

BINDURA UNIVERSITY OF SCIENCE EDUCATION

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BACHELOR OF SCIENCE EDUCATION HONORS DEGREE IN BIOLOGY



An investigation into the outputs and outcomes of learning as reflected by biology students. A case for Karoi Rural Secondary School in Hurungwe District, Mashonaland West province.

By

MTAMBU CATHRINE

Registration Number: B1437791

Dissertation submitted to Bindura University of Science Education in partial fulfilment of the requirements of the Bachelor of Science Degree in Biology

Supervisor: Dr. R. MAKADO

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Name of the student: Mtambu Cathrine

Registration Number: B1437791

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Mtambu C Date...../...../.....

Permanent Address: Standnumber1485, Whitehouse Extension,/Magunje Growthpoint, Magunje

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DEDICATION

This research is dedicated to Nelson Vakisai, my children and my fellow friends for their support during the study.

ABSTRACT

The researcher conducted a study to assess the outputs and outcomes of learning as reflected by Biology students in Karoi rural secondary schools in Hurungwe District, Mashonaland West Province. The study sought to establish the strategies that can be adopted to improve the learning of Biology at schools under investigation. This study was conducted in three secondary schools in Hurungwe district. The study used mixed research methodology. The study sampled 6 teachers teaching Biology. And 30 learners are also doing Biology. Specifically, it used survey research and observation to gather data. Questionnaires were given to biology learners, teachers, and HOD. The observations were done in biology lessons to have first-hand information on how lessons were conducted. Data was analyzed using themes that originated from the gathered data. The study established that most learners are being inspired to learn biology for inquiry-based learning and innovations, although there are not enough materials and equipment for inquiry-based learning to be conducted during lessons, a congested timetable, lack of study time and the proximity of learners from the school. The study recommends that school science laboratories should be sufficiently equipped with laboratory equipment to help accommodate all learners and have all learners in pragmatism. The Ministry of Primary and Secondary Education should articulate a clear policy on inclusion and provide adequate financial support to all schools to support learners and teachers.

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CHAPTER 1: BACKGROUND TO THE STUDY

1.0 INTRODUCTION

Education research plays a pivotal role in understanding the effectiveness and impact of teaching practices on student learning outcomes. In the field of biology education, it is crucial to assess the outputs and outcomes of learning to optimize instructional strategies and enhance students' conceptual understanding. This study aims to investigate the outputs and outcomes of learning among biology students, shedding light on their academic achievements and the effectiveness of biology education. The researcher shall discuss the introduction aspects that include the background to the study, statement to the problem, research questions and objectives, significance of the study, assumptions, delimitations and limitations of the study then lastly chapter summary.

1.1 BACKGROUND TO THE STUDY

Biology education is a fundamental component of science education, providing students with a solid foundation in understanding the living world. It encompasses a diverse range of topics, including cellular biology, genetics, ecology, and physiology. Proficiency in biology not only fosters scientific literacy but also cultivates critical thinking, problem-solving skills, and an appreciation for the natural world. To evaluate the effectiveness of biology education, it is essential to assess the outputs and outcomes of learning. Outputs refer to the tangible products of learning, such as tests cores, assignments, and laboratory reports. On the other hand, outcomes encompass the long-term impact of learning, including students' knowledge retention, conceptual understanding, and the ability to apply biological concepts to real-world

Several factors can influence the outputs and outcomes of learning among biology students. These factors include teaching methodologies, instructional materials, classroom environment, student engagement, and prior knowledge. Understanding the interplay between these factors are crucial for identifying effective teaching strategies and enhancing student learning outcomes. Previous studies have explored various aspects of biology education and its impact on student learning. For instance, research has investigated the effectiveness of inquiry-based learning approaches, the use of technology in biology education, and the influence of teacher-student interaction on student engagement and understanding. Building upon this existing body of research, the current study aims to contribute to the understanding of learning outputs and outcomes in the context of biology education.

1.2 STATEMENT OF THE PROBLEM

There has been concern on the need for learners to produce goods and services from what they learn. However, little is known on whether this actually happening. The study shall focus on the outputs and outcomes of learners in Biology. A case for Karoi rural secondary schools.

