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EXPLORING E-LEARNING IN ZIMBABWEAN PHYSICS EDUCATION:
CHALLENGES AND OPPORTUNITIES. CASE STUDY OF HOKODZI
SECONDARY SCHOOL IN MUREWA DISTRICT, MASHONALAND EAST,
ZIMBABWE.

BY

OLSON MATUNGA

B12 33383

IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF A BACHELOR OF
SCIENCE EDUCATION HONOURS DEGREE IN (PHYSICS)

SUPERVISOR: MR. MANYEREDZI

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APPROVAL FORM

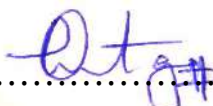
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“Exploring E-learning in Zimbabwean Physics education: Challenges and Opportunities. Case study of Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe”

Submitted by Olson Matunga B12 33383

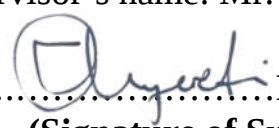
In partial fulfilment of the requirements of Bachelor of Science Education Honours
Degree in Physics.

Student’s Name: OLSON MATUNGA

Signature..........Date....16/10/2024.....

(Researcher)

Supervisor’s name: Mr. MANYEREDZI

Signature..........Date...16/10/2024.....
(Signature of Supervisor)

Signature..... Date.....
(Project Coordinator)

Signature..........Date...16/10/2024.....
(Faculty Chairperson)

DECLARATION

I, Olson Matunga, declare that this thesis is my own unaided work. It is being submitted in the fulfilment of requirements of the Bachelor of Science Education Honours Degree in Physics (HBSc Ed. Phy.) at Bindura University of Science Education (BUSE).

Student's Signature.....

NameOlson Matunga.....

Date.....16/10/2024.....

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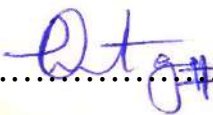
Name of Author: OLSON MATUNGA

Dissertation Title: Exploring E-learning in Zimbabwean Physics education: Challenges and Opportunities. Case study of Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe.

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Date.....16/10/2024.....

Signed..........

Permanent Address: House Number 5, Sable Close, Borrowdale West, Harare

DEDICATION

This research is dedicated to my late Mother, Mary (Maggi) Matunga nee Gambarara.
She encouraged me to be where I am today.

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First and foremost I would want to give much thanks to my supervisor, Mr T. Manyeredzi for the dedication, patience and long suffering he endured to make this production a reality. It wasn't easy but you remained steadfast and dedicated to the task at hand.

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To the people who contributed to the fulfilment of this dissertation, I thank you.

I thank God for making this dream a reality even under very difficult circumstances. To him goes all the Glory and Praises.

ABSTRACT

This study explored e-learning in Physics Education in Zimbabwean secondary schools, investigating challenges and opportunities. A mixed-methods approach was used, combining both qualitative and quantitative data. The study found that while e-learning has the potential to enhance physics education, various challenges hinder its effective implementation. These challenges include limited access to computers and internet, outdated hardware and software, lack of digital literacy skills among teachers and students, and inadequate training and support for teachers. The study also identified opportunities for e-learning in physics education, such as improved access to digital resources, enhanced student engagement, and personalized learning. The findings suggest that addressing the challenges and harnessing the opportunities of e-learning can improve physics education outcomes in Zimbabwean Secondary Schools. The study recommends that the government, educational institutions, teachers, and students work together to develop and implement effective e-learning strategies, provide training and support for teachers, and improve access to digital resources and infrastructure. The study contributes to the existing body of knowledge on e-learning in physics education and highlights areas for further research.

Keywords: e-learning, physics education, Zimbabwean secondary schools, challenges, opportunities, digital literacy, teacher training, infrastructure, access.

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ACCRONYMS

ICT.....	Information and Communication Technology
MOPSE.....	Ministry of Primary and Secondary Education
MOHTE.....	Ministry of Higher and Tertiary Education
SIG.....	School Improvement Grant
BSPZ.....	Better Schools Programme of Zimbabwe
MDG.....	Millennium Development Goal
LMS.....	Learning Management Systems
TUETSE.....	Teacher's Use of E-learning Tools in Secondary Education

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

The study was investigating the challenges and opportunities of e-learning tools in physics education in Zimbabwean Secondary Schools, case study of Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe as well as suggesting ameliorative strategies. Preliminary to other parts of this study, this chapter discussed the background of the study, and the statement of the problem that led to this study. In addition, the chapter also outlines the research aim and research objectives, significance of the study, assumptions, delimitations, and summary.

1.2 Background of the Study

In education today, as it was in years past and surely in years to come, challenges affecting the teachers' use of ICTs, particularly e-learning tools, were and will be an overwhelming epidemic, unless strategies to overcome them are unravelled. Teachers are faced daily with the prospect of having to resort to the traditional way of teaching due to a number of challenges they face during integration of e-learning tools into Physics education.

With the rising costs of procuring basic textbooks and other teaching and learning resources, there is hope that internet-based resources could be the panacea to the problem. Most subjects, Physics included, in Zimbabwean school have been affected by the shortages resulting in alarming failure rates in these subjects. Baylor and Richie (2002) in (Bukaliya & Jura, 2021) argue that the use of internet in class teachers and learners has an impact on students' content acquisition and class performance. Hungwe (2012) in (Bukaliya & Jura, 2021) also adds that in Africa the use of educational electronic resources has been embraced with the aim of enabling learners to think creatively, solve problems, communicate effectively, identify, and analyse existing information.

The Ministry of Primary and Secondary Education (MOPSE), in Zimbabwe, requires the student to textbook ratio be 1:1 but situation on the ground depicts a gloomy picture where there is shortage of textbooks most schools, particularly the public schools. There is thus, need to solve the problem so that there is effective teaching and learning. The government of Zimbabwe introduced School Improvement Grant (SIG) and Better Schools Programme of Zimbabwe (BSPZ) to address

textbook problems. Even United Nations Children Education Fund donated textbooks in 2012 but the limitations still exist. To empower learners with the use of e-resources, the government of Zimbabwe embarked on a massive drive to turn around the education sector by donating computers to many schools around the country and to train teachers on computer usage as well as introducing the updated curriculum. The implementation of the updated curriculum has brought many changes and is encouraging the use of information communication technology (ICT).

Innovation and implementations of e-resources in the classrooms tend to be accompanied by number of myths that have crept into folklore and belief systems noted by Sib Thorpe and Souttr (2011) in (Bukaliya & Jura, 2021). This is so in the political arena because new technologies when first introduced bring mixed feelings of fear anxiety and frustration. One of the Millennium Development Goals (MDGs) highlighted by United Nations in 2000 is the importance of using internet as an educational tool. Higgins, Xiao and Katsipataki (2012) in (Bukaliya & Jura, 2021) posits that technology in the 21st century is a necessity such that any person who fails to learn and adapt to the rules of survival in the current environment risk facing the challenge of extinction Hungwe (2012) in (Bukaliya & Jura, 2021). Though most high schools are lagging in use of e-learning tools, the proliferation of technologies has seen several schools adopting the use of e-learning tools in conjunction with the internet.

The effective implementation of the updated new curriculum using e-learning tools in Physics education has the capacity to enhance academic achievement among learners through collaboration, improved communication and sharing information. However, Kadzera (2006) in (Bukaliya & Jura, 2021) contends that the availability of the e-resources and internet tools does not mean that effective learning will take place. In addition to availability of these tools, learning also depends on the situation, the users` creativity and attitude, Smith & Nigel (2009) in (Bukaliya & Jura, 2021).

(Fredrick & Elijah, 2022), suggest that e-learning can be simultaneously presented online to students in both immediate locations (Classroom Model of e-learning) and in various geographical distances (Distance Education model of e-learning), but there is need to consider teachers as they play a pivotal role in the teaching and learning paradigm. (Hennessy, et al., 2022), has confirmed that in other parts of the world, secondary schools are expanding current online offerings and creating new platforms to address growing enrollment. (Mulyanengsih & Wibowo, 2021), purports

that there are recommendations regarding the use of e-learning in classroom learning as listed below:

- E-learning can able to meet the diverse needs of students, so that the nature of student-centred science learning can run well.
- the ease of using e-learning can increase students' motivation and learning activities

(Saraswati, et al., 2018), is of the view that research is still rare to measure the effect of e-learning on 21st century skills, especially regarding scientific literacy. Therefore, further research is expected to be able to test the effectiveness and influence of the application of e-learning on students' scientific literacy skills.

Since the introduction of ICTs in education, the most discussed question has been its impact on educational outcomes. This explains why almost all existing data on how e-learning tools is used in education might have been derived from sample based international comparative assessment that rely on students, teachers, and schools for descriptions and analysis of educational inputs, processes and outcomes without mainly concentrating on the challenges affecting the teacher on use of e-learning tools even in general, as teachers play a pivotal role in the process of teaching and learning, (Drent & Meelissen, 2019). The act of integrating the use of e-learning tools into teaching and learning is a complex process and one may encounter a number of difficulties. Therefore, it is from this background that this study seeks to analyse the factors affecting the teacher's use of e-learning tools in the teaching and learning of Physics in some selected schools in Murewa District, Mashonaland East Province, Zimbabwe.

1.3 Statement of the problem

Physics is among the three science subjects offered at the secondary school level in Zimbabwe. It is an undeniable fact that the knowledge obtained from Physics can be applied in any technological and engineering work making its role in a developing country like Zimbabwe quite substantial and critical. Students have interest and get motivated when they learn concepts that make them link classroom experiences with real life experiences that is, outside the classroom environment, (Elici, 2016). In this regard, advancements in technology such as e-learning tools can be leveraged to support these learners. The benefits of using e-learning tools in teaching Physics include incorporating text with activity explanation, use of virtual experiments, enhance interactive

learning, use of models to describe and simulate phenomena and graphical representation of real time data.

Notably, teachers employ teaching and learning methods that have majorly resulted in poor performance in Physics as a result making the subject to be disliked by a majority of students in secondary schools as compared to other science subjects. Therefore, this paper, explores the need to enhance learning of Physics in secondary schools by adapting a new paradigm of learner-centred teaching methodologies and do away with the traditional teacher-centred methods. This approach will break down the perception of difficulty and abstractness of some topics in Physics and bridge the gap and the mismatch that exists between the teacher's point of view and the learners' perspective.

All in all, despite efforts that are being made by the Ministry of Primary and Secondary Education (MOPSE) and Higher and Tertiary Education (MOHTE), government and non-governmental organizations to mitigate or reduce the challenges affecting the teacher's use of e-learning tools in secondary education in general, these challenges continue to rise at an alarming rate. However, there is not enough information, suggestions or solutions to these challenges, this research study serves to investigate these challenges in a bid to assist the target group (Zimbabwean Secondary School Physics teachers and learners) and other victims of these challenges in a more localized and practical way.

1.4 Research aim

The purpose of the study is to investigate challenges and opportunities of e-learning tool in Physics Education in Zimbabwean Secondary Schools, suggesting respective strategies to solve these challenges.

1.5 Research objectives

This study objects to:

- explain the importance of e-learning tools in Physics education,
- identify challenges faced by secondary school Physics teachers in using e-learning tools,
- determine the extent to which secondary school Physics teachers use the available e-learning tools in teaching and learning,
- Suggest alternative strategies for enhancing and improving the effective use of e-learning tools in Physics education by Zimbabwean secondary school teachers.

