BINDURA UNIVERSITY OF SCIENCE EDUCATION FACULTY SCIENCE OF EDUCATION HONOURS DEGREE IN PHYSICS

INVESTIGATING THE EFFECTIVENESS OF PROJECTORS AS INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) TOOL IN THE TEACHING AND LEARNING OF A- LEVEL PHYSICS: A CASE STUDY AT ST DAVID GIRLS HIGH SCHOOL BONDA IN MUTASA DISTRICT

BY

MUFUMISI JOHN

B1852441

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN PHYSICS EDUATION

SEPTEMBER 2023

RELEASE FORM

Title of dissertation: investigating the effectiveness of projectors as information and communication technology (ICT) tool in the teaching and learning of A- level physics: a case study at St David Girls High School Bonda in mutasa district.

1.To be completed by the supervisor

I certify that this dissertation is in conformity with preparation guidelines as presented in the Faculty guide and instructions for typing Dissertations.

__john_____ _____29/09/23_____

(signature of student) **(**Date)

2. To be completed by supervisor

This dissertation is suitable of submission to the faculty. This Dissertation should be checked for conformity with faculty guidelines.

tmanyeredzi_____
_____

(signature of supervisor) (Date) 04/10/2024

3. To be completed by chairman of the Department

I certify, to the best of my knowledge that the required procures have been followed and the preparation criteria have been met for the dissertation

_____
_____

(signature of chairman) (Date)

Approval form

Name of student: John Mufumisi

Registration number: B1852441

Dissertation title: Investigating the effectiveness of projectors as information and communication technology (ICT) tool in the teaching and learning of A- level physics: a case study at St David Girls High School Bonda in mutasa district.

Degree Title: HONOURS DEGREE IN EDUCATION PHYSICS

Year of completion: 2023

Signed _____ Date_____

Permanent St David Girls High School

P. Bag 7909

Mutare

ACKNOWLEDGEMENTS

I feel obliged to our almighty God who gave me strength to accomplish this work. I would like to thank my family for all their sacrifices they made for my benefit. I will forever appreciate and be grateful for their steadfast love.

I thank my supervisor Mr Manyeredzi for instructions and advice throughout this study. Special thanks also go to my mother and my sister for their financial, advisory, technical and inspirational support throughout the study. Lastly I would like to thank all those who completed the questionnaires who made this study worthwhile and meaningful.

DEDICATION

I dedicate wholeheartedly this study to my family, my sister Audrey and my brother Relton for their unwavering and visionary support during hard times encountered and all my colleagues.

ABBREVIATIONS AND ACRONYMS

ICT - Information and communication Technology

Zimsec – Zimbabwe school examination council

ABSTRACT

This study is focused on investigating the effectiveness of projectors in the teaching and learning of A- Level Physics. Therefore, the study aimed at the effectiveness of projectors in the learning of A- Level Physics and to suggest what can be done to improve student performance The projector is used to display videos, images data from a computer screen or something with a flat surface such as wall. Projector can help the teacher in communicating the material without having to write them on chalkboard. When communicating the information can be seen clearly. Researchers have observed or have seen the challenges experienced by students in understanding Physics concept. The research helps students to understand and grasp the text better through videos, audios and other ICT tools. The main research objectives are discussed above, the research was carried out to determine the effectiveness of using projectors as ICT tool to increase understanding and improve pass rate in secondary schools. The research is mainly using the mixed approach methodology The sample of the research was taken from A- Level learners. Test were used as an instrument for data collection. The research design was pre-test and as well as post-test. This was mainly different groups using projectors and others not using projectors. Performance was determined and assessed.

A personal computer and other ICT tools become area of concern. The researchers are much focussed on the ICT Use in Education while my own study is much focused on projectors as ICT tool and how it can be used effectively especially in the learning of A- Level Physics. Therefore, this study aims to determine the extent to which teachers can use projectors as ICT tool.

Table of Contents

Release form----------ii

Approval form----------iii

ACKNOWLEDGEMENTS iv

DEDICATION v

ABBREVIATIONS AND ACRONYMS----------vi

ABSTRACT vii

1 CHAPTER 1 INRODUCTION 1

1.1 Introduction 1

1.2 Background of the Study 1

1.3 Statement of the Problem 2

1.4 Aim and Objectives 3

1.5 Significance of the Study 4

1.6 Delimitations 5

1.7 Organisation of the Study 5

1.8 Chapter Summary 5

2 Chapter 2: literature review 6

2.1 Introduction 6

2.2 Benefits of ICT Tools in Education 6

2.3 Use of Projectors in Physics Education 8
2.4 Projectors impact on Student Engagement 10
2.5 Impact of Projectors on Active Learning 10
2.6 Impact of Projectors on Quality of Teaching 11
2.7 Challenges Faced by Teachers and Students When Using Projectors 11
2.8 Addressing Challenges When Using Projectors 15
2.9 CHAPTER SUMMARY 17
3 Chapter 3: Methodology 18
3.1 Introduction 18
3.2 Research Design 18
3.3 Research approach 18
3.4 Participants 19
3.5 Sampling procedures 19
3.6 Research Instrumentation 20
3.7 Data Collection Methods 21
3.8 Data Analysis 21
3.9 Ethical Considerations 22
3.10 Chapter Summary 22
4 CHAPTER 4: DATA PRESENTATION AND ANALYSIS 23
4.1 Introduction 23
4.2 Response Rate 23
4.3 Impact of projectors on student performance 23
4.4 Improving the quality of teaching using projectors in A- Level Physics 25
4.5 Challenges faced when using projectors 27
4.6 strategies to improve the effectiveness of using projectors 29

4.7 Chapter summary 30

5 Chapter 5 Summary, Conclusions and recommendations 31

5.0 Introduction 31

5.1. Summary 31

5.2. Conclusion 32

5.3 Recommendations 33

5.4 Recommendations for further study 33

REFERENCES 34

AppendixB: Learners' questionnaires 38

Appendix D: Teacher's questionnaires 41

Appendix E: Interview guide for teachers 44

Appendix F: Observation guide for Physics student who are taught 47

Appendix A---------38

Appendix B---------39

Appendix ---------40

Appendix D---------*41*

Appendix E

_____***44***

Appendix f _____-***46***

*Appendix G*_____*50*

LIST OF TABLES

Table 4.1: Pre-test and post test results----------23

TABLE: 4.3 Observation checklist----------29

The table 4.4 below shows teachers percentage ----------33

LIST OF FIGURES

4.2 The bar graph showing percentage pass rate of students----------24

1 CHAPTER 1 INRODUCTION

1.1 Introduction

This chapter sought to discuss the background of the study, statement of the problem, research objectives, significance of the study, delimitations of the study, organization of the study, and will close with a chapter summary.

1.2 Background of the Study

Globally the use of ICT devices as learning aids has long been proven to be beneficial in the learning process as it provides the necessary stimuli to motivate learners, making the grasping of concepts easy for learners.(Astuti 2021) states that ICT not only provides the aids for teaching and learning but also gives students and teachers nearly unlimited sources of content, self-paced study, alternatives for instruction as well as assessment options.

Recent studies conducted in different parts of the world have continued to support the effectiveness of projectors in improving student engagement and learning outcomes. Projectors enables teachers to engage and motivate pupils about concepts in different learning areas at secondary level(Khurshid 2016). The governments in many European countries like England and elsewhere are emphasizing on integrating ICT devices like projectors in teaching and learning as a means of improving educational outcomes in different learning areas. Teachers should be aware of the important part the projectors play in the teaching and learning of different subjects. Therefore, there is a need to investigate the effectiveness of projectors in the teaching and learning of Physics at A-Level.

In India, it was found that the use of projectors in Physics classes led to better understanding of concepts and improved performance on (Ordu 2021). Projectors are effective in displaying visual aids such as diagrams, graphs, and animations, which can help students better understand complex and abstract concepts. This can lead to better retention of information and more effective learning. However, we cannot rely only on this study to reach a conclusion from India since the setting is different from Zimbabwean context and at Bonda high school in Mutasa.

district.

In Africa, a study conducted in Nigeria found that the use of projectors in Physics classes led to improved student performance and motivation (Alkamel 2020). Similarly, a 2018 study conducted in Ghana found that the use of projectors in Physics classes led to improved student engagement, increased participation, and better learning outcomes (Tety 2016). In the Angola, it was found that the use of projectors in Physics classes led to increased student engagement and better understanding of concepts(Liu and Cheng 2015).

