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DEPARTMENT OF SCIENCE AND MATHEMATICS EDUCATION

AN ASSESMENT OF THE IMPACT ON APPLYING INFORMATION COMMUNICATION
TECHNOLOGY IN TEACHING AND LEARNING OF BIOLOGY AT CHEMHONDORO
SECONDARY SCHHOL IN SHAMVA DISTRICT MASHONALAND CENTRAL
PROVINCE

BY

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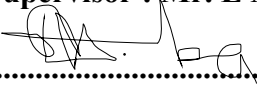
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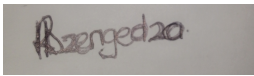
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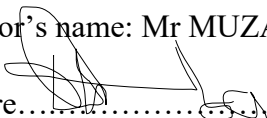
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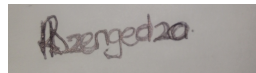
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DECLARATION

I, Dzengedza Alice Ruvimbo, declare that this thesis is my own unaided work. It is being submitted in the fulfillment of requirements of the Bachelor of Science Education Honours Degree in Biology (HBSc Ed. Bz.) at Bindura University of Science Education (BUSE).

Student's Signature

A rectangular box containing a handwritten signature in dark ink. The signature appears to be 'Dzengedza' followed by a stylized flourish.

...Date...02 FEBRUARY 2025.....

DEDICATION

This research is dedicated to my family,most importantly my mother ,children and not forgetting my father who accorded me unwavering encouragement to education and the whole lot of my upbringing

ACKNOWLEDGEMENTS

I would like to thank the almighty God who accompanied and directed me to achieve success throughout this study .I would like to extend my sincere gratitude to all contribution of all participants who kindly agreed to participate in the study . They generously gave their time and attention to the research and without them this study would have been impossible. I give thanks to my supervisor Mr MUZAMBA and my colleagues for their support and constructive criticism .lastly I would like to thank my family for their understanding and financial support.

ABSTRACT

The invention of Information and communication technology has made tremendous changes in the present-day world. The advent of Information and Communication Technology (ICT) has revolutionized the world in many ways, including education. In the past, classrooms were typically filled with chalkboards, textbooks, and lectures. However, as technology has advanced, so has our ability to incorporate it into the classroom. ICT has brought about a paradigm shift in the way teaching and learning are carried out in schools, colleges, and universities. The use of ICT in teaching has enabled teachers to create a better learning environment for students, making it easy for them to grasp complex concepts and ideas. This write-up explores the impact of ICT in teaching and learning Biology and how it has transformed education. No area has been influenced by this digital phenomenon. The advent of ICT in education helped to improve the quality of education where teaching and learning eventually became an engaging active process related to real life. Active and collaborative learning conditions facilitated by ICT help to develop a knowledge-based student community. This gives an overview of the use of ICTs in the field of education focusing on its impact on the teaching-learning process, quality and accessibility of education, motivating learners, learning environment, and student's academic performance. It includes both the positive and negative impact of ICT on teaching and learning in schools. Discussion on the impact is thoroughly done and recommendations are given in this paper. The literature review highlights the positive impacts of ICT on teaching and learning Biology in secondary schools in Shamva. It explores the integration of ICT in classrooms, access to digital resources, e-learning and blended learning, and teacher professional development, as well as the challenges faced. Understanding the benefits and challenges of ICT implementation in this context is crucial for policymakers, educators, and stakeholders to design effective strategies and support systems to enhance teaching and learning Biology outcomes in secondary schools across Zimbabwe.

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CHAPTER 1

1.1 Introduction

This chapter articulated the research problem and traced its background. The chapter also covered the statement of the problem, the overall aim of the study, the research objectives and research questions. It also dealt with significance of the study, delimitation, limitations and definition of keys terms.

1.2 Background to the Study

ICT has become an everyday entity in every aspect of life. Alhirbi,S (2021) argues that ICTs are now one of the key cornerstones of contemporary society. Several nations now consider using ICT and grasping the simple elements and concepts of ICT as components of the center of teaching and learning, together with reading, inscription and enumerating skills. Over the past two decades, ICT has profoundly changed the practices and processes of almost all forms of activities inside enterprise, education and policy makers.

With the use of hand-held devices, personal computers and social media platforms such as Skype and WhatsApp, teaching instructors and learners can easily hook up, simplifying the instructional and learning atmosphere to take diverse inventive arenas. Sometimes it's apparently problematic to deal with quality education without mentioning ICT. The introduction of ICT in institutions of learning and in the learning, process was motivated by worldwide forces which are out of reach of the school-based decision making (Voogt, 2010).

Conducting a study on the impact of applying Information Communication Technology (ICT) in the teaching and learning of Biology, particularly in secondary schools within the Shamva District of Mashonaland Central Province, was prompted by a general low Academic Performance in Biology.

Data from national examinations such Zimbabwe School Examinations Council results show a consistent trend of low pass rates in Biology compared to other subjects. This indicated a need for innovative teaching methods, such as the integration of ICT, to enhance understanding and engagement.

Observations and reports revealed that many secondary schools in Shamva District face challenges related to inadequate teaching resources. For example, the lack of biology

laboratories, textbooks, and practical materials can significantly hinder effective teaching and learning. The introduction of ICT tools could supplement these resources by providing digital simulations, multimedia presentations, and virtual labs.

Preliminary surveys and focus group discussions with students might indicated a low level of motivation and interest in Biology. In contrast, students reported a preference for interactive and multimedia learning experiences that ICT can provide, such as educational apps, online simulations, and interactive videos.

Research from various educational bodies supports the integration of ICT in the curriculum to promote active learning, creativity, and critical thinking. The UNESCO Global Education Monitoring Report emphasizes the role of technology in teaching and learning, underscoring its effectiveness in fostering inclusive and quality education. The introduction of ICT in the teaching and learning of Biology can uplift learners' knowledge and attitude toward the subject. In the current century, technology is a fundamental matter in several disciplines such as education as it has become the data transfer freeway in most nations. It has passed through modifications and changed our communities (Grade, 2007).

Furthermore, National and regional educational policies, such as Zimbabwe's ICT in Education policy, advocate for the incorporation of technology in teaching. This backdrop suggests that the study is timely and aligns with broader educational goals. Taking into account these pieces of evidence helped to underscore the necessity and relevance of this research topic, contributing to a better understanding of how ICT could improve the teaching and learning of Biology in Shamva District's secondary schools. The findings from the study could further inform educational practices and policy enhancements in the area.

1.3 Statement of the problem

The integration of Information Communication Technology (ICT) in education has been widely recognized as a catalyst for improving teaching and learning outcomes across various subjects. In the context of Shamva District in Mashonaland Central Province, however, there appears to be a significant gap in the effective use of ICT in the teaching of Biology, which may be contributing to poor student performance and low interest in the subject. Traditional pedagogical

methods, coupled with limited access to laboratory facilities and educational resources, hinder students' ability to grasp complex biological concepts and engage in inquiry-based learning. Furthermore, teachers often lack the necessary training and support in utilizing ICT tools effectively, leading to a disconnect between the technological capabilities available and their application in the classroom.

To address these challenges, the primary objective of this study is to assess the current level of ICT integration in the teaching and learning of Biology at selected secondary schools in Shamva District. This entails evaluating the availability of ICT resources, the training of educators, and the extent to which these technologies are utilized in lesson planning and delivery. By understanding the current state of ICT use in Biology education, the study aims to identify barriers to effective implementation and potential areas for improvement.

In addition to assessing the current use of ICT, the research will seek to determine the perceived impact of ICT on student learning outcomes and engagement in Biology. This includes evaluating students' attitudes toward learning the subject with the aid of technology and measuring any changes in academic performance. By collecting data from students and teachers, the second objective will be to establish a clearer understanding of how ICT can enhance the learning experience, making it more interactive and relevant to students. Finally, the study aims to formulate recommendations for best practices in ICT integration tailored to the unique context of Shamva District, thereby contributing to improved educational practices and outcomes in Biology.

1.4 Objectives of the Study

The study was guided by the following research objectives:

- To evaluate the current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District, focusing on the availability of technological resources, teacher training, and the methods used by educators to incorporate ICT into their lessons.
- To analyze the impact of ICT on student engagement and learning outcomes in Biology, by assessing student attitudes towards the subject, identifying changes in academic

performance, and exploring the effectiveness of various ICT tools and resources in enhancing the understanding of complex biological concepts.

- To identify the challenges and barriers faced by educators and students in effectively utilizing ICT for teaching and learning Biology, and to formulate practical recommendations and best practices for enhancing ICT integration in the curriculum of secondary schools in Shamva District.

1.5 Purpose of the study

The purpose of this study was to investigate the role of Information Communication Technology (ICT) in enhancing the teaching and learning of Biology in selected secondary schools in Shamva District, Mashonaland Central Province. By examining the current integration of ICT in the educational process, the study aimed to identify obstacles that both educators and students face in utilizing these technologies and to assess the impact of ICT on student engagement and academic performance. Ultimately, the study sought to provide evidence-based recommendations that can facilitate improved ICT practices within the Biology curriculum, thereby fostering more effective learning environments.

- To evaluate the current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District. This objective directly aligns with the study's purpose by seeking to assess how existing ICT resources are utilized within Biology instruction, providing a baseline understanding of the current educational environment.
- To analyze the impact of ICT on student engagement and learning outcomes in Biology. This objective supports the purpose of the study by focusing on students' experiences and perceptions regarding the use of ICT in their learning. By measuring any changes in engagement and performance, the research will shed light on the effectiveness of these technologies in enhancing the educational experience.
- To identify the challenges and barriers faced by educators and students in effectively utilizing ICT for teaching and learning Biology, and to formulate practical recommendations for enhancing ICT integration. This objective aligns with the overarching purpose of the study by addressing potential limitations in the current

integration of ICT and providing actionable insights that can lead to improved pedagogical practices and better student outcomes in Biology.