1.6 Significance of the study

The study is of significance to the field of education and technology as it expands the e-learning tools knowledge base as well as baring innovative strategies for the effective use of e-learning tools in the teaching and learning of Physics in Zimbabwean secondary schools. The concept of e-learning as a pedagogical tool is new to most teachers and students in Zimbabwe, (Guzel, 2016). The findings of this research study have the following benefits: Firstly, the findings of this study will impact the way e-learning tools are used as pedagogical tools in Zimbabwean Secondary Schools. Therefore, the study is significant to Physics educators who want to learn more about the use of e-learning tools. Secondly, the findings of the study are expected to create awareness among Physics teachers on the importance of e-learning tools as instructional tools and change attitudes and practices by improving their professional practices in teaching Physics. Thirdly, the findings will add new knowledge to the existing literature in Zimbabwe, for the benefit of teachers, learners and all stakeholders. Fourthly, the findings of this study will serve as reference points for educational stakeholders in other parts of the world that would lead to improvement of provisions of education among secondary school teachers.

1.7 Delimitations of the study

The research is delimited to a secondary school in Murewa District, in Mashonaland East, Zimbabwe. Perceptions from other stakeholders like parents, school heads and other stakeholders will be accepted in the study. To add on, this study will be conducted on a small geographical area as a case study, hence a smaller sample.

1.8 Limitations of the study

According to (Chari & Madondo, 2021), limitations are constraints which might hinder effectiveness and efficiency of the study. In carrying out this study, unwillingness of respondents to give full information regarding the issue under study was experienced. However, this was overcome by clarification to people on the purpose of the study and giving them assurance that the information collected will strictly be used for academic purpose only and will be treated with confidentiality.

1.9 Organisation of the study

Chapter one provided the background of the study, statement of the problem, the objectives of the study, the research aim, significance of the study, the research assumptions, limitations of the study, delimitations of the study, definitions of terms and chapter organization of study or chapter layout. Chapter two- (Literature review) will review and analyse literature on challenges of using e-learning as an instructional tool in Physics teaching from general to specific, regionally and internationally, then create a research gap for this study. The literature review will be based on both empirical and theoretical evidence. Chapter three- (Research methodology) will discuss the methodology that will be employed in the research. It will outline the research design, the sampling procedure, target respondents and data gathering instruments to be used. The strengths and weaknesses of each of the methods used to gather data will also be discussed. Chapter four- (Data analysis and presentation) will be concerned with analysing the data obtained from data sources. The main findings of the study will be analysed and presented diagrammatically for ease of assessment. Chapter five- (Research findings, conclusion and recommendations) will provide the summary of the major research findings, conclusions and recommendations.

1.10 Summary

This chapter serves as an introduction to the topic in question, and also serves to reveal the purpose of the study, which is to investigate challenges hindering the full-scale adoption and utilisation of e-learning tool in Physics Education in Zimbabwean Secondary Schools. In light of the aim of the study, the chapter discussed the background of the study from which the study is based on, the statement of the problem that led to this study, research aim, and objectives which forms the steps taken to achieve the aim. The chapter also outlined how the study is of significance and to whom. Assumptions, limitations and organisation of the study were also outlined, as well as the delimitations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The chapter serves to unveil the challenges faced by Physics teachers in their efforts to use e-learning tools in Physics education, the extent to which e-learning tools are being used for Physics teaching and learning. Alternative strategies that can be put in place for the improvement of the effective use of e-learning tools in Physics teaching and learning are also bared in this chapter.

2.2 E-learning in education

E-learning, or electronic learning, refers to the use of digital technologies to deliver educational content, facilitate learning experiences, and support communication and collaboration in various educational settings, (Bukaliya & Jura, 2021). It encompasses a wide range of electronic tools, platforms, and resources designed to enhance teaching and learning outcomes. Here are some key aspects of e-learning in education:

E-learning offers flexibility in terms of time, location, and pace of learning, (Dabbagh & Kitsantas, 2017). This flexibility enhances accessibility, particularly for students with diverse learning needs or those unable to attend traditional in-person classes. (Cifuentes & Murphy, 2017; Wong & Chan, 2020), posits that e-learning encompasses a variety of learning modalities, including multimedia presentations, interactive simulations, virtual laboratories, online discussions, and collaborative projects. These diverse formats cater to different learning styles and preferences, allowing learners to engage with content in ways that resonate with them and promote deeper understanding.

To add on, (Albirini, 2016) postulates that e-learning platforms often incorporate features such as adaptive learning algorithms, personalized feedback mechanisms, and customizable content repositories. These tools enable educators to tailor instruction to individual learners' needs, interests, and proficiency levels, fostering personalized learning experiences that support student engagement and achievement. Moreover, e-learning extends beyond traditional classroom settings to encompass lifelong learning opportunities for learners of all ages and backgrounds, (Taghavi & Knezek, 2017). Whether pursuing formal education, professional development, or personal interests, individuals can access a wealth of online resources, courses, and learning communities to continually enhance their knowledge and skills.

Overall, e-learning plays a pivotal role in transforming education by harnessing the power of technology to enhance teaching and learning processes, expand access to education, and empower learners to achieve their full potential in a rapidly evolving digital world

2.3 The use of e-learning in education

E-learning offers numerous advantages, including:

Accessibility: Learners can access educational materials from anywhere with an internet connection, breaking down geographical barriers, (Fredrick & Elijah, 2022). Flexibility: E-learning allows learners to study at their own pace and on their own schedule, accommodating various learning styles and preferences. Cost-effectiveness: E-learning eliminates the need for travel, printed materials, and physical facilities, reducing costs for both learners and educational institutions. Scalability: E-learning can easily accommodate large numbers of learners without significant infrastructure expansion, making it ideal for organizations with growing or fluctuating training needs, (Dabbagh & Kitsantas, 2017). Personalization: Adaptive learning technologies can tailor course content and delivery methods to individual learners, maximizing engagement and effectiveness.

Convenience: Learners can access e-learning materials on demand, fitting their studies around work, family, and other commitments, (Dutta & Bilbao-Osario, 2019). Consistency: E-learning ensures uniformity in content delivery and assessment, reducing variations in learning outcomes across different instructors or locations. Environmental sustainability: By reducing the need for printed materials and travel, e-learning helps minimize carbon emissions and environmental impact, (Ghavifekr, Kunjappan, Logeswary, & Antony, 2016). Interactivity: E-learning platforms often incorporate multimedia elements, interactive quizzes, and collaborative tools, enhancing learner engagement and retention. Real-time feedback: E-learning platforms can provide immediate feedback on quizzes and assessments, enabling learners to track their progress and address areas for improvement promptly, (Al-Zahrani, 2015). Overall, e-learning offers a versatile and efficient approach to education and training, empowering learners to acquire new skills and knowledge conveniently and effectively.

While e-learning has many advantages, it also comes with some challenges and disadvantages:

Lack of face-to-face interaction: E-learning often lacks the personal interaction between instructors and learners, which can lead to feelings of isolation and reduced motivation, especially for those who thrive in a traditional classroom setting, (Guzel, 2016). Technical issues: Access to

technology and internet connectivity can be unreliable, particularly in areas with limited infrastructure or resources, (Renuka & Loganathan, 2018). Technical problems such as server crashes or software glitches can disrupt learning activities.

Self-discipline and motivation: E-learning requires strong self-discipline and motivation from learners to stay on track with their studies, (Mohammed Sani & Ghavifekr, 2015). Without the structure and accountability of traditional classroom settings, some learners may struggle to maintain focus and engagement. Limited social interaction: E-learning typically involves less social interaction and collaboration with peers compared to traditional classroom settings. This can hinder the development of interpersonal skills and the exchange of ideas and perspectives.

Accessibility barriers: Not all learners have equal access to e-learning resources, particularly those from disadvantaged backgrounds or with disabilities, (Dutta & Bilbao-Osario, 2019). Issues such as language barriers, lack of assistive technologies, or digital literacy skills can hinder participation and success. Quality concerns: The quality of e-learning materials and instruction can vary widely. Some online courses may lack rigor, credibility, or relevance, leading to subpar learning experiences and outcomes. Isolation and disengagement: Without the physical presence of classmates and instructors, learners may feel isolated and disengaged from the learning process, (Albirini, 2016). This can impact motivation, retention, and overall satisfaction with the learning experience.

Over-reliance on technology: E-learning relies heavily on technology, which can be prone to malfunctions, cybersecurity threats, and data privacy concerns, (Dabbagh & Kitsantas, 2017). Over-reliance on digital platforms may also lead to dependence and decreased resilience in the face of technological disruptions. Limited hands-on learning: Certain subjects or skills, such as those requiring hands-on practice or laboratory work, may be challenging to teach effectively through e-learning alone, (Taghavi & Knezek, 2017). Lack of access to physical resources and equipment can hinder experiential learning opportunities. Cultural and language barriers: E-learning materials and instructional methods may not always be culturally sensitive or inclusive, leading to barriers for learners from diverse cultural backgrounds or non-native speakers of the language of instruction, (Taghavi & Knezek, 2017). Despite these challenges, e-learning continues to evolve and improve, with ongoing efforts to address these disadvantages and enhance the effectiveness and accessibility of online education.

2.4 Teachers experiences using e-learning tools in physics education

Integrating ICTs into teaching and learning is a complex process and one that may encounter a number of difficulties. These difficulties are known as “challenges” (Ghavifekr, Kunjappan, Logeswary, & Antony, 2016). A challenge is defined as “any condition that makes it difficult to make progress or to achieve an objective” as cited in (Mohammed Sani & Ghavifekr, 2015). The following are some of the key challenges that have been identified in the literature regarding teachers’ use of ICT tools, particularly, e-learning tools in Physics education.

Research studies in the past have concluded that Physics teachers in developing and developed countries face several challenges when integrating e-learning tools into secondary education. These challenges often stem from limitations in infrastructure, resources, teacher training, and student engagement. In this study, the factors affecting the full scale adoption of e-learning tools have been categorized in terms of infrastructural, technical competence and attitudinal challenges:

2.5 Experiences of using e-learning tools in developed countries

Access to technology, ensuring equity and inclusion amongst others, are experiences of using e-learning tools in Physics teaching and learning.

2.5.1 Access to technology

While developed countries generally have better access to technology and internet connectivity, disparities still exist, particularly in rural or underserved areas. Some students may lack access to devices or reliable internet connections, limiting their ability to participate in e-learning activities, (Al-Zahrani, 2015).

2.5.2 Digital divide among students

Even in developed countries, there are disparities in access to technology among students. Teachers may need to accommodate varying levels of digital literacy and provide additional support to students who are less familiar with e-learning tools, (Taghavi & Knezek, 2017).

2.5.3 Maintaining engagement:

Keeping students engaged in online learning can be difficult, especially for younger learners or those with shorter attention spans, (Renuka & Loganathan, 2018). Teachers must employ creative strategies to maintain student interest and participation in e-learning activities

2.5.4 Ensuring equity and inclusion:

E-learning tools may inadvertently exacerbate existing inequalities among students, such as those related to socioeconomic status, disability, or language proficiency, (Guzel, 2016). Teachers need to be mindful of these disparities and ensure that all students have equal opportunities to succeed in online learning environments.

2.5.5 Assessment and feedback:

Assessing student learning and providing timely feedback can be more challenging in e-learning environments, (Fredrick & Elijah, 2022). Teachers may need to explore alternative assessment methods and leverage technology to facilitate efficient grading and feedback processes.

2.5.6 Data privacy and security:

Teachers must adhere to strict data privacy regulations when using e-learning tools, particularly when collecting and storing student data online, (Al-Zahrani, 2015). They need to be aware of potential security risks and take appropriate measures to safeguard sensitive information.

2.5.7 Professional development:

Keeping up with advancements in e-learning technology and pedagogy requires ongoing professional development for teachers, (Cifuentes & Murphy, 2017). They may need access to training opportunities and resources to enhance their skills in using e-learning tools effectively.

2.5.8 Balancing workload:

Integrating e-learning tools into teaching practices can add to teachers' workload, particularly during the initial transition period, (Dabbagh & Kitsantas, 2017). They may need support from administrators and colleagues to manage their workload effectively while implementing new technologies. Addressing these challenges requires collaboration among teachers, administrators,

policymakers, and technology providers to ensure that e-learning tools are effectively implemented and support student learning in developed countries.

