

BINDURA UNIVERSITY OF SCIENCE EDUCATION



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DEPARTMENT OF SCIENCE AND MATHEMATICS EDUCATION

**PROBLEMS FACED BY TEACHERS AND LEARNERS IN USING REALIA IN
TEACHING AND LEARNING OF BIOLOGY IN SECONDARY SCHOOLS IN
CHEMACHINDA CLUSTER OF GURUVE DISTRICT.**

BY

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

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PROBLEMS FACED BY TEACHERS AND LEARNERS IN USING REALIA IN TEACHING AND LEARNING OF BIOLOGY IN SECONDARY SCHOOLS IN CHEMACHINDA CLUSTER OF GURUVE DISTRICT: A Case Study,


Submitted

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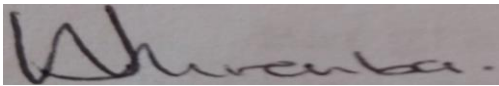
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DEDICATION

This work is dedicated to my mother, my husband and my sister for all the sacrifice and support during my studies. Not forgetting my friends for their firm belief in me towards the pursuit of my dreams

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ABSTRACT

The purpose of this study was to explore the problems faced by teachers and learners in using realia in teaching and learning of Biology in Secondary schools in Chemachinda Cluster of Guruve

District. Using research methodology, the study was guided by the interpretive research paradigm which focuses on ways in which human beings make sense of their subjective reality by attaching meaning to it. The research used a qualitative approach and purposive sampling was used to ensure the choice of participants with the information needed in the study. The total sample of participants was made up of five teachers and thirty learners. The total sample was thirty five participants. The study used structured interview questions, observations and a questionnaire for the data collection. Tables and narrations were used for analysis of qualitative data.

The findings revealed the benefits and challenges faced by teachers and learners in implementing realia based teaching and learning in of Biology in Secondary schools in Chemachinda Cluster of Guruve District. Recommendations were made to provide basic training to teachers on implementing realia in the teaching and learning process of Biology .In addition, teachers were encouraged to continually seek to improve themselves professionally so that they keep themselves abreast with the changes that took place in the education system. Parents should try by all means to provide their children with necessary and enabling realia to foster learning.

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CHAPTER ONE

1.1 Introduction

The main purpose of the introductory chapter is to outline the general summary of the entire study. This entails the background of the study, and mostly gaps of knowledge that motivated the researcher to carry out this study. To be examined are: sub-problems of the study, study boundaries, and the significance of doing this study to various groups of people. At the end of the chapter, the researcher analyzes limitations encountered and techniques adopted to avert them, conceptual analysis of key terms used, and the rundown of the chapter.

1.2 Background of the study

The use of realia in teaching and learning of Biology has been a cause for concern worldwide due to its sophisticated nature. Biology as a branch of science has interconnected series of concepts and conceptual schemes that have developed as a result of experimentation and observation.

In the United States of America, as well as other developed nations like Britain, France, Russia, and other European countries, classes have been characterized by moderate teacher-pupil ratios, coupled with widespread use of realia (Prensky, 2015). Due to the constantly changing nature of science of which Biology is a discipline, Miller (2010), observes that the strategies employed by science teachers in teaching earlier have become irrelevant today as our environment is not static but changing (Nwagbo 2006).

In the United States, the use of realia in education gained popularity as part of the broader movement towards hands-on, experiential learning. The integration of realia in American classrooms can be attributed to the work of influential educators and researchers who advocated for active learning approaches (Ormrod 2000). The National Science Education Standards, published in 1996 by the National Research Council, emphasized the importance of using realworld contexts and materials to teach science, including Biology. This framework encouraged the adoption of realia as a teaching method to enhance student engagement and understanding according to Perry (2015).

The use of realia in education in the United Kingdom is rooted in the principles of inquiry-based learning and practical science education. The National Curriculum for Science in the UK emphasizes the development of practical skills and scientific literacy. This focus on hands-on

learning and experimentation creates a conducive environment for the integration of realia. Additionally, educational reforms and research initiatives, such as the "Science for All" campaign, have contributed to the promotion of practical science education and the use of realia in classrooms.

In a different opinion Asian country, the adoption of realia in education is influenced by cultural and educational contexts. Many Asian education systems prioritize a strong foundation in science and mathematics education. The use of realia aligns with the goal of connecting theoretical concepts to real-world applications (Ormrod 2000). There are advancements in technology and the availability of digital resources has facilitated the incorporation of virtual realia, such as simulations and interactive models, into Asian classrooms. Ongoing research and educational initiatives in countries like China, Japan, India, and Singapore have further promoted the use of realia in Biology education.

In other developing African countries such as Ghana, Kenya and Nigeria, the use of realia in education is influenced by the need to provide practical and experiential learning experiences. The curriculum frameworks in the country highlight the importance of hands-on learning in science education. Teachers in Ghana often rely on locally available materials and resources to introduce realia into their classrooms. Educational reforms and initiatives that prioritize practical science education, such as the Science, Technology, and Innovation Policy in Ghana, have contributed to the integration of realia in these countries (Bello 2015).

The use of realia in South Africa education is informed by the principles of inquiry-based learning and practical science education. The South African National Curriculum Statement emphasizes the importance of practical work and the development of scientific inquiry skills. The integration of realia in South African classrooms is supported by educational policies and initiatives that promote hands-on learning experiences (Rutto and Kptingel 2014). The South African Department of Basic Education provides guidelines and resources for educators to incorporate realia into their teaching practices, aiming to enhance student understanding, critical thinking, and practical skills development.

Secondary Biology curriculum has undergone continuous changes since independence in Kenya .This has been necessary to demystify teaching of difficult concepts by intensifying the use of resources in the teaching of the subject. Biology was to be taught through inquiry approach with

learners doing much of the discovery through experiments and observation and setting their own experiments (Mulkeen 2010). This turned out to be the biggest impediment to its success due to high costs of equipment and lack of expertise by learners to design and perform experiments on their own. The government then introduced the Nuffield Science Project curriculum adopted from United Kingdom that had technical assistance programme, books, equipment and other apparatus but this also failed as had the UNESCO pilot scheme. The reasons for the failures of the project were due to heavy requirements of costly equipment, apparatus books and lack of highly trained and qualified teachers. The use of realia in Biology education has several benefits, Perry (2015). Firstly, it provides students with tangible and concrete examples that can make abstract concepts more accessible and relatable. For example, using actual plant specimens, preserved animal specimens, or models of organs can help students visualize and understand the structures and functions of living organisms, Mulkeen (2010).

Realia can facilitate hands-on learning experiences, allowing students to actively explore and manipulate objects related to Biology according to Motlhabane and Dibacha (2013). This hands-on approach can foster curiosity, critical thinking and problem-solving skills. For instance, conducting experiments with realia like soil samples, microscopes, or laboratory equipment can enable students to develop practical skills and engage in scientific inquiry, Kalinga (2008).

In Southern Africa, realia can include objects such as plant specimens, animal specimens, bones, fossils, preserved insects, rocks, seeds, microscopes, slides, and models of ecosystems. Additionally, field trips to natural habitats, botanical gardens, zoos, or conservation areas can provide students with firsthand experiences and encounters with living organisms. Gott and Duggan (2009) posit that it is worth noting that while realia can be a valuable teaching tool, its availability and accessibility may vary depending on the resources and infrastructure of different educational institutions in the region. Teachers and educators need to consider the appropriateness and safety of realia used in the classroom, as well as ethical considerations related to the sourcing of biological specimens, Headlam and MacDonald (2006).

Expectations of using realia in Zimbabwe are as follows, enhanced Learning, Realia can provide concrete and tangible examples that make learning more engaging and meaningful for students. It can help students understand abstract concepts by connecting them to real-world experiences. Cultural Relevance is another aspect. Zimbabwe is a culturally diverse country, and using realia

that reflects the local culture, traditions, and contexts can promote cultural understanding and inclusivity in the classroom. In addition there is practical application, Realia can help students develop practical skills and apply their knowledge in real-life situations.

Grabe and Grabe, (2007) argue that realia can become the natural tool for learning that is so often required by educators. The authors above suggest the use of movable realia and laptops as a possible solution to immovable huge realia. Proponents on the use of realia in the classroom also opine that realia in the form of information technology in education could be fully utilized if each teacher and student owns a laptop, iPad or a smart phone (Pennington, 2015; Prensky, 2015). If realia are properly used, then good results can be realized, but the reverse could be true if realia are poorly used in a teaching and learning of Biology situation (Ertmer, 2014). The researcher feels that a lot of research has been carried out on the usefulness of realia in aiding instruction to Secondary school learners, while a lot is yet to be availed on the challenges of using realia in multi-cultural learning institutions akin to those found in the Zimbabwean Secondary schools. This has motivated the researcher to ascertain challenges facing teachers and learners intending to use realia in the teaching and learning of Biology situation in Kachuta Cluster, Guruve District.

1.3 Statement of the Problem

Integration of realia in teaching Biology in secondary schools in Kachuta Cluster faces several obstacles that impact the quality of education and learning outcomes. Challenges such as limited access to appropriate realia resources, inadequate training for teachers on how to effectively incorporate realia into lessons, and insufficient guidance on best practices in utilizing realia hinder the full potential of these teaching aids.

1.3.1 Main Research Question

What problems are faced by teachers and learners in using Realia in teaching and learning of Biology in secondary schools in Chemachinda of Guruve District?

1.3.2 Research Sub-questions

- 1) Which particular realia materials are frequently used in biology classrooms, and how do they help students learn at Kachuta Cluster Schools?
- 2) What are the common difficulties encountered by teachers when incorporating Realia in Biology lessons?

- 3) How does the use of Realia affect student's motivation and interest in studying Biology?
- 4) How can the use of Realia be integrated with other teaching methods and technologies to enhance biology education?
- 5) What are the attitudes and beliefs of teachers regarding the use of Realia in Biology lessons?

1.4 Research Objectives

This study aims to:

- Identify the particular Realia materials frequently used in Biology classrooms and how they help students in their learning at Kachuta Cluster Schools.
- Identify the challenges faced by teachers in using Realia in the teaching and learning of Biology
- Explore the impacts of Realia on students learning outcomes in Biology
- Develop effective strategies for integrating Realia into Biology education
- Investigate the perceptions and attitudes of teachers and learners towards using Realia in Biology education

1.5 Significance of the Study

Understanding and addressing the challenges faced by teachers and students in using realia in Biology instruction is crucial for enhancing the quality of education in Kachuta Cluster. By improving the effective utilization of realia, educators can create more engaging and interactive learning experiences, leading to improved student comprehension, retention, and overall academic performance in Biology. The findings of this research are expected to make significant contributions to the field of educational practice, particularly in the context of Biology instruction in secondary schools. By identifying and addressing the challenges related to the use of realia, this study aims to improve teaching quality, enhance student learning experiences, and ultimately contribute to the academic success of learners in Kachuta Cluster.