Studies conducted in Kenya found that the use of visual aids like projectors in Physics classes led to improved student engagement and learning outcome(mohammed 2020). Similarly, a 2016 study conducted in South Africa found that the use of interactive whiteboards and projectors in Physics classes led to increased student engagement, better understanding of concepts, and improved performance on assessments (Cano, Luisa, and García 2013).

In Zimbabwe, recent studies have also demonstrated the effectiveness of projectors in improving student engagement and learning outcomes in Physics at O level(Ndihokubwayo, Uwamahoro, and Ndayambaje 2020). states that many schools are investing to improve the use of ICT in the teaching and learning especially the use of projectors. However, it is not clear how effective is the use of projectors at Advanced Level Physics. While previous studies have shown that ICT tools can enhance teaching and learning outcomes, there is limited research on the use of projectors specifically in Physics education. It is against this background to investigate the effectiveness of projectors as an ICT tool in the learning of A Level Physics in Zimbabwe. This study aims to fill this gap by investigating the impact of projectors on student engagement, active learning, and the quality of teaching in A -Level Physics at St David Girls High School Bonda.

1.3 Statement of the Problem

Using ICT in education has been extensively appreciated as an essential way of challenging changes being brought by technological advances in the society and globally. The fast changing technology and internationalization are necessitating the evolution of an open flexible educational system. Although the integration of ICT tools in education has been found to be

effective by various researchers in the global village, it is not clear how tools like projectors impact learning outcomes in specific subjects such as Physics.

The research problem found by the researchers is that most teachers are teaching without the utilizing visual media in learning or there are still teaching using the direct method. The weakness of teaching without using or utilizing media is that students are receiving lessons every day and they will eventually not pay attention because some are weak in vocabulary expressions. It can lead to students not able to understand a text. Therefore, teachers need effective methods and also sufficient ways in the use of the media to overcome these problems. According to Levie (2012) visual based media can have four functions which are effective this means a projector can present a picture results in exciting students, it can attract their attention, it can also provide understanding and remembering of information or messages contained in images. The Researcher choose a projector as visual learning media; the growing technology requires us to use modern methods. The use of visual media like projectors is a topic of concern as it leads to improvements in student academic performance This Research is much focussed on projector as to be used to play a role in education as visual media and is a problem to be solved in the way possible. Other researchers are much focussed on ICT use in Education but there are not specific about media use like projectors so this research is looking at projectors on how they can be used as Information and Technology tools in the Learning of A- level Physics.

1.4 Aim and Objectives

The study aims to investigate the effectiveness of projectors as Information and Communication Technology (ICT) tools in the teaching and learning of A-level Physics using St David's Bonda girls high school as a case

The study aims to address the following research objectives

- Grouping learners in three categories for learning.
- Teaching of learners, the same topic using projector, laboratory and without using projectors.
- To assess performance from a written test from the groups.

1.5 Significance of the Study

Technology is perceived as a vital driving force for contemporary education. The Government of Zimbabwe acknowledges the relevance of Information and Communication Technology (ICT) in education, and it is financing ICT in both primary and secondary schools. Thus this research will benefit the government and the Ministry of Education in that its results will answer a number of questions related to the effective use of ICT in schools (Khurshid 2016).

The study contributes to the existing knowledge on the use of projectors as an ICT tool in A-Level Physics education. While previous studies have shown that ICT tools can enhance teaching and learning outcomes, there is limited research on the use of projectors specifically in Physics education. The current study provides insights into the impact of projectors on student engagement, active learning, and the quality of teaching in the subject. In addition, the study identifies the challenges faced by teachers and students when using projectors in A- Level Physics classes and provide recommendations for addressing these challenges. The study is important because it can provide valuable insights into the effectiveness of projectors as an ICT tool in the teaching of Physics in Zimbabwe and contribute to the improvement of Physics education in the country. The study can also provide ST David Girls High School with valuable information on the impact of its investment in projectors and promote the integration of ICT tools in teaching practices.

The study provides valuable information on the effectiveness of projectors as an ICT tool in the teaching of Physics. By building on the findings of previous research, it provides insights into the specific challenges faced by teachers and students when using projectors in A-Level Physics classes. This can contribute to the improvement of Physics education in Zimbabwe and other developing countries.

The findings can inform the development of policies and guidelines for the integration of ICT tools in Physics education in Zimbabwe. Additionally, the research can be used to develop training programs for Physics teachers on the effective use of projectors and other ICT tools in the classroom. Teacher training is crucial for successful ICT integration in education, enhancing the quality of Physics education in Zimbabwe and promoting active learning and student

engagement in the subject. The study can encourage other schools and institutions to invest in ICT tools and integrate them into their teaching practices.

This research will also add to the larger body of the study hence contributing to the already consolidated literature on the use of ICT in teaching and learning. Above all, the study will enable other researchers to identify gaps and loopholes hence necessitating further researches.

1.6 Delimitations

Although there are many school and districts in Zimbabwe the researcher delimited this study at St David Girls High School in Mutasa district. The study is confined at this school because it has the characteristics that had the potential to provide answers to both the research broad question and the specific research objective that guide the study. For this study, the researcher delimited to investigate the effectiveness projectors in the teaching and learning of Physics at Advanced Level.

1.7 Organisation of the Study

This study is organized into five chapters, with each chapter addressing specific aspects of the research study. Chapter 1 provides an introduction to the study, and Chapter 2 presents the review of related literature. Chapter 3 outlines the research methodology, while Chapter 4 presents the data analysis and findings. Finally, Chapter 5 discusses the conclusions and recommendations of the study.

1.8 Chapter Summary

This chapter serves as an introduction to the study, providing the necessary context and background information to help the reader understand the purpose and scope of the research. The statement of the problem highlights the gap in knowledge that the study aims to address, while the research aim and objectives provide a clear direction for the study. The significance of the study is explained in terms of its potential contributions to the field of Physics education and the development of effective teaching practices using ICT tools. The next chapter is going to focus on related literature review.

2 Chapter 2: literature review

2.1 Introduction

The intention of this section is to reflect the available relevant literature of the study. The chapter will be guided by the research aim and objectives highlighted in the first chapter. In this chapter, the researcher will concentrate on the utilization of projectors as an information and communication technology (ICT) instrument in the instruction and comprehension of Physics. The researcher will talk about the benefits that come with using ICT tools in education, and then will provide an overview of how projectors are utilized in the teaching of Physics. After that, the researcher investigates prior research that have been conducted on the effects of projectors on the level of student engagement, active learning, and the quality of instruction in the subject of Physics. During the discussion of various literature, the researcher will attempt to demonstrate and reflect the knowledge and research gap which necessitate the research.

2.2 Benefits of ICT Tools in Education

ICT tools have the potential to promote equity and access to education. According to Collins (2020), children in rural and distant places can have access to educational opportunities through the use of online learning platforms like Khan Academy. Therefore, the incorporation of ICT tools into educational settings has the potential to contribute to the improvement of educational standards and the expansion of educational opportunities for all students.

It has been suggested by Mohammed (2020) that the use of multimedia devices like projectors can facilitate active learning, increase student involvement, and improve comprehension of difficult and abstract ideas. According to(Shabiralyani 2015) research, the usage of interactive projectors and they revealed that projectors are useful to increase student engagement, as well as their comprehension of the material and their ability to work together to learn.

According to a study carried out in 2014 in Zimbabwe by UNICEF based on the integration of ICT in Secondary schools, teachers declared that ICT plays a pivotal role in stimulating motivation and interest of learning in students if it is used effectively in the classroom (Cano,Luisa,and Carcia (2014). The teachers further said that internet had increased their

information research base and students' academic achievements increased due to the use of ICT in schools.

(Ordu 2021) also says that ICT supports collaborative learning and distance learning through eLearning. This is a great benefit when looking at this covid19 era where lockdowns can be announced anytime yet disturbing the school calendar. Parkstan (2016) continues to say that pupils can work in small groups through Gmail, e-learning and even online video conferencing, sharing information and knowledge. This simply means the use of virtual classrooms like Google classroom and Microsoft Teams.

Thamarana (2017) also state that computer applications and software such as Microsoft PowerPoint with projectors have assisted students to efficiently and effectively carry out their presentations using the projector, and also to write their assignments neatly using Microsoft Word. Information Communication Technology in the learning and teaching process of Economics provide with the tools to engage learners powerfully in the learning process. It greatly enhances the effectiveness of communication. If it is properly designed, skilfully produced and effectively used, it has great influence on teaching and learning because it saves time, increase interest of the learners, hold attention, clarify ideas, reinforce concepts, add tone and prove a point. In other words, the media helps in concept transfer.