2.6 Experiences of using e-learning tools in developing countries

As educational institutions embrace digital platforms and online resources to enhance teaching and learning experiences, they encounter various obstacles that require careful navigation and consideration

2.6.1 Infrastructural Challenges

Like in all underdeveloped countries, ICT projects have been hampered by infrastructural challenges. For instance lack of electricity, lack of necessary devices like computers to facilitate continuous access to e-learning, higher internet costs and its unavailability, lack of space for establishment of e-learning centres among others. According to (Habbler, Major, & Hennessy, 2016), Infrastructure like the availability of electricity, computers and the Internet is not yet fully in place to enhance the e- learning projects. (Renuka & Loganathan, 2018), asserts that the developing countries mainly face obstacles in infrastructure, resources, information access. A collection of such infrastructural problems have negatively affected the teacher's use of e-learning tools in underdeveloped countries. Power outages, unreliable internet connectivity, and lack of proper facilities can hinder the effective use of e-learning tools, (Ghavifekr, Kunjappan, Logeswary, & Antony, 2016). In a nut shell, many schools in developing countries lack sufficient access to computers, internet connectivity, and other necessary technological resources. This limits the implementation of e-learning tools.

2.6.2 Technical support

Technical support presents a significant challenge in utilizing e-learning tools for physics education in several ways. Amongst many of technical challenges, infrastructure maintenance, software integration and hardware compatibility.

Infrastructure Maintenance is of great importance during integration of e-learning tools into education. (Chari & Madondo, 2021), supports the notion when they say, E-learning tools often require robust infrastructure, including hardware, software, and networking equipment. Technical

support is essential for maintaining and troubleshooting these components to ensure uninterrupted access to educational resources.

To add on, software integration is relevant during e-learning integration into Physics teaching and learning. Physics teachers may encounter difficulties in integrating e-learning software with existing learning management systems (LMS) or school networks, (Chiriseri & Muzenda-Mudavanhu, 2016). Technical support is needed to address compatibility issues and ensure smooth integration, particularly when implementing complex simulations or virtual laboratories.

Moreover, User Training and Assistance are also essential settings. Teachers and students may require training and ongoing technical assistance to effectively use e-learning tools, (Kim & Kim, 2023). Technical support personnel play a vital role in providing training sessions, workshops, and troubleshooting guidance to ensure users can leverage the full potential of these tools.

Last, but not least, Access and Connectivity Issues are relevant. Inadequate internet connectivity or unreliable access to electricity can hinder the use of e-learning tools in some regions, (Andersen & Hansen, 2016). Technical support teams may need to explore alternative solutions, such as offline access options or mobile-compatible resources, to address connectivity challenges and ensure equitable access to educational content.

Overall, technical support is essential for overcoming the various technical challenges associated with implementing e-learning tools for physics education, thereby enabling educators to deliver engaging and effective learning experiences to their students.

2.6.3 Effective training

Effective training poses several challenges for teachers in using e-learning tools for physics education:

Teachers in developing countries may have limited access to comprehensive training resources for e-learning tools. Accessible, high-quality training materials specifically tailored to physics education can be scarce, making it challenging for teachers to acquire the necessary skills and knowledge, (Dabbagh & Kitsantas, 2017). Teachers often have busy schedules with teaching duties, administrative tasks, and other responsibilities. Finding time to attend training sessions or engage in self-paced learning activities to familiarize themselves with e-learning tools can be difficult, (Chiriseri & Muzenda-Mudavanhu, 2016).

Furthermore, some teachers may lack the technical proficiency required to effectively use e-learning tools. Training programs must cater to educators with varying levels of technological expertise, providing basic to advanced instruction on tool usage, troubleshooting, and integration into the physics curriculum, (Moyo & Zvobgo, 2017). Integrating e-learning tools into physics instruction requires more than technical skills; it also demands an understanding of effective pedagogical strategies. Teachers need training on how to align e-learning activities with learning objectives, design engaging instructional materials, and facilitate meaningful student interactions in online environments.

One-time training sessions may not suffice to ensure long-term proficiency in using e-learning tools. Continuous professional development opportunities, ongoing support networks, and communities of practice are essential for sustaining teachers' skills and fostering innovation in physics education, (Jones & Clark, 2021). To add on, training programs for e-learning tools may incur costs related to materials, facilitators, and infrastructure. Limited funding and resources in some educational settings can restrict the availability and accessibility of comprehensive training initiatives for physics teachers, (Dubois & Tremblay, 2015).

A multifaceted approach involving collaboration between educational institutions, government agencies, non-profit organizations, and technology providers is required to address these challenges. Investing in teacher training programs that are accessible, sustainable, and pedagogically sound can empower educators to effectively leverage e-learning tools to enhance physics education and improve student learning outcomes.

2.6.4 Attitudinal Challenges

Attitudinal challenges pose significant barriers to the use of e-learning tools in physics education for secondary school teachers. These challenges stem from teachers' beliefs, attitudes, and perceptions about technology integration and its impact on teaching and learning. Attitudinal challenges, range from resistance to change, perceived lack of relevance, perceptions about pedagogical quality and the list goes on.

To start with, resistance to change. Some teachers may resist incorporating e-learning tools into their teaching practices due to a fear of change or a preference for traditional teaching methods, (Mukoroverwa, Chikwature, & Murimbika, 2022). They may perceive technology as a disruption to established routines or doubt its effectiveness in improving student outcomes.

To add more, perceived lack of relevance is another challenge. Teachers may question the relevance of e-learning tools to physics education or believe that these tools are more suitable for other subjects, (Nyamupanedengu & Mhizha, 2020). They may struggle to see how technology can enhance the teaching of abstract concepts in physics or facilitate hands-on learning experiences.

More so, concerns about pedagogical quality are an attitude that emanates from teachers. Teachers may have concerns about the pedagogical quality of e-learning materials, particularly regarding their alignment with curriculum standards, cognitive engagement, and ability to foster critical thinking skills, (Tanaka & Yamamoto, 2017). They may hesitate to use e-learning tools if they perceive them as inferior to traditional instructional methods.

Some teachers may lack confidence in their ability to effectively use e-learning tools or feel overwhelmed by the technical skills required, (Schmidt & Mu'ller, 2018). They may doubt their capacity to troubleshoot technical issues, navigate digital platforms, or adapt instructional materials to suit diverse learning needs. Teachers may question whether e-learning tools can effectively engage students in physics education or foster meaningful interactions and collaboration, (Wong & Chan, 2020). They may worry that technology-mediated instruction could lead to passive learning or detract from interpersonal communication and social interaction in the classroom.

Lastly, cultural and societal beliefs are another attitudinal challenge. Cultural norms, societal attitudes, and institutional policies can influence teachers' attitudes towards technology integration in education, (Nyamupanedengu & Mhizha, 2020). Teachers may encounter resistance from colleagues, administrators, parents, or community members who hold negative perceptions about the role of technology in teaching and learning.

Addressing attitudinal challenges requires proactive efforts to promote positive attitudes towards e-learning tools among teachers. This may involve providing professional development opportunities, fostering a culture of innovation and experimentation, showcasing successful examples of technology integration, and addressing misconceptions through targeted communication and support. Additionally, creating a supportive environment that values teachers' input, acknowledges their concerns, and offers ongoing encouragement and training can help mitigate attitudinal barriers to the use of e-learning tools in physics education.

2.6.5 Technical Competence and how it affects e-learning

For the underdeveloped countries, the lack of pedagogical skills and the technical competence required to setup, run and maintain e-learning centres are still farfetched. Even where donations have been made and training has not taken place, that has left e-learning underutilized and its potential not fully exploited, (Mutsau & Mutonhora, 2017). Moreover, in developing countries, Physics teachers may lack the necessary training and skills to effectively use e-learning tools. They may struggle with integrating technology into their teaching practices, (Renuka & Loganathan, 2018).

2.6.6 Language Barriers

E-learning materials may be primarily available in English, which can pose challenges for students and teachers in countries where English is not the primary language, (Bukaliya & Jura, 2021). Language barriers can pose significant challenges in the effective integration of e-learning tools in physics teaching and learning in several ways. Physics, like many scientific disciplines, often involves complex concepts and technical terminology, (Wong & Chan, 2020). If the e-learning tools are not available in the language understood by the learners, comprehension becomes difficult, hindering effective learning. E-learning tools typically include instructional materials such as videos, simulations, and written content. If these materials are in a language that learners are not proficient in, they may struggle to follow along and grasp the concepts being taught, (Tanaka & Yamamoto, 2017). Effective communication between instructors and learners is crucial in online learning environments. Language barriers can impede communication, leading to misunderstandings, confusion, and frustration for both parties.

2.6.7 Financial Constraints

Financial constraints can present significant challenges in the effective integration of e-learning tools in physics teaching and learning in various ways. Affordability of devices, software, and internet access can be a significant barrier for both schools and students, (Fredrick & Elijah, 2022). Many e-learning tools and platforms come with a price tag, whether it's licensing fees, subscription costs, or purchasing software and hardware, (Andersen & Hansen, 2016). Schools and institutions may struggle to afford these expenses, especially if they serve underprivileged communities or have limited budgets allocated for technology. Implementing e-learning tools often requires

infrastructure investments, such as upgrading internet bandwidth, providing devices for students, and maintaining servers for hosting online resources, (Mashingaidze & Zhou, 2018). These infrastructure costs can be substantial and may strain limited financial resources. Training programs and ongoing support services come with additional costs, including hiring trainers, developing educational materials, and dedicating staff time to training sessions. (Tanaka & Yamamoto, 2017), is of the view that effective utilization of e-learning tools requires training for teachers and support staff. Also creating high-quality educational content tailored to physics instruction can be expensive and time-consuming.

Addressing these challenges requires a multi-faceted approach involving government support, infrastructure development, teacher training programs, and the creation of localized e-learning content.

2.7 Extent of use of available e-learning tools

The extent to which e-learning tools are being used in physics teaching and learning can vary depending on factors such as educational institutions, technological infrastructure, and instructional approaches. Availability of e-learning tools, Integration into curriculum, Enhancement of learning experiences, Accessibility and inclusivity, are some considerations regarding the use of e-learning tools in physics education:

There is a wide range of e-learning tools available for physics education. Simulation software, virtual laboratories, interactive multimedia resources, online textbooks, and learning management systems (LMS), (Martinez & Rodrigues, 2019). The availability and adoption of these tools may vary among educational institutions. Some physics educators integrate e-learning tools seamlessly into their curriculum, using them to supplement traditional lectures, laboratory experiments, and homework assignments, (Cifuentes & Murphy, 2017). Others may use e-learning tools primarily for distance learning or blended learning models, combining online instruction with face-to-face classroom activities.

E-learning tools can enhance physics learning experiences by providing interactive simulations and visualizations that help students understand complex concepts, conduct virtual experiments, and explore real-world applications, (Smith & Brown, 2022). These tools can engage students in hands-on learning and promote deeper conceptual understanding. E-learning tools can improve accessibility and inclusivity in physics education by providing flexible learning opportunities for

students with diverse learning needs and preferences, (Chari & Madondo, 2021). For example, students with disabilities may benefit from accessible digital resources and alternative modes of content delivery.

Technical issues, such as compatibility problems or inadequate internet connectivity, can hinder the effective use of e-learning tools. Despite their potential benefits, e-learning tools in physics education also face challenges and limitations, (Mavhunga & Muchemwa, 2019). Additionally, some educators may lack the necessary training or support to integrate these tools effectively into their teaching practices. The successful implementation of e-learning tools in physics education requires careful consideration of pedagogical principles and instructional design strategies, (Moyo & Zvobgo, 2017). Educators need to select appropriate tools that align with learning objectives, engage students effectively, and facilitate active learning experiences. E-learning tools can support assessment and feedback processes in physics education by providing opportunities for online quizzes, simulations-based assessments, and automated feedback mechanisms. However, educators must ensure that assessment methods align with learning goals and accurately measure student understanding.