Enhancing understanding, Realia can provide concrete examples and tangible representations of biological concepts, structures, and processes. By using actual specimens, models, or interactive materials, teachers can help students visualize and understand complex biological phenomena

more effectively. This hands-on approach can deepen students' comprehension and engagement with the subject matter.

In addition Opie (2014) posits that there is bridging theory and practice as Biology is an applied science that involves the study of living organisms and their interactions with the environment. Realia can bridge the gap between theoretical knowledge and real-world applications. It allows learners to connect abstract concepts with concrete, observable examples, fostering a deeper understanding of biological principles and their relevance to everyday life.

Stimulating interest and motivation, realia can pique students' curiosity and engage their senses, making the learning experience more engaging and memorable. By bringing in live organisms, preserved specimens, or multimedia resources, teachers can create a stimulating learning environment that promotes interest and motivation in Biology. This can lead to increased student participation and enthusiasm for the subject, Millar (2010).

Addressing misconceptions, Biology encompasses a wide range of topics, some of which may be counterintuitive or prone to misconceptions. Realia can be used to challenge and correct these misconceptions. For example, by using models or visual aids, teachers can demonstrate biological processes that are difficult to observe directly, such as cell division or genetic inheritance, and help students develop accurate mental models of these phenomena.

Despite the potential benefits, there are challenges associated with the use of realia in the teaching and learning of Biology. For instance, Mwenje (2012) pointed out that the availability of resources determines the effectiveness of realia in teaching and learning. Realia often requires access to specific specimens, models, or equipment, which may not be readily available in all educational settings. Limited funding or lack of access to appropriate resources can hinder the effective use of realia in the classroom. This is even worse for Kachuta schools where parents do not pay fees for their children.

In the same vein, maintenance and safety is another challenge that is teachers encounter in using realia. Some realia, such as live organisms or biological specimens, require proper care, maintenance, and safety protocols. Teachers need to ensure the ethical treatment of living organisms and implement appropriate safety measures when handling specimens or using equipment, which can be time-consuming and demanding, Oprea (2013)

Millar (2009) postulated that realia-based activities may be challenging to implement especially in large classrooms. Providing hands-on experiences to all students can be logistically difficult, requiring careful planning, coordination, and management of resources.

On the other hand there is integration with the curriculum, the use of realia should be aligned with the curriculum goals and learning objectives. Teachers need to carefully select and integrate realia into their lesson plans to ensure that they enhance the intended learning outcomes and cover the required content effectively, according to Tok (2010)

To overcome these challenges, teachers can collaborate with colleagues, seek professional development opportunities, and explore alternative strategies, such as virtual simulations or multimedia resources, when access to physical realia is limited. By leveraging the benefits of realia and addressing the associated challenges, teachers can create a more interactive and meaningful learning experience for students in the field of Biology

1.7 Limitations

Availability - Realia may not always be readily available or accessible for all topics or concepts in Biology. It can be challenging to find appropriate real-life objects that accurately represent certain biological phenomena or processes.

Cost and maintenance - Obtaining and maintaining realia can be costly. Some biological specimens, models, or equipment may require specialized handling, storage, or maintenance, which can strain limited resources.

Ethical concerns - The use of realia may involve ethical considerations, especially when it involves live animals or endangered species. It is important to ensure that the acquisition and use of realia align with ethical guidelines and regulations.

Variation and standardization - Realia may introduce variability due to natural variations in the objects themselves or inconsistencies in their availability. This can make it challenging to ensure consistent and standardized learning experiences across different classrooms

1.8 Delimitation

The study was conducted in Guruve District. Five secondary schools in one cluster were chosen by the researcher, and each of them used realia in their instructions. The total sample was 35

participants, 30 are learner's and 5 are teachers, focused mostly on the difficulties that secondary school teachers and students in the Chemachinda Cluster of the Guruve District faced when using realia.

1.9 Definition of terms

Realia according to Ruffatto (2012) says that realia refers to real objects or materials that are used in the teaching and learning process to provide students with firsthand experiences and concrete examples. On the hand Tok (2012) states that these objects can be physical items such as tools, artifacts, or specimens that are directly related to the topic being taught. Realia is used to enhance understanding, provide context, and promote active learning by allowing students to interact with tangible objects, Owino (2014).

Teaching: Rocard et al (2007) define teaching as the process of imparting knowledge, skills, and values to others. It involves the systematic and intentional act of guiding and facilitating learning in individuals or groups. Teachers utilize various instructional strategies, methods, and resources to engage learners, promote understanding, and foster intellectual and personal development. Effective teaching involves planning, organizing, delivering, and assessing instruction while considering the needs, abilities, and learning styles of the students, Polit and Beck (2006).

Learning: Tuysuz (2010) states that learning is the process of acquiring knowledge, skills, attitudes, or competencies through study, experience, or teaching. It involves the internalization and assimilation of new information or abilities, resulting in a lasting change in behavior, thinking, or understanding. In addition Nasri et al (2010) indicated that learning can occur through various methods such as reading, listening, observing, practicing, or reflecting. It is a complex and individualized process influenced by factors such as motivation, prior knowledge, learning environment, and instructional strategies, Owino et al (2014).

Biology: Swain (2000) defines Biology is the scientific study of living organisms and their interactions with the environment. It encompasses the exploration of various aspects of life, including the structure, function, growth, evolution, distribution, and classification of organisms. Biology encompasses multiple sub-disciplines such as botany (study of plants), zoology (study of animals), microbiology (study of microorganisms), genetics (study of heredity), ecology (study of ecosystems), and physiology (study of bodily functions).in addition Mukeen (2010) says that

Biology seeks to understand the fundamental principles and processes that govern life at the molecular, cellular, organism, and ecological levels.

1.10 Scope of the Study

This research focuses specifically on the challenges encountered by teachers and learners in integrating realia in teaching and learning Biology within secondary schools in Kachuta Cluster, Gurusu District. The study will involve teachers, students, and school administrators to gather a comprehensive understanding of the issues and potential solutions related to the use of realia in Biology education.

1.11 Chapter Summary

By addressing the challenges faced by teachers and learners in using realia in teaching and learning Biology, this study seeks to contribute to the improvement of Biology education standards in secondary schools in Kachuta Cluster. Through collaborative efforts and strategic interventions, the effective integration of realia can enhance the learning experiences and outcomes for both educators and students.

CHAPTER TWO

2.0 Introduction

The results of past research on the topic of realia in secondary schools by educators are cited in this chapter. This entails assessing the ways in which realia can be used to support Biology instruction and learning as well as determining the degree to which realia is currently being utilized to support Biology instruction and learning at the secondary school level. Additionally, the researcher will examine the difficulties that instructors and students encounter when using realia, as well as potential solutions for these difficulties.

2.1 Theoretical Framework

The theoretical framework underpinning the use of realia in education draws heavily from constructivist learning theories, particularly the work of Jean Piaget and Lev Vygotsky. According to Piaget, learners construct their own understanding of the world through active engagement with their environment, which aligns with the hands-on nature of utilizing realia in teaching. Vygotsky's sociocultural theory emphasizes the importance of social interactions and scaffolding in learning, suggesting that realia can serve as tools for cognitive development and concept formation in a social context.

2.1.1 Piagetian Perspective

In the context of Biology education, the use of realia can support Piaget's theory of cognitive development by providing concrete experiences that help students move from concrete operational thinking to abstract reasoning. By interacting with realia such as models, specimens, or simulation tools, students can bridge the gap between concrete observations and abstract biological concepts, enhancing their understanding of complex biological processes. Piaget's theory of cognitive development emphasizes the importance of active learning and the construction of knowledge through interaction with the environment. According to Piaget, learners construct their understanding of the world through a series of stages, from sensorimotor to formal operational. In the context of realia in Biology, Piaget would likely view it as a valuable tool for engaging learners in concrete experiences and promoting active learning.

Piaget believed that learners need to actively manipulate and interact with objects in their environment to construct knowledge. Realia, which refers to real objects or materials used in teaching, can provide concrete examples and hands-on experiences that help learners make connections between abstract concepts and their real-world applications. For example, using real plants or animal specimens in Biology lessons can allow students to observe, touch, and explore the subject matter directly, facilitating their understanding of biological concepts.

2.1.2 Vygotskian Perspective

From a Vygotskian perspective, the incorporation of realia in Biology instruction can facilitate collaborative learning experiences and peer interactions. Realia offer opportunities for students to engage in meaningful discussions, share perspectives, and co-construct knowledge through social interactions. By using realia as shared artifacts within a community of learners, students can

receive guidance and support from their peers, leading to deeper conceptual understanding and higher-order thinking skills.

Vygotsky's sociocultural theory emphasizes the role of social interaction and cultural tools in cognitive development. According to Vygotsky, learning takes place through social interactions with more knowledgeable others, such as teachers or peers. The use of tools and artifacts, including realia, can mediate and scaffold learners' understanding.

In the context of realia in Biology, Vygotsky would likely emphasize the importance of social interaction and collaborative learning. Realia can serve as a shared artifact that facilitates communication and collaboration among learners. By examining and discussing real biological specimens or models together, students can engage in dialogue, ask questions, and jointly construct knowledge. This collaborative approach can enhance students' understanding and promote higher-order thinking skills.

Overall, both Piaget and Vygotsky would likely support the use of realia in the teaching and learning of Biology. Piaget would emphasize the value of hands-on experiences and active engagement with the environment, while Vygotsky would highlight the social and collaborative aspects of using realia as a tool for learning.

2.1 Identify the particular Realia materials frequently used in Biology classrooms and how they help students in their learning at Kachuta Cluster

In biology classrooms, various realia materials are commonly used to enhance students' learning experiences and provide them with hands-on opportunities to explore biological concepts. Some examples of realia materials frequently used in biology classrooms include.

According Mille (2010) states that microscopes allow students to observe and study microscopic organisms and structures. They enable students to visualize cells, microorganisms, and tissues, fostering a better understanding of their structure and function.

In the same vein Mulkeen (2010) acknowledges that prepared slides consist of microscope slides with mounted specimens, such as plant tissues, animal cells, or microorganisms. They provide students with a closer look at specific biological structures and allow for detailed examination under a microscope.

In a finding carried out by Oprea (2013) it was found out that there are models and charts. The three-dimensional models and charts are useful tools for understanding complex biological processes, anatomical structures, and systems. For instance, models of the human body, organs, or DNA helix can help students visualize and comprehend these concepts.

Specimens and dissections that is the preserved specimens, such as frogs, earthworms, or plant parts, are commonly used for dissections. They enable students to observe and explore the internal structures of organisms, learn about their anatomy, and gain practical knowledge about various biological systems according to Kibirige and Teffo (2014).

Opie (2004) contend that the plant and animal Specimens which is the fresh or preserved plant and animal specimens allow students to examine different species, their adaptations, and characteristics. By studying real organisms, students can develop a deeper understanding of their diversity, classification, and ecological roles.