Learning without technological media is least permanent. Abstract concepts are concretized hence easy to grasp. The learning is also fostered through the use technological media like projectors with videos, pictures and audios. Varied learning experiences and teaching methodologies can be employed when ICT is used in the classroom. Verbal exposition of concepts makes learning difficult particularly to those learners with challenged abilities whereby the instructional technology and media is an answer.

ICT motivates the learners to participate in the learning process. It stirs the learners and captures their attention. During the teaching and learning of concepts, projectors, televisions and computers can be used to provide audios, videos and pictures to illustrate concepts. (Liu and Cheng 2015)declares that ICT captures the attention of the learners hence allowing them to follow learning instructions. He added that technologies motivate the reluctant learners hence

maximizing the attainment of the lesson objectives in the classroom. Here learners are motivated to capture the concept as abstract ideas are concretized providing a rich learning experience that keeps students focused and actively engaged in learning.

Ojelade (2022) declare that the most effective teachers don't depend on one single teaching style but instead use a variety of methods to reach the greatest number of students. They experience the real objects hence concretizing abstract ideas. Astuti (2021) argues that, instructional technology with discovery learning allows each child, despite individual strength abilities, to have an experience of their research of knowledge, which will deepen their knowledge and understanding of any topic. All learners are allowed to experience the real world around them using ICT.

Alkamel (2020) states that ICT allows the teacher to effectively use different teaching methods. The media here act as a double sword here. It is a way of giving instructions in the classroom and it support the learner centred approach as advocated by the new curriculum. Chistina (2018) states that the teacher can also use Power Point presentations during explanations in the classroom. This will also enable the learners to take down the notes. Although ICT is reflected as an effective teaching and learning weapon, there is need to focus on relevant literature to reflect its effectiveness specifically on the teaching of Advanced Level Physics.

2.3 Use of Projectors in Physics Education

The projection of visual aids such as diagrams, graphs, and animations is a popular application for projectors in the classroom setting of Physics(Ndihokubwayo, Uwamahoro, and Ndayambaje 2020). Research has shown that the use of projectors in the teaching of physics can improve students' levels of engagement, as well as their ability to learn key concepts and remember knowledge.

According to Azewei (2019), projectors have the capability of displaying dynamic and interactive visual aids, which assist pupils in better comprehending difficult and abstract ideas. Astuti (2021) found that use of projector in physics teaching make sure genuine visual effort to the learners is enhanced. In addition, using content related videos helps the students to comprehend the thoughts and get in the actual concept on that subject matter. Moreover, students

can give attention to the use of contextual experiments in the videos along with non-verbal characteristics of the experiments that assists them to have better understanding of the concept.

Shah (2020) focused on significance of projector as well as audio visual aids for learning sciences and Alkamel (2020) said it permits the students to guess, assume and investigate the information of the subject matter.

Ojelade and Gbemisola (2022) discussed about the benefits of using multimedia projector in teaching among learners. It creates curiosity for learning in the students, it is also save the time because it can give the detailed idea very much effectively and accurately, load of teacher is decreased, teacher can develop his/her personal knowledge, new varieties of experience for students, it makes learning very easy, it helps in concentrating the attention of students on the lesson (Daniel 2014). He added that projector in the class allows teachers to deliver a topic not only verbally but also visually that is much supportive for the students to give more concentration in the class. Students are also able to discuss together between the verbal and non-verbal as well as theoretical and material issues.

In India, it was found that the use of projectors in Physics classes led to better understanding of concepts and improved performance on assessments (Astuti 2021). Projectors are effective in displaying visual aids such as diagrams, graphs, and animations, which can help students better understand complex and abstract concepts. This can lead to better retention of information and more effective learning.

Studies conducted in Kenya found that the use of visual aids like projectors in Physics classes led to improved student engagement and learning outcomes (Amin 2018). Similarly, a 2016 study conducted in South Africa found that the use of interactive whiteboards and projectors in Physics classes led to increased student engagement, better understanding of concepts, and improved performance on assessments (Sibiya and Sibanda 2015).

In Zimbabwe, recent studies have also demonstrated the effectiveness of projectors in improving student engagement and learning outcomes in Physics at O level (Ndihokubwayo, Uwamahoro, and Ndayambaje 2020).

Although the use of projectors in Physics teaching has become a widely tendency to the teachers and trainers; there is not enough study on the effectiveness of the projectors particularly in the

Zimbabwean context at A -Level Physics.

2.4 Projectors impact on Student Engagement

Several studies have been conducted to evaluate the effect that projectors have on the level of involvement that students have in other subjects. For example, a study titled "Liu et al., 2019" that was carried out in the United States in 2019 discovered that the usage of projectors in Physics classrooms led to greater levels of student involvement. A similar finding was made in a study that was carried out in China in 2018 and it was discovered that the usage of projectors in Physics classrooms led to improved student participation and engagement (Deng 2018). According to Oluwadare's research from 2020, using projectors in Physics classrooms can boost both the motivation of students as well as their interest in the subject matter.

Oluwadare (2015) revealed that, the use of projectors in Physics classes led to improved student performance and motivation. Similarly, a 2018 study conducted Ghana found that the use of projectors in Physics classes led to improved student engagement, increased participation, and better learning outcomes (Liu and Cheng 2015). In the Angola, it was found that the use of projectors in Physics classes led to increased student engagement and better understanding of concepts (Agyei 2021).

2.5 Impact of Projectors on Active Learning

It has also been discovered that the utilization of projectors in the field of Physics education facilitates active learning. According to Prince (2013), active learning is a type of instruction that encourages students to engage in activities that develop their ability to think critically and find solutions to problems. According to research conducted by Bhattacharrya(2021), the utilization of projectors in Physics classrooms has been found to foster active learning by furnishing students with dynamic and interactive visual aids that require them to engage with the subject matter in an active manner.

According to Collins (2020),Teaching and learning becomes monotonous when the teachers are compelled to rely on the text books as the only source of content input". There, they found how the use of projector helps the language teacher in physics classroom at university level. They explored that the result of their work specifies that using projector in any subject teaching is helpful for both the teachers and the learners. It was argued that projectors with power points makes the class interesting and effective.

2.6 Impact of Projectors on Quality of Teaching

It has also been discovered that incorporating projectors into the teaching of Physics can improve the overall quality of instruction(Liu and Cheng 2015). Research has shown that the use of projectors in the classroom can assist educators in presenting difficult and abstract ideas in a manner that is more visually appealing and accessible to students. This, in turn, leads to improved student comprehension and knowledge retention. Additionally, according to Chikwauke and Munyoro (2017), the use of projectors can improve teaching practices by encouraging interaction between teachers and students as well as collaborative learning.

.Thamarana (2017) if the learners and the teachers show positive impression toward the use of projector as audio-visual aids, they will be benefit in various ways. By using projector in the classroom, teachers can make the class interesting way. The use of projector brings difference in the classroom teaching which are useful to draw the concentration of the learners to the lessons. He has also given an example that, if the teacher use various kinds of images related to the lesson of the class, the classes become dynamic as well as learners get the real idea of the topic. It is beneficial to have something visuals in front of the learners so that they can comprehend the lesson well.

2.7 Challenges Faced by Teachers and Students When Using Projectors

In spite of the numerous advantages that projectors offer in the field of Physics education, there are a number of obstacles that may arise when employing them. According to Mugoni and Maphosa(2014), some of these problems include inadequate infrastructure, limited teacher training, and restricted access to information and communication technology tools. In addition, according to (Bozzi, Raffaghelli, and Zani 2018), there is a possibility that some educators lack

the knowledge and abilities necessary to successfully incorporate projectors into their classroom activities. As a result, there is a demand for training and assistance designed specifically for instructors to enable them to successfully use projectors into their classroom activities.

Several research studies indicate that lack of access to resources, including home access, is another complex challenge that prevent teachers from integrating new technologies like projectors into education. Ruhul and Mahedi A(2018) argues that teachers complained about how difficult it was to always have access to computers and projectors. The author gave reasons like "computers had to be booked in advance and the teachers would forget to do so, or they could not book them for several periods in a row when they wanted to work on several projects with the students. In other words, a teacher would have no access to ICT materials because most of these are shared with other teachers. According to the inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school. It may be the result of one of a number of factors such as poor resource organization, poor quality hardware, inappropriate software, or lack of personal access for teachers (Ordu 2021).