In sum, the purpose of the study encapsulates the essence of the research objectives, creating a coherent framework that aims to understand and enhance the use of ICT in Biology education within the context of Shamva District.

1.6 Research Questions

The study sought to assess the following research questions

- What is the current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District?
- How does the use of ICT in Biology education affect student engagement and learning outcomes in selected secondary schools in Shamva District?
- What challenges and barriers do educators and students face in effectively utilizing ICT for teaching and learning Biology in selected secondary schools in Shamva District?

1.7 Significance of the Study.

The study on assessing the impact of applying Information Communication Technology (ICT) in the teaching and learning of Biology in selected secondary schools in Shamva District holds critical significance for various stakeholders, including learners, teachers, researchers, school administrators, and policymakers. Below is a discussion of the significance of the study for each group

- Learners

The study's findings can provide insights into how ICT tools improve learner engagement, motivation, and comprehension of complex biological concepts. By identifying effective ICT resources and methods, the study may help learners achieve better academic outcomes in Biology. Exposure to ICT in education equips learners with essential digital skills that are increasingly important in both higher education and the job market.

- Teachers

The study highlights the importance of teacher training and integration strategies, thereby guiding teachers in enhancing their instructional practices with ICT. Educators can learn about effective ICT tools and methodologies to improve their lesson planning and delivery, making learning more interactive and impactful. By understanding the barriers faced in ICT integration, teachers can seek targeted support and develop strategies to overcome these obstacles.

- Researchers

The study adds to the existing body of research on ICT in education, particularly within the context of Biology teaching and learning. By identifying gaps in ICT integration and its effects on learning, this research can serve as a basis for further investigations into technology use in other subjects or regions. Researchers gain insights into effective methodologies for assessing ICT impacts in educational settings, which can be applied in similar studies.

- School Administrators

The findings can guide school administrators in making strategic decisions regarding ICT investments, resource allocation, and teacher training programs. Understanding the challenges faced by teachers in ICT integration can prompt administrators to provide necessary support and resources, fostering a more conducive teaching environment. The study's insights can assist school leaders in developing curricula that leverage ICT effectively, aligning with contemporary educational trends.

- Policy Makers

The study can inform policymakers about the current landscape of ICT integration in education, leading to the formulation of effective policies that support ICT in schools. Insights from the study may highlight the need for investments in technology and training, influencing budget allocations and funding for educational technology initiatives. The findings can help policymakers establish frameworks for continuous professional development in ICT for teachers, ensuring they are equipped to use technology effectively in their classrooms.

In summary, the significance of this study extends across multiple stakeholders, providing valuable insights that can lead to improvements in educational practices, policies, and outcomes. By aligning ICT with the needs of learners and the demands of modern education, the study aims

to contribute to a more effective and engaging teaching and learning environment in Biology education.

1.8 Assumptions of the study.

The following assumptions guided the research on assessing the impact of applying Information Communication Technology (ICT) in the teaching and learning of Biology in selected secondary schools in Shamva District. These assumptions incorporated the benefits of ICT, the challenges faced in its implementation, and potential solutions.

- It was assumed that the effective integration of ICT tools and resources in the teaching and learning of Biology would lead to improved student engagement and academic performance. The study posits that ICT can facilitate interactive learning experiences, enabling students to better understand complex biological concepts through multimedia resources, simulations, and virtual labs.
- The assumption here was that the availability and accessibility of ICT resources in secondary schools play a critical role in the effectiveness of their use in Biology education. It was believed that schools with adequate technological infrastructure (such as computers, software, and internet access) will see higher levels of ICT integration, leading to more positive learning outcomes. Conversely, limited access to resources can hinder the effective use of ICT in teaching.
- This study assumed that the level of teacher training in ICT significantly influences their ability to integrate technology into their Biology teaching practices. It is assumed that teachers who receive adequate professional development and training in using ICT tools will be more effective in incorporating these resources into their lessons, thereby enhancing student learning experiences.
- The study assumed that while challenges such as lack of technical support, resistance to change, and inadequate training exist in the integration of ICT in Biology education, these challenges can be effectively addressed through targeted solutions. For example,

providing ongoing professional development, developing user-friendly resources, and creating a supportive school culture for technology integration are potential solutions to overcome these barriers.

- It was assumed that students' attitudes and perceptions toward ICT would significantly affect their engagement and overall learning experience in Biology. The study posits that positive attitudes towards technology can enhance students' willingness to participate in lessons and explore biological concepts more deeply.
- The study assumed that fostering collaboration among teachers, between teachers and students, and within the school community can improve the implementation of ICT in Biology education. Establishing support networks, such as peer mentorship programs and collaborative planning sessions, is believed to help educators share best practices and overcome individual challenges faced during ICT integration.
- Finally, it was assumed that the integration of ICT not only benefits student learning but also leads to the overall improvement of teaching practices in Biology. The study asserts that through the use of technology, teachers can utilize innovative instructional strategies that cater to diverse learning styles and needs, thereby enhancing the quality of education.

These assumptions were fundamental to guiding the study's methodology and interpretation of results. By considering the benefits of ICT, recognizing the challenges involved in its implementation, and proposing solutions, the study aimed to provide a holistic view of how technology can transform the teaching and learning of Biology in secondary schools within Shamva District.

1.9 Definition of terms.

The key terms in this study are ICT, Teaching, Learning, Secondary School and Biology.

Here are definitions for the terms "learning," "teaching," and "ICT," including two citations for each term along with a contemporary definition.

➤ Learning

Learning is a process that involves acquiring knowledge, skills, attitudes, or competencies through experience, practice, or study. Merriam-Webster (2021): "Learning is the acquisition of knowledge or skills through experience, study, or being taught." Kolb (1984): "Learning is the process whereby knowledge is created through the transformation of experience."

In today's digital age, learning can be defined as an ongoing process of personal and professional development that incorporates various modalities, including online platforms, social interactions, and self-directed study, enabling individuals to adapt to changing environments and demands in a complex world.

➤ Teaching

Teaching is the act of facilitating learning by providing instruction, guidance, and support to help learners acquire knowledge or develop skills. National Education Association (NEA, 2020): "Teaching is to engage students in a learning process involving interaction, communication, and practice. "Mayer (2004): "Teaching is an instructional process designed to promote learning through the presentation of information and opportunities for practice and feedback." Teaching can be viewed as a dynamic and collaborative endeavor that embraces diverse instructional strategies, including technology integration, to meet the needs of diverse learners while fostering critical thinking, creativity, and problem-solving skills.

➤ ICT (Information and Communication Technology)

ICT refers to a broad range of technologies that facilitate the access, sharing, and management of information, encompassing various devices, software, and communication tools. UNESCO (2002): "Information and Communication Technologies (ICT) refer to technologies that provide access to information through telecommunications, the internet, and other digital means." OECD (2011): "ICT encompasses all digital technology that assists individuals, businesses, and governments in using information. "In the 21st century, ICT represents not only the technological tools used in education but also the collaborative and innovative applications of

these tools that enhance learning experiences, communication, and collaboration among students and educators across diverse contexts.

- Teaching: Mpofu, (1994) defines teaching as systematic activities by which the teacher helps the learner on how to do certain things that will assist the learner cope with and improve on his/her environment. In Education, teaching is defined as the process of interaction with learners to enable their appreciation and application of knowledge, concepts and processes. According to Morrison (1995) teaching is considered as an intimate interaction between personalities where one is mature and the other less mature one.
- Learning: Joyce and Weil (1985) define learning as the process of obtaining new thought, knowledge, manners, competencies, values, attitude and choices. Learning is the moderately permanent change in a person's understanding or conduct. It is therefore the transformative progression of acquiring information that, when adopted and mixed with what has been experienced, changes on what a person knows and on what a person does.
- ICT: ICT stands for information and communication technology. It is a term that emphasizes on the functions of unified interactions and the incorporation of telecommunications and personal computers, including the essential software and audiovisual structures that enable operators to access, store, and transfer and use information. In education, it involves information and communication technology upkeep, improve and maximize the delivery of information.

1.9 Delimitation of the study.

Delimitations refer to the boundaries or scope that a researcher establishes for a study. In the context of assessing the impact of Information Communication Technology (ICT) in the teaching and learning of Biology in selected secondary schools in Shamva District, the study is specifically delimited to three schools within the district. The following are the key delimitations and their justifications:

- The study is confined to three secondary schools in Shamva District.

This geographical limitation allows for a focused analysis of the specific context and environment of these schools. By concentrating on a localized area, the study can provide in-depth insights into the unique challenges and opportunities related to ICT implementation in that particular setting. The findings may not be generalizable to other regions, but they will offer valuable lessons learned that can inform local education stakeholders.