Overall, the extent to which e-learning tools are being used in physics teaching and learning can vary depending on factors such as technological readiness, pedagogical approaches, and institutional support. As technology continues to evolve and educational practices evolve, the role of e-learning tools in physics education is likely to expand, providing new opportunities for student engagement and learning.

2.8 Strategies to improve use of e-learning tools

Improving the effective use of e-learning tools requires a comprehensive approach that addresses various aspects of technology integration, pedagogy, and support structures. Here are some strategies to enhance the effectiveness of e-learning tools:

2.8.1 Teacher Training and Professional Development

Providing teachers with training and professional development opportunities enhances their technological proficiency and pedagogical skills related to e-learning tools. (Cifuentes & Murphy, 2017), asserts that workshops, courses, and online resources on topics such as instructional design, digital literacy, and effective use of specific e-learning platforms.

2.8.2 Integration into Curriculum and Instructional Design

Encouraging teachers to integrate e-learning tools seamlessly into the curriculum by aligning them with learning objectives, instructional activities, and assessment strategies. (Andersen & Hansen, 2016), posits that, promote the use of pedagogically sound instructional design principles, such as active learning, student engagement, and differentiated instruction, enhances integration into curriculum and instructional design by Physics teachers.

2.8.3 Accessibility and Inclusivity

Ensuring that e-learning tools are accessible and inclusive for all students, including those with disabilities or diverse learning needs. (Dubois & Tremblay, 2015), is of the view that providing guidance and resources on designing accessible digital content, accommodating different learning styles, and fostering a supportive learning environment for all students is a strategy to enhance effective use of e-learning tools by Physics teachers.

2.8.4 Technical Support and Infrastructure

Establishing robust technical support systems and infrastructure to address issues related to technology integration, software compatibility, and internet connectivity can enhance the use of e-learning tools. (Habbler, Major, & Hennessy, 2016), posits that providing assistance and troubleshooting services to teachers and students to resolve technical problems effectively and minimize disruptions to learning activities can enhance Physics teachers' use of e-learning tools.

2.8.5 Collaborative Learning and Peer Support

Fostering a culture of collaboration and peer support among teachers, administrators, and educational technologists to share best practices, exchange ideas, and collaborate on e-learning initiatives. (Schmidt & Mu'ller, 2018), supports the notion when they say encouraging collaborative projects, communities of practice, and professional learning networks focuses on e-learning innovation and improvement.

2.8.6 Student Engagement and Motivation

Designing e-learning activities and resources that promote student engagement, motivation, and active participation enhances the teachers' use of e-learning tools. Incorporate interactive

multimedia elements, gamification strategies, and collaborative learning experiences to enhance student interest and enjoyment in online learning, (Jones & Clark, 2021).

2.8.7 Feedback and Assessment

Implementing effective feedback and assessment mechanisms to monitor student progress, provide timely feedback, and evaluate the effectiveness of e-learning tools among others, are strategies that can be employed to enhance effective use of e-learning tools by Physics teachers. Use of a variety of assessment methods, such as quizzes, assignments, projects, and peer assessments, to measure student learning outcomes and inform instructional decision-making, (Ghavifekr & Wan Athirah, 2015).

2.8.8 Continuous Improvement and Evaluation

Regularly evaluating the effectiveness of e-learning tools and practices through formative assessment, feedback surveys, and data analysis improves the use of e-learning tools by Physics teachers. (Chari & Madondo, 2021), supports the idea that the use of evidence-based research and evaluation findings to identify areas for improvement, refine instructional strategies enhances the overall quality of e-learning experiences.

2.8.9 Community Engagement and Partnerships

Engaging stakeholders, including parents, community members, industry partners, and policymakers, in supporting and promoting the effective use of e-learning tools. (Al-Zahrani, 2015), believes that seeking partnerships with external organizations, educational institutions, and technology providers to access resources, expertise, and funding opportunities for e-learning initiatives improves the effective use of e-learning tools by Physics teachers..

2.8.10 Flexibility and Adaptation

Remaining flexible and adaptable in responding to evolving technology trends, pedagogical approaches, and educational needs is a positive strategy in Physics teachers' use of e-learning tools. (Tanaka & Yamamoto, 2017), purports that continuously seeking opportunities for innovation, experimentation, and iteration to improve the effectiveness and relevance of e-learning tools in diverse learning contexts is a good recipe to enhancing ICT use by Physics teachers.

By implementing these strategies in a coordinated and collaborative manner, educational stakeholders can enhance the effective use of e-learning tools and promote student success in digital learning environments.

2.9 Research gap

Impact on student learning outcomes, effectiveness of specific e-learning tools, long-term impact and sustainability are some potential research gaps in the challenges faced by Secondary School Physics Educators in their efforts to fully utilize e-learning tools in teaching and learning:

2.9.1 Effectiveness of specific e-learning tools:

While many studies have examined the effectiveness of e-learning in general, there is a need for more research focusing on specific e-learning tools and technologies. Understanding the relative effectiveness of different tools, such as virtual labs, multimedia simulations, or collaborative platforms, can help educators make informed decisions about tool selection and integration.

2.9.2 Pedagogical strategies for maximizing e-learning tool effectiveness:

Research is needed to explore effective pedagogical strategies for integrating e-learning tools into teaching practices. This includes investigating how different instructional approaches, such as flipped classrooms, inquiry-based learning, or problem-based learning, can enhance the effectiveness of e-learning tools in promoting student engagement and learning outcomes.

2.9.3 Impact on student learning outcomes:

While there is evidence to suggest that e-learning can lead to positive learning outcomes, more research is needed to understand the specific factors influencing these outcomes. This includes examining the relationship between e-learning tool usage patterns, student engagement levels, and academic achievement across different subject areas and student populations.

2.9.4 Accessibility and inclusivity of e-learning tools:

There is a need for research focusing on the accessibility and inclusivity of e-learning tools for diverse learners, including those with disabilities or special educational needs. This includes investigating the usability of e-learning interfaces, the availability of alternative formats, and the

effectiveness of accommodations and support services in ensuring equitable access to digital learning resources.

2.9.5 Teacher training and professional development:

Research is needed to explore effective approaches for training and supporting teachers in the effective use of e-learning tools. This includes investigating the impact of professional development programs, mentoring initiatives, and collaborative learning communities on teacher confidence, competence, and instructional practices related to e-learning tool integration.

2.9.6 Barriers and challenges to e-learning tool adoption:

Despite the potential benefits of e-learning tools, there are still barriers and challenges that hinder their widespread adoption in educational settings. Research is needed to identify and address these barriers, including technological constraints, institutional policies, financial constraints, and cultural attitudes towards technology-mediated learning.

2.9.7 Ethical and privacy considerations:

With the increasing use of e-learning tools, there are emerging ethical and privacy concerns related to data collection, privacy protection, and student data security. Research is needed to explore the ethical implications of e-learning tool usage, including issues related to data ownership, consent, and digital surveillance in educational settings.

2.9.8 Long-term impact and sustainability:

While many studies have focused on short-term outcomes of e-learning interventions, there is a need for research examining the long-term impact and sustainability of e-learning tool usage. This includes investigating the durability of learning gains, transferability of skills, and scalability of e-learning initiatives over time.

By addressing these research gaps, scholars and practitioners can contribute to the ongoing advancement of e-learning tools in education and promote evidence-based practices for enhancing teaching and learning in digital environments.

2.10 Chapter Summary

The chapter dwell on challenges are being experienced by physics teachers in their efforts to use e-learning tools in physics education, which turned out to be, but are not limited to: limited accessibility and network challenges, school with limited technical support, lack of effective training, lack of time and lack of effective training. The chapter also looked at the extent to which e-learning tools are being used in Physics education by teachers, and also suggestive strategies that can enhance the effective use of e-learning tools in Physics education. Research gaps were identified, and impact on student learning outcomes, effectiveness of specific e-learning tools, long-term impact and sustainability, amongst others were discussed in the chapter.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter presented the research methodology adopted for this study. The research design, and paradigm were presented and discussed in the context of the study. The chapter also discussed the research instruments used to collect data and how these were controlled to ensure and enhance validity and reliability of data. The population, sample and sampling techniques were spelt out and justifications for these presented. The administration of the study, methods of data presentation and analysis were also presented and discussed, and a summary decorated the end of the chapter with summarised details of the chapter.

3.2 Research design

The study was conducted using mixed method, which uses both quantitative and qualitative research methods. This method was chosen because this method focuses on the collection and analysis of both numerical and non-numerical data. The study required a method that provides a roadmap for the entire research process, guiding the collecting and analysing of data in a systematic and logical manner, hence the decision to select mixed method. During the study, a case study was employed, because the challenges affecting teachers' use of e-learning tools required an in-depth understanding, and case studies provide detailed understanding of the experiences and perspectives of the individuals or groups being studied.

3.3 Research paradigm

Previous studies argued that interpretivist researchers recognize the role of human consciousness, meanings, and context in shaping reality. Thus, this study seeks to understand the subjective experiences, perspectives, and meanings attributed to phenomena through qualitative methods, that is the use of questionnaires to collect data.

(Onwuegbuzie & Collins, 2017), used critical theory, which is grounded in the idea that social realities are shaped by power dynamics, ideology, and social structures. This study, from a critical theorist's point of view, seek to uncover and challenge systems of oppression, inequality, and injustice. In addition, this study engaged in reflexivity and critique of dominant ideologies, aiming

to empower marginalized voices and promote social change, (Yin, 2018). Thus, this study employed qualitative methods such as participatory action research and critical discourse analysis were used in critical research.

This study drew on a combination of quantitative and qualitative methods, selecting the most appropriate approach based on the research question and context. Pragmatism values the integration of theory and practice to address real-world issues, (Flick, 2019).

The study employed indigenous research paradigm which was grounded in Indigenous ways of knowing, being, and doing. (Creswell & Creswell, 2017), once used indigenous researchers and drew on Indigenous ontologies, epistemologies, and methodologies to conduct research that is respectful, reciprocal, and relevant to Indigenous communities. In this study, just as in indigenous research, the study valued oral traditions, storytelling, ceremony, and relationality.

These previous studies used paradigms that were not mutually exclusive, and drew on elements from multiple paradigms depending on the nature of their research questions, the context of their study, and their own philosophical orientations. However, by understanding and critically engaging with a combination of these research paradigms, employing these paradigms was essential to reflect on the study's assumptions, navigate methodological choices, and produce meaningful and ethical research outcomes.

3.4 Research methodology

The research study was studied using a grounded theory research which is a mixed-method approach. This research paradigm employs an inductive approach, meaning it moves from the specific to the more general, and uses descriptions rather than numbers to understand the phenomena (Denzin & Lincoln, 2018). This is a combination of quantitative and qualitative research approach used to understand and explain the meaning of a social phenomenon in a natural setting (Creswell & Creswell, 2017). Teachers participating in this study are those identified by the Ministry of Primary and Secondary Education as quality teachers. The study intended to present an insider's perspective into the events that occurred in the study as data was collected and analysed.

A questionnaire was designed as the information gathering instrument, with four sections A-D and each section answering to research questions respectively. From all the sections, an average

response was formulated and used to give out solutions and generalizations about the challenges and opportunities of e-learning tools in Physics Education in Zimbabwean Secondary Schools.

3.5 Research strategy

The study seeks to identify challenges faced by Secondary Schools educators in using e-learning tools for Physics teaching and learning, and suggesting respective strategies to solve these challenges. The study was conducted using grounded theory, which employs an inductive approach, a combination of quantitative and qualitative research method. A self-generated questionnaire was used to collect data, and the collection and analysis of data was done ethically. Results were tabulated and presented graphically, using bar graphs for easy interpretation of the analysis.