The challenges related to the accessibility of new technologies for teachers are widespread and differ from country to country. Palagolla , and Wickchchiet (2016). study found that lack of access is the largest barrier and that different challenges to using ICT in teaching were reported by teachers, for example a lack of computers and a lack of adequate material.

Similarly, Rusmini (2017) found that low numbers of computers, oldness or slowness of ICT systems, and scarcity of educational software in the school were barriers to the successful ICT implementation in Turkish schools. Shabiralyani et al. (2015)found that having no access to the Internet during the school day and lack of hardware were hampering technology integration in Saudi schools.

Moreover, another study revealed that without both good technical support in the classroom and whole_school resources, teachers cannot be expected to overcome the obstacles preventing them from using ICT tool like projectors((Amin 2018). It was found that in the view of primary and

secondary teachers, one of the top barriers to ICT use in education was lack of technical assistance. Therefore, technical problems were found to be a major barrier for teachers.

Kabau (2020) argued that ICT support or maintenance contracts in schools help teachers to use ICT in teaching without losing time fixing software and hardware problems. The Mohammed

(2019) report stated “if there is a lack of technical support available in a school, then it is likely that technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns”. Many of the respondents to survey indicated that technical faults might discourage them from using ICT tools like projectors and computers in their teaching because of the fear of equipment breaking down during a lesson.

In teaching, several studies indicated that lack of technical support is a main barrier to using technologies. According to Gomes (2013), ICT integration in teaching needs a technician and if one is unavailable the lack of technical support can be an obstacle. In Turkey, Toprakci (2017) found that the lack of technical support was one of two significant barriers to ICT integration in science education in schools and might be considered “serious”. In Saudi Arabia, science teachers would agree to introduce computers into teaching, except that they believe they will encounter problems such as technical service or hardware problems(Khurshid 2016). Shabiralyani (2015) argued that whatever kind of technical support and access teaching staff have and whether they have twenty years of experience or are novices to the profession, technical problems generate barriers to the smooth lesson delivery by teachers.

The challenge most frequently referred to in the literature is lack of effective training (Ndihokubwayo, Uwamahoro, and Ndayambaje (2020).The study revealed that there were not enough training opportunities for teachers in using ICTs in a classroom environment. Similarly,

Beggs (2020) found that one of the top three barriers to teachers’ use of ICT in teaching was the lack of training. Recent research in Turkey found that the main problem with implementing new ICT in education was the insufficient amount of in-service training for teachers(Ordu 2021) concluded that limited teacher training in ICT use in Turkish schools is an obstacle.

According to Becta (2014), the issue of training is certainly complex because it is important to consider several components to ensure training effectiveness. These were time for training, pedagogical training, skills training, and an ICT use in initial teacher training. Correspondingly, recent research by Gomes (2016) relating to various subjects concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom and lack of training concerning technology use in specific subject areas were obstacles to using new technologies in classroom practice. Some of the Saudi Arabian studies reported similar reasons for failures in using educational technology: the weakness of teacher training in the use of computers, the use of a "delivery" teaching style instead of investment in modern technology, as well as the shortage of teachers qualified to use the technology confidently (Astuli 2015).

Providing pedagogical training for teachers, rather than simply training them to use ICT tools, is an important issue(Shah 2020).Cox (2019) argue that if teachers are to be convinced of the value of using ICT like projectors in their teaching, their training should focus on the pedagogical issues. The results of the research by Cox(2019)showed that after teachers had attended professional development courses in ICT they still did not know how to use ICT in their classrooms; instead they just knew how to run a computer and set up but don't know how to use a projector. They explained that this is because the courses only focused on teachers acquiring basic ICT skills and did not often teach teachers how to develop the pedagogical aspects of ICT. In line with the research by (Liu and Cheng 2015),indicated that inappropriate teacher training is not helping teachers to use ICT tools like projectors in their classrooms and in preparing lessons. They assert that this is because training programs do not focus on teachers' pedagogical practices in relation to ICT but on developing ICT skills.

Fundamentally, when there are new tools and approaches to teaching, teacher training is essential Shabiralyani (2015) if they are to integrate these into their teaching. However, according to Balanskat (2018), inadequate or inappropriate training leads to teachers being neither sufficiently prepared nor sufficiently confident to carry out full integration of ICT tools like computers and projectors in the classroom. Newhouse (2018) stated "teachers need to not only be computer literate but they also need to develop skills in integrating computer use into their teaching/learning programmes".

Several recent studies indicate that many teachers have competence and confidence in using projectors in the classroom, but they still make little use of technologies because they lack the time. A significant number of researchers identified time limitations and the difficulty in scheduling enough computer time for classes as a barrier to teachers' use of ICT in their teaching(Shah 2020). According to Silicia (2020), the most common challenge reported by all the teachers was the lack of time they had to plan technology lessons, explore the different Internet sites, or look at various aspects of educational software.

Becta's study (2014) found that the problem of lack of time exists for teachers in many aspects of their work as it affects their ability to complete tasks, with some of the participant teachers specifically stating which aspects of ICT require more time. These include the time needed to locate power points, prepare lessons, explore and practise using the technology, deal with technical problems, and receive adequate training.

2.8 Addressing Challenges When Using Projectors

There are a few different approaches that can be taken to solve the issues that students and teachers encounter while utilizing projectors in the context of Physics instruction. Among these include the provision of suitable infrastructure, such as dependable energy and internet connectivity; the expansion of access to information and communications technology (ICT) tools; and the provision of training and support for educators (Can,Mugoni and Maphosa 2014). In addition, teachers can work together with their peers to build successful instructional strategies that make use of projectors, share successful teaching approaches, and discuss best practices.

In achieving the integration of ICT and technological solution, such as use of projectors the school leader must have a proper ICT school policy. The policy is a blue print for the school to design and manage ICT programme for teachers and students in a systematic and progressive manner. As suggested by (Bozzi, Raffaghelli, and Zani 2018), the school ICT policy should consist of objectives, rationale, curriculum audit and goals. The Education Technology Department also has to come out with a guide line of managing technology in schools and it should be an important reference to all school leaders.

The school leaders' command of technology is important. Leaders who are computer literate are more aware of his staff member's needs. Learning the basics of connecting devices like projectors, computer word processing, spreadsheets, presentation software, using web page and the Internet are prerequisite to boost their computer skills. Leaders can form a collaborative network and seek knowledge and training from State Education Resource Centre. In order to stay ahead and becoming a competitive person, keeping abreast with the latest technology such as wireless technology and so forth are pertinent for the school leaders. With the vast amount of information and materials around will leave the school leaders nothing less than being a well-informed technology person who will equip the teachers.

In implementing technology successfully, all staff should be encouraged to participate in the implementation process(Ahmad 2016). Early and extensive participation in a change should be part of the implementation. Participation gives those involved a sense of control over the change activity. All teachers should be encouraged to share their technical and pedagogical methods and working in teams in integrating projectors and other ICT devices into teaching and learning.

Having a clear vision for technology is essential in order to make wise decision in integrating and managing ICT in schools. In gaining ICT expertise and fund raising, leaders can foster smart partnership with the community, public and corporate sector. Resourceful leaders should explore many avenues for acquiring technology resources in order to increase accessibility and equity of ICT among the students.

Planning a Training Programme for Teachers is a significant move to ensure the effectiveness of use of ICT tools. In planning for an ICT training programme for teachers, the first step is motivating them to learn new knowledge and gaining new skills and competencies. Evaluating and supervising ICT-using teacher in teaching and learning are significant roles that have to be played by the school leaders. These will ensure the skills and competencies of the teachers are met as have been targeted in the school's documented policy.

As the use of new technologies is increasing, the school should anticipate and prepare for an ongoing change. In doing so, leaders can exchange information with other schools, be it in pedagogical methods or managerial styles. They can benchmark schools that have good

reputation for having an established ICT system in teaching and learning or using ICT effectively in school management. This will broaden knowledge and ideas in integrating ICT in schools.

2.9 CHAPTER SUMMARY

This chapter was committed to exploring relevant studies to inform this research project. It adopted the concept of investigating the known in order to access the unknown information. This chapter took a consultative approach in order to draw from the expertise of the past and recent researchers by looking at their findings that are relevant to continuous assessment in the education sector. This review was intended to develop an informed background which forms a strong foundation on which the researcher will build up strategies to extract essential research information for the current study. The next chapter will look at the research methodology.