- The research will only include three selected schools based on predefined criteria (e.g., availability of ICT resources, level of ICT integration, or academic performance in Biology). By deliberately choosing schools with varying levels of ICT integration, the study aims to capture a range of experiences and perspectives that reflect the diversity within the district. This targeted sampling enables a more detailed exploration of how different contexts influence the application and effectiveness of ICT in teaching and learning Biology, enhancing the depth of the analysis.
- The study is centered solely on the teaching and learning of Biology, without examining other subjects. Focusing specifically on Biology allows for a comprehensive investigation into pedagogical practices unique to this subject. Given the nature of Biology, which often involves complex concepts that can benefit from visual and interactive ICT tools, this delimitation helps isolate variables that specifically impact the teaching and learning process in Biology, providing clearer insights into the relationship between ICT and education outcomes in this discipline.
- The study will be conducted within a specific academic year. Limiting the research to a particular time frame allows for a manageable data collection process and ensures that the information gathered reflects current ICT practices and challenges faced in the selected schools. A defined time frame also facilitates a focused analysis of ICT implementation, as educational contexts can evolve rapidly with the progression of technology.
- The study will include only teachers and students directly involved in Biology classes, excluding other educational stakeholders such as parents or school administrators. This narrow focus on teachers and students ensures that the study gathers relevant data from

those most directly engaged in the foundational processes of teaching and learning. By excluding other stakeholders, the study can delve deeper into the specific dynamics of the teaching-learning relationship in the context of ICT, leading to richer and more applicable findings.

In summary, the delimitations of this study serve to provide clarity and a focused approach to investigating the impact of ICT on Biology education in Shamva District. While the findings may not be generalizable beyond this specific context, they will offer important insights for educators, policymakers, and researchers interested in the effective integration of technology in the teaching and learning processes.

The study was conducted at one secondary school in Mashonaland Central. It mainly focused on the Ordinary Level learners in form 4 studying biology. The study lessons were conducted during Term three of the school Calendar and a specific topic was taught for three weeks.

1.10 Limitations.

In any research project, it is crucial to acknowledge the limitations that may affect the study's findings. These limitations can influence the validity, reliability, and generalizability of the results. Below are the specific limitations associated with the study of the impact of Information Communication Technology (ICT) in the teaching and learning of Biology in three selected secondary schools:

1.10.1 Sample Size

The study is limited to three secondary schools, which may not provide a comprehensive view of the ICT integration landscape across all secondary schools in Shamva District or beyond. A small sample size can limit the generalizability of the findings. The experiences and practices observed may not represent the larger population of schools in the district or other regions. As a result, the study may not capture the full range of challenges and successes associated with ICT integration.

1.10.2 Participant Bias

The data collected will primarily come from self-reported surveys and interviews with teachers and students, which can introduce bias based on personal perceptions and experiences. Participants may present their experiences in a more favorable light or may not

accurately recall past events. This self-reporting bias could skew the data, leading to overestimations or underestimations of the actual impact of ICT on teaching and learning in Biology.

1.10.3 Limited Duration

The study is conducted over a single academic year, which restricts the observation of long-term effects of ICT integration in teaching and learning. The limited time frame may not adequately capture seasonal variations in teaching and learning patterns, such as exam preparation periods or changes in curriculum. Consequently, the findings may not reflect the sustainable impact of ICT on student performance and engagement over a longer period.

1.10.4 Variability of ICT Resources

There may be significant differences in the availability and quality of ICT resources among the three schools selected for the study, such variability can lead to inconsistent experiences among participants. If one school has significantly more advanced technology or access to resources than the others, it may skew the results, making it challenging to draw meaningful conclusions regarding the overall effectiveness of ICT in the teaching and learning of Biology.

1.10.5 Contextual Factors

The study may not account for external factors that can influence teaching and learning, such as socio-economic conditions, parental support, or differences in school administration policies. These contextual factors can play a crucial role in how effectively ICT is integrated into the classroom. Failing to consider these variables may lead to an incomplete understanding of the study's findings and limit the researchers' ability to provide comprehensive recommendations.

1.10.6 Researcher Bias

The researcher's background, beliefs, and perspectives may unintentionally influence the design, data collection, and interpretation of the study. Researcher bias can affect the objectivity of the study. If the researcher has a strong belief in the benefits of ICT, they may unconsciously emphasize positive responses or overlook negative ones. This bias can compromise the credibility and neutrality of the research findings.

1.10.7 Data Collection Methods

The reliance on qualitative data collection methods (such as interviews and open-ended surveys) may lead to challenges in analyzing the data systematically. Qualitative data can be subject to interpretation and may lack the rigor of quantitative analysis. This subjectivity may affect the consistency and reproducibility of the results, making it difficult to compare findings across the three schools or draw definitive conclusions.

Acknowledging these limitations is important for contextualizing the findings of this study. While the research may provide valuable insights into the impact of ICT on Biology education, it is essential for readers to recognize the constraints that may influence the interpretation of the results. Future research could address these limitations by expanding the sample size, incorporating quantitative methods, and extending the study duration.

1.11 Summary

The chapter presented the problem under study and its background. This chapter included the background knowledge and problem statement that describes a need for this study. In addition, Chapter 1 focused on the nature of the study, which included the selection of a case study design that has a specific scope and delimitations and limitations. Also included in this chapter was a discussion of the significance of the study, which is connected to knowledge advancement. The next chapter presents the review of related literature.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The integration of Communication Technology Tools (CTTs) into the educational landscape has

transformed the paradigm of teaching and learning across various disciplines, including Combined Science. As a critical component of modern educational practice, CTTs encompass a range of digital resources and platforms such as online collaborative tools, multimedia presentations, virtual laboratories, and learning management systems (LMS). This chapter aims to explore the existing body of literature on the impact of CTTs in the teaching and learning of Combined Science, specifically focusing on three selected secondary schools in Mashonaland Central Province.

2.2: ICT integration impacted the teaching and learning in Zimbabwe

The adoption of CTTs in educational settings has been linked to enhanced student engagement, improved academic performance, and the development of critical thinking skills. Scholars argue that CTTs facilitate interactive learning environments, allowing educators to present complex scientific concepts in more accessible and engaging formats. For instance, multimedia resources such as videos and simulations can help demystify abstract theories, making them easier for students to comprehend (Earle, 2002; Lai & Hwang, 2016). Furthermore, the incorporation of CTTs promotes collaborative learning, enabling students to work together across different geographic locations and leverage diverse perspectives in problem-solving scenarios (Garrison & Anderson, 2003).

Despite the potential benefits, the integration of CTTs into Combined Science instruction is not without challenges. Barriers such as inadequate infrastructure, limited teacher training, and varying levels of digital literacy among students can hinder effective implementation (Hew & Brush, 2007). Understanding these obstacles is crucial, particularly in the context of Mashonaland Central Province, where socio-economic factors often influence educational access and quality. This chapter will critically review relevant literature, identifying both the advantages and drawbacks of using CTTs in science education.

In examining this literature, the chapter will be organized thematically, addressing key areas such as the pedagogical implications of CTTs, their impact on student motivation and achievement, and the challenges faced by educators in integrating technology into the curriculum. Through this exploration, the literature review aims to contextualize the findings from the case studies in the selected secondary schools, ultimately providing insights that can inform practice and policy in the field of science education within the province.

As we delve into the literature, the ultimate goal is to highlight the transformative potential of CTTs in enhancing the teaching and learning process in Combined Science, while also acknowledging the multifaceted challenges that practitioners and institutions must navigate. The following literature review demonstrates the effectiveness and benefits of integrating and using ICT in making the educational process more enjoyable as well as the teachers and learners' perspectives on the integration of ICT in the teaching and learning of textiles and clothing technology. A significant problem to this study is the lack of research of the use of science technology by students {Barko and Saddler, 2013) perceptions of the learning material and the impact of technology on the student for A level biology learning. Little is known about the impact of modern technology in Advanced level biology for CZA high school students. A review of the current research literature for this study established relevance of the research problem.

The integration of Communication Technology Tools (CTTs) into education has significantly reshaped teaching and learning methodologies. This chapter reviews the relevant literature on the application of CTTs in the teaching and learning of Combined Science, particularly in the context of three selected secondary schools in Mashonaland Central Province. By examining the theoretical frameworks, empirical studies, benefits, challenges, and implications of CTTs, we can acquire a comprehensive understanding of their impact on educational outcomes.

2.3 The Impact of Communication Technology Tools on Teaching and Learning globally

2.3.1 Enhancing Student Engagement and Motivation

Research has shown that CTTs can enhance student engagement and motivation in science education. For instance, Belland et al. (2017) found that the use of digital simulations and interactive software significantly increases student interest and participation in science topics. The interactive nature of these tools allows students to take an active role in their learning, fostering a deeper understanding of scientific concepts.

2.3.2 Improving Academic Performance

Several studies indicate a positive correlation between the use of CTTs and improved academic performance in science subjects. A meta-analysis by Vongkulluksn et al. (2018) demonstrated that students who used technology-enhanced instructional methods consistently outperformed

their peers in traditional settings. Moreover, the use of virtual laboratories enables students to conduct experiments that may not be feasible in physical labs due to constraints such as safety or resource availability (Ferguson, 2012).

2.3.3 Promoting Collaborative Learning

CTTs also facilitate collaborative learning, which is essential for developing critical thinking and problem-solving skills in students. Hew & Cheung (2014) noted that tools such as discussion forums and collaborative project platforms enable students to communicate, share resources, and work together, ultimately enriching the learning experience. This collaborative approach is particularly valuable in Combined Science, where interdisciplinary connections are vital.