1.3 RESEARCH QUESTIONS

- 1) What are the aspirations of biology students in Karoi rural secondary schools?
- 2) How do biology students' learning outputs reflect their understanding of course content?
- 3) What are the personal, social, and institutional factors that contribute to the learning outputs and outcomes of biology students?

1.4 RESEARCH OBJECTIVES

- 1) To investigate the aspirations of biology students in Karoi rural secondary schools.
- 2) To identify biology student learning outputs reflecting their understanding
- 3) To explore the relationship between student engagement, motivation, and academic achievement in biology.

1.5 SIGNIFICANCE OF THE STUDY

The findings from this study would assist biology teachers in understanding how to teach the subject.

The finding from this study might also be helpful to Biology teacher sin the evaluation of teaching and learning of Biology thus helping inputting in place the strategies aimed at improving teaching and learning of Biology subject in schools. The findings of this study might also contribute to new knowledge that might help biology teachers find solutions to the problem of learners who are not performing well in the subject. Furthermore, teachers might also benefit from this study as the findings may be of value to teaching and learning strategies and teaching and learning resources in implementation of Biology curriculum.

School administrators

They would benefit from suggestions on how to ensure an enabling learning environment for students and teachers to enhance performance in Biology.

Policy formulators

Would gather useful information which would shed light on why the interventions so far implemented not so far yielded required outcome. The study results would benefit policymakers

as they would get to know the real insight into the factors which influence the performance of Biology in Karoi rural secondary schools, as well as the country at large.

The pupils or learners

Biology is beneficial to learners as it stimulates active learning (active recipients) and learners construct their own knowledge and understanding through discovery as the learning become learner -centered especially in practical works. This would also contribute to improved practical skills that will make it easier for the learners to apply given any examination situation.

The researcher

The researcher would also benefit from the study, since the study is carried out in the partial fulfilment of the studies she is pursuing. There search is part and parcel of there searcher's studies. It would benefit the researcher as one of the stake holders who faces the challenges in 4 the teaching and learning of biology. The researcher had acquired relevant skills that would help her with the tasks of planning instruction, preparing education materials and learning experiences for pupils in Biology.

Understanding the outputs and outcomes of learning in biology can inform the development and refinement of biology curricula. It help student if the key knowledge, skills, and understanding that students should acquire, allowing educators to prioritize and structure the content accordingly. Investigating the outputs and outcomes of learning in biology enables the development of valid and reliable assessment tools. By a ligning assessments with the desired learning outcomes, educators can accurately measure student progress and identify areas where additional support or intervention maybe needed. Understanding the outputs and outcomes of learning can inform the professional development of biology educators. It helps identify areas where teachers may need additional training or support to effectively facilitate student learning and achieve desired outcomes. By studying the outputs and outcomes of learning in biology, educators can identify factors that contribute to students ' success and engagement in the subject. This knowledge can inform the development of strategies to enhance student motivation, interest, and achievement in biology

1.6ASSUMPTIONS

It is assumed that teachers wish to see their learners being productive. Thus maximum co-operation is assured. Also, teachers take pride in seeing their students taking practicals. Learners feel good when they do something out of what they learn hence they will co-operate. Members of staff will get interested in seeing their learners showing out their talents; they will encourage them to participate.

1.7 DELIMITATION OF THE STUDY

The study shall be confined to Karoi rural schools in Hurungwe District, Mashonaland province. It shall focus on outputs and outcomes of learning in Biology.

1.8 LIMITATIONS OF THE STUDY

The study will be focused on Karoi rural schools. The study is not exhaustive; it is limited by resources and money. Also, time factor is another limit to my study.

1.9 DEFINITION OF TERMS

Output is being creative and innovative, where learning can foster creativity and innovation by providing individuals with a broader knowledge base and different perspectives. It encourages individuals to think critically, explore new ideas, and generate innovative solutions.

Outcomes learning in biology is the understanding of biological systems: Students should comprehend the organization and functioning of biological systems at different levels, ranging from molecules and cells to organisms and ecosystems. This includes understanding how biological structures and processes contribute to the overall functioning of living organisms.