3 Chapter 3: Methodology

3.1 Introduction

This chapter describes the procedures that are to be followed in data collection. The following aspects are considered in this chapter: research paradigms, research design, sampling procedures, population and instrumentation. The researcher will focus on how the methods and instruments are used as well as their merits and demerits.

3.2 Research Design

The study focuses on a mixed Methodology research case study carried out at A- Level St David Girls High School Bonda. According to Gill (2019) a case study design gives a detailed analysis of a sample under study. When using the case study design the researcher obtained information from observations and compiled documents of the group under study**.** In carrying out the research the teacher used experimental research design which was used to answer effectiveness of projectors in the teaching and learning of A- level Physics. The experimental design enabled the teacher to meet the objectives of the study.

3.3 Research approach

The investigation was conducted using a mixed-methods research methodology, which included the gathering and examination of qualitative as well as quantitative data. This study adopted both qualitative and quantitative because it's an action research used to investigate how effective projectors are as an information and communication technology (ICT) tool in the teaching of A-Level Physics in Zimbabwe. The quantitative approach consisted of gathering information from students by having them write a pre-test and post-test. Highest marks and average marks of learners are used to reach a conclusion.

The tests were held to determine whether or not instructors felt that projectors improved the quality of their lessons. A more in-depth comprehension of the usefulness of projectors in the teaching of physics was made possible by the utilization of a research design that included the use of many approaches.

3.4 Participants

The participants in the study were A-level students and teachers of physics who were enrolled in at St David Girls High School Bonda. The school was chosen for the study because of its accessibility as well as staff's willingness to take part in the research. The population consist 530 students. Therefore, gathering information will be easier.

The qualitative method consisted of conducting semi-structured interviews with teachers in order to collect more in-depth information on their experiences and perceptions of using projectors.

3.5 Sampling procedures

The researcher used the 30 Form 5 physics class as the chosen sample since all the classes of *the* school could not be used due to limited time. In sampling the researcher will use stratified procedure to ensure that all sub-groups in the population are represented in a sample. This method allowed every member of the population to have an equal chance of being chosen to be in the sample. Tayloral (2017) states that random sampling restricts against selection bias and the results will apply to all pupils. The researcher carried out the research with 30 form 5 learners from the population by choosing them randomly. Learners were divided into three groups Group A (using the projectors and lab), Group B (using projectors only) and group C (using lab only). The researcher used random sampling because it is possible to estimate the sampling error because of the population size and sample which are known. The sample error is the discrepancy between a sample statistics and the population parameter. Every member in the group has an equal chance of being selected.

3.6 Research Instrumentation

The research used various instruments in collecting data. An instrument can be defined as any device for systematic collection of data. Instrumentation is the whole process of collecting data. The researcher used tests.

Tests

The researcher used tests as an instrument of collecting data. Two tests will be given to all groups, the pre-test and the post test. A test was used consisting of tasks that are used to enable the systematic observation and recording of behaviour that are selected to represent an individual so as to elicit light response. A test also requires pupils to answer some questions to check for one's knowledge or concept mastery. In this research tests are given to pupils. Therefore, a set of questions subjected to anybody for response. The researcher focuses on pre-test and post-test recording the results.

Pre –Test

A pre-test is given before the research is done in order to measure the samples present level of understanding. Group A, B and C sat for a pre-test and the results were recorded.

Post-Test

This is a test given after the research. Both groups wrote the same test and at the same time and the marks were recorded.

This instrument is effective in that through testing one's academic status and performance is easily deduced and analysed. This was important because the learner's work was receiving suitable help in terms of corrections, remediation or counselling if possible. Tests help pupils to evaluate themselves, and they can easily detect their strengths and weaknesses motivating them to work hard. Tests can also be used for streaming purpose. Tests are less expensive to administer and they give results or feedback quickly. Records are often available and relate information about each pupil and group for the study.

Observation.

Creswell (2017) states that observation is a research instrument that can provide first-hand information. According to him, rather relying on what the respondents say, the researcher is capable of getting first-hand information through observation of the situation or phenomenon under study. The main advantage is that the researcher is capable critically look deeply into the situation. In this study the researcher will observe the learning process in order to find the effectiveness of projectors in the teaching and learning of A- level Physics.

Interviews

Interviews were used in this study, although they cannot cover a large number of population therefore they need much time to carry them. The researcher favoured this type of information gathering because the respondents usually respond when confronted in person and this type of interviewing is not rigid but flexible and the interviewer has control and can also probe some more issues to get more detail. An interview guide was used to guide the researcher. This was done to ensure that there was uniformity in the type of questions the researcher was asking.

3.7 Data Collection Methods

The research used a couple of different approaches to collect data, including tests and semi structured interviews. Students were given tests. The student engagement, active learning, and the quality of instruction were some of the themes that were covered in the interviews and observations, which consisted semi structured questions transcribed. A more comprehensive understanding of the application of projectors in Physics classrooms was achieved through the utilization of both tests, observations and oral interviews.

3.8 Data Analysis

The information obtained from the interviews was evaluated using a method known as theme analysis. In order to obtain insight into the teachers' experiences and impressions of using projectors in their teaching, the themes that emerged from the interviews were recognized and coded, and patterns were found. This was done after the interviews were conducted. The utilization of quantitative and qualitative data analysis led to the development of a more in-depth comprehension of the value that projectors bring to the field of Physics instruction. The data collected from the tests written by learners was analysed and presented in tables, frequencies and

charts. This is where the researcher found the effectiveness of projectors in the teaching and learning of Physics at A- Level.

3.9 Ethical Considerations

Ethics or principles which are imposed by researchers upon themselves so as to clarify how they can conduct their professional duties as researchers. This is a code of conduct or a rule indicating what is right or wrong in the professional practice of a particular profession

Taylor (2017) defines ethics as Science of morality. Ethics are enforced to protect the research profession. Primarily ethical clearance will be obtained from the school head. The researcher will seek consent from all participants to be interviewed.

In this study, the researcher sought informed consent from the research. Kothhari (2014) avers that informed consent means that the research participants understand the research process and willingly agree to it. Participants were made aware that the purpose of the research is academic, and as such, their participation is voluntary. Thus, participation in the study was voluntary.

While Alkamel (2020) posits that the researcher has to protect the anonymity of the research participants and the confidentiality of their disclosure unless they consent to the release of personal information, Bozzi, Raffaghelli, and Zani (2018) postulate that anonymity requires the names or identities of the respondents should not be divulged. Therefore, the researcher conformed to these ethical considerations by assuring respondents that their names would not be published in the write-up but rather, pseudonyms were used.

3.10 Chapter Summary

This chapter looked at research design and research methods chosen. The researcher outlined the data collection producers, data analysis procedures, defined types of instruments used as well as giving advantages and disadvantages. An attempt to make sure that the information was collected in relation to the ethical considerations was provided. The coming section is going to focus on Data presentation and analysis.

4 CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter involves the presentation and interpretation of findings in relation to the study objectives and can be evidenced below. The semi-structured interviews, tests and observations were conducted with the learners and teachers. The findings were captured in written format.

4.2 Response Rate

All the targeted interviewees were interviewed and tests were administered as planned by the researcher. The researcher attributed the 90% response rate to the adequate time given to the participants to respond and the fact that they were booked in time Taylor (2017) acknowledges that scheduling time for participants well in advance helps to ensure that the researcher obtains a very high response rate.

4.3 Impact of projectors on student performance

The majority of respondents revealed that, projectors provide a comprehensive projection of visual aids such as diagrams, graphs, and animations in the classroom setting of Physics. One of the participants added that this create mental picture in the mind of the Physics learners. During interview the participants declares that projectors in the teaching of physics can improve students' levels of engagement, as well as their ability to learn key concepts and remember knowledge. I believe in the use of projectors in Physics because as learners are fully engaged and are able to reflect back what they learn even after a long period.