There are biological tools instruments like pipettes, petri dishes, test tubes, and beakers are essential for conducting experiments and investigations in biology. They help students develop laboratory skills and gain firsthand experience in scientific inquiry according to Kishor (2003).

On the other hand there are field guides which provide information about local flora and fauna, helping students identify and learn about different species in their natural habitats. They encourage outdoor exploration and engagement with the living world, Kalinga (2008) acknowledges that. The use of realia materials in biology classrooms facilitates kinesthetic learning, inquiry-based learning, and visual representation of biological concepts. They promote active participation, critical thinking, and a deeper understanding of the subject matter by providing students with tangible and concrete learning experiences.

In marginalized areas where resources may be limited, realia materials can still play a valuable role in enhancing students' learning experiences. While the availability of specific materials may vary depending on the school set up like my case study. Local natural specimens, students can explore and study local natural specimens, such as leaves, rocks, shells, or insects. These materials can be collected from the immediate environment, and they provide opportunities for students to understand the local ecosystem, biodiversity, and natural resources.

In addition there is the use of indigenous tools, artifacts, and crafts can be used to teach cultural and historical aspects of the community. Students can learn about traditional practices, craftsmanship, and the local heritage through hands-on interactions with these materials. Community gardens, establishing community gardens in schools or nearby areas can serve as realia materials. Students can participate in planting, cultivating, and observing the growth of plants, which fosters an understanding of agriculture, food production, and environmental sustainability.

Local maps and landmarks, maps of the local area, including landmarks and geographical features, can be used to teach geography and spatial awareness. Students can engage with the maps, identify their own communities, and learn about their surroundings. Everyday objects found in the local community can be utilized as realia materials. For example, utensils, clothing, tools, or household items can be used to teach concepts related to materials, technology, or cultural practices.

Oral and visual stories, in marginalized areas with limited access to written resources, oral and visual stories become important realia materials. Local myths, legends, and narratives can be shared orally, or visual representations like pictures, drawings, or paintings can be used to communicate stories and cultural traditions. Local crafts and artwork, students can engage in local crafts and artwork as realia materials. This can involve traditional crafts like weaving, pottery, or basket-making, allowing students to learn about traditional techniques and cultural expression.

The use of realia materials in marginalized areas helps make learning more contextualized, relevant, and inclusive. By incorporating local resources, traditions, and knowledge, realia materials promote cultural pride, community engagement, and a sense of belonging among students. They encourage active participation, critical thinking, and the application of knowledge in real-world contexts, despite limited resources.

2.2 Benefits of Realia in Education

Research has shown that the use of realia in teaching and learning can enhance student comprehension, retention, and motivation. Realia provide concrete examples that enable students to visualize abstract concepts, making learning more engaging and interactive. Furthermore, realia can cater to diverse learning styles and facilitate deeper understanding of complex biological processes.

Building upon the theoretical frameworks of constructivism, the literature highlights several key benefits of incorporating realia in teaching and learning. According to Hofstein and MaalmokNaalma (2007), there is enhanced engagement, where Realia captures students' interest and attention, making abstract concepts more tangible and relatable. Improved retention, hands-on experiences with realia help solidify memory retention by creating lasting impressions and connections between objects and concepts. On the other hand there is catering to diverse learning styles as realia appeal to visual, kinesthetic, and auditory learners, providing multiple entry points for understanding biological concepts, Desmond et al (2003). Realia can be a valuable resource in the teaching and learning of biology in secondary schools.

Specimens and models, such as preserved animals, plants, or organs, can be used to provide firsthand experience with biological structures and characteristics. Students can observe and examine the specimens to develop a deeper understanding of anatomy, morphology, and adaptations Millar (2009). Additionally, models and replicas can be used to represent complex biological processes, such as DNA replication or cell division, allowing students to visualize and manipulate these processes.

According to Nasri et al (2010) posits that microscopes and slides, they provide a way to explore the microscopic world in biology. Realia can include prepared slides of different cell types, tissues, or microorganisms. Students can use microscopes to observe and analyze these specimens, developing skills in microscopy and gaining insights into cellular structures and functions, Perry (2015).

Ruffatto (2012) posits that living organisms can be used as realia can involve live organisms that can be observed, studied, and cared for in the classroom. This can include plants, small animals, or microorganisms. By interacting with living organisms, students can learn about their life cycles, behaviors, adaptations, and ecological relationships. It also provides an opportunity to develop skills in scientific inquiry and experimentation.

In addition, Opie (2004) supported that there is field trips and outdoor exploration, in biology can extend beyond the classroom through field trips and outdoor exploration. Students can visit local ecosystems, such as forests, wetlands, or marine environments, to observe and study biodiversity,

ecological interactions, and adaptations in their natural habitats. Field trips provide a hands-on experience and foster a deeper connection with the natural world Tortop et al (2010).

Perry (2015) indicated that dissections and experiments, realia can be used in dissections and experiments to provide a practical understanding of biological concepts. For example, students can dissect specimens like frogs or earthworms to learn about organ systems, or they can conduct experiments on plant growth, photosynthesis, or genetics using real plants or seeds.

In addition Owino et al (2014) says that there is environmental samples and data collection, realia can involve collecting environmental samples, such as water, soil, or air, to analyze their properties and study ecological factors. Students can learn about environmental monitoring, data collection, and analysis, as well as understand the impact of human activities on ecosystems, Polite and Beck (2006).

Stake (2010) postulated that the multimedia resources, in biology can also include multimedia resources, such as videos, simulations, or virtual reality experiences. These resources can provide visualizations of biological processes, virtual dissections, or interactive simulations that allow students to explore complex concepts in a safe and controlled environment, Perry (2015).

Overall, realia in the teaching and learning of Biology enhances student engagement, promotes hands-on exploration, and deepens understanding of biological concepts and phenomena. It provides a bridge between theoretical knowledge and real-world applications, fostering a sense of curiosity and appreciation for the living world. Facilitating Conceptual Understanding, Realia serve as cognitive tools that support students in visualizing, manipulating, and exploring abstract ideas in a concrete manner.

2.3 Challenges in Using Realia in Biology Education

Despite the significant benefits of realia, educators and learners encounter various challenges when integrating realia into Biology instruction. Using realia in the teaching and learning of Biology in secondary schools can be beneficial as it provides students with tangible and concrete examples of biological concepts. However, there are also several challenges that may be encountered.

In a study carried by Tok (2010) indicated that the availability and cost as realia needs live organisms, preserved specimens, or specialized equipment, may not be readily available or

affordable for all schools. Limited budgets or access to resources can hinder the use of realia in the classroom. There are safety concerns as some realia, use live organisms or hazardous biological materials, may pose safety concerns in the classroom. Teachers must ensure proper handling, storage, and disposal of these materials to ensure the safety of students according to UNEST (2012).

In addition, there is ethical considerations, the use of certain realia, particularly live organisms, can raise ethical concerns. Teachers need to consider the welfare of the organisms and ensure that their use aligns with ethical guidelines and regulations, Swain (2000).

On the other hand, there is maintenance and longevity according to the research carried by Dekkers (2005) as realia, may require ongoing care and maintenance. This can be challenging in a school setting where resources, time, and expertise may be limited. Ensuring the long-term sustainability of realia can be a challenge.

In addition, there is limited accessibility as realia may not be accessible to all students, especially those with physical disabilities or those attending schools in remote areas. This can create disparities in learning opportunities and hinder inclusive education, Desmond et al (2002).

On the other hand, there is curriculum alignment as teachers need to align the use of realia with the curriculum objectives and learning outcomes. It can be a challenge to integrate realia effectively into the existing curriculum and ensure that it enhances learning rather than becoming a mere demonstration according to Capel et al (2009).

Time constraints also pose another challenge to the use of realia. In a research carried out by Millar (2009), the incorporation of realia in lessons may require additional time for preparation, setup, and cleanup. It can be challenging to allocate sufficient time for hands-on activities while covering the required content within the allocated time frame. In addition, there are time constraints in the preparing and organizing realia activities can be time-consuming, especially for teachers with limited instructional time, Mulkeen (2010). More so, there is lack of training, teachers may not have received adequate professional development on how to effectively integrate realia into their lessons. Institutional Support, Educational institutions may not prioritize the provision of resources or support for utilizing realia in Biology education, Stake (2010).

In another study carried by Owino et al (2014) surfaced that there is teacher competence, as the effective use of realia requires teachers to have the necessary knowledge, skills, and training. Teachers need to be familiar with the realia, understand their relevance to the curriculum, and be able to facilitate meaningful learning experiences. Limited Resources, Schools may lack access to diverse and high-quality realia materials, restricting teachers' ability to offer hands-on experiences.

Analyzing the theoretical foundations of constructivism, the literature on the benefits of realia, and the challenges associated with its implementation in Biology education provides a comprehensive understanding of the potential impact of realia on student learning outcomes. By addressing these challenges and leveraging the advantages of realia, educators can create more engaging and effective learning experiences in Biology classrooms. To overcome these challenges, schools and educators can collaborate with local scientific institutions, seek external funding, utilize virtual simulations and digital resources, and provide professional development opportunities for teachers to enhance their knowledge and skills in using realia effectively.

2.3 Best Practices in Utilizing Realia

Effective use of realia in Biology education involves careful selection of relevant and ageappropriate objects, integration of realia into lesson planning, alignment with curriculum objectives, and providing opportunities for hands-on exploration and inquiry-based learning. Collaborative planning and professional development can also enhance teachers' capacity to leverage realia effectively in the classroom.

Select relevant and meaningful realia; choose realia that aligns with the learning objectives and content. It should be authentic, tangible, and relatable to the topic. For example, if teaching about plants, you could bring in actual plant specimens, seeds, or gardening tools, Tok (2010).

Use realia as a concrete representation, realia can make abstract concepts more tangible and accessible, Ruparaganda et al (2013). It provides a visual, tactile, and sensory experience that helps learners connect with the subject matter. For instance, when teaching about historical events, you could use artifacts from that time period to create a more immersive learning experience.

Encourage exploration and inquiry, realia stimulates curiosity and encourages learners to explore and ask questions. Allow students to interact with the realia, manipulate objects, and make

observations. This hands-on approach fosters active learning and can lead to deeper understanding and critical thinking according to Owino et al (2014).

Provide context and background information, before introducing realia, provide context and background information to help learners understand its purpose and relevance. Explain how the realia relates to the topic and how it can be used to enhance learning. This pre-activity discussion primes learners for engagement, Rutto and Kptingel (2014).

In addition Nasri et al (2010) posits that there is facilitation, reflection and discussion, after interacting with realia, facilitate reflection and discussion. Encourage learners to share their observations, insights, and connections they made. This promotes metacognition and helps consolidate learning. Comparing and contrasting different realia items can also deepen understanding.