1.10 CHAPTER SUMMARY

This chapter highlighted the background to the study of Biology, statement to the problem and assumptions. It also looked at research questions, objectives as well as significant to the study of biology. Finally, it elaborated on limitations, delimitations and definitions of key terms. Studying biology helps solve real life problems and improves quality of life.

CHAPTER TWO LITERATURE REVIEW

2.0 INTRODUCTION

Chapter two discusses the literature which is related to the study. Literature refers to secondary sources, and does not report new or original experiments as well as the theoretical and methodological contributions of a particular topic (Heart, 2013). This literature shall be discussed under four themes that emerged. These are:

1. Aspirations of learning by biology students.
2. Factors that influence the learning outputs and outcomes of biology students.
3. Relationships between student engagement, motivation, and academic achievement in biology.
4. Compare the learning outputs and outcomes of biology students across different educational levels and finally the chapter summary.

2.1 ASPIRATIONS OF LEARNING BY BIOLOGY STUDENTS

Gaining a comprehensive understanding of living organisms and their interaction with the environment.

Outcome: Students develop a deep appreciation for the complexity and diversity of biological systems, enabling them to analyze and interpret scientific data effectively.

Output: Students demonstrate strong analytical and critical thinking skills, capable of drawing evidence-based conclusions about biological phenomena. Students may also like to research on trees that can be used for treating diseases naturally, like *Kigelia africana*, commonly known as the sausage tree, which has anti-cancer and anti-diabetic properties recommended for treating these diseases as stated in the Medical Journal of Zambia, 50(1).

Exploring the potential applications of biological knowledge in fields such as medicine, biotechnology, and environmental conservation:

Outcome: Students acquire practical skills and knowledge that can be applied to solve real-world problems, contributing to advancements in various industries.

Output: Students engage in research projects, internships, or collaborative work that showcases their ability to translate biological concepts into tangible solutions.

Pursuing a career in scientific research, teaching, or healthcare:

Outcome: Students develop specialized expertise and the necessary skills to succeed in their desired career paths, contributing to the advancement of their respective fields.

Output: Students may publish research papers, deliver presentations at conferences, or participate in educational outreach programs, demonstrating their proficiency and passion for their chosen career.

Contributing to the understanding and preservation of the natural world:

Outcome: Students develop a sense of environmental stewardship, advocating for sustainable practices and the conservation of biodiversity.

Output: Students engage in community-based projects, volunteer work, or policy-making initiatives that promote environmental protection and sustainable development as stated in Journal (2021).

Student characteristics describe the students in terms of socio-economic status (SES), aptitude, and/or high-school performance, and educational aspiration (Chapman, 1981). First, a study revealed that SES affects student choice of an academic degree program in a university where high SES students intend to pursue engineering or sciences. In contrast, low SES students prefer academic degree programs that guarantee immediate job opportunities after graduation (Misran et al., 2012). In other words, students from disadvantaged families may be more sensitive to education costs and may have lower preferences for education (Declercq & Verboven, 2015). Second, aptitude, which refers to high-school achievement and college entrance examination performance, is another variable that Chapman (1981) identified as influencing college choice. It is reported that academic ability is used to get a sense of academic confidence and affiliation rather than as an objective measure of ability (Elsner et al., 2021; Huntington-Klein, 2017). Students who perceive themselves with advanced academic ability tend to plan academic degree programs within the STEM domain (Rudasill & Callahan, 2010). The level of educational aspiration is also considered to influence college choice. However, while a considerable number of literature relate the level of educational aspiration to participation in higher education (2019; Othman et al., 2013), considerably fewer studies relate the level of educational aspiration to academic degree program choice.

Lichtenberger and George-Jackson (2013) reported that students with loftier educational aspirations are generally more likely to major in STEM fields in post-secondary education. Efforts to examine the learning outcomes in the Biology curriculum in terms of thinking skills are not at the desired levels. These studies need to reach the desired levels in terms of quantity and quality for the improvement of Biology curricula.