2.3.4. Benefits Of Integration Of Technology In The Teaching And Learning

The application of technologies in education is changing learners' experiences both inside and beyond the classrooms. The benefit of using technology in education has been well-researched. Mobile devices facilitate the connection between tutors and learners to use computing capabilities anywhere. The internet and wireless technology promote interlink amidst mobile gadgets with other computing devices such as computers, tablets, and other items (Hinostroza et al., 2016). In her study, Wijdan **Al-Shammari (2019)**, has examined the impact of contemporary technology on education in the Faculties of Fine Arts, and referred to the new vision brought by tablets and graphic tools. Al-Shammari used the experimental method for her research sample, which consisted of 32 male and female students. The results have indicated that the use of tablet computers and graphic tools in arts in general are important variables in the technical manifestations of electronic forms. This has established an integrated system that displaced the historical values of plastic arts and their associated tools by virtual brushes, colors, tools and effects that have been brought by computer software, thus enabling learners to produce various characteristics.

Ottenbreit-Leftwich and others (2010) stated that the use of technology in education is important to motivate student learning. Goldin and Katz (2018) researched on three factors that increase students' motivation in the technologically enhanced setting. The factors included communication, learning, and empowerment as students appreciated how they interact with others in real time by using technologies such as computers. Connecting with others is made possible by the internet enabling real-time communication. The learners were empowered in a

technology surrounding, as they were secluded from teachers and were less scared of relating to others. Learners believed that computer enables them to have control over their learning by promoting independence (Goldin & Katz, 2018).

The existence of technologies in the class set up learning has been effective particularly in ensuring the improvement of in-service teacher education and preparation for pre-service instructors to make sure successful alignment of educational technology in the learning activities. Recently teacher-learning establishment is making an effort to prepare for pre-service tutors to make sure there is an integration of technology into the future teaching practices (Anderson, 2016).

Ereiter and others (2006) maintained that integration of technology can help students improve several general skills such as problem solving and self-regulation or ICT skills. Hew et al. (2007) and Hennessy et al. (2005) maintained that technology integration has found about how teachers use technology to convey familiar activities more reliably and productively.

Other studies have shown that “there is an evolving relationship between education and technology, and the evolving pedagogies have also taken advantage of newly designed or emerging technologies. Diane and Steven (2007), stated that ubiquitous computing is being used for education and training to provide “augmented reality” interfaces, which are characterized by the use of handheld computers to infuse the virtual world onto the real one, resulting in deeply immersive simulations. Oliveira et al., (2019) carried out a review literature on emergent technologies from the field of science education. She maintains that technological artifacts such as computer simulations, virtual labs, mobile devices, robots, games, and digital photography and drawing are increasing the experience of learners. A study by Berland and Wilensky (2015) comparing the effectiveness of curricular units in supporting students’ complex systems and computational thinking has shown that “students using the physical system were more likely to interpret situations from a bottom-up (“agent”) perspective, and students using the virtual system were more likely to employ a top-down (“aggregate”) perspective.

2.4 Challenges Faced in Integrating CTTs in Combined Science Education

Despite the benefits, several challenges impede the effective integration of CTTs in the teaching and learning process.

2.4.1 Infrastructure Limitations

In many regions, including Mashonaland Central Province, inadequate technological infrastructure remains a significant barrier. Many schools lack reliable internet access, sufficient hardware, and technical support, limiting the feasibility of implementing CTTs in classrooms (Sife et al., 2007).

2.4.2 Teacher Preparedness and Training

The proficiency of teachers in using CTTs is crucial for successful integration. However, studies, such as those by Ertmer (2005), indicate that many educators do not feel adequately trained or confident in utilizing technology effectively. The lack of professional development opportunities further exacerbates this issue, leading to a reliance on traditional teaching methods.

2.4.3 Teachers' Perspectives On The Application Of ICT In The Teaching and Learning

Underwood, (2006) provides evidence that teachers use ICT to support existing pedagogies. On supporting this view, Romboll Management, (2005) illustrates the current dilemma concerning the pedagogical use of ICT in the classroom. He states, "Even though a large number of teachers have gained more pedagogical knowledge (through better access to ICT-based materials and pedagogical concept via training and discussion), teachers have increased the use of ICT in teaching and learning". Similar positive results are affirmed by Haggins (2005) by stressing that an overwhelming majority of teachers have confidence in using ICT in classroom. ICT gives teachers access to information to support them in trying new strategies, thinking, reflecting on practice and engaging with new materials, committee on development in the science of learning, (2000). There is no doubt that teachers who use ICT in classrooms have to demonstrate high levels of energy, hard work and confidence, Lanksher & Snyder, (2000).

In addition, a number of studies have found that, "personal access for teachers to a computer for the purpose of preparation and planning is one of the strongest influences on the success of ICT training and subsequent classroom use", office for standards in Education, (2002). Becta, (2002), also supports that enthusiastic and visionary leadership has a positive impact on teachers' attitudes and behaviors.

2.4.4 Students Perspectives Towards Application of ICT To Enhance Teaching And Learning

The use of ICT in schools should have a positive impact on students in terms of supporting their learning and providing them with relevant technological literacy. In addition, ICT should increase the engagement of students and in most cases increase their independence, so that students are not only required to use ICT completely but may also be required to adjust to change in their role. In many cases, the students' role becomes more;

- i. Independent and responsible
- ii. Co-operative and collaborative
- iii. Directive and negotiate.

It follows from the above that there is need to develop students' computer literacy because research studies indicate that students assume greater responsibility for their own learning when they use computer, working more independently and effectively, Becta, (2002). Eurydice (2005) argues that students' ICT skills cannot only be learnt in school but also in informal content, at home and with friends. It is emphasized that students' informal learning and experiences in using ICT are far more attractive than the school can offer. As a result, students face few challenges using ICT in school. Rockman and Chessler, (2000) found in their studies that students' computer literacy improves their academic achievements and positive attitudes in learning. Research studies further indicate that learners participate more actively when ICT is used in learning. However, some students may become frustrated when they perceive that their ICT skills are being under-estimated and under-utilized, Becta (2002). Therefore, teachers are required to use ICT integration in teaching and learning effectively in order to realize the objective of ICT integration.

The e-learning Nordic, (2006) studies also place a strong emphasis on ICT, positive impact on what might be called secondary or indirect variables such as motivation, concentration, engagement, cognitive processing, creativity, critical thinking, independent learning and teamwork. According to Comber, (2002), and Higgins, (2005) increased motivation goes together with a positive learning and leads for example to more attention during lessons with students being involved in learning activities. 22 Teamwork between students is greater when

they use ICT for T for project work, Romboll Management, (2006), Kezzel (2005). The above affirms that ICT enhances a more student-centered learning approach which is of important benefit to learners. They further identified that involvement and increased effectiveness of learning is also a key impact of ICT in the classroom. It also helps students to reflect on what and how they have learnt and thus a catalyst for reflection. Romboll Management, (2006) indicates that learners with special needs or behavioral difficulties also gain in different ways from the use of ICT. Finally, there can be a positive impact on students when ICT is used appropriately in learning.

2.4.5 Varying Levels of Student Digital Literacy

Students' varying levels of digital literacy can also pose challenges. While some students may embrace technology, others may struggle due to limited exposure or experience (Van Dijk, 2005). This disparity can create inequalities in learning opportunities, undermining the overall effectiveness of CTTs in diverse classrooms.

2.5 Implications for Practice and Policy

The findings from existing literature suggest that while CTTs have the potential to enhance the teaching and learning of Combined Science, careful consideration of the local context is essential. Schools in Mashonaland Central Province can benefit from targeted investments in infrastructure and technology, as well as teacher training programs designed to build digital competencies. Additionally, fostering a culture of collaboration among educators can facilitate the sharing of successful practices and resources, ultimately enhancing the quality of science education.

2.6 Conclusion

In summary, the existing literature illustrates the transformative impact of Communication Technology Tools on teaching and learning in Combined Science. However, significant challenges remain, particularly in resource-constrained settings. By addressing these challenges through strategic interventions, stakeholders can leverage CTTs to create more engaging, equitable, and effective learning environments for students. By synthesizing existing literature, this review provides a foundational understanding for investigating the specific context of three secondary schools in Mashonaland Central Province. The identified themes will guide the research methodology and analysis, ultimately contributing to an informed understanding of the

role of CTTs in science education. The effectiveness of ICT in teaching and learning is most definitely not a cheap solution for secondary education, but by facilitating the creation of new modes of teaching and learning and provision of education resources, it is believed to have a significant role to play in education sector. To date the effectiveness of ICT tools into teaching and learning has not been successful. However, emphasis has been put across the continent to provide teachers and students with relevant ICT skills in the hope that this will mystically enable them to embrace the use of ICT positively in teaching and learning in learning institutions.

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter exposes the research methodology applied in this investigation to assess the impact of Information Communication Technology (ICT) in teaching and learning Biology at Chemhondoro Secondary School. The study employed qualitative research methods to gather comprehensive insights on how ICT is utilized in biology education and its effects on student learning outcomes.

3.2 Research Approach

This study used a case study as its research approach. This involves an in -depth exploration of a particular instance, event or phenomenon within its real-life context. In this study the focus was specifically on educational settings where ICT is integrated into the biology curriculum. This approach was incorporated to understand how ICT tools affect teaching methods, student engagement, learning outcomes, and the overall educational experience in Biology classes.

3.3 Research Design

Creswell & Poth (2018) define research design as “the plan or proposal to conduct research that includes the selection of qualitative, quantitative, or mixed methods, along with the specific procedures and actions to implement the study.” This emphasizes the choice of methodology and detailed steps that guide data collection and analysis. Bryman (2016) defined research design as a “framework for collecting and analyzing data,” noting that it includes decisions on how to sample participants, how to gather data, and how to analyze it. This definition highlights the importance of structuring the investigation systematically. Kothari (2021) is of the opinion that research design is “the blueprint for fulfilling research objectives and answering research questions.” He notes that it encompasses decisions regarding the type of research (descriptive, exploratory, and explanatory) and the methods used (case studies, surveys, experiments). Flick (2021) defines research design as “a strategic framework for the collection and analysis of data” that helps to define “the decisions that guide the entire research process.” This perspective emphasizes the strategy behind the research, influencing how data is collected and understood.