Integrate realia across different subjects. Realia can be used across various subjects and disciplines. Look for opportunities to incorporate realia in science, history, geography, art, mathematics, language learning, and more. This interdisciplinary approach enriches learning experiences and promotes holistic understanding, Mulkeen (2010).

Mwenje (2012) indicated that you consider safety and accessibility, when using realia; ensure that it is safe and appropriate for learners of all ages. Consider any potential allergies, sensitivities, or other safety concerns. If realia is not feasible due to size, availability, or cost, consider using high-quality replicas, digital simulations, or virtual reality experiences as alternatives.

Extend learning beyond the classroom, encourage learners to explore realia outside the classroom. Provide suggestions for further exploration, such as visiting museums, attending cultural events, or conducting field trips. This extends the learning experience and connects classroom knowledge to the real world, Perry (2015).

2.4 Strategies to improve the use of realia in the teaching and learning of Biology:

Curriculum integration, ensure that the use of realia is integrated into the curriculum and aligned with specific learning objectives. Identify key topics or concepts where realia can enhance student understanding and engagement. Plan and design lessons that explicitly incorporate realia as a teaching tool.

Access to resources, ensure that the necessary realia resources are available to support classroom activities. This may involve collaborating with science departments, local museums, botanical gardens, or other educational institutions to acquire specimens, models, microscopes, or other equipment. Develop a repository of realia resources that can be easily accessed by teachers and students, Millar (2012).

Holfstein and Maalmlok-Naaman (2007) Teacher training and professional development, it provides teachers with training and professional development opportunities to enhance their knowledge and skills in utilizing realia effectively. Offer workshops, seminars, or online courses that focus on incorporating realia into biology instruction. Support teachers in identifying and acquiring suitable realia resources and integrating them into their lesson plans, Swain (2000).

Stake (2010) states that lesson planning and preparation, it encourages teachers to carefully plan and prepare realia-based lessons. This involves selecting appropriate realia resources, designing hands-on activities, and considering safety protocols. Provide guidance and templates for lesson planning that integrate realia effectively into the teaching and learning process, Ormrod (2000).

Student engagement and interaction foster a student-centered approach that encourages active engagement and interaction with realia. Incorporate inquiry-based learning strategies, such as open-ended questions, discussions, and problem-solving activities. Allow students to explore and manipulate realia, make observations, and draw conclusions. Encourage collaboration and group work to promote peer learning and discussion according to Kishor (2003).

Opie (2004) posits that there is authentic assessment that develops assessment strategies that allow students to demonstrate their understanding of biology concepts using realia. This can include performance-based assessments, such as conducting experiments, analyzing realia samples, or creating presentations or models. Consider using rubrics that assess both content knowledge and the ability to apply that knowledge using realia, Polit and Beck (2006).

In a study carried by Kalinga (2008), there is technology integration which explores the use of technology to enhance the effectiveness of realia in biology instruction. This can include using digital microscopes, interactive simulations, virtual field trips, or online resources that provide access to realia beyond the physical classroom. Integrate technology tools and platforms that support virtual learning experiences and facilitate student engagement with realia.

Reflection and feedback encourage teachers and students to reflect on their experiences with realia-based instruction and provide feedback. This can be done through classroom discussions, surveys, or structured reflections. Use this feedback to refine and improve realia-based lessons and identify areas for further development, Gott and Duggan (2009).

By implementing these strategies, you can enhance the use of realia in the teaching and learning of biology, creating a more immersive and engaging learning experience for students. Remember that realia is a valuable teaching tool, but it should be used purposefully and intentionally. It is important to align its use with specific learning goals and instructional strategies to maximize its effectiveness.

2.5 Perceptions and attitudes of teachers and learners towards using Realia into Biology education
Perceptions and attitudes towards using realia in biology education can vary among teachers and learners depending on the geographical location.

Dekkers (2005) indicated that there is enhanced engagement; many teachers believe that incorporating realia materials in biology education enhances student engagement. Realia materials provide hands-on experiences, stimulate curiosity, and make abstract concepts more tangible and relatable. This approach can generate enthusiasm for learning and promote active participation in the classroom.

Bello (2015) also submits that there improved understanding; Realia materials are often seen as effective tools for improving students' understanding of biological concepts. By providing concrete examples and visual aids, realia materials help students visualize and grasp complex biological processes, structures, and systems. They can facilitate a deeper understanding of the subject matter and enhance retention of knowledge.

Mwenje (2012) contend that authentic learning; Realia materials offer opportunities for authentic learning experiences. They enable students to connect classroom knowledge with real-world applications, such as studying local ecosystems, conducting fieldwork, or exploring natural specimens. Realia materials can foster a sense of relevance and practicality in biology education, Motlhabane and Dibacha (2013).

There is inclusivity and accessibility; the use of realia materials can support inclusivity and accommodate diverse learning styles and abilities. Visual and tactile learners, as well as students with different language proficiencies, can benefit from the concrete nature of realia materials. They can level the playing field by providing alternative ways for students to access and understand biology content, according to Tok (2010).

Nwagbo (2006) proposes that the issue of resource constraints; one potential challenge is the availability and affordability of realia materials. In some contexts, limited resources and budget constraints may hinder the widespread use of realia in biology education. Teachers may need to be creative and resourceful in identifying and utilizing locally available materials as substitutes.

In a finding carried out by Tuysuz (2010) it was found out that teacher competence remain as a problem as teachers' attitudes and competencies play a crucial role in effectively integrating realia materials into biology education. Teachers who are knowledgeable about realia materials, understand their pedagogical value, and possess effective instructional strategies can maximize the benefits of using realia in the classroom.

It's worth noting that perceptions and attitudes towards realia in biology education can vary among individuals and educational contexts. Teachers' and learners' experiences, cultural backgrounds, and access to resources can influence their views on the effectiveness and practicality of using realia materials. Conducting specific research studies or surveys in a particular setting can provide more detailed insights into the attitudes and perceptions of teachers and learners towards realia in biology education.

2.6 Chapter summary

The cause of this chapter was to analyze contributions from in the past researchers who made findings about the efficacy of incorporating ICT in the instructing and gaining knowledge of Biology of Secondary faculty learners. The researcher also ascertained the extent to which ICTs are being integrated via educators in the teaching and mastering of Biology process. Finally, the researcher scrutinized the setbacks that militate on the use of Realia in the Secondary school, as properly as capability of keeping off the recognized shortcomings. The ways of mitigating the highlighted setbacks additionally blanketed techniques that can be used to inspire instructors and

beginners to enhance interest to embody ICT integration in facilitating educating and mastering Biology.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter examines the techniques the researcher used to collect the study's data. These consist of the target population, the sample, the sampling process, and the research design. Along with highlighting the instruments used to collect data, the researcher also discusses the advantages and disadvantages of each instrument. Along with the methods used to gather, present, and analyze data for this study in order to respond to research objectives, the chapter also addresses ethical issues.

3.1.1 Research Design

The normative survey method, also known as the descriptive survey methodology, was employed by the researcher. This study's data will be gathered through the use of questionnaires, interviews, and observations, all of which are simple to put together. A descriptive survey, according to Swain (2000), is a research tool used to gather data that can be examined, patterns found, and comparisons established. In descriptive surveys, the researcher uses tables, charts, and graphs to illustrate the answers that participants provide through questionnaires and interviews. According to Gott and Duggan (2009), research design is an inexpensive way to gather opinions, attitudes, and firsthand knowledge about a situation, a person, or a product. Using a descriptive survey approach, the researcher was able to collect information about the difficulties that encountered by teachers and learner's at Chemachinda Cluster

3.3 Population

The total number of units from whom data can be gathered is known as the population. A population is defined as "all the elements that meet the criteria for inclusion in a study," according to Dekkers (2005). A population can also be described as a collection of people or things that have one or more things in common, from which data can be gathered and shown for examination. The

researcher collaborated with Form 2, Form 3, and Form 4 students and instructors from five particular schools in the Guruve District's Chemachinda Cluster. The researcher primarily focused on students from five of those schools because of scheduling and budgetary constraints.

3.4 Sample and sampling procedure

The process of choosing a group of individuals, occasions, or behaviors to examine involves sampling. A sample is described as "a proportion of the population" by Dekkers (2005). A sample, then, ought to be a portion of the total population. As per Tok (2010) assertion, sampling is a methodical, frequently strategic, and quantitative process that entails employing the most feasible techniques to collect a sample that most accurately represents a broader population, Abraham et al (2013). Thirty students and five teachers made up the total number of participants the researcher worked with. To obtain the necessary sample, the researcher employed random sampling. The researcher chose random sampling because it gave each participant an equal chance of being chosen for the research without bias.

3.5 Research Instruments

The investigator employed firsthand observations, questionnaires, and oral interviews. The instruments that were used will all be looked at below.

3.5.1 Observation

According to Nwagbo (2006), an observation is a methodical strategy to gathering data in which researchers observe respondents in their natural environments using a variety of senses.

3.5.1.1 Advantages of Observations

Kishor (2003) states that there is naturalistic data, observations allow researchers to gather data in natural settings, providing a more authentic representation of behavior or phenomena. In addition there is rich qualitative data; observations can capture detailed and nuanced information that may not be easily obtained through other methods, such as facial expressions, body language, and contextual factors. On the other hand Mwenje (2012) indicated that there is flexibility, observations can be adapted to various research contexts and settings, allowing researchers to study diverse phenomena. Millar (2012) indicated that there is researcher control; researchers have control over the observation process, including the selection of variables to observe, the duration of observation, and the recording methods.

3.5.1.2 Disadvantages of Observations

Perry (2015) states that there is observer bias, the presence of the researcher may influence participants' behavior, leading to observer bias. Researchers must strive to minimize their impact on the observed participants. In the same vein Swain (2000) posits that there is subjectivity, interpretation of observed behavior can be subjective, as it relies on the researchers' perspectives and biases. On the other hand there is limited generalizability; observations are often conducted in specific settings with a limited number of participants, which may limit the generalizability of findings to other contexts or populations. More so there is time-consuming; observations can be time-consuming, especially if conducted over extended periods or in complex settings. This can increase the cost and logistics of data collection.

3.5.2 Questionnaire

A questionnaire is described as a document with questions intended to elicit information suitable for data analysis by Tuysuz (2010) . According to Mulkeen (2010) questionnaires are designed to gather data that will aid in achieving the goals of the research and include questions pertaining to the sub-problems of the study.

3.5.2.1 Advantages of questionnaires

Kishor (2003) postulates that there is efficient data collection, questionnaires allow researchers to collect data from a large number of participants simultaneously, making it a time- and cost-effective method. Tok (2010) states that there is standardization, questionnaires provide standardized questions and response options, ensuring consistency in data collection and facilitating comparisons across participants or groups. Anonymity and confidentiality, participants can respond to questionnaires anonymously, which may encourage more honest and unbiased responses, particularly for sensitive topics. Quantitative data, questionnaires often generate quantifiable data, enabling statistical analysis and the identification of patterns, correlations, and trends according to Dekkers (2005).