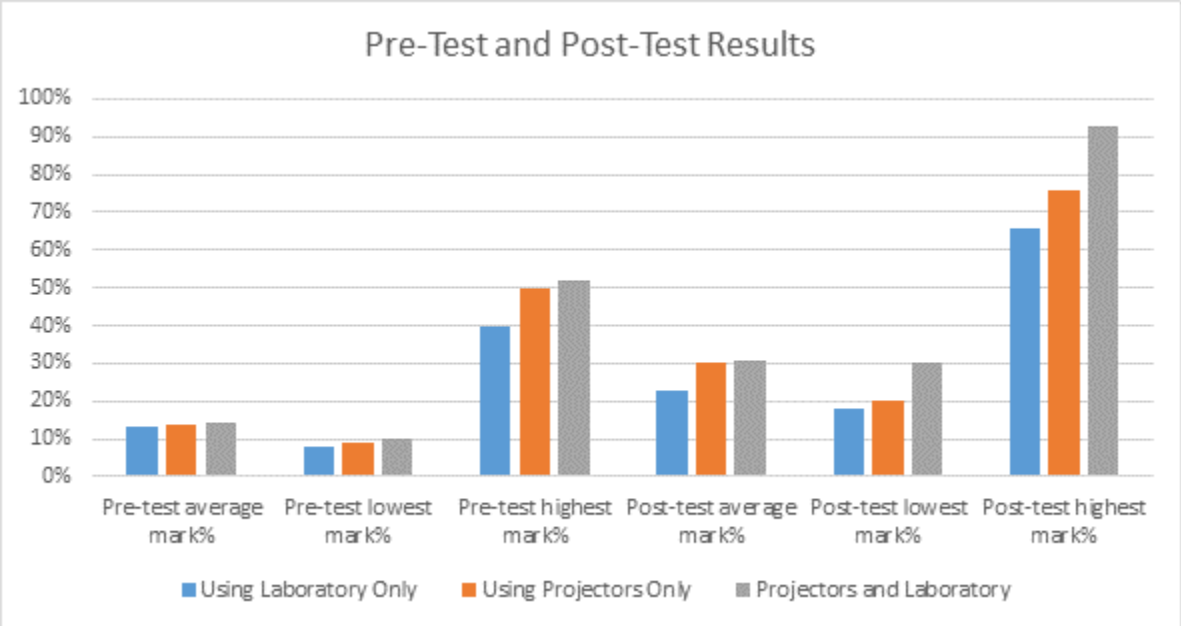
This finding is in agreement with Ndihokubwayo, Uwamahoro, and Ndayambaje (2020) who declares that projectors enhance the learning process to be more realistic and vivid as learners are fully engaged. This was also supported from what the researcher observed from the learning process as learners where fully engaged and learners perform better when using projectors in the laboratory. The results from observations are presented in Table 4.1;

Table 4.1: Pre-test and post test results

	Pre-test mark (%)			Post-test mark (%)		
Group Description	Average	Lowest	Highest	Average	Lowest	Highest
Using Laboratory Only	13%	8%	40%	23%	18%	66%
Using Projectors Only	14%	9%	50%	30%	20%	76%
Projectors and Laboratory	14.2%	10%	52.1%	30.5%	30%	93%

The diagram above is showing average, lowest and percentage mark for the given test also shows that the use of projectors can improve students' performance as indicated in the table above. Those using projectors perform better as compared to lecture method. Therefore, there is need to use projectors in the teaching and learning of Physics. Lastly those who have access to Projectors as well as having laboratory perform better

4.2 The bar graph showing percentage pass rate of students



It is indicated that projectors are important in learning of Physics because it results in videos, images there are clearly shown thereby increasing students understanding. Therefore, there is need to use projectors in the learning of Physics.

The results from pre-test and post test administered to the learners shows that during the pre-test there was no much differences in terms of marks obtained. However, after the conditions were set and the learning process between the variable groups it is shown that the average mark for those learners with projectors and laboratory is higher than that of laboratory only. The present of projector therefore has an impact on the learner performance. This findings was supported by Azewei (2019) who states that projectors have the capability of displaying dynamic and interactive visual aids, which assist pupils in better comprehending difficult and abstract ideas. The researcher observed that the use of projector in physics teaching make sure genuine visual effort to the learners is enhanced.

During the interview with the Physics learners it was also revealed that, the use content related videos helps the students to comprehend the thoughts and get in the actual concept on that subject matter and the learners are capable of giving attention to the use of contextual experiments in the videos along with non-verbal characteristics of the experiments that assists them to have better understanding of the concept.

4.4 Improving the quality of teaching using projectors in A- Level Physics

During interview with most of the Physics learners, it was revealed that projectors allows students to understand the subject matter through visual imageries. The researcher observed that during the teaching and learning process learners enjoy seeing pictures and diagrams which they appreciate creating mental pictures. During focus group discussion with Physics learners it was revealed that learners are motivated by projectors as they provide them with real life experience through images, videos and audios. This findings is related to Shah (2020) who states that it permits the students to guess, assume and investigate the information of the subject matter allowing the experience to last long.

Some of the participants during the interview revealed that projectors are the best in creating curiosity. They added that it first activates the learners mind making it ready to learn and know

new knowledge. One of the participants also states that projectors create curiosity and saves time when giving a detailed lesson explanations and simplification of complex concepts.

If it is properly designed, skilfully produced and effectively used it has great influence on teaching & learning because it saves time, increase interest of us as the learners, we hold attention, receive clarified ideas, reinforce concepts, add tone and prove a point.

This finding is in agreement with Ojelade and Gbemisola (2022) who discussed about the benefits of using multimedia projector in teaching among learners. according to him, it creates curiosity for learning in the students, it is also save the time because it can give the detailed idea very much effectively and accurately, load of teacher is decreased, teacher can develop his/her personal knowledge, new varieties of experience for students, it makes learning very easy, it helps in concentrating the attention of students on the lesson. The researcher also observed this to be true as he observed that projector in the class allows teachers to deliver a topic not only verbally but also visually that is much supportive for the students to give more concentration in the class. Students are also able to discuss together between the verbal and non-verbal as well as theoretical and material issues. The observation check list is shown on Table 4.2;

TABLE: 4.3 Observation checklist

Observation area	Day 1	Day 2
Learner Participation when projectors is used	High participation most of the learners fully engaged	High learner participation.
Learner participation when projector is not used	Poor learner participation	Learners not fully engaged only few learners were showing much interest

The information from the table shows that during teaching and learning with projectors learners were fully engaged in both lessons while lessons without projectors learners were reluctant to participate in the learning process in both two lessons. This shows that projectors motivate

learners to participate and fully engage in the teaching and learning process of physics. This agrees with the findings from the interviews in which it was reflected that projectors helps to motivate learners to fully engage in the teaching and learning process of Physics. The researcher also observed that the results of exercises from different exercises written by learners after a lesson delivery with projectors were performed better than those when no projector was used. This agrees with the findings from the interviews in which it was reflected that projectors enables leaners to capture and master the concept.

4.5 Challenges faced when using projectors

Information obtained from interviews' shows that the respondents agree that non-use of projectors resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school but also due to other factors. The following are the responses given by the participants. There is no effective use of projectors in our school because of one a number of factors such as poor resource organization, poor quality hardware, inappropriate software, or lack of personal access by the teacher.

These barriers include insufficient unit of computers, insufficient peripherals, insufficient numbers of copies of software, and insufficient immediate Internet access. One of the top barriers to ICT use at Advanced Level Physics is lack of technical assistance in our schools thus hindering the effectiveness of projectors to improve physics pass rate. Technical faults might discourage the teachers from using projectors in their teaching because of the fear of equipment breaking down during a lesson.

There is no effective use of projectors in our school because of problems such as poor resource organization, poor quality hardware, inappropriate software, or lack of personal access for teacher to use these in the teaching and learning of physics. During our teaching training there were not enough training opportunities for teachers in using ICT tools like projectors in a classroom environment.

The table 4.4 below shows teachers percentage response about the causes of poor usage of ICT tools like projectors

Lack of technical support	Lack of training	Less time to use projector in lessons
70%	80%	40%

Table 4.4

Lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom and lack of training concerning technology use in specific subject areas like Physics is one of the stumbling blocks in using new technologies like projectors in classroom practice,70% of the respondent's states that due to lack of both good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the obstacles preventing them from using ICT. The findings are in line with Gomes (2016) who states that technical problems were found to be a major barrier for teachers. These technical barriers included waiting for websites to open, failing to connect to the Internet, printers not printing, malfunctioning computers, and teachers having to work on old computers. "Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity" 80% of the respondents' states that Lack of effective training is one of the stumbling block that hinders effective use of ICT tools like projectors to improve A Level Physics pass rate. They assert that this is because training programs do not focus on teachers' pedagogical practices in relation to ICT but on developing ICT skills. This is in line with Becta, Cox (2019) who states that providing pedagogical training for teachers, rather than simply training them to use ICT tools, is an important issue therefore if teachers are to be convinced of the value of using ICT in their teaching, their training should focus on the pedagogical issues.