Robson & McCartan (2016) state that “research design is the structure that guides research in every field by laying out a clear path through the different research stages.” They stress the importance of aligning the research design with the research problem to ensure effective findings that are credible and relevant.

Summary Definition:

Research design is a structured plan that outlines the methodology, procedures, and techniques for conducting a study to answer specific research questions or achieve defined objectives. It encompasses the selection of a research type (qualitative, quantitative, or mixed), sampling methods, data collection, and analysis strategies, providing a coherent framework for the entire research process.

The research utilized a descriptive survey design. This design allows for the collection of data from a diverse group of participants, including students and teachers. The descriptive survey is particularly appropriate for this research as it seeks to capture the current state of ICT integration in the Biology classroom and its impact on teaching and learning experiences. Bryman (2016) states, “A descriptive survey aims primarily to provide a factual account of the characteristics of a population, often in terms of social phenomena or attitudes, without manipulation from the researcher” (p. 43).

Dillman et al. (2014) note that “descriptive surveys provide a methodical approach to understanding how individuals within a population think or act, focusing on the collection of data to describe those thoughts or actions” (p. 8). This points out the survey's role in understanding and describing behaviors or opinions.

Advantages of Descriptive Research Design

- It enables the gathering of rich data through varied methodologies such as surveys, interviews, and observations.
- It provides a snapshot of the current technological integration within the educational setting.
- It is efficient and relatively quicker in terms of data collection and analysis.

Limitations of Descriptive Research Design

- It does not explore relationships between variables deeply, focusing primarily on "what" rather than "why."
- The data collected may be subject to bias based on respondents' perceptions and willingness to provide accurate information.

3.4 Research Paradigm

This study is based on the constructivist paradigm which posits that knowledge is constructed through social interactions and experiences. This paradigm emphasizes on how technology facilitates active learning, collaboration, and engagement among other students. The paradigm utilizes qualitative research methods such as case study to gain in depth insights into the experiences of learners and educators.

3.5 Population

The target population for this study included all Biology teachers and students at Chemhondoro Secondary School from where the study was being conducted. These consisted of qualified teachers who are authorized by the ministry of Primary and Secondary Education to teach in government schools

3.6 Sampling and Sampling technique

A purposive sampling method was employed due to the specific characteristics of the research participants:

Students: A sample of thirty Form 4 students (both high-achieving and struggling learners) was chosen to ensure a range of perspectives. Ten Biology teachers were selected based on their experience in using ICT in their teaching practices.

3.7 Data Collection Instruments

Several data collection instruments were employed to ensure the gathering of comprehensive data

3.7.1 Interviews:

In-depth semi-structured interviews were conducted with teachers to gain insights into their experiences and challenges faced in integrating ICT into Biology lessons. This format allowed for open dialogue while ensuring specific topics were covered.

3.7.2 Observation:

Observation is a research method where the researcher observes participants in their natural setting, with the aim of gathering data on their behavior, interactions, or activities, (Creswell, 2018). Observation is a research method where the researcher observes participants in their natural setting, with the aim of gathering data on their behavior, interactions, or activities, (Kumar, 2019). Classroom observations were conducted during Biology lessons to evaluate the actual implementation of ICT tools and their effectiveness in engaging students, including the use of computers, projectors, and other educational software.

3.8 Data Analysis

Quantitative data obtained from students' questionnaires were analyzed using statistical methods, incorporating descriptive statistics to summarize responses. Qualitative data from interviews and observations were transcribed and thematically analyzed to identify common patterns and recurring themes regarding the use of ICT in teaching and learning.

3.9 Ethical Considerations

Ethical approval was obtained from the school administration prior to conducting research. Informed consent was secured from all participants, ensuring they understood their rights, confidentiality, and the voluntary nature of their participation.

3.9.1 Confidentiality

"Confidentiality refers to the protection of participants' personal and identifiable information from unauthorized access or disclosure" (Kumar, 2019). "Confidentiality involves protecting the privacy of participants by ensuring that their personal and identifiable information is not shared with others" (Creswell & Poth, 2018). Confidentiality is the protection of participants' personal

and identifiable information from unauthorized access or disclosure, ensuring that their privacy is maintained and their trust is respected.

In this study, confidentiality was maintained by using pseudonyms or codes to identify participants, and by storing data in a secure and password-protected location. Participants were also assured that their personal and identifiable information would not be shared with others, and that their responses would be kept confidential.

3.9.2 Anonymity

"Anonymity refers to the protection of participants' identities from being linked to their responses or data" (Kumar, 2019). "Anonymity involves protecting the identity of participants by ensuring that their names and identifying information are not linked to their responses or data" (Creswell & Poth, 2018). Anonymity is the protection of participants' identities from being linked to their responses or data, ensuring that their privacy is maintained and their trust is respected.

In this study, anonymity was maintained by ensuring that participants' names and identifying information were not linked to their responses or data. Participants were also assured that their identities would be kept anonymous, and that their responses would be kept confidential.

3.9.3 Informed Consent

"Informed consent refers to the process of obtaining participants' voluntary and informed agreement to participate in the study" (Kumar, 2019). "Informed consent involves providing participants with information about the study's purpose, procedures, risks, and benefits, and obtaining their voluntary and informed agreement to participate" (Creswell & Poth, 2018). Informed consent is the process of obtaining participants' voluntary and informed agreement to participate in the study, ensuring that they are fully aware of the study's purpose, procedures, risks, and benefits.

In this study, informed consent was obtained through a written consent form, which provided participants with information about the study's purpose, procedures, risks, and benefits. Participants were also assured that their participation was voluntary, and that they could withdraw from the study at any time without penalty or loss of benefits.

3.10 Conclusion

Chapter 3 presented the methodology employed in this study, outlining the research design, sampling strategies, data collection instruments, and analysis methods. By employing a mixed-method approach, the research aimed to capture a well-rounded view of the impact of ICT on teaching and learning Biology at Chemhondoro Secondary School.

CHAPTER 4

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings derived from the data collected and analyzed. It examines the impact of Information Communication Technology on teaching and learning Biology at Chemhondoro Secondary School, emphasizing qualitative insights gathered from students and teachers.

4.2 Data Presentation using questionnaire

The researcher administered a total of 30 questionnaires to gather data on students' perceptions in relation to ICT and the results are presented below;

4.2.1 Students' Perceptions of ICT:

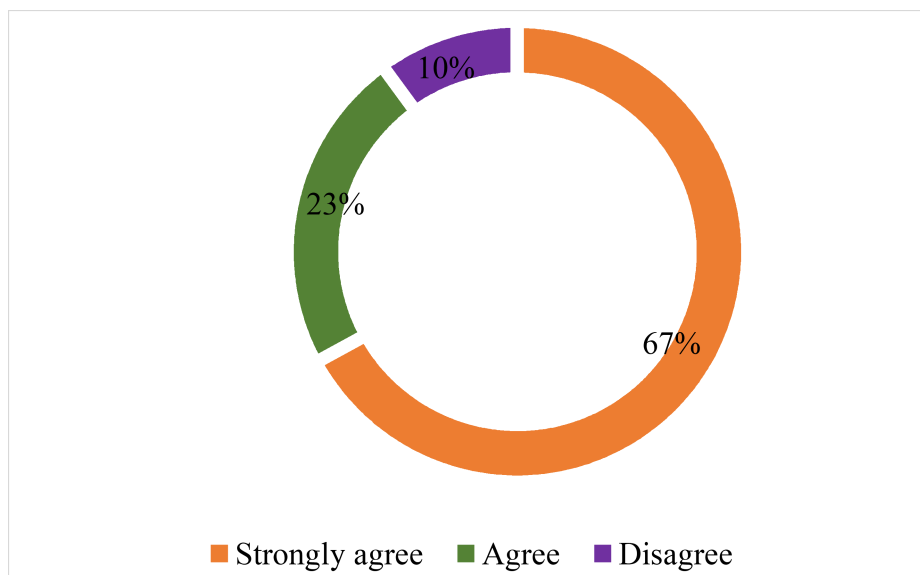


Figure 4. 1: Student perceptions: ICT enhance learning

From the above, 90% of students agreed that the use of ICT tools, such as computers and online resources, enhanced their understanding of biological concepts. The results also indicate that only a few, 10% of students disagreed. This could be attributed to lack of knowledge on the role of ICT in the teaching and learning of Biology. Students expressed that access to videos, online simulations, and interactive programs made learning Biology more engaging. This serves to

confirm that ICT is of great significance in the learning of Biology and as such schools should invest in ICT for effective learning.