3.5.2.2 Disadvantages of questionnaires

Swain (2000) posits that there is limited depth; questionnaires typically gather concise and predefined information, which may restrict participants' ability to express nuanced opinions or provide detailed explanations. In addition there is response bias; participants may provide

inaccurate or socially desirable responses due to various factors, such as memory recall issues, social desirability bias, or fatigue. More so there is lack of clarification, questionnaires lack the presence of a researcher to clarify ambiguous questions or provide additional context, potentially leading to misunderstandings or incomplete responses, according to Perry (2015). Mulkeen (2010) posits that there is limited flexibility, once a questionnaire is designed and distributed; it is challenging to modify or adapt the questions during data collection, which may limit the researcher's ability to explore emerging themes or issues.

3.5.3. Oral Interview

According to Karinga (2008), an interview is a procedure where two people directly communicate verbally in order to acquire data. According to the aforementioned author, interviews are appropriate when one wants to request sensitive information.

3.5.3.1 Advantages of oral interviews

Miller (2012) postulates that there is in-depth information, interviews allow for detailed exploration of participants' perspectives, experiences, and beliefs, providing rich qualitative data. On the other hand there is flexibility, interviewers can adapt their questions and follow-up based on participants' responses, allowing for a deeper understanding of the topic being studied, Ngwabo (2006). Clarification and probing, interviewers can seek clarification and probe further into participants' responses, ensuring a comprehensive exploration of the research topic. Personal connection, oral interviews facilitate a personal connection between the interviewer and the participant, potentially enabling more open and honest responses, Ruparaganda et Al (2013).

3.5.3.2 Disadvantages of interviews

Interviewer bias, interviewers' personal beliefs, biases, or non-verbal cues can influence participants' responses, potentially introducing bias into the data collected. Time and resource-intensive, conducting interviews requires substantial time and resources, including recruiting participants, scheduling interviews, and transcribing or analyzing the data. Limited sample size, due to the time-intensive nature of interviews, the sample size may be relatively small, which could impact the generalizability of findings. Social desirability bias, participants may provide socially desirable responses or withhold information that they perceive as sensitive, affecting the validity and accuracy of the data collected.

3.6 Ethical considerations

One of the most important things to keep in mind when conducting research is ethics. One way to think of ethics is as moral guidelines and norms that direct someone's actions when doing research. In order for responders to make an informed choice about whether or not to participate, the researcher made sure they were completely aware of the purpose of the study, as well as its risks and advantages. Additionally, confidentiality was guaranteed so that inquiries could be freely answered without worrying about becoming victims. In essence, the researcher guaranteed the participants' rights to confidentiality, anonymity, equity, and informed consent.

3.7 Plans for Data Gathering, Presentation, and Interpretation

For this study, the researcher employed three different methods to gather data: direct observations, questionnaires, and oral interviews. It follows that he applied the triangulation method. Teachers completed surveys that the researcher self-administered, and learners were interviewed. Above all, the researcher watched students and teachers during classes in the studied schools firsthand and took useful data for study. Statistical visualizations like pie charts, bar graphs, tally tables, and frequency distribution tables were used to show the collected data. After that, the data was examined and evaluated in light of the goals or research questions. This indicates that the researcher discovered connections between the information acquired and previous researchers' conclusions.

3.8 Chapter summary

The approaches and procedures that the researcher employed to collect the data for this investigation were covered in this chapter. Oral interviews, questionnaires, and non-participatory observations were the methods of data collection employed by the researcher in the descriptive survey research design. The research design, instruments, and strategies for reducing the difficulties they present were all covered in this chapter, along with their benefits and drawbacks. This chapter also examined ethical considerations that were given priority and the study's demographic, sample, and sampling techniques. Chapter 4 provides an analysis and interpretation of the data that was gathered by the researcher.

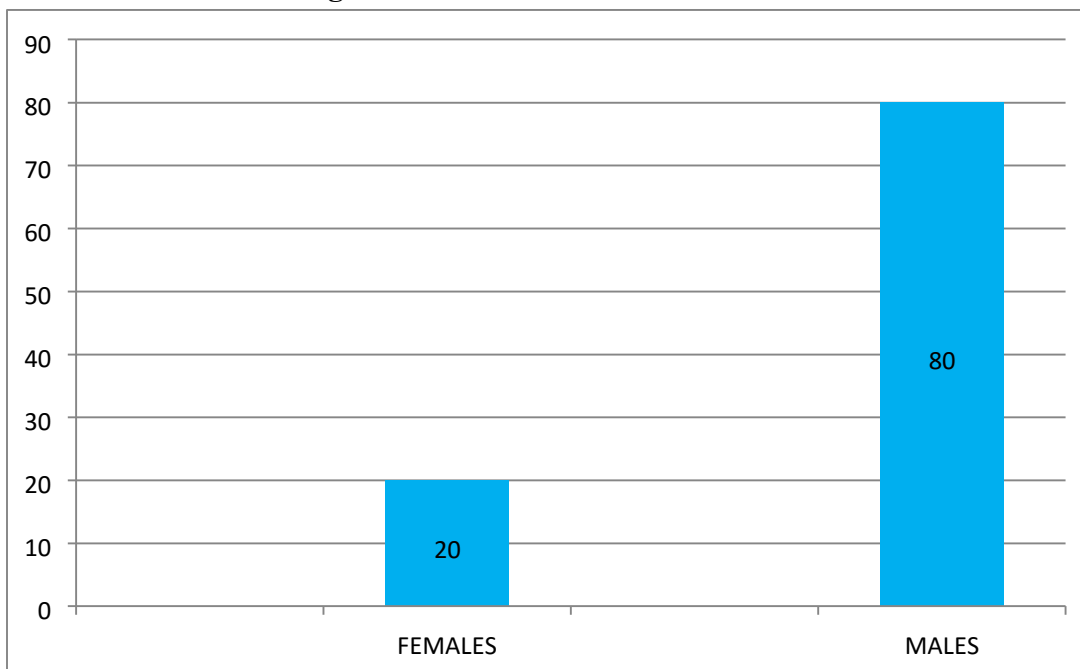
CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND PRESENTATION

4.1 Introduction

The researcher's findings on frequency distribution tables and bar graphs are presented in Chapter 4. The study's research questions will subsequently be addressed by an analysis and interpretation of the data that has been provided. Analyzing and interpreting the data will also look for connections between the researcher's conclusions and those of other past educationists.

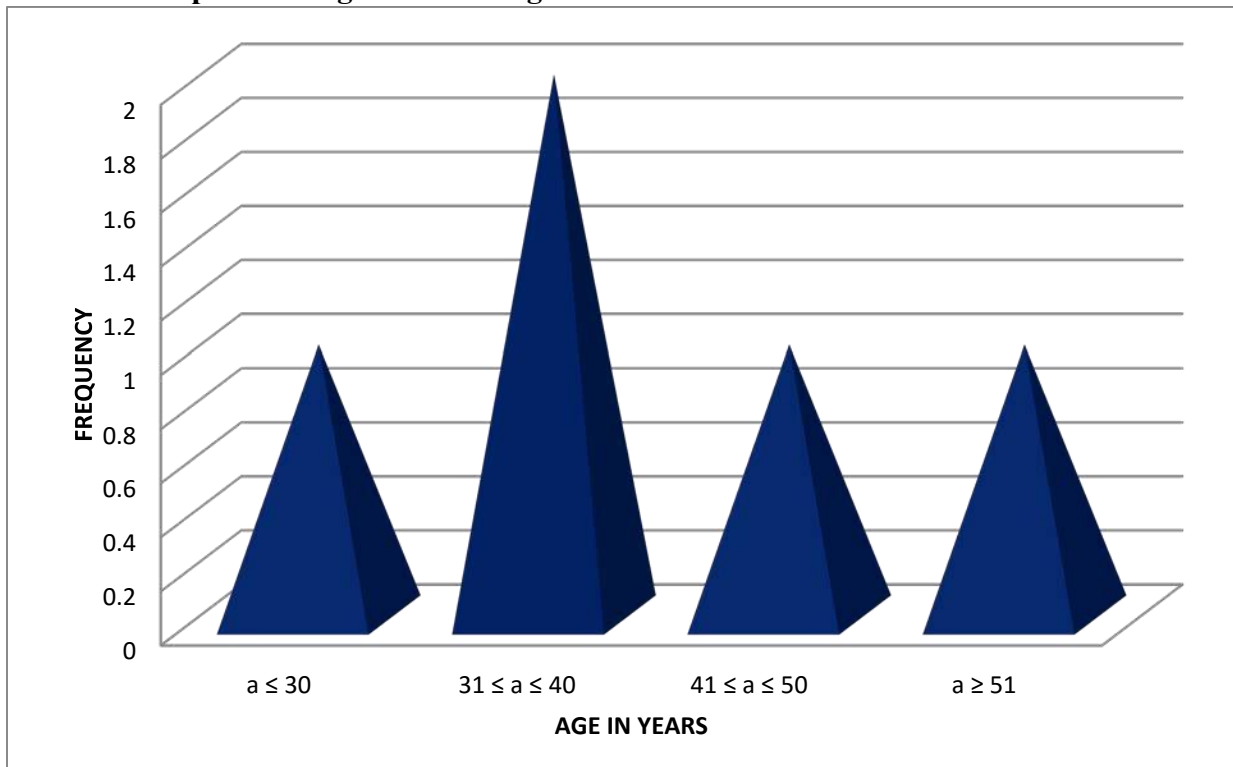
4.2 Questionnaire Results

4.2.1 Bar Chart Showing Teachers' Sex



The above bar graph illustrates that the researcher collaborated with five teachers, four of whom were male (80%) and one of whom was female (20%). The study's inclusion of both sexes addressed gender equity and sought feedback from all sex groups regarding the difficulties encountered in the teaching and learning of biology. As can be seen from the above results, this study included more men than women.

4.2.2 Bar Graph Showing Teachers' Ages



One teacher (20%) is less than or equal to 30 years old, two teachers (40%) are between 31 and 40 years old, one teacher (20%) is between 41 and 50 years old, and one teacher (20%) is older than 51 years old, according to the above bar chart. Based on the data, it can be inferred that the researcher's sample of educators comprised both novices to the system and experienced educators with extensive experience in using realia in biology instruction. This suggests that the researcher's perceptions reflected the opinions of secondary school teachers at large.

4.2.3 Table Showing Teachers' Educational Qualifications

EDUCATIONAL QUALIFICATION	FREQUENCY	PERCENTAGE
Certificate in Education	0	0%
Diploma in Education	4	80%
First Degree in Education	1	20%
Other (specify)	0	0%
TOTAL	5	100%

Regarding the educational backgrounds of the teachers used in the study, it is evident from the frequency table above that none of them held a certificate in education, while four (80%) had diplomas, one (20%) had a first degree in education, and none had a master's degree in education. Once more, the researcher looked at teachers with different backgrounds to find out how they felt about using realia in secondary school biology instruction.