2.2 FACTORS THAT INFLUENCE THE LEARNING OUTPUTS AND OUTCOMES OF BIOLOGY STUDENTS

-The teaching approach, such as lecture-based, active learning, or problem-based learning, can significantly impact student learning outcomes. Studies have shown that active learning and

problem-based learning can lead to better knowledge retention and critical thinking skills in biology students. Freeman et al., (2014); Deslauriers et al., (2019)

Students who are actively engaged in the learning process and are intrinsically motivated to learn biology tend to have better learning outcomes. Factors such as interactive classroom activities, real-world applications, and instructor enthusiasm can contribute to student engagement (Trowler, (2010); Sinatra et al., (2015)). Students' prior knowledge and conceptual understanding in biology can influence their ability to learn new material and make connections. Addressing and building upon students' existing knowledge can lead to more effective learning. Bransford et al., (2000);

The physical and virtual learning environments, as well as the availability of resources, for example, laboratory equipment, technology, and learning materials can impact student learning. Well-equipped and supportive learning environments can enhance student engagement and understanding (Bransford et al., 2000); Pascarella & Terenzini, 2005). Individual differences, such as learning styles, cognitive abilities, socioeconomic status, and cultural backgrounds, can affect how students approach and engage with biology content. Addressing these individual differences can lead to more inclusive and effective learning (Felder & Brent, 2005; Hurtado et al., 2011)

The way students are assessed and the quality of feedback they receive can impact their learning outcomes. Formative assessments and timely, constructive feedback can help students identify their strengths, weaknesses, and areas for improvement. Nicole & Macfarlane-Dick (2006); Opportunities for collaborative learning, such as group discussions, peer-to-peer interactions, and team-based projects, can enhance student learning in biology. Collaborative learning can foster critical thinking, problem-solving, and communication skills (Johnson & Johnson, 2009)

These factors, when addressed holistically, can contribute to improved learning outputs and outcomes for biology students. It is important for educators to consider these factors with the global recognition of the growing importance of developing STEM competencies, great emphasis has been placed on STEM as a field of study. This results in several educational initiatives and reform efforts focused on attracting students to pursue STEM courses and eventually work on aligned career pathways (McDonald, 2016). These efforts include providing merit-based scholarships for incoming college students, engaging them in collaborative research (Piper & Krehbiel, 2015), and transforming secondary schools into academies that allow teachers and students to engage in STEM (Kennedy & Odell, 2014). The latter is accomplished through several initiatives, including offering proactive and strategic approaches to empower teachers with the resources needed to transform teaching and learning methods for the new century. Other practical initiatives geared toward increasing enrollment, retention, and graduation in STEM programs, particularly for low-income and talented students with interest in the field, are creating a strong cohort framework for them, developing mentor relationships, and hosting co-curricular activities that promote interaction, learning, and exchange (Shahhosseini et al., 2020). Tsui (2007)

also reviewed the literature and reported effective strategies commonly adopted to increase diversity in STEM fields.

These are offering pre-college summer bridge or transitional programs that focus on science, mathematics, and engineering subjects, mentoring and tutoring programs, career counseling and awareness, workshops and seminars, academic advising, and financial support. In addition, prospective students are engaged in hands-on STEM-related research, learning centers are established, and curriculum and instruction undergo reforms and implement evidence-based teaching practices to support student success in biology. Some studies reported that many students who entered college with the intent of pursuing a career in the biological or biomedical sciences later abandon this goal or do not finish the academic degree program (Soldner et al., 2012).

Career choice is a dynamic interaction between youth developmental stages and the prevailing environmental conditions, Howard et al., 2009. It involves understanding and exploring career options through planning and guidance, Porfeli & Lee, 2012. Guidance may come from family members, teachers, educators, peer influence, and societal expectations or social responsibilities, Akosah-Twumasi et al., 2018; Esters, 2007. In this context, the influence of significant people or interpersonal factors plays a crucial role in deciding which academic degree program to pursue. Parents' profession, knowledge, income in professional areas or the job market they venture into, norms, beliefs, information about modern jobs, and skills they acquire may influence their children's career choices, Saleem et al., 2014. Meanwhile, peers, teachers, and schools are potential enablers for STEM aspirations because they can maintain students' interest and achievement levels in science and mathematics during the early years of education, so they believe that pursuing a STEM degree or career is achievable, Holmes et al., 2017. These same interpersonal factors could also influence students' perceptions of the university image, the quality of academic degree programs, and career opportunities, as reported by several studies, Abe & Chikoko, 2020; Malgwa et al., 2005. Thus, the following hypotheses are proposed.