4.2.2 Teachers' Insights on ICT Integration:

The researcher also asked teachers on the benefits of ICT in the learning of Biology. Teachers gave various benefits and these are presented below:

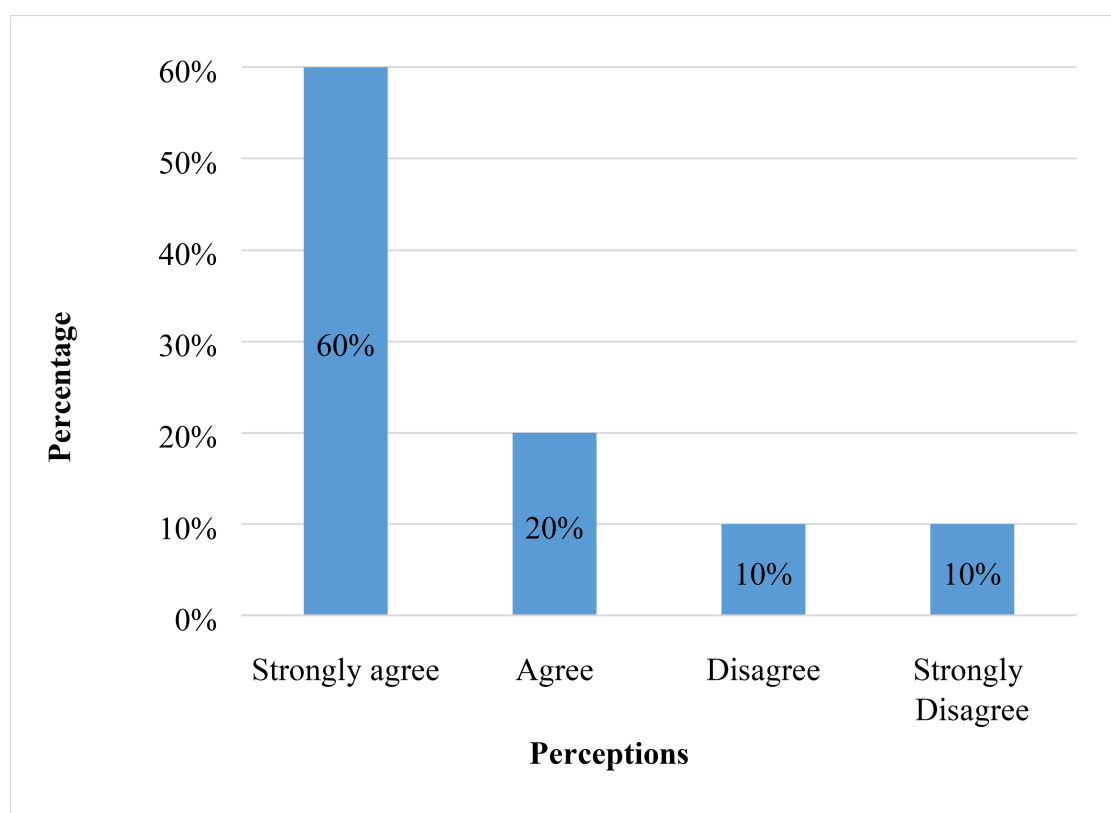


Figure 4. 2: Perceived Benefits of ICT Integration: Enhanced learning

Results indicate that 80% of teachers agreed that ICT enhance learning and this could be attributed to availability of network connectivity and ICT laboratory where teachers and students have access and could research and conduct their studies using various ICT tools.

4.2.3 ICT and Access to Diverse Resources:

Table 4.2: ICT and access to diverse resources;

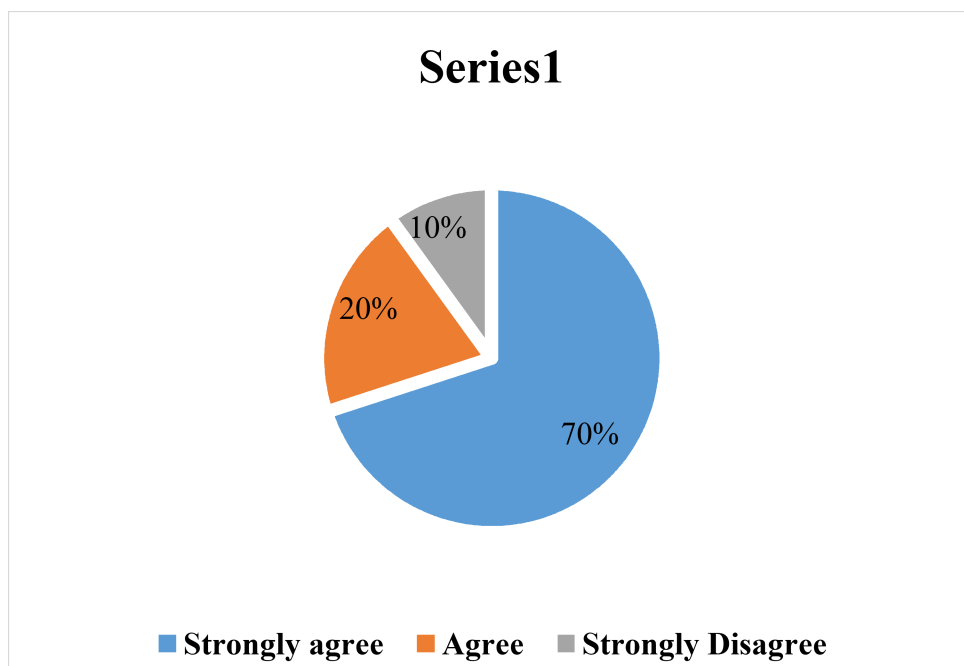


Figure 4. 3: ICT and Access to diverse resources

From the above table, 90 % of the teachers agreed that ICT enable access to diverse resources, whereas only 10% disagreed. This serves to confirm that ICT provides access to a wealth of resources, enabling them to enrich their lesson plans with multimedia content. Hence the internet has transformed how they prepare lessons.

4.2.4 ICT and Interactivity:

Table 4. 1: ICT allows interactivity

Response	Frequency	Percentage
Strongly agree	4	40
Agree	3	30
Strongly disagree	2	20
Disagree	1	10

Results show that, 70% of teachers agreed that ICT allows interactivity. This translates to the effectiveness of ICT in terms of allowing students to interact with their teachers. This is crucial since it enhances student and teacher relationship and as such creating a good learning

atmosphere. Therefore, Interactive simulations are effective tools for teaching complex biological processes.

4.2.5 Challenges in ICT Integration:

Table 4. 2 Challenges in ICT integration

Variables	Strongly agree		Agree		Strongly disagree		Disagree	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
ICT is affected by technical difficulties	3	30	5	50	0	0	2	20
Lack of Training	2	20	4	40	1	10	3	30
Time constraints	1	10	4	40	1	10	4	40

From the above, 80% of teachers reported facing recurring technical issues, such as equipment malfunctions or insufficient internet connectivity. This could most probably be attributed to unavailability of state of art equipment and poor internet connectivity. This negatively affect learning of biology using ICT. The results also show that, 60% of teachers agree that lack of training is another setback in terms of learning using ICT. This calls for the need to facilitate professional development in this area. Moreover, 50% of teachers agreed that learning using ICT is time consuming. This clearly shows that integrating ICT into their lesson plans often took longer than traditional methods.

4.3 Data Presentation of open-ended interviews

The researcher used interviews to gather information and the findings are presented based on the order of objectives

Question 1: What is the current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District?

Majority of the respondents responded verbally stating the current level of ICT integration in the teaching and learning processes of Biology in selected schools in Shamva district. The researcher

identified various factors which support the relevance of ICT in the teaching and learning processes of Biology. These include, the use of different platforms such as YouTube, Google to obtain information. When asked to give their views on the current level of ICT interrogation, here are their views:

T1 respondents said that:

“The use of ICT in teaching and learning is essential to both the teacher and the learner. As a teacher I can use website such as YouTube and Google to search for relevant materials for my lesson and use them to teach the students, everyone would like to integrated ICT in his/her lesson, the main challenge we face a tours school is that we have only one classroom with computers and a media room that is having a smart board and computer facility and the rooms are always booked, if all classes could be facilitated with at least a projector we could use our own laptops”

T2 respondents said that:

“I think there should be a program of providing basic ICT education to teachers no to only on how to use them brutal soon how to integrate ICT in their teaching subjects. I really need to know how to use ICT to teach mathematics and I believe if I have proper training on how to use internet and computer I will be able to search relevant materials for my students”

Responding to the interview question T3 alleged:

“Not all teachers are capable of using ICT some of us don’t know how to use one and they are not available a tour working environment, I have never thought that ICT can be used in classrooms also”

Another T 4 described:

*“I am too old to adapt to the new teaching styles and I am happy with my own teaching period”,
“I believe in traditional method which let the students touch, feel and learn. I could make interactive lesson without using the ICT tools”*

Question 2: How does the use of ICT in Biology education affect student engagement and learning outcomes in selected secondary schools in Shamva District?

In the interview held between the respondents and the interviewer, majority of respondents revealed that, most of respondents replied this question by enlisting possible effect of using ICT in Biology education on student engagement and learning outcomes in selected schools. These include the following, that students improve their interaction with teachers, enhance student participation, boost student study habits and enhances student understanding of various concepts as well as improving student collaboration during learning.

A comment for a biology teacher T4 presented

‘ICT plays a crucial role in improving the learning process, a learner is not fixed to work or learn Biology to a specific time period, but at any given time he or she can start studying. This helps them to develop interest in the subject and it also brings positive results in their examinations. ’

Another respondent T3 had the following to say on the effect of ICT in Biology education:

‘through ICT, learners can work as a group, sharing ideas and helping each other to address difficult concepts. This has seen a remarkable improvement in Biology performance. ’

A comment for T2

I have seen that most of students have to travel long distance to reach school and the integration of ICT has assisted them to access information in the comfort of their homes and some are not lagging behind they collaborate with their peers online and share notes and different ideas.