4.2.4 Table Showing Teachers' Teaching Experience

Teaching Experience (Years)	Frequency	Percentage
$x < 5$	1	20%
$5 \leq x \leq 10$	4	80%
Total	5	100%

As can be seen from the frequency table above, of the instructors who responded, only one (20%) had fewer than five years of work experience, four (80%) had between five and ten years of teaching experience, and none had more than ten years of secondary school teaching experience. Since the researcher worked with both new college graduates and more seasoned educators in the system, this data is especially helpful to her.

Table 4.2.5 Benefits of Realia in Secondary Schools

Benefit of Realia in teaching and learning of Biology	SA	A	D	SD
Keeping lessons lively and animated	80	20	0	0
Consistent content delivery	10	10	80	0
Using all senses to facilitate learning	100	0	0	0
Increasing concentration span	100	0	0	0
Helping retention and remembrance of learnt concepts	20	80	0	0
Boosting confidence	0	20	80	0

As can be seen from the above table, teachers overwhelmingly agreed that Realia-based instruction is essential for improving students' attention spans (100%), utilizing multiple senses to aid in the teaching and learning of Biology (100%), and maintaining students' positive attitudes (100%). Teachers recognize that when Realia are used, students are engaged in class activities from start to finish Polit and Beck (2006), they employ their senses of hearing, sight, and touch to understand topics Owino et al (2007), and lessons are delightful from start to finish Oprea (2013).

Furthermore, four educators concurred that Realia's use in Biology instruction is essential because it helps students retain and recall the material they have learned (80%). The study observed that teachers were aware that using Realia helps students create mental images that aid in remembering what they had learned, even though they did not fully agree. This result is consistent with Kibirige and Teff (2014) assertion that Realia may function as a medium for both teaching and studying Biology.

Despite everything that the instructors had said, 75% of the educators didn't think that the community needed to be included in the purchase of Realia and the construction of infrastructure like labs. Teachers contended that since parents were footing the bill for school fees and other levies, school administrators should have the right to handle funds fairly, acquire Realia, and build sufficient infrastructure to protect Realia. However, Tuysuz (2010) suggests that all stakeholders

should be included in the procurement of ICT resources as well as the establishment of Realia laboratories in schools. This stance runs counter to her advice.

Table 4.2.6 Challenges faced by teachers in implementing Realia

Table 4.2.7: Techniques that can be used to improve implementation of Realia in Secondary Schools

Possible challenge of implementing Realia in teaching and learning of Biology	SA	A	D	SD
Lack of spacious rooms	100	0	0	0
Poor electricity supplies	100	0	0	0
Lack of properly qualified personnel	0	40	60	0
Lack of Realia in Schools	80	20	0	0
Thefts	0	0	100	0
Inaccessibility of Realia	0	20	80	0
Possible way of improving use of Realia-aided teaching	SA	A	D	SD
Send teachers for in-service workshops on Realia usage	100	0	0	0
Engage the community for Realia procurement and infrastructure programs	0	20	80	0
Monitor learners when using Realia	40	60	0	0
Safeguard existing Realia	60	40	0	0
Schools to give technical support to teachers and learners	100	0	0	0
Government to nationally initiate rural electrification	100	0	0	0
Heads to make Realia accessible to teachers and learners	100	0	0	0

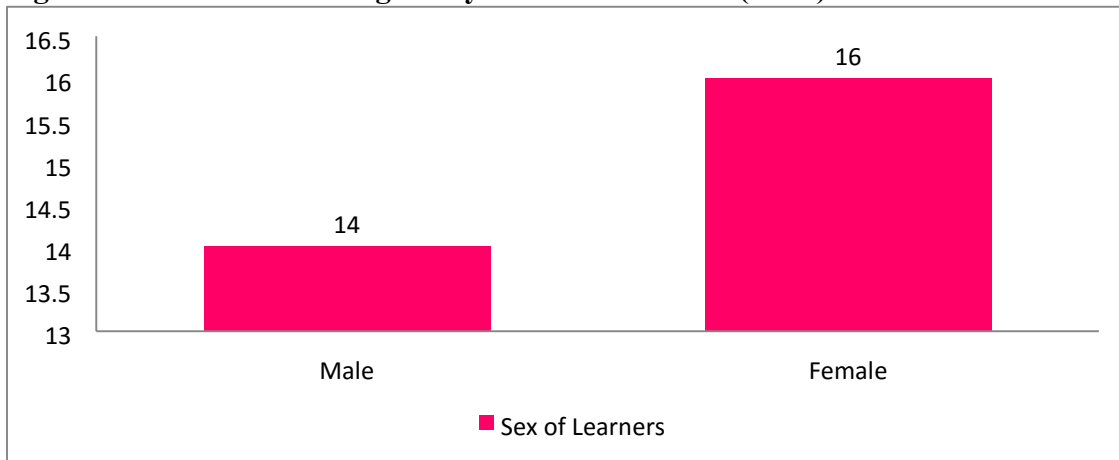
From the table above, it is clear that the teachers strongly agree that there is need: for the government to initiate rural electrification programs (100%), School heads to make Realia accessible to teachers and learners (100%), teachers should be send for refresher training on Realia use (100%), and that there is need to safeguard the few Realia available in Schools (60%). This means that the teachers yearn for electrical power to be able to use even their own resources, they wish if Schools could give adequate technical support (to implant a serious culture) and they require additional training (to be equipped with pedagogical skills of using Realia). More to that, Swain (2000) supports that when he argued that apart from clamoring for new Realia, teachers must have safeguard existing resources.

Correspondingly, teachers agreed that there is need to strictly monitor learners during Realiaaided teaching and learning of Biology. Though the advantages and disadvantages of doing so were not readily mentioned, it emerged that monitoring learners during Realia use was beneficial in discouraging the use of the Realia for non-intended motives during lesson time. This finding consolidates the sentiments of UNEST (2012) who postulates that learners need constant supervision when using Realia-aided teaching and learning of Biology.

In spite of all the assertions by teachers, 75% of the educators disagreed that there was need to rope in the community for procurement of Realia and building infrastructure such as laboratories. The teachers argued that since parents were paying School fees and numerous levies, it was the prerogative of School administrators to manage funds equitably and procure Realia as well erecting adequate infrastructure to safeguard Realia. This sentiment however goes against the recommendations of Miller (2009), who posits that all stakeholders should be incorporated in both procurement of ICT materials and setting up Realia laboratories in Schools.

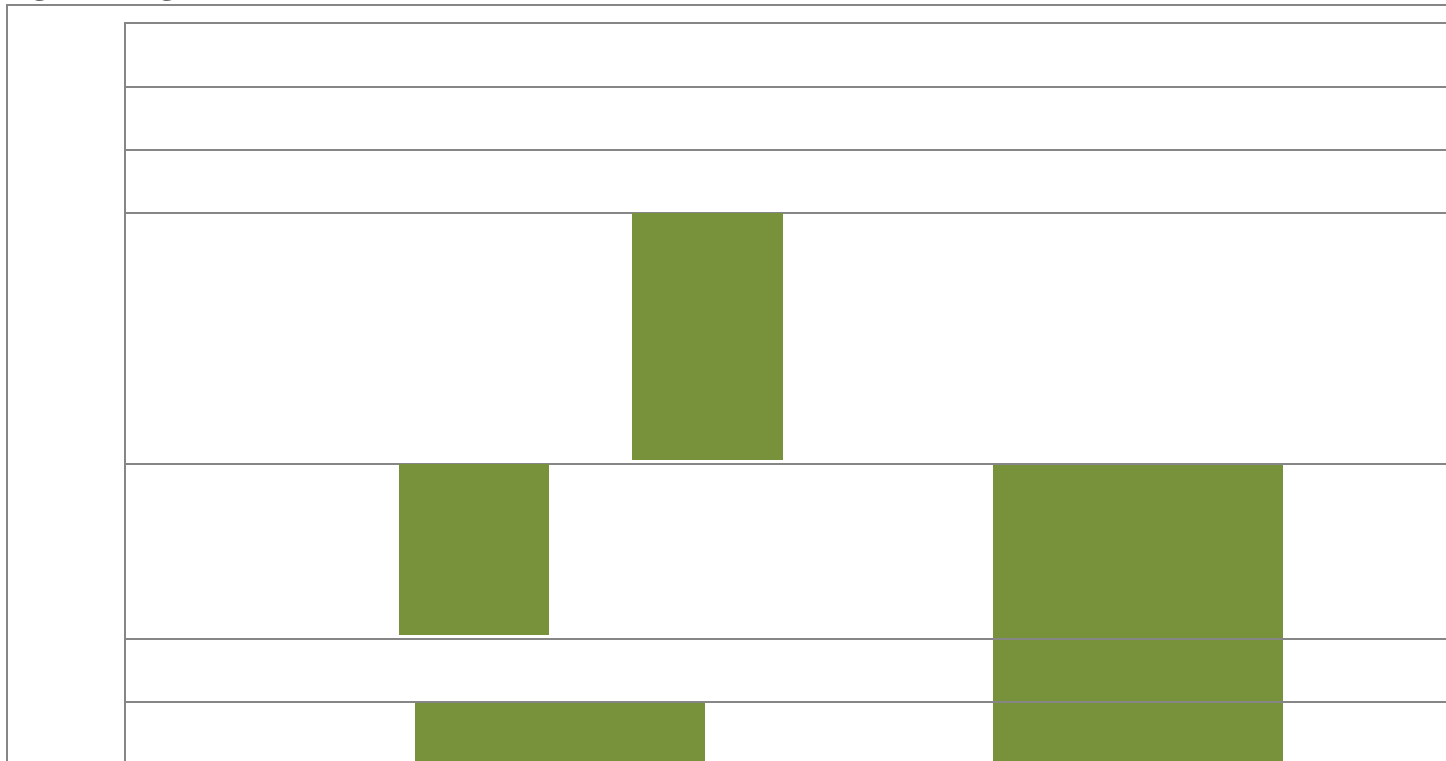
4.3 Results from Interviews with Learners

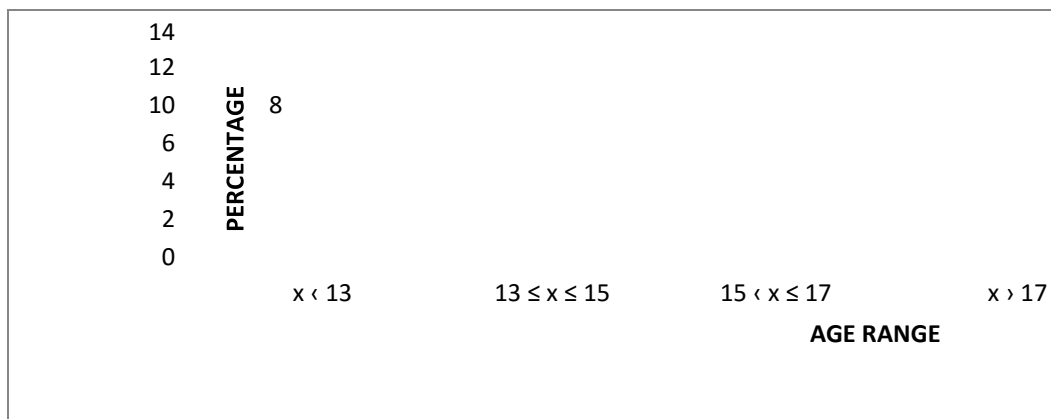
Fig 4.3.1 Bar Chart showing Analysis of learners' sex (n=30)



The bar graph above makes it clear that the researcher employed 16 female and 14 male students. Thus, out of the thirty students, 47 percent were males and 53 percent were females. In order to address gender balance, this study included both male and female participants. As a result, information about the difficulties encountered in engaging in Realia for Biology teaching and learning was gathered by the researcher from all sex groups.