Some respondents with 40% states that they have competence and confidence in using projectors in the classroom, but they still make little use of technologies because they lack the time. A significant number of respondents identified time limitations and the difficulty in scheduling enough computer time for classes as a barrier to teachers' use of projectors in their teaching. During interviews the respondents exposed that the problem of lack of time exists for teachers in many aspects of their work as it affects their ability to complete tasks, with some of the participant teachers specifically stating which aspects of projector require more time.

From the general response of the participants during the interview, it has to be noted that about 80 percent of the respondents believe that the greatest hurdle to effective integration of modern projectors in physics classes is connectivity issues due to such issues as load shedding. For example, one respondent complained of very slow internet services and power cuts.

About fifty percent of the respondents indicated that they experience difficulty understanding concepts when they are exclusively presented through new technology forms such as overhead projectors. In other words, the general response from the interview seems to suggest that learners still prefer new technology to be accompanied by explanations from their teacher. Again, this finding serves to strengthen the findings from the observations and teacher interview which exposed that the majority of respondents (80%) feel that a fine blend of ICT projectors and teacher explanations should be maintained for effective grasp of content and skills in A-level Physics to boost the pass rate.

4.6 strategies to improve the effectiveness of using projectors

The information obtained from teachers' interview exposed that there are a few different approaches that can be taken to solve the issues that students and teachers encounter while utilizing projectors in the context of physics instruction. The participants revealed that among these include the provision of suitable infrastructure, such as dependable energy and internet connectivity; the expansion of access to information and communications technology (ICT) tools; and the provision of training and support for educator. This finding was supported by Can,Mugoni and Maphosa (2014) who states that all the ground work must be put in place in order to ensure that ICT tools like projectors are effectively implemented . In addition, it was revealed that teachers can work together with their peers to build successful instructional strategies that make use of projectors, share successful teaching approaches, and discuss best practices.

One of the participants argue that in order to achieve the integration of ICT and technological solution, such as use of projectors the school leader must have a proper ICT school policy. The policy is a blue print for the school to design and manage ICT programme for teachers and students in a systematic and progressive manner. This finding is in line with Bozzi, Raffaghelli,

and Zani (2018), who states that the school ICT policy should consist of objectives, rationale, curriculum audit and goals.

Some of the participants revealed that the school leaders' command of technology is important because leaders who are computer literate are more aware of his staff member's needs. Learning the basics of connecting devices like projectors, computer word processing, spreadsheets, presentation software, using web page and the Internet are prerequisite to boost their computer skills. It was revealed that leaders can form a collaborative network and seek knowledge and training from teacher professional institutions or teacher capacity development as initiated by the second republic government of Zimbabwe. It was also revealed that having a clear vision for technology is essential in order to make wise decision in integrating and managing ICT in schools. The participants agreed that planning a Training Programme for Teachers is a significant move to ensure the effectiveness of use of ICT tools like projectors. In planning for an ICT training programme for teachers, the first step is motivating them to learn new knowledge and gaining new skills and competencies.

4.7 Chapter summary

This chapter has presented major findings as revealed by respondents of this study. Findings were presented in accordance with the study's specific objectives and aim. The chapter opens with response rate, followed with the information respondent's education level and working experience. This was then followed by answers from findings made using the interviews, observations and tests administered.

5 Chapter 5 Summary, Conclusions and recommendations

5.0 Introduction

From the findings of the study in the previous chapter, this chapter presents the summary, conclusions and it also puts forward recommendations that Government, educators and other important stakeholders can consider to maximise the use of projectors in the teaching and learning of Advanced Level Physics to improve learners pass rate.

5.1. Summary

The research looked for this study, the researcher delimited to investigate the effectiveness projectors in the teaching and learning of Physics at Advanced Level learners. The researcher decided to first find out what the related literature say about these research questions. In the literature review, it has been accumulated that projectors are essential in the teaching and learning. The methodology guiding the research was the mixed method.

Information obtained showed that computer applications and software such as Microsoft PowerPoint have assisted students to efficiently and effectively carry out their presentations using the projector, and also to be fully engaged. The study reveals that Information Communication Technology in the learning and teaching process of A- level Physics provide the tools to engage learners powerfully in their learning process. It greatly enhances the effectiveness of communication in the classroom making abstract concept more concrete.

The study revealed that the ICT tools like projectors can be used to support collaborative learning and distance learning through e-learning. This is a great benefit when looking at this covid19 era where lockdowns can be announced anytime yet disturbing the school calendar. ICT tools like projectors makes it easier for teachers to give learners notes and assignments and in return enables him to cover the syllabus more easily. The research discovered that using ICT in the teaching and learning of A- level physics makes it easier for teachers and leaners to cover up the syllabus. it was revealed that, if it is properly designed, skilfully produced and effectively used it has great influence on teaching and learning because it saves time, increase interest of the learners hold attention, clarify ideas, reinforce concepts, add tone and prove a point. In other

words, the Media helps in concept transfer. All these positives will lead to an improvement in the academic performance of A-level Physics students.

It was revealed that varied learning experiences and teaching methodologies can be employed when projectors are used in the classroom. Verbal exposition of concepts makes learning difficult particularly to those learners with challenged abilities and the instructional technology and media is an answer. ICT tools like projectors motivates learners and bring concept more clearly to learners and this brings higher academic performance in Physics. ICT motivates the learners to participate in the learning process. It stirs the learners and captures their attention. All learners are allowed to experience the real world of Physics around them using ICT projectors.

However, the study reveals that although there are many benefits of ICT tools like projectors in the teaching and learning of A-Level Physics, there are still stumbling blocks hindering maximisation of the positive impact of ICT which include Zimbabwe Electricity Supply Authority (ZESA) power cuts, lack of technical experience and knowledge among the teachers and shortage of ICT gadgets in some schools. The study reveals that factors such as poor resource organization, poor quality hardware, inappropriate software, or lack of personal access by the teachers and insufficient immediate Internet access. One of the top barriers to ICT use at Advanced Level Physics is lack of technical assistance in schools thus hindering the effectiveness of projectors to improve the teaching and learning process. Technical faults might discourage the teachers from using projectors in their teaching because of the fear of equipment breaking down during a lesson.

The study exposed that, during teaching training there were not enough training opportunities for teachers in using ICTs in a classroom environment. Lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom and lack of training concerning technology use in specific subject areas like Physics is one of the stumbling blocks in using new technologies in classroom practice at A- Level Physics

5.2. Conclusion

The study found out that varied learning experiences and teaching methodologies can be employed when projectors are used in the classroom. Learners perform better when using

projectors in laboratories in their learning process. Verbal exposition of concepts makes learning difficult particularly due to those learners with challenged abilities and the ICT instructional technology and media is an answer. Although there are numerous positive contributions of projectors in physics teaching and learning, there are stumbling blocks that hinder the effectiveness of projectors. Technical problems were found to be a major barrier for both teachers and learners. These technical barriers included waiting for websites to open, failing to connect to the Internet, projectors not working, malfunctioning computers, and teachers having to work on old computers. Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity

5.3 Recommendations.

In line with the afore mentioned findings, the researcher recommends the following

Teachers or educators to ensure that they integrate ICT tools like projectors in the teaching and learning processes at A-level Physics. The government and school administrators should collaborate and ensure that they provide ICT equipment in schools which runs from big computer gadgets and Internet services. Teachers should fuse ICT tools like projectors with explanations to ensure that learners capture the concept. Teacher training institutions should ensure that all teachers are equipped with ICT skills by making computer subject a compulsory subject. Schools should install solar power systems or use generators to mitigate the problems related to Zesa power cuts, of professional workshops should be deployed to ensure that all teachers are eye opened and encouraged to use ICT. Parents are encouraged to buy ICT gadgets for their children in schools to ensure that they flight with Morden teaching and learning processes.

5.4 Recommendations for further study

The researcher recommends other investigators to focus on the perception of teachers on the use of ICT in the teaching and learning of Physics**.**

REFERENCES

Agyei, Elizabeth Darko. (2021). “Enhancing Students ’ Learning of Physics Concepts with Simulation as an Instructional ICT Tool.”

Alkamel, Mohammed Abdulkareem. (2020). “Use of Information and Communication Technology (ICT) in a Literature Classroom.”

Amin, Md Ruhul, Mahedi Azim, Abul Kalam, and Md Abdus Salam.(2018).