3.6 Research method

This study was conducted using mixed-method research method, which focuses on understanding subjective experiences, meanings, and social phenomena through both numerical and non-numerical data. Qualitative methods include interviews, focus groups, participant observation, case studies, and content analysis, often employing techniques such as thematic analysis or grounded theory, (Creswell & Creswell, 2017).

The choice of research method depended on the research questions, objectives, and theoretical framework of the study, as well as practical considerations such as available resources and ethical considerations. Not only that, but the way data was presented and analysed also influenced the choice of research method.

3.7 Population and sampling

The population for this study consisted of 20 qualified teachers at Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe and 27 Ordinary level students who are taking Physics as a subject from the same school. The sample of the study was comprised of 14 teachers from the total population and 16 students were randomly selected. The number of teachers sampled was determined by the subject they are trained to teach, thus, for the sample to be over 50% of the population, administrators and other qualified teachers in the station were asked to respond to the questionnaires as their views on e-learning tools were deemed to be equally important due to the fact that they could probably use e-learning tools as an instructional tool, if there were to be no challenges fostering the idea.

3.8 Sampling procedure

In this study, two sampling procedures were employed, namely probability and non-probability sampling, for learners and teachers, respectively. The probability sampling methods used involved random selection, where each member of the population has a known and non-zero chance of being selected. Common probability sampling methods include simple random sampling, stratified sampling, cluster sampling, and systematic sampling, (Yin, 2018). This sampling procedure was employed during selection of a sample from the learners since the study wanted just an amount of respondents to generalize conclusions from the whole population and not the whole population.

Among the types of sampling methods that include non-probability sampling, convenience sampling, purposive sampling, snowball sampling, and quota sampling, non-probability sampling methods which do not involve random selection, and the selection of participants based on the researcher's judgment or convenience, (Teddlie & Tashakkori, 2018) was opted for. Purposive sampling procedure was employed during selection of respondents from teachers, since not all the total number of the population are able to teach Physics, so the study only sampled the Physics Teaching Staff, and Administrators, from the whole population, thus, non-probability sampling was used. Sampling involves selecting a subset of individuals or cases from the population to be included in the study, (Onwuegbuzie & Collins, 2017). The purpose of sampling is to make inferences about the population based on the characteristics of the sample.

3.9 Data collection instrument

A self-generated questionnaire was used as a data collection instrument in this study. This is because using questionnaires in both quantitative and qualitative research studies offers several advantages, despite being traditionally associated with quantitative research, (Campbel & Stanley, 2015). Questionnaires allow researchers to standardize data collection by asking the same set of questions to all participants, (Mile, Huberman, & Saldana, 2019). This enhanced the reproducibility of the study and facilitates comparison of responses across participants.

For the purposes of anonymity and reduced social desirability bias, (Denzin & Lincoln, 2018), where respondents may feel more comfortable providing honest and candid responses to sensitive or stigmatized topics when completing questionnaires anonymously, reducing the likelihood of social desirability bias. This can lead to more accurate and reliable data.

The study was conducted with its data collected using Questionnaire for the purpose of Flexibility in Timing and Location. Questionnaires offer flexibility in terms of timing and location of data collection. Participants can complete questionnaires at their convenience, whether online, via mail, or in person, without requiring the presence of a researcher, (Teddle & Tashakkori, 2017). This enhanced participant convenience and led to higher response rates.

The instrument for data collection was a self-developed questionnaire titled, 'Teacher's Use of E-learning Tools in Secondary Education' (TUETSE). It was structured into three sections (A-D) which sought information on the three research questions. Section A has ten items; Section B has seven items, Section C has ten items and Section D has nine items. Some Likert scale coding was generated for answering the questions under each section as follows:

Section A: A=Available, NA= Not Available

Section B: A=Agree, DA= Disagree

Section C: A= Agree, SA= Strongly Agree, D=Disagree, SD=Strongly Disagree

Section D: A=Agree, SA=Strongly Agree

For every section, an overall decision for all responses was generated. The face and validation of the instrument was determined, and reliability of the instrument was obtained.

3.10 Data analysis methods

Data from this study was analysed using Cluster Analysis and Data Visualizations. Cluster analysis is used to group similar data points together based on their characteristics or features, (Flick, 2019). It is often used for segmentation or pattern recognition. Data Visualization gives visual representations of data, such as charts, graphs, and plots, are used to explore patterns, trends, and relationships within the data, (Campbell & Stanley, 2015). Common visualization tools include bar charts, histograms, scatter plots, and heat maps. The data from this study was grouped together using grouped responses from the Likert scale generated questions and presented graphically using bar graphs, thus, Cluster Analysis and Data Visualizations.

3.11 Reliability and validity

Reliability and validity are essential concepts in research methodology, ensuring the accuracy, consistency, and trustworthiness of measurement instruments and research findings. By understanding and assessing reliability and validity, researchers can enhance the quality and rigor

of their studies, ultimately advancing knowledge and understanding in their respective fields, (Creswell & Creswell, 2017).

3.12 Ethical considerations

Permission was sought for the ethical progress of the study, for the purpose of ethical considerations, as they are essential aspects of any research study, guiding researchers in conducting their work responsibly and ensuring the well-being, rights, and dignity of participants. To make sure of that, the study was done after observing all protocols, that is after seeking permission from the responsible authorities, **APPENDIX 1**.

The participants of the study were all informed of the purpose of the study, and participated with their full consent. This involved providing clear information about the purpose, procedures, risks, benefits, and confidentiality of the study, allowing participants to make an informed decision about their participation. For the learners below the age of 18, a consent form was designed and sent to their parent for consent, **APPENDIX 4**.

To add on, confidentiality as an ethic was considered. Researchers must protect the confidentiality of participants' personal information and research data, (Onwuegbuzie & Collins, 2017). The participants of the study were advised not to write their names on the questionnaire, in the event that a name was written by mistake whatsoever, the name was treated with great confidentiality, that is anonymized, and no other participant had access to participant information or filled questionnaires.

Another ethic considered during this study is privacy. Researchers should respect participants' privacy by minimizing intrusions into their personal lives and ensuring that their participation in the study does not compromise their privacy rights, (Maxwell, 2016). This study was done strictly for academic purposes and participants involved directly or indirectly would benefit from the results. Researchers should strive to maximize benefits and minimize harm to participants and other affected parties, (Teddlie & Tashakkori, 2018).

Respect for Participants' Autonomy and Dignity is yet another ethic considered during this study. Researchers should respect participants' autonomy and treat them with dignity and respect, (Mile, Huberman, & Saldana, 2019). This involves involving participants in decision-making, respecting their rights and preferences, and avoiding coercion or undue influence. This ethic was honoured

when the underage learners 'parents were asked for permission for their children to be sampled in the study.

Fairness and Equity: Researchers should ensure that research participation opportunities are accessible and equitable, without discrimination based on factors such as race, gender, ethnicity, age, disability, or socioeconomic status. Last but not least of the ethics considered during the study was Honesty and Integrity. Researchers should conduct their research with honesty, integrity, and transparency, accurately reporting their methods, findings, and limitations, (Creswell & Creswell, 2017). This included avoiding fabrication, falsification, or plagiarism in research conduct and reporting. No response from any responded was altered nor falsified for the purpose of gain during the study, all generalizations made were done religiously.

3.13 Chapter Summary

This chapter provided a detailed overview of the research methodology used to investigate the challenges and opportunities of e-learning tools in Physics Education in Zimbabwean Secondary Schools. Mixed-method approach was adopted in this study, combining qualitative and quantitative data. A population of Physics teachers and students were used for this study. A sample of 16 teachers and 14 students was selected using random sampling and non-probability sampling procedures, respectively. Data was collected using a self-constructed questionnaire. Before the study was conducted, an ethical approval letter was produced to the authority of the school for permission. For the purpose of considering ethics, an informative parent or guardian consent form was designed and administered to parents before involving under-age learners in the study, and only learners whose parents or guardians responded participated in the study. Participant above the age of consent also signed a participant consent form, so that no participant would participate in the study without fully knowing what the study is about.

CHAPTER FOUR

DATA REPRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The chapter serves to present and analyse the results of the investigation undertaken as described in the previous chapter. In the study, tables were employed to present data followed by the analysis and interpretation of the information illustrated. Graphs showing the percentage results are also shown below each table.

4.2 Data Presentation and Analysis

Data on respondents' highest qualification has been represented in the form of a bar graph. Respondents' qualifications ranged from Diploma, Degree and Masters. Questionnaire distribution and response rate has also been tabulated as shown on Table 4. 1 Questionnaire distribution and response rate.

Table 4. 1 Questionnaire distribution and response rate

Questionnaires	Number
Distributed	30
Returned	22
Response Rate	73%

The study had a 73 % response rate for the questionnaires, with 22 out of 30 distributed questionnaires being returned as shown in Table 4. 1 Questionnaire distribution and response rate. A response rate of around 65% is considered acceptable and satisfactory for qualitative research in social sciences, as supported by Campbell & Stanley (2018), Flick (2019), and Yin (2019). While higher response rates are preferable to minimize non-response bias, a 73 % response rate suggests the majority of participants responded, providing a decent sample size for analysis and drawing of conclusions from the data collected.

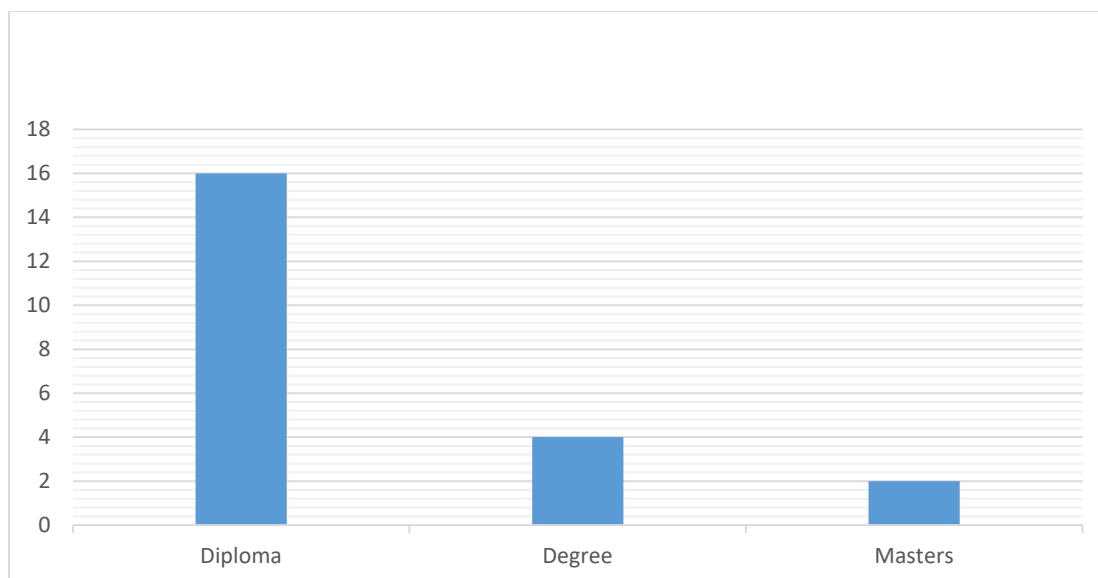


Figure 4.1: Respondents' Highest Qualification

With respect to qualification, a large number of respondents have Diplomas as their highest qualification as shown in Figure 4.1: Respondents' Highest Qualification. This proves that most teaching staff still have Diplomas and are yet to upgrade themselves to Degrees, meaning when they enrol for an upgrade, they will also be getting an in-service training on the use of e-learning tools. For this and other reasons, teacher training programs should be implemented to enhance teachers' digital literacy and pedagogical skills in using e-learning tools.