Fig. 4.3.2 Ages of Learners





From the bar chart above, it is manifest that of the participants, 2 learners (6.7%) are less than 13 years old, 9 learners (30%) are between 13 and 15 years old inclusive, 13 learners (43.3%) are between 15 and 17 years old inclusive and 6 learner (20%) are greater than 17 years of age. This data shows that the greatest percentage (43.3%) of participants used is in the age range of 15 - 17 years old, followed by 30% who are between 13 and 15 years. The data also reflects that a very small percentage of learners (6.7%) are less than 13 years of age and another small figure, only 6 learners (20%) are over 17 years old.

Fig. 4.3.3 Benefits of Realia in Secondary School

Benefits of Realia in teaching and learning of Biology	SA	A	D	SD
Keeping lessons joyful	90	10	0	0
Generating of interest and motivation	100	0	0	0
Using of multiple senses to facilitate learning	20	80	0	0
Increasing concentration level	100	0	0	0
Helping retention and remembrance of learnt concepts	100	0	0	0
Boosting confidence	0	70	30	0

According to the frequency table above, learners overwhelmingly agreed that Realia is extremely important for piquing their curiosity and motivating them (100%), for lengthening their attention span (100%), and for aiding in the retention and recall of newly learned concepts (100%). Additionally, 90% strongly believed that Realia makes lessons engaging and dynamic.

Everyone agreed that Realia are an excellent tool for teaching and studying biology because they allow students to use a variety of senses to support the process of teaching and learning Biology. The students acknowledged that Realia aided in their ability to touch and feel the material, to utilize computers for listening, and to interact with various body parts in order to enhance the biology teaching and learning process. This acknowledgement by the students is consistent with the theories put forth by, who praised Realia-assisted instruction for using over 50% of the students' senses in a biology lesson. Still, 70% of students and teachers disagree that Realia gave them more confidence to participate in class. The investigator did not provide an explanation. Confidence in students, which in turn gives them the courage to participate in other class activities. The students compared, emphasizing how using Realia boosts confidence.

Table 4.3.4 Challenges faced by learners in implementing Realia-based Teaching

Challenge of implementing Realia in teaching and learning of Biology	SA	A	D	SD
Lack of spacious rooms	80	20	0	0
Poor electricity supplies	100	0	0	0
Lack of properly qualified personnel	0	10	90	0
Lack of Realia in Schools	90	10	0	0
Thefts due to lack of security	0	0	100	0
Inaccessibility of Realia accessories	0	40	60	0

According to a review of the issues impeding Realia-assisted biology teaching and learning, 80% of students complained that there wasn't enough room, which made it difficult for them to use Realia in biology classes. Ninety percent more people firmly agreed that the absence of Realia in schools poses a serious threat to the successful implementation of Realia in secondary schools. The aforementioned chart also makes clear that all students—100% of them—believe that one of the biggest obstacles to implementing ICT-related real-world applications in the classroom is the absence of electricity in schools. The students asserted that they might have personal laptops that need electricity. Electrical power is required for Realia to function properly. Abilities to control

Realia if they were available at the school. The idea that there is no theft or vandalism in schools runs counter to the beliefs of those who believed that knowledgeable servicemen who were called in to remove viruses from Realia were stealing Realia accessories, which was the main obstacle to its usage. In a similar spirit, Obikwe and Chinwe (2012) bemoaned that school officials frequently refuse instructors and students access to Realia, a claim that the latter disputed.

Fig. 4.3.5 Techniques that can be used to improve implementation of Realia in Secondary School

Improving Realia use in teaching and learning of Biology	SA	A	D	SD
Send teachers for in-service workshops on Realia use	10	10	80	
Engage the community for Realia procurement and infrastructure programs	16.7	16.7	66.6	
Monitor learners when using Realia	10		90	
Safeguard existing Realia	90	10		
School heads should make Realia accessible to beneficiaries	100			
Schools should offer technical support	100			
Government to nationally initiate rural electrification	100			

Students strongly agreed that, in order to maintain the culture of Realia use in secondary schools, schools should provide 100% technical support, 100% rural electrification programs, and 90% safe storage of the available Realia. These are some of the intervention strategies that should be implemented to improve the implementation of Realia in the teaching and learning of Biology for Secondary School students. The students bemoaned the high turnover rate of employees resulting from the unavailability of electricity in their localities. Ormrod (2000) asserts that Realia often operates with a steady power supply, highlighting the necessity for rural electrification, while Perry (2015) counsels educators to protect Realia entrusted to them.

Remarkably, students disputed (90%) that they require supervision when using Realia, and 80% of teachers said teachers should attend refresher courses to brush up on their Realia usage. The

students exuded confidence in their ability to control Realia without the teacher there. For instance, the students said they don't need the teacher's help to run a public address system. Although the findings suggested that teachers should keep a careful eye on students when they are learning biology with Realia, it became clear from the data that students want to be autonomous and develop professionally through practicing self-control when using Realia, suggested that all educators who planned to use Realia send their teachers for refresher training, but the students rejected this suggestion.

4.4 Results from Observations

4.4.1. Structures in the selected schools

- Not to mention Realia and associated materials, the School lacked sufficient buildings to accommodate all of its students.
- There wasn't enough ventilation, security, or dust in the few buildings that were available to keep Realia secure.
- The administration offices were the only ones with secure rooms.
- There were no rooms set aside for keeping Realia safe.

Because of inadequate facilities, the majority of the sampled schools were unable to safely care for Realia. This discovery aligns with the views expressed by Stake (2010), who recognized that infrastructure is a barrier for many secondary schools, preventing them from both acquiring Realia for use in biology instruction and learning and from protecting their current Realia resources.

4.4.2. Number of Realia in the Secondary Schools under Sample

Not a single Realia intended for the school was utilized in any of the secondary schools. The only technology available was that which each teacher had, such as laptops. One major obstacle to the purchase of Realia was the lack of electricity needed to power the majority of them. While certain devices, like cell phones and radios, could run on solar power, laptops needed electricity, which wasn't accessible in all of the schools in the sample. According to Desmond et al. (2002), there was a shortage of Realia in schools, which is why they weren't used much for biology instruction.

4.4.3. Realia's quality in the secondary schools that were sampled

The majority of the teachers' Realia were too tiny to hold large classes. For instance, teachers' radios and smart phones were too small to be useful in large courses. The laptops used by teachers

were in good working order, although they were primarily intended for record-keeping and amusement purposes rather for biology instruction. The characteristics of Realia in the classroom made them unsuitable for use in large-class biology instruction. Given the huge class sizes that were common in the schools that were sampled, it was also evident that, despite the availability of a few gadgets in the school, their state was not suitable for use in the teaching and learning of biology. Mwenje (2012) feelings are reflected in this observation.

4.4.4. Class sizes that were noted

In the sampled courses, there were very high teacher-to-student ratios. The researcher considered the greatest teacher-to-pupil ratio—1: 49—to be intolerable. Even with the minimum teacherpupil ratio of 1:36, the teacher-learner ratio was still higher than average.

Realia-assisted biology instruction was not possible due to the high teacher-to-student ratios. Even though Kalinga (2008) acknowledges that Realia can help teachers collaborate with a large number of students, a smaller teacher-to-student ratio was required in order to successfully incorporate Realia into Biology instruction. Similar opinions are expressed by Mulkeen (2010), who contends that the existence of is one of the main obstacles to the integration of ICTs in biology teaching and learning.

4.4.5. Security of Realia offered in the secondary schools that were sampled

If Realia used them, there were a few administration rooms with sufficient security. After using their laptops, most teachers went home. Other than the classrooms, which were likewise packed with students, there were no store rooms where Realia could be kept. The lack of spaces for Realia's safe maintenance was a big setback for rural schools hoping to use Realia in their biology curricula. This remark is similar to Miller (2009) claims that the safety of Realia at many secondary schools was compromised by inadequate infrastructure.

4.4.6. Both internet access and electricity.

Every school in the sample lacked internet access, solar power, and electricity. Nonetheless, Econet and Netone provided telephone networks that connected to all of the schools. Since there was no electricity in the schools or even nearby, it was seen that using Realia, which required electrical power, was an enormous challenge for the tested schools. Furthermore, none of the sample schools offered WiFi, making it impossible to browse or surf the internet. Bello (2015) promoted the theory

that the majority of schools avoid implementing ICT-related Realities because they lack energy and internet connectivity.

4.5 Chapter summary

Data from questionnaires, in-person interviews, and direct observations were presented in this chapter by the researcher. Bar graphs, frequency distribution tables, and other statistical graphs were used to present the data. The investigator employed statistical tools to facilitate the condensing of the results and enable their examination. The researcher then went on to interpret and analyze the data in light of the study's goals after providing an explanation of the material that had been provided. To find out if the researcher's data and other previous discoveries were correlated, the collected data was thus evaluated and interpreted. The study's summary, conclusions from the data, suggestions for further research and research topics are provided in Chapter 5, the following part.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This last chapter includes a summary of the entire investigation, the researcher's conclusions based on the information gathered, and suggestions to be made based on the researcher's findings. The researcher concludes by outlining research questions for more study.

5.2 Summary of the study

Four chosen secondary schools in the Guruve District's Chemachinda Cluster served as the study's sites. This study's primary goal was to determine the difficulties that secondary school biology teachers and students have when utilizing Realia in the classroom. Thirty students and five teachers made up the 35 participants in the study.

In the study's second chapter, relevant material was reviewed by several authorities, who pointed out numerous benefits of using Realia to support biology instruction in secondary schools. The benefits of using Realia in biology instruction and learning were examined, along with the difficulties involved in using Realia to support biology instruction and learning. A discussion was held regarding the several approaches that may be used to enhance the usage of Realia in Biology instruction at the secondary school level.