Another T5 said

Most of learners use ICT especially computers on their own, they search on the internet for references that matches our lesson and correlate with teachers,

Question 3. What challenges and barriers do educators and students face in effectively utilizing ICT for teaching and learning Biology in selected secondary schools in Shamva District?

In an interview conducted by the researcher respondents gave their views on challenges and barriers do educators and students face in effectively utilizing ICT for teaching and learning Biology here under are their views. In responding to the interview T4 said

The use of ICT in the learning and teaching of Biology is time consuming. For example, a learner has to research on internets and search relevance of the ideas and also check what other students are doing. This consumes lots of times since I have to find free time to do so, I would advise provision of seminars and workshops on how to use ICT in classrooms". More suggestions from another respondent to the interview question on which way to improve use of ICT to facilitate teaching and learning;

A comment from a T2:

"Not all students have access to internet and are able to use various platforms such as YouTube, Google and other searching engines. This also affect their learning. I would suggest the school should also use DVD, recordings and other media platforms which are common and easy to use so that all students will have access to the information."

Other respondent from district office commenting on the challenges faced he said

"Most students even teacher lack basic knowledge of ICT and this further makes it difficult to implement ICT in the teaching and learning of Biology in schools. There is need, for a program of providing basic ICT education to teachers not only on how to use them but also on how to integrate ICT in their teaching subjects."

4.3 Discussion of Findings

This area presents discussion of the findings of the study. The research questions lead the discussion to be organized under the following broad themes:

- i. Current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District, focusing on the availability of technological resources, teacher training, and the methods used by educators to incorporate ICT into their lessons.
- ii. The impact of ICT on student engagement and learning outcomes in Biology, by assessing student attitudes towards the subject, identifying changes in academic performance, and exploring the effectiveness of various ICT tools and resources in enhancing the understanding of complex biological concepts.
- iii. Challenges and barriers faced by educators and students in effectively utilizing ICT for teaching and learning Biology, and to formulate practical recommendations and best practices for enhancing ICT integration in the curriculum of secondary schools in Shamva District.

4.3.1 Level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District

The results indicated that the integration of ICT led to significantly increased student engagement and understanding of biological concepts. This finding aligns with existing literature, for example, research has shown that CTTs can enhance student engagement and motivation in science education. This aligns with findings by Belland et al. (2017) who found that the use of digital simulations and interactive software significantly increases student interest and participation in science topics. The interactive nature of these tools allows students to take an active role in their learning, fostering a deeper understanding of scientific concepts. This clearly shows that technology enhances the learning environment by making it more interactive and relatable.

Results further indicated that the use of ICT improved learner performance. This concurs with findings by Vongkulluksn et al. (2018) who also demonstrated that students who used technology-enhanced instructional methods consistently outperformed their peers in traditional settings. Moreover, the use of virtual laboratories enables students to conduct experiments that may not be feasible in physical labs due to constraints such as safety or resource availability (Ferguson, 2012).

Moreover, it was observed that ICTs also facilitate collaborative learning, which is essential for developing critical thinking and problem-solving skills in students. Hence, The study further show that teachers have a positive perception on the use of ICT, but the availability and accessibility of ICT resources such as hardware, software and communication infrastructure are limited. In the same vein, Hew & Cheung (2014) noted that tools such as discussion forums and collaborative project platforms enable students to communicate, share resources, and work together, ultimately enriching the learning experience. This collaborative approach is particularly valuable in Combined Science, where interdisciplinary connections are vital

4.3.2 The impact of ICT on student engagement and learning outcomes in Biology

The results have indicated that the use ICT plays a crucial role in improving student understanding of biology concepts, performance and collaboration. This is facilitated by the use of tablet computers and graphic tools in arts in general are important variables in the technical manifestations of electronic forms. This has established an integrated system that displaced the historical values of plastic arts and their associated tools by virtual brushes, colors, tools and effects that have been brought by computer software, thus enabling learners to produce various characteristics. The study results are similar to Ottenbreit-Leftwich et al., (2010) who posits that the use of technology in education is important to motivate student learning. In addition, Goldin and Katz (2018) who argued that students appreciated how they interact with others in real time by using technologies such as computers. Connecting with others is made possible by the internet enabling real-time communication.

Moreover, the existence of technologies in the class set up learning has been effective particularly in ensuring the improvement of in-service teacher education and preparation for pre-service instructors to make sure successful alignment of educational technology in the learning activities. Recently teacher-learning establishment is making an effort to prepare for pre-service tutors to make sure there is an integration of technology into the future teaching practices (Anderson, 2016).

4.3.3 Challenges and barriers faced by educators and students in effectively utilizing ICT for teaching and learning Biology

While teachers expressed enthusiasm for incorporating ICT, the lack of resources presented a barrier. This could be attributed to insufficient funds by schools to purchase ICT resources such as computers, projectors and installation of internet. This agrees with study by Eze and Olusola (2013) who revealed that in Botswana, lack of electricity in rural schools and high cost of computers is a stumbling block to the integration of ICT in teaching, internet is impossible where there are no telephones and electricity.

Therefore, effective application of ICT into classroom heavily relies on the availability of technological resources, qualified and confident teacher and other internal and external factors that directly or indirectly affect teachers' welfare and morale. Insufficient training can hinder effective ICT implementation, underscoring the need for educational institutions to provide robust professional development opportunities. It was observed that infrastructural limitations also affect effective ICT integration. Challenges such as unreliable internet access and inadequate technical support inhibited teachers' ability to fully implement ICT resources. Addressing these issues is crucial for successful long-term ICT utilization in education.

4.4 Chapter summary

The results from this chapter demonstrated a positive impact of ICT on teaching and learning Biology at Chemhondoro Secondary School. While there are notable benefits in terms of student engagement and resource accessibility, teachers also face challenges that need deliberate attention for successful implementation of ICT. The next chapter provides the last part of the research report; it covers summary, conclusion, and recommendations for actions and for further research.

CHAPTER FIVE

5.0 Summary, conclusion and recommendations

5.1 Introduction

This chapter provided the last part of the research report; it covers summary, conclusion, and recommendations for actions and for further research.

5.2 Summary

This study intended to examine impact of applying ICT tools in the teaching and learning of Biology: a case study of selected secondary schools in Shamva District in Mashonaland Central.

The study was guided by three objectives:

- To evaluate the current level of ICT integration in the teaching and learning processes of Biology in selected secondary schools in Shamva District. This objective directly aligns with the study's purpose by seeking to assess how existing ICT resources are utilized within Biology instruction, providing a baseline understanding of the current educational environment.
- To analyze the impact of ICT on student engagement and learning outcomes in Biology. This objective supports the purpose of the study by focusing on students' experiences and perceptions regarding the use of ICT in their learning. By measuring any changes in engagement and performance, the research will shed

light on the effectiveness of these technologies in enhancing the educational experience

- To identify the challenges and barriers faced by educators and students in effectively utilizing ICT for teaching and learning Biology, and to formulate practical recommendations and best practices for enhancing ICT integration in the curriculum of secondary schools in Shamva District.

The study adopted a descriptive research design. The population of the study was 100 people drawn from secondary schools in Shamva District. The sample size of the study was 10 facilitators and 30 learners' respondents selected using purposive sampling method. The study adopted a qualitative research approach. The questionnaire and interview were also used for data collection in this study. Interviews schedule were used to support information obtained through questionnaire and to increase reliability of the findings. According to Smith, Thorpe, and Lowe (2012) the main purpose of a descriptive survey design is to obtain information from a defined set of people so as to generalize the sample results to the population. Gray, (2014) maintains that descriptive survey tends to use an inductive approach, often using open-ended questions to explore perspectives.

5.3 Summary of the Findings

The summary of the findings in this study was organized in line with the research sub-questions.

5.3.1 To assess the role played by ICT tools in the overall instructional process of biology as a subject

The study affirmed the above stated proposition as the study found out that, there was existence of cordial relationship between computers and skill development of primary school learners. Most importantly it was found that the learners gain an array of skills based on technological learning which stimulates their learning style in the classroom.

5.3.2 To discuss the challenges in detail, how teaching and learning is affected by integrating ICT

The research found out that recurring technical issues, such as equipment malfunctions or insufficient internet connectivity are a major setback of integrating ICT in teaching and learning

Biology. More so time constrains as well as lack of knowledge on how to integrate ICT in instruction process of Biology were also other set backs

5.3.3 To make recommendations on how to improve teaching and learning of computers

This objective found out that the government has a role to play in establishing lasting solutions to full implementation of ICT in Secondary schools with provision of obsolete computer support systems.

5.4 Conclusion

This research assessed the impact of applying Information Communication Technology in teaching and learning Biology at Chemhondoro Secondary School. The findings revealed that ICT integration significantly enhanced student engagement and comprehension of complex biological concepts. Students expressed enthusiasm toward learning with ICT tools, while teachers recognized the potential advantages but faced several implementation barriers. Therefore, while the research supports the benefits of integrating ICT in the Biology curriculum, targeted strategies are essential to address existing challenges.

5.5 Recommendations

In light of the conclusion drawn above, this study makes the following recommendations:

5.5.1 General recommendation

❖ Ongoing Professional Development:

The Ministry of Education and local authorities should implement regular ICT training programs for teachers to enhance their skills and confidence in integrating technology into their teaching practices.

❖ Infrastructure Enhancement:

Investments should be made to improve the ICT infrastructure at Chemhondoro Secondary School. This includes reliable internet access, updated hardware, and technical support to ensure that resources are available for effective teaching.

❖ Curriculum Development:

The Biology curriculum should be revised to embed ICT across all subjects, promoting the development of essential digital competencies among students.