Astuti, Irnin Agustina Dwi.(2021). “Flipped Classroom and Kahoot in Physics Learning: Improving Students’ Motivation Learning.” Miles, M. B., Huberman, A. M., and Saldana, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). Sage Publications. Al-Azawei, A., Alshammari, G., and Alkurdi, B. (2019). Bhattacharya, S. (2015). The use of multimedia in teaching physics. Journal of Education and Practice, 6(8), 106-115.

Deng, Q., Zhu, X., and Chen, S. (2018). The effect of ICT integration in physics instruction on students’ academic achievement and attitudes: A meta-analysis. Educational Research Review, 22, 27-38. doi: 10.1016/j.edurev.2017.11.003

Khalid, S., Mahmood, N., and Raza, S. (2018). Interactive whiteboard: A tool for physics teaching and learning. Journal of Education and Educational Development, 5(2), 150-170.

Liu, Y., Gao, Y., and Wang, S. (2019). The effect of multimedia-assisted instruction on physics learning outcomes and attitudes: A meta-analysis. Educational Research Review, 26, 140-149. doi: 10.1016/j.edurev.2019.02.002. Mtebe, J. S., and Raphael, C. (2013). Integration of ICT in education: Pedagogical implications. International Journal of Education and Development using ICT, 9(1), 112-124.

Mugoni, C., and Maphosa, C. (2013). Challenges facing the integration of ICT in teaching and learning of physics in secondary schools in Zimbabwe. Journal of Emerging Trends in Educational Research and Policy Studies, 4(1), 156-163.Munyoro, G., and Chikwature, E. (2017). Teachers' perceptions on the use of multimedia projectors for teaching science in Zimbabwean secondary schools: A case study. International Journal of Education and Development using ICT, 13(2), 99-113.Oluwadare, A. E. (2020).

Sibanda, N. (2016). Enhancing teaching and learning through multimedia: A case study of the use of projectors in a secondary school in Zimbabwe. Electronic Journal of e-Learning, 14(4), 238-246.

Al-Azawei, A., Parslow, P., Lundqvist, K. O., and Wills, G. (2019). Investigating the impact of using gamification on the students' engagement and motivation in learning.

Bhattacharya, S. (2015). Impact of ICT on teaching of physics in school level. Journal of Education and Practice, 6(20), 101-109.Chigona, A., and Chigona, W. A. (2016). Factors influencing ICT integration in teaching and learning in South African rural secondary schools. International Journal of Education and Development using Information and Communication Technology, 12(1), 56-75.Deng, Y., Li, M., and Liu, J. (2018). The impact of projector

Bozzi, Matteo, Juliana Raffaghelli, and Maurizio Zani. (2018).

Cano, Esteban Vázquez, M Luisa, and Sevillano García.(2013).

Liu, Li Ying, and Meng Tzu Cheng. (2015).

Ndihokubwayo, Kizito, Jean Uwamahoro, and Irénée Ndayambaje.(2020).

Ojelade, Adenike, and Aregbesola Busayo Gbemisola. (2022).

Ordu, Uchechi Bel-Ann. (2021). “The Role of Teaching and Learning Aids/Methods in a Changing World.” *Bulgarian Comparative Education Society (BCES)* 19: 210–16.

Shabiralyani, Ghulam, Khuram Shahzad Hasan, Naqvi Hamad, and Nadeem Iqbal.(2015).

Thamarana, Simhachalam. (2017).

Appendix A: Informed consent agreement form

I hereby agree to participate in research regarding…….

In giving my consent I state that:

- I understand the purpose of the study and what I will be asked to do.
- I understand that I am participating freely and without being forced.
- I understand that this is a research project whose purpose is not necessarily to benefit me personally the whole community.
- I have been informed about the nature of the research and the nature of my involvement.
- The researcher has answered any questions that I had about the study and I am happy with the responses.
- I understand that I can withdraw from the interview at any time and that this decision will not in any way affect me negatively.
- I understand that I may refuse to answer any questions I do not wish to answer.
- I understand that personal information about me that is collected over the course of this interview will be stored securely and will only be used for purposes that I have agreed to.
- I understand that information about me will only be told to the researcher's supervisor, and that my identity will not be referred to.
- I understand that the results of this study may be published, but these publications will not contain my name or any identifiable information about me.
- I consent to:

Signature of participant: ……..

Date: ……

AppendixB: Learners' questionnaires

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

My name is Mufumisi John registration number B1852441, Iam doing Bachelor of Science Education Honours Degree at Bindura University of Science Education. I am carrying out a research as part of the requirements of my Bachelor of Science Education Honours Degree in Physics. The study focus on effectiveness of projectors as ICT tool in the teaching and Learning of A –Level Physics Mutasa District. The main thrust of this questionnaire is to gather information. Your participation in this study is highly appreciated. Information provided will be treated with strict confidence.

Tick your answers in the box provided

1. Gender Female
2. Class A-Level

Appendix C: Teaching Methods

3. What are other information communication Technology tools used in teaching and learning of A-Level Physics?
    - **i.** ……..
    - **ii.** ……..
    - **iii.** ……..
    - **iv.** …….
    - **v.** ……
4. How effective are these projectors in teaching and learning of A-Level Physics?
    - i. ……
    - ii. ……
    - iii. ……
    - iv. ……
    - v. ……

Importance of projectors as information communication technology tool

5. How does the use of projectors in teaching benefit you as a student?
    - i. ……..
    - ii. ……..
    - iii. ……..
    - iv. ……..
    - v. …….

Challenges faced using projectors

6. What do you suggest should be done to reduce the challenges you mentioned above?
    - i. …….

ii. …….

iii. ……

iv. ……

v. ……

Appendix D: Teacher's questionnaires

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

My name is Mufumisi John, student number B182441, a Bachelor of Science Education Honours Degree student at Bindura University of Science Education. I am carrying out a research as part of the requirements of my Bachelor of Science Education Honours Degree in Physics. The study investigates The effectiveness of using projectors as ICT tool in the teaching and learning of A-Level Physics in Mutasa District. The main thrust of this questionnaire is to gather information on advantages, challenges faced by teachers and strategies to be adopted to improve learning via ICT tools like projectors. Your participation in this study is highly appreciated. Information provided will be treated with strict confidence. Thank you very much in advance for your valued responses and time you spare to answer these questions

Age…… Sex…….

1. Are the Physics learners able to use projectors as information communication technology tool in the teaching and learning of A–Level Physics? Yes…….No……..
   ……
   ……

……

……

……

2. How often do you use projectors as the teaching ICT tool in A-Level?

   ……..

3. What are other online teaching tools do you use?

   ……

   ……

   ……

   ……

   ……..

4. What are the benefits of using the projectors as information and communication technology in teaching of A-Level Physics?

   ……

   ……

   ……

   ……

   ……

   ……..

5. What do you think are the challenges we may face that disturb the use of projectors in teaching?

   ……

   ……

   ……

   ……

   ……

   …….

6. What should be done to minimise the challenges you have mentioned above?

   ……

   ……

   ……

   ……

……
……

Appendix E: Interview guide for teachers

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

My name is Mufumisi John, student number B1852441, a Bachelor of Science Education Honours Degree student at Bindura University of Science Education. I am carrying out a research as part of the requirements of my Bachelor of Science Education Honours Degree in Physics. The study investigates the effectiveness of using projectors as information communication tool in Mutasa District.

I would like to ask on how effective are the projectors in A-Level Physics.

The interview is going to take about 8 minutes. Are you available to respond to some of the questions at this time?

Questions

1. What is your level of education (highest qualification)?
   Diploma Bachelor's Degree Master's Degree other
2. How many years have you been serving as a Physics teacher?
   Five years or less more than 7 years.
3. How often do you use projectors as ICT tool in the teaching and learning of Physics?
4. What are other online teaching methods do you use?
5. What are the benefits of using Projectors as information communication tool in Teaching of A-Level Physics?

Appendix F: Observation guide for Physics student who are taught

Topic: An investigation into effectiveness of using projectors in the teaching and learning of A-Level Physics in Mutasa District.

Issues to be observed	Comments
Individual participation in using projectors	
Organisation of the learners	
Type of language used during learning	

Appendix G percentage of teachers' response

The table 4.4 below shows teachers percentage response about the causes of poor usage of ICT tools like projectors

Lack of technical support	Lack of training	Less time to use projector in lessons
70%	80%	40%

List of Tables

table 4.1---------- ------25

table 4.2---------- ----25

table 4.3---------- --27

table 4.4----------29