The researcher employed a descriptive survey research methodology to acquire the evidence for this study. The primary data collection methods for this research were direct observations, questionnaires, and oral interviews. While learners were given questionnaires, oral interviews were done with them. In addition to using these research tools, the researcher personally saw how biology was being taught and learned at the school using Realia. Pie charts, bar graphs, tally tables, frequency tables, and other statistical tables were used to show the data that was gathered through oral interviews, questionnaires, and direct observations.

5.3 The Findings and Conclusions researcher's conclusions were as follows:

- Even though Realia was available in some secondary schools in the Guruve District's Chemachinda Cluster, instructors lacked the pedagogical abilities to use them effectively to support the biology teaching and learning process.

- When it comes to sending teachers to seminars that promise to provide them the necessary abilities to use Realia in teaching and learning biology at the secondary school level, schools are not really supportive of their teachers.
- Financial difficulties prevent many secondary schools from purchasing Realia, which is necessary for instructors and students to use in order to support the teaching and learning of Biology in the secondary school.
- The majority of the secondary schools in the Chemachinda Cluster in the Gurube District have over-enrolment, which makes it difficult for educators and students to utilize Realia.
- In many secondary schools, inadequate infrastructure makes it difficult to maintain desktop computers and Realia safely.
- Student engagement and motivation, while realia can enhance student engagement, some learners may find the hands-on activities distracting or may struggle to connect the realia to the underlying biological concepts.
- Assessment and evaluation challenges, it can be challenging for teachers to effectively assess student learning and understanding when using realia, as traditional assessment methods may not adequately capture the skills and knowledge gained through these hands-on experiences.
- Lack of access to appropriate realia materials, many schools, especially in resourceconstrained areas, face challenges in obtaining relevant and sufficient realia for Biology instruction. This can limit the hands-on learning opportunities for students.
- Difficulty in relating realia to abstract biological concepts.
- Limited opportunity for hands-on exploration and experimentation.
- Difficulty in understanding the relevance of realia to real-life situations.
- Lack of Realia resources, the study found that many schools, especially those in resourceconstrained areas, lacked adequate realia (real-world objects and materials) for teaching biology. This limited the ability of teachers to effectively demonstrate concepts and engage students.
- Inadequate teacher training, the research revealed that many teachers lacked proper training on the effective integration of realia into biology lessons. This resulted in suboptimal utilization of available resources and missed opportunities to enhance student learning.

- Curriculum misalignment, the existing biology curriculum was sometimes found to be misaligned with the availability and accessibility of realia, making it challenging for teachers to seamlessly incorporate these materials into their lessons.
- Time and logistical constraints, teachers often faced challenges in terms of time and logistics when it came to sourcing, preparing, and incorporating realia into their biology lessons. This added to their workload and hindered their ability to fully leverage the benefits of realia.
- Student engagement and motivation, the use of realia was generally found to improve student engagement and motivation in the learning of biology. However, the study also identified instances where students were not accustomed to this approach, leading to initial hesitation or resistance.
- Assessment alignment, assessments in biology sometimes did not adequately reflect the skills and knowledge gained through the use of realia, creating a disconnect between the teaching and learning process and the evaluation of student performance.

Conclusions

- Increased investment in realia resources for biology education, particularly in underserved areas, is essential to enhance the teaching and learning process.
- Realia can enhance learners' engagement, motivation, and understanding of biological concepts.
- Effective integration of realia requires proper training, resources, and support for teachers.
- Realia should be carefully selected and aligned with learning objectives to maximize learning outcomes.
- Learners benefit from hands-on exploration and experimentation with realia to develop deeper understanding and connection to real-life situations
- Comprehensive teacher training programs focused on the effective integration of realia into biology lessons should be implemented to empower educators and maximize the benefits of this approach.

- Curriculum developers should closely align the biology curriculum with the availability and accessibility of realia, ensuring seamless integration and optimal utilization of these resources.
- Strategies to address time and logistical constraints, such as providing additional support or resources to teachers, should be explored to facilitate the effective use of realia in biology lessons.
- Gradual introduction and familiarization of realia-based learning approaches, coupled with clear communication of the benefits to students, can help address initial resistance and promote a more positive response.
- Aligning assessment practices with the skills and knowledge gained through realia-based instruction will ensure a comprehensive and coherent evaluation of student learning in biology.
- Increased investment and support are needed to provide schools, especially those in underserved areas, with access to a diverse range of realia materials suitable for Biology education.
- Careful planning and scaffolding of realia-based activities can help maintain a balance between hands-on engagement and the development of conceptual understanding among learners.
- Alternative assessment approaches, such as performance-based assessments and projects, should be explored to better capture the learning outcomes associated with the use of realia in Biology instruction.
- Collaboration between education researchers, policymakers, and practitioners is crucial to address the systemic challenges and develop comprehensive solutions for the effective utilization of realia in the teaching and learning of Biology.

5.4 Recommendations from the study

The researcher would like to provide the following recommendations in light of the study's findings:

- The study was limited to students in secondary schools, but more research may be done to include students at all educational levels.

- According to the study, using Realia in Biology teaching and learning is extremely important. As a result, school administrators should work nonstop to get Realia for their teachers and send them to workshops to provide them the pedagogical skills they need to use Realia in Biology teaching and learning.
- Since the study was limited to four schools in the Guruve District, the researcher recommends expanding the study to include the entire district or province in order to increase the validity and reliability of the results.
- Since the study revealed significant flaws in Realia-based biology instruction at the secondary school level, teachers should carefully consider their lesson plans and implement some of the study's recommended mitigating strategies.

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APPENDICES

APPENDIX 1: Ethical approval letter from BUSE

SAMED

P. Bag 1020
BINDURA
ZIMBABWE

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

 BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 10/04/2024

TO WHOM IT MAY CONCERN

NAME: CHICANGAIDZE AGATHA REGISTRATION NUMBER: B1129723

PROGRAMME: HBSCEdBz PART: 2.2

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

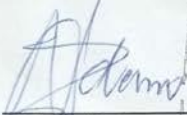
The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBSCEdBz programme. The research topic is:


Problems faced by teachers and learners in using Realia in teaching and learning of Biology in Secondary Schools in Chemachinda cluster of GURUVE District

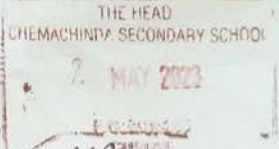
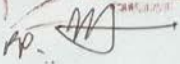
In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.


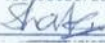
Your co-operation and assistance is greatly appreciated.

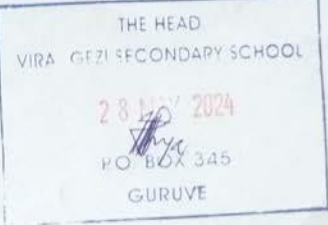

Thank you


Z Ndembu (Dr.)
CHAIRPERSON - SAMED




Signature: 

APPENDIX 2: Questionnaire for Secondary School Biology Teachers

INTRODUCTION

*I Agatha Chigangaidze, I am a student at Bindura State University in the **Department of Educational Foundations**. I am currently undertaking research work as a requirement for the award of a Bachelor of Biology. The research title of my research project is “**Problems faced by Teachers and Learners in Using Realia in the Teaching and Learning of Biology is Secondary Schools in Chemachinda Cluster of Guruve District**”. The information obtained will strictly be used for academic purposes and will be treated with confidentiality. You are sincerely requested to respond to questions from this questionnaire as honestly and professionally as possible. Please you do not need to write your name. Your participation is entirely voluntary. Therefore, I kindly ask you to respond to the following questions genuinely and sincerely. The questionnaire is to be completed by Biology teachers only.*

Section A: DEMOGRAPHIC DATA

Please tick in the appropriate box against each item

- *Age*
 - Below30* []
 - Between 31to40* []
 - Between 41to50* []
 - Above50* []

- *Gender*
 - Male* []
 - Female* []

- *HighestProfessional Qualifications*
 - Degreed (with Education)* []
 - Degreed (without Education)* []

Diploma in Education []

Certificate in Education []

• *Teaching Experience*

Less than 5 years []

5-10 years []

11-20 years []

Above 20 years []

SECTION B

Write your response on the spaces provided.

1) Do you have a personal realia or laptop? Yes [] No []

2) Does your School have desktop Realia or laptops? Yes [] No []

3) Does your School have a Realia laboratory? Yes [] No []

4) Is your School electrified? Yes [] No [] 5) Are you Realia literate? Yes [] No []

6) What do you think are the benefits of using Realia in teaching and learning of Biology?

.....

.....

.....

7) What challenges do you encounter when you try to integrate Realia in teaching and learning of Biology?

.....

.....

.....

8)What do you think can be done to improve Realia-aided teaching and learning of Biology at your

School?

Thank you for your time!

APPENDIX 3: INTERVIEW SCHEDULE FOR LEARNERS

INTRODUCTION

I Agatha Chigangaidze I am a student at Bindura State University in the **department to Educational Foundations**. I am currently undertaking research work as a requirement for the award of a Bachelor of Biology. The research title of my research project is **“Problems faced by**

Teachers and Learners in Using Realia in the Teaching and Learning of Biology in Secondary Schools in Chemachinda Cluster of Guruve District”. The information obtained will strictly be used for academic purposes and will be treated with confidentiality. You are sincerely requested to respond to questions from this questionnaire as honestly and professionally as possible. Please you do not need to write your name. Your participation is entirely voluntary. Therefore, I kindly ask you to respond to the following questions genuinely and sincerely. The questionnaire is to be completed by School Learners’ only.

Section A: DEMOGRAPHIC DATA

Please tick in the appropriate box against each item.

- *Age*
Below13 []
Between 13and15 []
Between 15 and 17 []
Above17 []
- *Gender*
Male []
Female []

SECTION B

Write your response on the spaces provided.

- Are you Realia literate? Yes [] No []
- Do you own a personal Realia or laptop? Yes [] No [] • Does your teacher sometimes use Realia in teaching and learning of Biology?
Yes [] No []
- Is your School in a position to use Realia to facilitate teaching and learning of

Biology?

Yes [] No []

Give reasons for your response in 4 above

.....
.....
.....
.....

- What do you think are the benefits of using Realia in teaching and learning of Biology?

.....
.....
.....
.....

- What challenges do you face when integrating Realia in teaching and learning of Biology?

.....
.....
.....
.....

- What mechanisms do you think can be adopted by the School, your teachers and parents to facilitate the use of Realia in teaching and learning of Biology?

.....
.....
.....

Thank you for your time!

APPENDIX 4: OBSERVATION GUIDE FOR TEACHERS AND LEARNERS

The researcher shall observe and record the following:

- Teacher-pupil ratios at the sampled Schools
- State of infrastructure at the sampled Schools
- Availability of electricity or power supplies in the Schools selected.
- Availability of internet services at each selected School.
- Quantity of Realia at each of the selected Schools.

- Quality of Realia at each of the selected Schools.
- Teacher efforts in use of Realia-aided teaching and learning of Biology.
- School initiatives in facilitating the use of Realia in teaching and learning of Biology.