4.2.1 Questionnaire results and analysis

Results have been recorded responding respectively to research questions in Sections A-D and below is the tabulated presentation of the results. A graphical analysis of the tabulated responses preceded the tables from Table 4. 2 to Table 4. 5

4.2.1.1 Available e-learning tools

The study established that there is lack of e-learning tools in schools, starting from ordinary offline computers to personal gadgets such as tablets, smartphones and internet connectivity. These and many other e-learning tools are hindering the full scale adoption of e-learning tools as an instructional tool in the teaching of Physics.

Table 4. 2 Available e-learning tools shows responses to respective questions from respondents on availability of e-learning tools.

Table 4. 2 Available e-learning tools

IN	Items: Available E-Learning Tools	Sample size	Total response	A	NA	Overall Decision
1.	Off-line/ Ordinary computers	30	22	18	4	A
2.	Telephone/wireless Applications	30	22	0	22	NA
3.	Online/ Internet connected Computers	30	22	0	22	NA
4.	Printers, Scanner etc.	30	22	22	0	A
5.	Email facilities (Local emails e.g. <i>example@hokodzisec.ac.zw</i>)	30	22	0	22	NA
6.	Multimedia Projectors	30	22	0	22	NA
7.	Digital Library	30	22	0	22	NA
8.	Ready-made electronic media e.g. DVD, etc.	30	22	0	22	NA
9.	Fax machine	30	22	0	22	NA
10.	Interactive boards	30	22	0	22	NA

Table 4. 2 Available e-learning tools, above shows that it was discovered that most of the teachers were exposed to computers, either online or offline. But the overall decision concluded after comparing the differences in responses from respondents that 20 % of the responses was positive about the availability of listed e-learning tools, and 80 % was negative. This generally depicts that there are not sufficient e-learning tools available for Physics teaching in Zimbabwean Secondary schools.

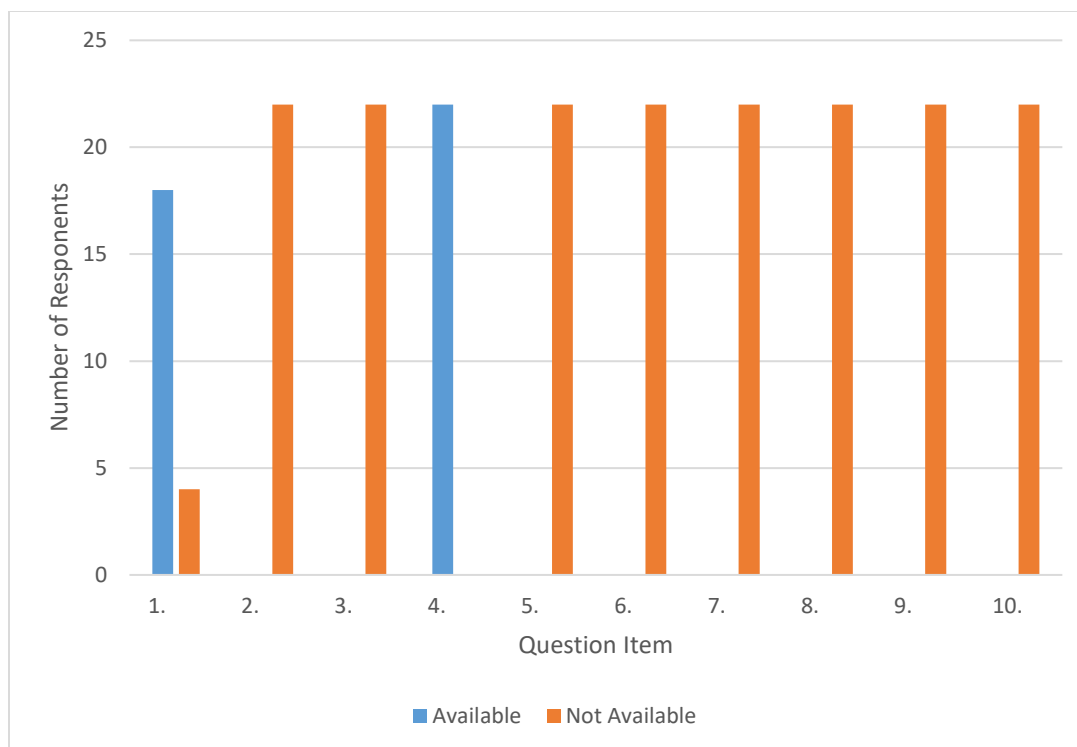


Figure 4.2: Available E-learning tools

It can be summarized that there is need for procuring e-learning tools in schools first, before even looking at challenges to their full scale usage in teaching and learning. In conclusion, it was noted that only a few offline computers, and a printer are usually available at the school, which may probably be used by the administrative staff only as shown in

4.2.1.2 Challenges of using e-learning tools

Table 4. 3 below shows perceived challenges to the full scale utilization use of e-learning tools by secondary school Physics teachers. Most of the challenges faced by teachers range from, access to the technologies, attitude from learners (digital divide),lack of infrastructure, lack of technical support, lack of knowledge (technical expertise) and financial constraints to acquire e-learning tools.

Table 4. 3 Challenges of using e-learning tools

IN	Items: Challenges	Sample size	Total Response	A	DA	Overall Decision
1.	Do you have access to information & communication technologies (ICTs)?	30	22	15	7	A
2.	Is there digital divide among learners? (attitude)	30	22	20	2	A
3.	Are there infrastructural challenges at your school?	30	22	19	3	A
4.	Is technical support readily available at your school	30	22	3	19	DA
5.	Have you undergone any training on the use of e-learning tools?	30	22	9	13	DA
6.	Do you face any attitudinal challenges, be it from admin, colleagues, or the learners?	30	22	16	6	A
7.	Does your school have any financial constraints to acquire e-learning tools?	30	22	21	1	A

From Figure 4.3: Challenges of using e-learning tools on challenges being faced by Physics teachers in using e-learning tools, the overall decision was generalized that 71 % of the respondents agreed, 29 % disagreed, meaning generally the overall decision was that the response was agree for all the section items. These challenges ranged from access to technologies, digital divide, infrastructural challenges, lack of technical support, and lack of training and technical expertise including financial constraints to acquire e-learning tools

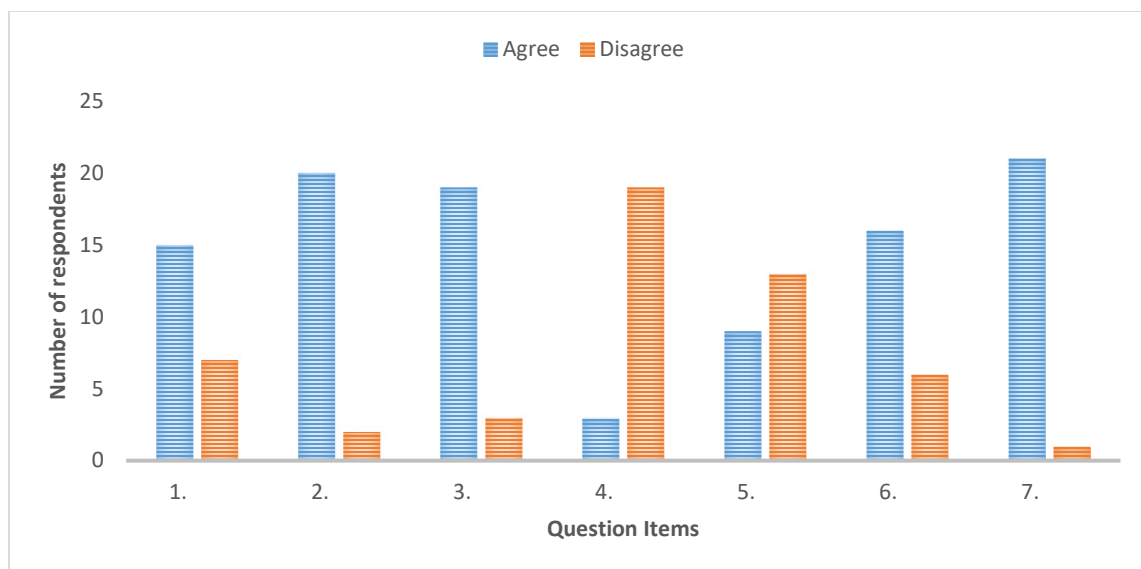


Figure 4.3: Challenges of using e-learning tools

To overcome these and other challenges, there is need for the development of Physics specific digital resources and e-learning materials, language support and digital literacy programs for teachers and students.

4.2.1.3 Use of Available e-learning tools

The ability of teachers' sue of e-learning tools was examined using a scale as illustrated on Table 4. 4: Use of Available e-learning tools and an overall decision is reached due to responses gathered from respondents. Use of e-learning tools ranged from creation of simple visual presentations, downloading electronic media, use of computer based programs, emails as well as connecting the computer to peripherals such as Overhead projectors and interactive whiteboards.

From Table 4. 3 of the responses from Section C, the overall decision was generalized that 50% strongly agreed, 30% disagreed, 10% agreed and 10% strongly disagreed to the items in section C on the use of available e-learning tools, meaning generally the overall decision was that all respondents strongly agreed to all items in section C.

Table 4. 4: Use of Available e-learning tools

IN	Items: Use of Available tools	Sample Size	Total Response	A	SA	D	SD	Overall Decision
1.	I can create visual presentation, graphics, charts, and type assignments for students using offline/ ordinary computers	30	22	1	7	12	2	D
2.	I can download teaching materials regarding my subject from the internet using online computers	30	22	1	5	16	0	D
3.	I can use computer based programs in developing the scheme of work and lesson plan, e.g. Microsoft Word, Excel etc.	30	22	2	4	12	4	D
4.	I can use email to send and receive assignments to my students	30	22	0	7	15	0	D
5.	I am able to use a learning management system (e.g., Web CT, IUMS, MURUNANI etc.) to support teaching	30	22	0	0	0	22	SD
6.	I am able to search for data on computer systems and organize them into files e.g. from an online school database.	30	22	0	0	0	22	SD
7.	I can connect the computer to other peripherals e.g. interactive board, printer, multimedia projector etc.	30	22	1	7	14	0	D
8.	I can access and share information on a network e.g. source files.	30	22	0	0	20	2	D
9.	I can create a basic presentation using a presentation package e.g. Microsoft PowerPoint and print to various networked printers.	30	22	2	4	16	0	D
10.	I can setup and use a Multimedia Projector for classroom delivery	30	22	1	7	14	0	D

The study deduced that most teachers could not use e-learning tools as an instructional tool in teaching Physics. It has been observed that the teachers were lacking the knowledge and skills; and they were reluctant about the changes and incorporation of extra learning associated with computers into their teaching. Hence there is a problem of teachers' acceptance and adoption of e-learning tools. Figure 4.4: Use of available tools shows a graphical presentation of the responses and it can be concluded that a lot needs to be done to equip teachers with the expertise on how to integrate ICT into the classroom. Accordingly, teachers who do not use computers in classrooms claim that "lack of skills" is constraining factor preventing them from using e-learning tools in Physics education in Zimbabwean Secondary Schools.

