them advice on the best teaching methods so that effective teaching and learning of physics takes place at a school A in Glenview.

There should be adequate and proper teacher training as well as development programs. Okebukola and Akingbabe (2020) assert that regular and proper teacher training. These programs enhance the teachers' skill and experience in the teaching and learning of physics. The development programs are meant to install critical thinking, tolerance as well as other characteristics that make a very good and efficient teacher. Also, these development programs should teach teachers on technology so that they make use of internet for example YouTube were they can download some physics videos to use in lessons so as to spice up teaching and learning of physics at school A in Glenview.

The availability of resources is a great contributor to the effective teaching and learning of physics at school A. From the study, it was noted that the school lacked proper resources which include labs, apparatus, library materials, specimens as well as models that are essential in the teaching and learning of physics as they aid greatly in the teaching and learning process. So, the study recommends that the school administration should prioritize the building of laboratory as well as purchasing all the necessary apparatus and materials needed for smooth lessons to be conducted. Fadehan and Ademola, (2020) postulate that school administration needs to provide maximum support to the science department.

From the study it can also be recommended that the teachers need to adopt different teaching methods to accommodate different learning capabilities in secondary schools which are in Glenview. Learners have different learning capabilities as well as different levels of grasping knowledge hence different methods need to be used so as to achieve set lesson objectives. Garrity and Linder, (2020) asserts that learners have different learning capabilities therefore it is the duty of the teacher to embrace all learners. From the research it can be recommended

that teachers use different teaching methods which include videos, demonstration, lecture as well as hands on experiments so that all learners fit in in their suitable teaching method.

Also, from the study, it can be recommended that teachers use not only English as a medium of instruction but should rather make use of local languages to aid in the explanation of concepts. Also, since English and subject jargon pose a hindrance to effective teaching and learning of physics at school A in Glenview, teachers are encouraged to find alternative ways which include demonstration and use of local languages to explain physics concepts and make sure learners understand.

Lastly the attitudes of parents, teachers and learners have a direct effect to the teaching and learning of physics. All of the people mentioned above need to develop a positive attitude towards physics at school A in Glenview. Recommendations are that parents need to be educated on the benefits of physics to their children, once parents develop a positive attitude, they will rub it into their children. Teachers are also encouraged to develop a positive attitude as they will whole heartedly teach the learners which leads to achievement of better results.

5.5 SUMMARY

This chapter served to show a summary of the study, conclusions as well as provide recommendations in accordance to the study results.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR STUDENTS

My name is Zhou Precious, a Bindura University student carrying out research on investigating strategies to mitigate challenges into teaching and learning of physics**.** You are encouraged to answer to all the questions on this questionnaire truthfully. All the information obtained will be used for academic purposes only and your identity will not be disclosed to anyone.

Section A: Use a tick to choose the correct answer.

1.What is your gender?

Male

Female ☐

2.What is your age rage

1 1 to 13 years ☐

14 to 16 years ☐

17 to 19 years ☐

20. to 22 years ☐

SECTION B

3. Please indicate by ticking the number that corresponds with your response.

Key

SD- Strongly Disagree **D**-Disagree **NS**- Not Sure **A**-Agree **SA**-Strongly Agree

Rate the level of impact of the following strategies at your school for student learning outcomes

No	Theme	SD	D	NS	A	SA
Presentations	Makes physics interesting since there is less	1	2	3	4	5
Use of ICT e.g projector	I get to concentrate and understand better when a projector for example is used	1	2	3	4	5
Experiments	Makes physics real and interesting Helps my level of understanding					
Group work group discussions	Improves student learning and participation	1	2	3	4	5
Use of physics jargon	Provide student with that courage to those ones who has made it by just using those jargons be it at school or in the society.	1	2	3	4	5
Use of local languages during lessons e.g shona	Provides a better understanding and everything will become clear	1	2	3	4	5
Increasing time allocated for physics lessons	The teacher will have time to explain more and use different methods for learners to understand	1	2	3	4	5

Section C Challenges faced by learner during physics lessons

4. What are challenges if any, have you encountered during lesson in your physics classes? (check all that apply)

Difficult to understand ☐

Unable to grasp the concepts ☐

Physics jargon are difficulty to understand ☐

It more theoretical ☐

Strategies used during lessons

5. Which teaching strategy that you think will make physics lessons understandable and more interesting? Please select all that apply.

The use of ICT ☐

Experiments ☐

Group discussions ☐

Use of local language ☐

Collaborative learning platforms ☐

APPENDIX B: INTERVIEW GUIDE

My name is Zhou Precious a Bindura University student carrying out research on investigating into strategies to mitigate challenges to teaching and learning physics. You are encouraged to answer to all the questions truthfully. The information you give will not be

used against you or the school in any way your participation in the study is voluntary. All the information obtained will be used for academic purposes only and your identity will not be disclosed to anyone.

Section A Demographic data

1. What is your age range

Section B different strategies being used in Teaching Physics

2. Can you describe the strategies you are currently using in your physics classes, such as the use of ict, teaching methods and learning styles use of local language during explanations?

3. How often do you apply these strategies and what are results? How do you measure the results?

4. What motivated you to come up with different strategies in your teaching, and what benefits do you think it has brought to your students' learning?

Section B: Challenges and Effects

5. Have you encountered any challenges during your teaching, such as lack of resources, technical issues, or resistance from students or colleagues? What are the effects of these challenges?

7. How did you address these challenges, and what strategies have you found to be effective in overcoming them?

8.Do you think there are any specific challenges or barriers that are unique to teaching and learning physics using?

Section C: Impact on Student Learning

7. How do you assess the impact of strategies you are using on your students' learning in physics?

9. Can you provide any specific examples or data that demonstrate the positive impact of your strategies on student learning?

10. Do you think some strategies that you are using has helped to address any common misconceptions or difficulties that students may have in learning physics?

Section D Professional Development

11.Have you received any formal training or professional development on strategies to mitigate challenges in teaching physics, such as workshops, conferences, or online courses?

12.How have you sought out resources and support to help you effectively use different strategies into your teaching, such as through colleagues, mentors, or online communities?

13.Do you think that professional development opportunities and resources are adequate for teachers looking to implement different strategies in their teaching?

Thank you for your time

APPENDIX C: OBSERVATION SCHEDULE

Purpose

The purpose of this observation is to assess how teachers incorporate different strategies in physics lessons.

- Observer…….
- Teacher…….

- Class……
- Lesson ……..
- Date……..
- Time……

Indicator	**Yes**	**No**	**Comment**
integration of strategies e.g experiments 7. Are the students able to understand concepts use of hands on activities to support their learning of physics			
7Do the teachers use different strategies to cater for everyone to deliver physics lessons			
impact of these strategies 8. Does students engaged, motivated and interested in learning physics using these different strategies			
9.Does student understand the concept of physics by using different strategies used during the lesson			
Challenges			

10. Are there any challenges while using these strategies in teaching physics such as lack of resources, technical issues or teacher resistance			