❖ Encouraging Collaboration:

Teachers should be encouraged to collaborate and share best practices concerning ICT integration in their teaching. This could be facilitated through professional learning communities or workshops.

❖ Regular Monitoring and Evaluation:

A framework should be established for the continuous assessment of ICT integration into the curriculum. This framework can include feedback from students, teachers, and parents to evaluate its effectiveness and recommend necessary adjustments.

❖ Community Involvement:

Schools should partner with local organizations, NGOs, and community leaders to access additional resources and expertise to support ICT initiatives in education.

5.6 Future Research Directions

Future studies could explore the long-term effects of ICT integration on different student demographics and their academic performance beyond Biology. Additionally, research could examine specific ICT tools and their tailored application in various educational contexts across Zimbabwe.

REFERENCES

- Belland, B. R., Walker, A. E., Kim, N. H., & Penuel, W. R. (2017). Efficacy of Inquiry-Based Learning in Science: A Meta-Analysis. *Journal of Research in Science Teaching*
- Bryman, A. (2016). *Social Research Methods* (5th ed.). Oxford University Press.
- Campbell, N. A. (2018). *Biology*. 11th Edition. Pearson Education.
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 4th Edition. Sage Publications.
- Creswell, J. W., & Poth, C. N. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Sage Publications.
- Earle, R. S. (2002). The Integration of Instructional Technology into K-12 Teaching: Expectation and Reality. *Journal of Technology and Teacher Education*.
- Ertmer, P. A. (2005). Teacher Pedagogical Beliefs: The Key to Unlocking Student Technology Use.
- Ferguson, D. (2012). Virtual Laboratories: A Chat Between Theory and Practice. *Physics*

Teacher.

Flick, U. (2021). *An Introduction to Qualitative Research* (6th ed.). Sage Publications.

Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st Century: A Community of Inquiry Framework for Research and Practice*. Routledge.

Hew, K. F., & Brush, T. (2007). *Integrating Technology into K-12 Teaching and Learning: An Examination of the Research*.

Hew, K. F., & Cheung, W. S. (2014). *Use of Web 2.0 Technologies in K-12 Classrooms: A Review of the Research*. Computers & Education.

Hungi, N. (2017). *The State of Education in Zimbabwe: A National Overview of Policy and Practice*. Journal of Education Policy, 32(3), 367-380.

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice Hall.

Kothari, C. R. (2021). *Research Methodology: Methods and Techniques* (3rd ed.). New Age International Publishers.

Lai, M. J., & Hwang, G. J. (2016). *Seamless M-Learning as a New Paradigm for Learning anytime and anywhere*. Educational Technology & Society.

Mavhunga, E. (2012). *The Role of Indigenous Knowledge in Learning Biology: Perspectives from Zimbabwean Secondary Schools*. African Journal of Biology Education, 1(1), 32-41.

Mayer, R. E. (2004). **Where the Red Fern Grows: A Fidelity Analysis of Teacher Reported Measures of Instructional Practice: Journal of Teacher Education**. 55(3): 223-233.

- Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*.
- Musiyiwa, J., & Mukoda, M. (2021). Teacher Perceptions of Indigenous Knowledge in Learning and Teaching Processes. *Education as Change*, 25(1), 125-143.
- National Education Association (NEA) (2020). What Is Teaching?. Retrieved from [NEA website].
- Nyaruwata, M., & Madzima, R. (2021). Relevance of Indigenous Knowledge in Zimbabwean Schools: Opportunities for Policy Reform. *Journal of African Education*, 12(3), 29-45.
- OECD (2011). The Role of ICT in Education: The Impact of Information and Communication Technology on Education in OECD Countries. Retrieved from [OECD website].
- Piaget, J. (1973). *To Understand is to Invent: The Future of Education*. Grossman.
- Robson, C., & McCartan, K. (2016). *Real World Research* (3rd ed.). Wiley.
- Shumbayawonda, E. (2011). *Research Methods in Educational Research**. ZOU Press.
- Sife, A. S., Lwoga, E. T., & Sanga, C. (2007). New Technologies for Teaching and Learning in Developing Countries: Opportunities and Challenges. *International Journal of Education and Development using ICT*
- UNESCO (2002). Information and Communication Technologies in Education. Retrieved from [UNESCO website].
- Van Dijk, J. (2005). *The Deepening Divide: Inequality in the Information Society*. Sage Publications.

Vongkulluksn, V., Borrero, J., & Borgen, K. (2018). The Impact of Technology on Academic Performance in Science Classrooms: A Meta-analysis. Educational Technology Research and Development,

APPENDICES

APPENDIX A: QUESTIONNAIRE FOR BIOLOGY TEACHERS

Section A: Demographics

1. Age: _____
2. Gender:
 - ☐ Male
 - ☐ Female
 - ☐ Other
3. Grade/Class: _____
4. How long have you been using ICT in Biology classes?
 - ☐ Less than 1 year
 - ☐ 1-2 years
 - ☐ More than 2 years

Section B: Experience with ICT in Biology

5. What types of ICT tools do you use in your Biology classes? (Select all that apply)
 - ☐ Computers/Laptops
 - ☐ Tablets

- ☐ Projectors
- ☐ Educational Software
- ☐ Online Resources
- ☐ Others: _____

6. How often do you use ICT in your Biology classes?

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

7. How has ICT impacted your understanding of Biology?

- ☐ Very positively
- ☐ Positively
- ☐ Neutral
- ☐ Negatively
- ☐ Very negatively

8. Can you provide some specific benefits you have received from using ICT in learning Biology?

- _____

9. Have you encountered any challenges while using ICT in your Biology classes?

- ☐ Yes
- ☐ No

If yes, please specify: _____

10. Would you recommend more use of ICT in your Biology education?

- [] Yes

- [] No

- If no, please explain: _____

APPENDIX B: INTERVIEW GUIDE FOR TEACHERS

Opening Questions

1. Can you briefly describe your experience with teaching Biology and the use of ICT?
2. What ICT tools are frequently used in your Biology classes?

Core Questions

3. In what ways do you integrate ICT into your Biology curriculum?
4. How do you believe the use of ICT affects student engagement and learning outcomes in Biology?
5. What specific ICT tools or resources do you find most effective in teaching Biology? Why?
6. Can you provide examples of successful lessons or projects where ICT positively impacted student learning?

Challenges and Improvements

7. What challenges have you encountered when implementing ICT in your Biology classes?
8. How do you address these challenges?
9. In your opinion, what additional support or resources do teachers need to effectively integrate ICT in biology teaching?

Concluding Questions

10. What is your vision for the future use of ICT in Biology education at Chemudondo Secondary School?
11. Any other comments or suggestions regarding ICT in Biology teaching?

APPENDIX D: OFFICIAL LETTER FROM THE DISTRICT

Ministry of Primary and Secondary Education
Mashonaland Central Province
P.O. Box 340
Bwindura
Zimbabwe

16/12/2024

RE: PERMISSION TO COLLECT DATA FOR RESEARCH PURPOSES IN MASHONALAND
CENTRAL PROVINCE. SHAMVA DISTRICT/S
CHEMHONORO PRIMARY/SECONDARY SCHOOL/S

Reference is made to your application to carry out research at the above mentioned district in Mashonaland Central Province on the title:

AN ASSESSMENT OF THE IMPACT ON APPLYING
INFORMATION COMMUNICATION TECHNOLOGY (ICT)
IN TEACHING AND LEARNING BIOLOGY AT CHEMHONORO
SECONDARY SCHOOL IN SHAMVA DISTRICT

I am pleased to inform you that the Provincial Education Director has granted you permission to carry out your research in Mashonaland Central Office. You should, however, liaise with D.S.I. SHAMVA District before you start. You should ensure that your research work does not disrupt the normal operations of the school. Where students are involved, parental consent is required.

Finally, you are advised to submit a copy of your findings to the Provincial Education Director (PED) Mashonaland Central for Primary and Secondary Education.

C. M. MUKWESHA
FOR PROVINCIAL EDUCATION DIRECTOR
MASHONALAND CENTRAL PROVINCE

17 DEC 2024

All communications should be addressed
to
"The District Education Officer
Shamva District Office"
Telephone: 0371-242
Cell: 0783588351



Ministry of Primary and Secondary Education
Shamva District Office
P.O Box 130
Shamva
Zimbabwe

17/12/24

Ref/P: PHCE - R. Dzengedza

CHEMUCHIBORO SECONDARY School

Shamva District

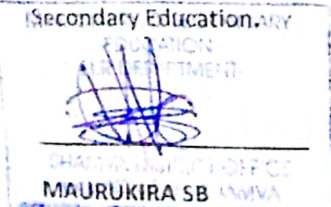
Re: PERMISSION TO CARRY OUT RESEARCH
AT CHEMUCHIBORO SECONDARY SCHOOL
: MASHONALAND CENTRAL PROVINCE: SHAMVA DISTRICT

Reference is made to the Provincial Education Director's minute dated 17/12/2024
granting you permission to carry out research in Shamva District on the research title:

"An Assessment of the Impact on Applying Information
Communication Technology (ICT) in Teaching and Learning
Biology at Chemuchiboro Secondary in Shamva District

I am pleased to inform you that the District Schools Inspector has granted you permission to
carry out your research in Shamva District. You should however liaise with the Head of the
chosen schools before you start.

Finally you are advised to submit a copy of your findings to the Ministry of Primary and
(Secondary Education)



FOR DISTRICT EDUCATION INSPECTOR