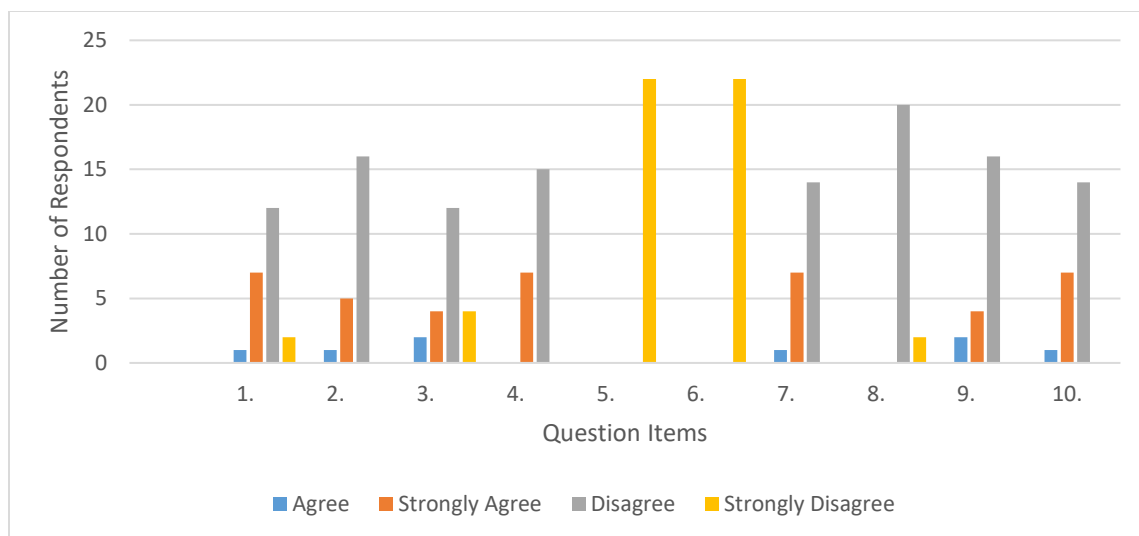


Figure 4.4: Use of available tools

4.2.1.4 Strategies for improvement

Strategies for the improvement of the use of e-learning tools for Physics teaching by Secondary school teachers have been tabulated with the respective responses from respondents as shown in Table 4. 5 Data gathered was in the form of Likert scale which used Agree and Disagree and an overall decision was put at the end of each suggestion.

Table 4. 5 Strategies for Improvement

IN	Items: Strategies/suggestions For Improvement	A	DA	Overall Decision
1.	Massive computer literacy programs for teachers	20	2	A
2.	Adequate provision of Online Computers/ Email	22	0	A
3.	Connection of classrooms to the internet	22	0	A
4.	Provision of incentives for courseware development	22	0	A
5.	Provision of Digital libraries	22	0	A
6.	Employment of computer technicians for routine repairs (Technical Support)	22	0	A
7.	Provision of generators or solar systems for regular power supply	22	0	A
8.	Provision of security to safeguard e-learning tools	22	0	A
9.	Training and retraining of teachers through seminars, workshops, and or staff developments	22	0	A

Figure 4.5: Strategies for improving use of e-learning tools below shows a graph of the proposed strategies for the improvement of the use of e-learning tools in Physics education. Question items coded on the graphs are items listed on Table 4. 5 Strategies for Improvement The study unravelled that massive computer literacy programs need to be rolled out to equip Physics teachers with the requisite expertise to fully utilize e-learning tools for teaching Physics

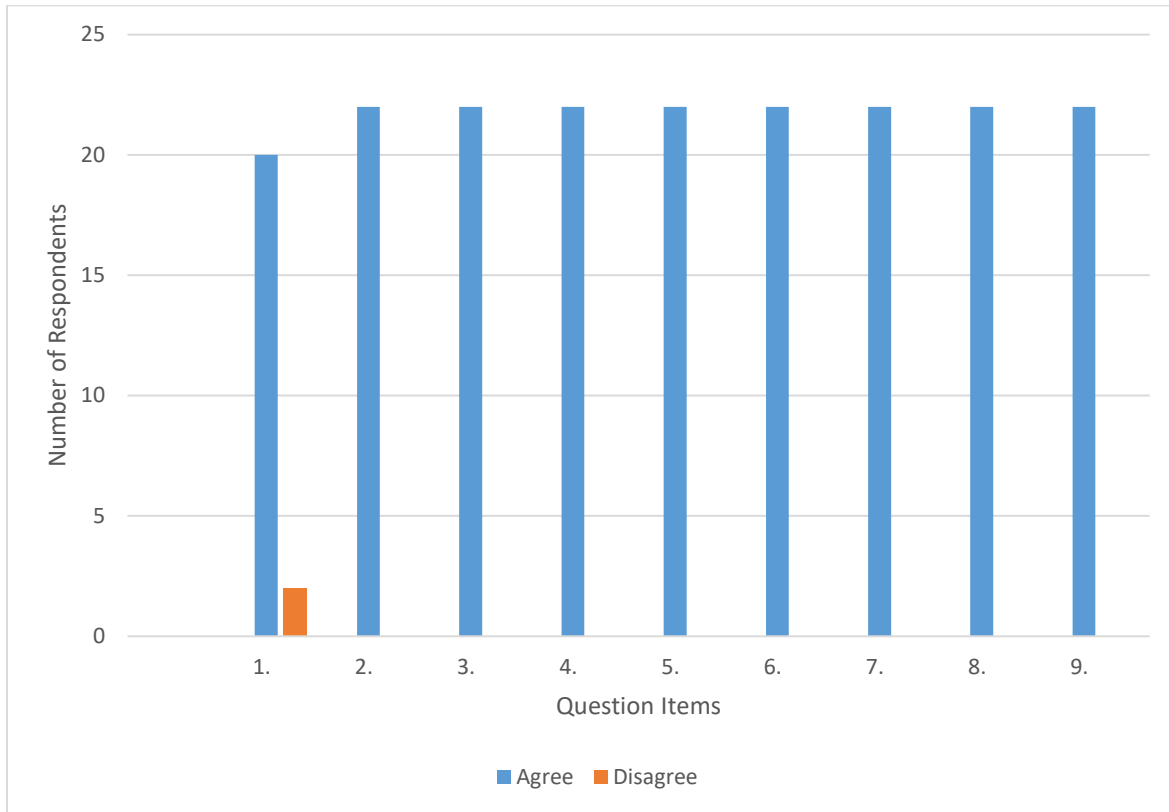


Figure 4.5: Strategies for improving use of e-learning tools

Among the strategies for improvement of the use of e-learning tools evaluated from the study, it can be concluded that teachers need on-going support in terms of technical support, massive computer literacy for teachers, training of teachers such as workshops, seminars, staff developments and conferences to enhance teachers' ICT literacy.

4.3 Chapter Summary

This chapter has presented the data that has been collected during the study in an effort to identify challenges being faced by secondary school Physics teachers in using e-learning tools for teaching as well as outlining suggestive measures to enhance the effective use. The methodology employed enabled the study to obtain the relevant information from the respondents. Data was collected on time and 22 out of the 30 distributed the questionnaires were returned, meaning 73% responses were used to generalise the views of the respondents. Analysis of data indicated that lack of experience, insufficient training and support, limited availability of e-learning resources, language barriers and limited digital literacy among teachers and students, limited technical support and infrastructural shortages, concerns about digital divide and equity among many others are hindering the full scale adoption of e-learning tools in the teaching of Physics.

To overcome these challenges, there is need for increased investment in ICT infrastructure and internet connectivity in schools. Professional development programs for teachers on e-learning tools and pedagogies, development of Physics specific digital resources and e-learning materials, provision of affordable and accessible e-learning tools and resources. To add on, there is also need for language support and digital literacy programs for teachers and students. Technical support and maintenance of e-learning tools and infrastructure as well as ensuring equity in access to e-learning opportunities.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarized the findings of the study, which investigated the challenges and opportunities of using e-learning tools in teaching Physics in Zimbabwean secondary schools. The study revealed that technological, pedagogical, and institutional challenges hinder the effective use of e-learning tools.

5.2 Summary of the study

The study investigated the challenges and opportunities of using e-learning tools in teaching Physics in Zimbabwean secondary schools. A mixed-methods approach was employed in the study, collecting data through questionnaires and interviews from Physics teachers and students at secondary school in Murewa District as a case study. It was found that an increased engagement and motivation in Physics can be achieved when using e-learning resources and also that teachers who received training and support in e-learning were more likely to integrate it into their teaching practices.

The study showed that schools with adequate infrastructure and resources can have higher adoption rates of e-learning in physics education and that there is likely to be a significant positive student engagement and motivation in physics and student performance in the subject when e-learning tools are used as instructional tools. To add on, it was revealed in the study that students' perceptions of e-learning in physics were influenced by their prior experience with technology and e-learning. The study found that collaborative learning and peer-to-peer interactions were enhanced through e-learning in physics education.

Not only that, but also the study revealed that teachers' confidence in using e-learning resources can be increased after receiving training and support. The study found that the most effective e-learning resources were those that were aligned with the physics curriculum and learning objectives.

In a nutshell, the study found that school administrators' support for e-learning initiatives was crucial for successful implementation, and also that the main barriers to e-learning adoption were lack of infrastructure, limited internet access, and high costs of e-learning resources.

5.3 Key Findings

1. Limited access to computers, internet, and digital resources hindered the effective use of e-learning tools in Physics teaching and learning.
2. Most teachers lacked training and support in integrating e-learning tools into their teaching practices.
3. Students showed a positive attitude towards using e-learning tools, but their limited computer literacy and lack of access to devices outside of school constrained their ability to fully benefit from e-learning resources.
4. The majority of teachers and students believed that e-learning tools enhanced the learning experience, improved understanding, and increased student engagement in Physics classes.

5.3.1 Challenges

- Infrastructure and resource constraints
- Limited teacher training and support
- Student computer literacy and access issues
- High costs of internet data and devices

5.3.2 Opportunities

- Enhanced student engagement and motivation
- Improved understanding and visualization of complex Physics concepts
- Increased access to quality educational resources
- Personalized and flexible learning experiences

5.4 Conclusions

The study concludes that;

E-learning tools have the potential to enhance physics education in Zimbabwean secondary schools. However, various challenges need to be addressed to ensure effective implementation. The government, schools, teachers, and students must work together to overcome these challenges. The study's findings highlight the need for a comprehensive approach to address the challenges hindering the effective use of e-learning tools in physics education in Zimbabwean secondary

schools. The results suggest that investing in infrastructure, teacher training, and digital content development can improve the adoption and effective use of e-learning tools. The study's conclusions underscore the importance of stakeholders' collaboration to address the challenges and ensure successful implementation of e-learning initiatives. The findings provide insights for policymakers, educators, and researchers to develop targeted interventions and strategies to enhance physics education through e-learning. The study contributes to the existing body of knowledge on e-learning in physics education and highlights areas for further research. The results emphasize the need for continuous monitoring and evaluation to ensure that e-learning initiatives meet their intended goals and improve physics education outcomes.

5.5 Recommendations

The following recommendations, if properly considered by all the stakeholders involved, can lead to a fruitful and effective adoption and utilisation of e-learning tools as instructional tools;

The government and educational institutions should:

- Invest in robust infrastructure and reliable internet connectivity to support e-learning.
- Develop and implement policies and guidelines that support the integration of e-learning in physics education.
- Provide ongoing training and support for teachers to enhance their digital literacy and e-learning pedagogy skills.
- Encourage collaboration among teachers, students, and stakeholders to share best practices and resources.
- Continuously monitor and evaluate the effectiveness of e-learning initiatives and make data-driven decisions.
- Schools should invest in e-learning infrastructure and resources and provide training and support for teachers.

Teachers, on the other hand should;

- Embrace e-learning and develop digital literacy skills and collaborate with colleagues to share best practices.
- Embrace e-learning and incorporate it into their teaching practices.
- Develop digital content and resources that align with the physics curriculum.
- Encourage student engagement and participation in e-learning activities.
- Provide feedback and support to students using e-learning platforms.

Students should:

- Take advantage of e-learning resources and opportunities to enhance their physics knowledge and skills.
- Develop digital literacy skills and learn to navigate e-learning platforms effectively.
- Provide feedback and suggestions to teachers and educators on e-learning experiences.

Researchers and developers should:

- Conduct further studies to investigate the impact of e-learning on physics education in Zimbabwean secondary schools.
- Develop and evaluate the effectiveness of digital content and resources for physics education.
- Explore innovative technologies and approaches to enhance e-learning in physics education.