2.3 RELATIONSHIP BETWEEN STUDENT ENGAGEMENT, MOTIVATION, AND ACADEMIC ACHIEVEMENT IN BIOLOGY

Inquiry-based learning is gaining popularity in science curricula and educational strategies. Learners are strongly invited to actively think about why they expect certain results to happen and how the results can be interpreted. Developed modules help students develop a more integrated understanding of complex biological processes and improve their biology conceptual understanding. Through inquiry-based learning, biology students will be capable of exploring authentic problems using the processes and tools they have learned in the biology disciplines. For inquiry-based learning to be successful, students must possess the basic skills to conduct

scientific inquiry to investigate and/or solve a biological question as stated by Elisa M. Stone, CBE-Life Sciences Education, 2017.

As the objectives of learning are being developed through time, more specific educational strategies focus on problem-based learning in organized groups. Problem-solving in biological and other sciences requires critical thinking, is often considered an essential learning outcome of institutions in higher education. More emphasis is needed to provide more active student-centered in-class instruction and assessments that contain a higher-order cognitive set of biological questions. Several models have been developed to increase the attention and interest of biology learners in scientific topics and improve their critical thinking skills. The overall objective of the learning process focuses more on higher than lower order thinking, as is the case with traditional teaching methods.

Technological developments in the production, use, and transfer of scientific knowledge have led to many innovations in biological science. Especially with new developments in genetic engineering and biotechnology, biology has become a part of our daily life, and this has increased the requirements for biology education. In the Biology Course Curriculum, the contribution of Turkish-Islamic scientists to science, in particular, to the role of biology in human life and science history, has been included. The development of knowledge, skills, competencies, and values of students in relation to the interactions between science, technology, society, and environment has been emphasized).

Several causes pointing out students' declining interest in pursuing biology as a major in college have surfaced. These include, but are not limited to, high-school preparations, academic demands or size of academic requirements both in and out of the class, intrinsic and extrinsic motivations, perceived relevance and confidence, and anxiety in learning biology (Ekici, 2010; Jackson et al., 2022; Ursavas, 2020). This is despite the importance of the discipline in promoting the development of new generations of creative biologists, enhancing environmental literacy, and instilling social responsibility to citizens (Fleischer et al., 2017). Marketability of career opportunities, job satisfaction, financial outcomes or high salaries, prestigious professions, and future benefits are among of the future career opportunities considered when choosing a career (Ahmed et al., 2017; Akosah-Twumasi, 2018; Nyamwange, 2016). In other words, students choose an academic degree program that prepares them for these career opportunities. The study of Biology as an academic degree program may offer these future opportunities if completed.

At the high school level, biology education typically focuses on providing a foundational understanding of key biological concepts and principles. According to a study published in the *Journal of Biological Education*, high school biology students often demonstrate stronger performance in recalling and understanding basic facts, definitions, and processes, such as cell structure, photosynthesis, and basic genetics. However, they may struggle more with applying this knowledge to analyze complex problems or engage in higher-order thinking skills.

In contrast, at the undergraduate level, biology education aims to develop more advanced skills and a deeper conceptual understanding. A study in the CBE-Life Sciences Education journal found that undergraduate biology students display greater proficiency in tasks that require critical thinking, problem-solving, and the ability to interpret and analyze scientific data. Undergraduate students are also more likely to engage in hands-on laboratory experiments, research projects, and scientific communication, which enhance their understanding of the scientific method and their ability to apply biological knowledge in practical contexts.