The study highlights the potential benefits of e-learning tools in teaching Physics in Zimbabwean secondary schools, but also emphasizes the need to address the challenges and constraints that hinder their effective use. By implementing these recommendations, Zimbabwean secondary schools can overcome the challenges of using e-learning tools in physics education, leading to improved learning outcomes and enhanced teaching methods.

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APPENDICES

APPENDIX 1: Application to conduct a research study

Hokodzi Secondary School
Staff Quarters
P O Box 130
Murewa

8 May 2024

Hokodzi Secondary School
P O Box 130
Murewa

ATT: THE HEAD

Dear Madam

REF: APPLICATION FOR PERMISSION TO CONDUCT AN EDUCATIONAL RESEARCH STUDY

As the above subject matter refers, I do hereby apply for permission to conduct an educational research study (Dissertation) as partial fulfilments to a study towards a Bachelor of Science Education Honours Degree in Physics (HBSc Ed. Phy.) that I am undertaking with Bindura University of Science Education.

Yours Faithfully,

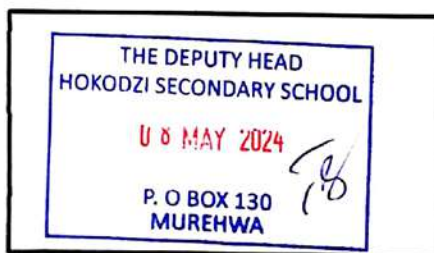
Matunga Olson

EC Number 5415804 S

Approved By.....  Date 08/05/24

Not Approved Date

Date Stamp



APPENDIX 2: Ethical Approval Letter

SAMED

P Bag 1020
BINDURA
ZIMBABWE

Tel: 0271 - 7531 ext 1038
Fax: 263 - 71 - 7616


BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 07/05/2024

TO WHOM IT MAY CONCERN

NAME: MATUNGA OLSON REGISTRATION NUMBER: B12 33383

PROGRAMME: HBSc Ed Physics PART: 2.3

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

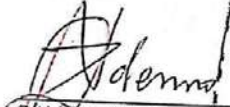
The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBSc Ed Physics programme. The research topic is:

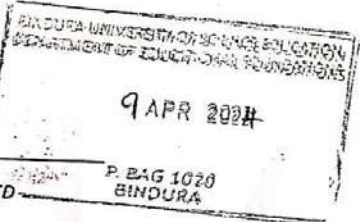
EXPLORING E-LEARNING IN ZIMBABWEAN PHYSICS EDUCATION: CHALLENGES AND OPPORTUNITIES - CASE STUDY OF HOKODZI SECONDARY SCHOOL IN MUREWA DISTRICT, MASHONALAND EAST, ZIMBABWE.

In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.

Your co-operation and assistance is greatly appreciated.

Thank you


Ndema (Dr.)
CHAIRPERSON - SAMED


P. BAG 1020
BINDURA


THE DEPUTY HEAD
HOKODZI SECONDARY SCHOOL
07 MAY 2024
P. O BOX 130
MUREHWA

Teacher's Use Of E-learning Tools In Secondary Education (TUETSE)

*To identify challenges and opportunities of e-learning tools for
Physics education in Zimbabwean Secondary Education, suggesting
respective strategies to solve these challenges.*

Please complete the questions in the pages that follow and submit to:

HOKODZI SECONDARY SCHOOL, TECHNICALS DEPARTMENT

ATT: MR MATUNGA

This questionnaire is a research instrument used to gather information on challenges and opportunities of e-learning tools in Physics education in Zimbabwean Secondary Education, suggesting respective strategies to solve these challenges. The research study is educational and a partial fulfilment of a Bachelor of Science Education Honours Degree in Physics (HBSc Ed Physics) with Bindura University of Science Education. Please kindly assist by responding in utmost good faith to the Sections (A-D). Each section tries to answer to research questions (objectives).

Your cooperation will be kindly appreciated.

Researcher

Mr. O. Matunga

PLEASE INDICATE YOUR HIGHEST QUALIFICATION *(Please tick the appropriate box)*

Diploma ☐ Degree ☐ Master of Education ☐

ICT LITERACY CHECK

How proficient are you in the use of ICTs? *(Please tick the appropriate box)*

Very Good ☐ Good ☐ Fair ☐ Bad ☐ Very Bad ☐

SECTION A

QUESTION: What are the available e-learning tools at Hokodzi Secondary School for teaching?

Directions: **Please tick below the desired/chosen code in the columns**

Key: IN= item number, Items= E-learning tools, A=Available, NA= Not Available

Which of the listed e-learning tools are readily available at Hokodzi Secondary School for teaching?

Table 1

IN	Items: E-Learning Tools	A	NA
1.	Off-line/ Ordinary computers		
2.	Telephone/wireless Applications		
3.	Online/ Internet connected Computers		
4.	Printers, Scanner etc.		
5.	Email facilities (Local emails e.g. <i>example@hokodzisec.ac.zw</i>)		
6.	Multimedia Projectors		
7.	Digital Library		
8.	Ready-made electronic media e.g. DVD, CD, etc.		
9.	Fax machine		
10.	Interactive boards		
11.	Other (<i>Specify</i>).....		
12.	Other (<i>Specify</i>).....		

SECTION B

QUESTION: Which challenges do you face in using e-learning tools at Hokodzi Secondary School for Physics teaching?

Directions: **Please tick below the desired/chosen code in the columns**

Key: IN= item number, Items= Challenges, A=Agree, DA= Disagree

Which challenges do you face in using e-learning tools at your school for Physics teaching?

Table 2

IN	Items: Challenges	A	DA
1.	Do you have access to information & communication technologies (ICTs)?		
2.	Is there digital divide among learners? (attitude)		
3.	Are there infrastructural challenges at your school?		
4.	Is technical support readily available at your school		
5.	Have you undergone any training on the use of e-learning tools?		
6.	Do you face any attitudinal challenges, be it from admin, colleagues, or the learners?		
7.	Does your school have any financial constraints to acquire e-learning tools?		
8.	Other (Specify).....		
9.	Other (Specify).....		

SECTION C

QUESTION: To what extent are the available e-learning tools currently being used at Hokodzi Secondary School?

Directions: **Please tick below the desired/chosen code in the columns**

Key: IN= item number, Items= Use of Available tools, A= Agree, SA= Strongly Agree, D=Disagree, SD=Strongly Disagree

Do you agree, strongly agree, disagree, or strongly disagree with the statements below considering the use of available e-learning tools at Hokodzi Secondary School?

Table 3

IN	Items: Use of Available tools	A	SA	D	SD
1.	I can create visual presentation, graphics, charts, and type assignments for students using offline/ ordinary computers				
2.	I can download teaching materials regarding my subject from the internet using online computers				
3.	I can use computer based programs in developing the scheme of work and lesson plan, e.g. Microsoft Word, Excel etc.				
4.	I can use email to send and receive assignments to my students				
5.	I am able to use a learning management system (e.g., Web CT, IUMS, MURUNANI etc.) to support teaching				
6.	I am able to search for data on computer systems and organize them into files e.g. from an online school database.				
7.	I can connect the computer to other peripherals e.g. interactive board, printer, multimedia projector etc.				
8.	I can access and share information on a network e.g. source files.				
9.	I can create a basic presentation using a presentation package e.g. Microsoft PowerPoint and print to various networked printers.				
10.	I can setup and use a Multimedia Projector for classroom delivery				
11.	Other (Specify).....				
12.	Other (Specify).....				

SECTION D

QUESTION: What are the strategies for improving the use of e-learning tools by teachers?

Directions: **Please use either of the listed coding from the key as your response**

Key: IN= item number, Items= Strategies for Improvement, A=Agree, SA=Strongly Agree, D=Disagree

Do you or do you not agree with the below suggestions/strategies to improve the use of e-learning tools?

Table 4

IN	Items: Strategies/suggestions For Improvement	Response
1.	Massive computer literacy programs for teachers	
2.	Adequate provision of Online Computers/ Email	
3.	Connection of classrooms to the internet	
4.	Provision of incentives for courseware development	
5.	Provision of Digital libraries	
6.	Employment of computer technicians for routine repairs (Technical Support)	
7.	Provision of generators or solar systems for regular power supply	
8.	Provision of security to safeguard e-learning tools	
9.	Training and retraining of teachers through seminars, workshops, staff developments, and or conferences	
10.	Other (Specify).....	
11.	Other (Specify).....	
12.	Other (Specify).....	

Thank you for taking your time to complete and submit this questionnaire. Your insights and information are very valuable to the researcher and the nation at large, in analysing the challenges affecting the teacher's use of e-learning tools in secondary education and coming up with alternate suggestions to the problem.

The objectives of this study are to:

- identify challenges faced by secondary school Physics teachers in using e-learning tools,
- determine the extent to which secondary school teachers are using the available e-learning tools in teaching Physics,
- Suggest alternative strategies for enhancing and improving the effective use of e-learning tools by Zimbabwean secondary school Physics teachers.

Use the space below to provide additional comments on how we can come up with viable solutions to the challenges bedevilling the teaching fraternity on the use of e-learning tools.

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Should you have any further questions or concerns about this survey or any of its questions, please kindly contact **Olson Matunga** at +263 772 118 937 or +263 719 118 937

matungaolson@gmail.com or matunga.olson@yahoo.com

Please return your completed QUESTIONNAIRE to

MR MATUNGA
HOKODZI SECONDARY SCHOOL, TECHNICALS DEPARTMENT

APPENDIX 4: Parent/ Guardian Consent Form

Title of Study: Exploring E-learning in Zimbabwean Physics education: Challenges and Opportunities. Case study of Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe.

Researcher: Mr O. Matunga

Purpose of Study: The purpose of the study is to investigate challenges hindering the full-scale adoption and utilisation of e-learning tools as well as identifying the opportunities of e-learning in Physics Education in Zimbabwean Secondary Schools.

Task for the child

The learner will be asked to:

- Complete the printed questionnaire
- Participate in responding to the research questions using approximately 30 minutes of their time, either at home or in school.

Child's Rights

The learner has the right to:

- Withdraw from the study at any time.
- Refuse to respond to answer any questions that they feel uncomfortable answering.
- Request for a copy of their data.

Researcher's Rights and Responsibilities

- The researcher guarantees that the research study is strictly academic,
- The researcher also guarantees confidentiality, that there is not going to be anywhere in the study where names are required nor to be used.
- The researcher is, therefore responsible for upholding the confidentiality clause and purpose of the study strictly confidential.

Signature.....

Date.....

Printed Name.....

Child Name.....

Age.....

By signing, I agree and give my consent for my child to participate in the study. I understand that I may withdraw my consent anytime.

APPENDIX 5: Participant consent form

Title of Study: Exploring E-learning in Zimbabwean Physics education: Challenges and Opportunities. Case study of Hokodzi Secondary School in Murewa District, Mashonaland East, Zimbabwe.

Researcher: Mr O. Matunga

Purpose of Study: The purpose of the study is to investigate challenges hindering the full-scale adoption and utilisation of e-learning tools as well as identifying the opportunities of e-learning in Physics Education in Zimbabwean Secondary Schools

Task for the Participant:

- Complete the printed questionnaire
- Participate in responding to the research questions using approximately 30 minutes of their time, either at home or in school.

Risks and Benefits:

- There are no anticipated risks to participating in this study.
- Benefits include, contributing to knowledge about e-learning tools in education.

Confidentiality:

- Your responses will be kept confidential and anonymous
- Your name and contact information will not be needed, nor linked to your responses whatsoever.

Your Rights:

- You have the right to withdraw from the study at any time.
- You have the right to refuse to respond to answer any questions that they feel uncomfortable answering.
- You have the right to request for a copy of their data.

Signature.....

Date.....

Printed Name.....

Contact Information (*Optional*).....

By signing, I agree and give my consent for my child to participate in the study. I understand that I may withdraw my consent anytime.