Outputs and outcomes of learning in biology education have been a subject of interest in recent years. Research has focused on understanding what students learn and how they apply their knowledge in real-life situations (Anderson et al.,2011). Studies have shown that -based learning and hands-on activities (Bybee,2010).

Biology students' outputs, such as lab reports and projects, demonstrate their understanding of scientific concepts and processes (Hmelo-Silver,2004). However, outcomes of learning, such as critical thinking and problem-solving skills, are more complex to assess (Bao et al.,2017). Research emphasizes the need for authentic assessments that reflect real-life scenarios to measure students' learning outcomes (Wiggins&McTighe,2005).

However, it is important to note that the learning outcomes of biology students can vary depending on factors such as teaching methods, curriculum design, and individual student characteristics. A review article in the journal Bio sciences highlighted the importance of incorporating active learning strategies, inquiry-based approaches, and opportunities for student engagement to optimize learning outcomes at both the high school and undergraduate levels.

High School Level

Learning Outputs: Understanding of basic biological concepts, familiarity with the scientific method, and ability to conduct simple experiments.

Outcomes: Develop interest in biology, prepare for further study in the field.

Undergraduate Level

Learning Outputs: Comprehensive understanding of core biological principles, ability to critically analyze scientific literature, hands-on experience with lab techniques.

Outcomes: Acquire foundational knowledge, develop analytical and problem-solving skills, and prepare for graduate-level study or entry-level jobs.

Graduate Level

Learning Outputs: Mastery of advanced topics, expertise in specialized areas, independent research skills, ability to design and execute complex experiments.

Outcomes: Conduct original research, contribute to the advancement of the field, and prepare for careers in academia, industry, or research organizations.

Learning Outputs: Cutting-edge knowledge in a specific area of biology, advanced research and experimental design skills, ability to formulate and test hypotheses.

Outcomes: Generating novel scientific insights, publishing in peer-reviewed journals, becoming independent researchers, and securing academic or industry positions.

The functional aspect relates to the attributes or benefits linked to the university, such as the quality of its education or training, vision, mission, goals, research, and publications. The affective image covers the personality of the university such as its ideological component and finally, the reputation pertains to the perception of the university overtime in terms of its commitment to community service, ranking over other universities, employability of graduates, and among others. University image has become an increasingly important attribute of any university as what prospective students formed by them greatly influences their choice and eventually maintain their competitiveness in the market Azouryetal., (2014; Gołata & Sojkin, (2020); Wilkins &Huisman,(2014).It has also become a determinant of how students perceived the quality of its academic degree program offering Pampaloni, (2010).

Pedagogical levels of students should be taken into consideration when organizing subjects in the curriculum. Furthermore, attention should be paid to the developmental state of mental skills in the sequencing of achievements. It is necessary for developing effective interpretations for students to have experiences on subject organizing and have learning outcomes appropriate to the practical reflections on these experiences. Large-scale project studies involving biology teachers, consultant lecturers, and coordinator teachers may be developed to integrate reflective thinking into biology course curriculum. Studies can be done to improve reflective thinking of instructors and researchers as well as students as postulated by MEB (2018).

In conclusion, the investigation into the outputs and outcomes of learning in biology education reveals critical gaps between teaching methods, assessment strategies, and intended learning objectives. Many educators focus on content delivery without ensuring that learners develop critical thinking and problem-solving skills. Additionally, assessments often emphasize rote memorization rather than the application of biological knowledge in real-life contexts. To address these gaps, it is essential to align teaching methods and assessments with clear, measurable learning objectives. This alignment not only enhances conceptual understanding but also fosters skills relevant to scientific inquiry and lifelong learning in biology.

In summary, while high school biology students often perform well in recalling basic facts and concepts, there is a noticeable gap in their ability to engage in higher-order thinking such as analysis, application, and evaluation. On the other hand, undergraduate students tend to show more advanced skills in critical thinking and scientific problem-solving; however, they may still lack depth in foundational knowledge or struggle to connect theory with practical situations. These gaps highlight the need for a more integrated and progressive biology curriculum that not

only builds a strong knowledge base at the high school level but also intentionally develops cognitive and scientific inquiry skills as students advance. A balanced and scaffolded approach is essential to ensure continuity and progression in biology education across educational levels.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 INTRODUCTION

The chapter is all about research methodology. The researchers going to present this under the following headings research design. There searcher intend to highlight how these instruments help together data related to the topic under study. It brings forward the study of research instruments to be used which are questionnaire, population, sampling procedures, and reliability, data presentation and analysis and finally chapter summary.

3.1 RESEARCH DESIGN

This study adopted across sectional survey research design located in the qualitative and quantitative paradigm. Research design is a broad classification of the investigation conceived to obtain answers to research questions (Makore,2001). The researcher is going to use descriptive research design which is a powerful tool used by scientists and researchers together information about a particular group or phenomenon. This type of research provides a detailed and accurate picture of characteristics and behavior of a particular population or subject. The descriptive research design involves observing and collecting data on a given topic without tempting to infer cause-and-effect relationships as stated by Sirisilla, S. (2023).

3.2 RESEARCH METHODS /METHODS OF DATA COLLECTION

Research instrument to be used by there searcher are surveys, sampling procedures, data presentation, and analysis. These are both qualitative and quantitative research methods which is survey. Surveys are a type of descriptive research that involves collecting data through self-administered or interviewer-administered questionnaires. Additionally, they can be administered in person, online and can collect both qualitative and quantitative data as postulated by

Sirisilla,S.(2023). Open-ended questions, which are any other aspects they will have done or not done in school.

3.3 RESEARCH INSTRUMENTS

Research instruments are tools used by the researcher for purposes of data collection Mertens,(2005).This is buttressed by Babbie (2007) who avers that research instruments can be tools used as measurement or observation parameters when one is carrying out a research. For this study, questionnaires, focus group discussions and observation schedules were used to solicit data from the

respondents, thereby enabling data triangulation Charmaz,(2014). Inherently, data triangulation produces an airtight research as the data collection tools complement rather than compete to gain truth. Other than Bell,(2005). The collection of data for any research requires a multi-pronged data collection technique. This will enable the collection of raw data from various sources and to meet the confined time frames for the research. According to Robinson (1997), the commonly used data collection techniques are observations, interviews, documents and records. However, a deep look at the curriculum evaluation programs in Zimbabwe, questionnaires are becoming the mostly used method of data collection. In this research, the researcher opted to use the questionnaire and interviews as a binary combination for the collection of data.

3.3.1 Questionnaires

Gilbert (2002) avers that, a questionnaire is a research instrument which consists of a series of questions that are used for the purpose of gathering data from respondents. In this study, the researcher developed a questionnaire with two sections. Kasawaya (2015) defines a questionnaire as a document of questions whose sole purpose is to elicit responses from respondents. One section gathered information on the personal details of the subject, whilst the other section solicited information on factors contributing to high failure rate in Combined Science at 'O' Level.

To get desired feedback, the administering of questionnaires was used as one of the many ways to extract information from the school. The research used a combination of both open ended and closed-ended questions in administering the questionnaires. Open questionnaires create room for elucidation, the questionnaires were meant for both the teachers and the learners' sample as the research participants.

3.3.2 Advantages of questionnaires

Questionnaires caters for the reduction of the chances of researcher bias because the same questions are administered to all respondents and administration is comparatively inexpensive and easy even when gathering data from large numbers of people spread overwide geographic area. Adding on, quite several people feel more comfortable responding to a survey than participating in an interview. Vandenbosch, (2006) opines that questionnaires measure the ability of what a person knows, dislikes, and thinks as well as to discover what experiences have taken place. The data collected is usually reliable and has high degree of accuracy. Usually, the respondents get to respond to the questionnaires at their own and afford the respondents time-alone, as they may not wish to discuss the issues raised by the questionnaire through face-to-face interactions. Adding on, data collected via this method is gathered in a short is gathered in a short space of time. Moreover, questionnaires enable measurement of knowledge, value, preferences, attitudes, beliefs, and experiences of respondents beyond the physical reach of the researcher.

3.3.3 Disadvantages of questionnaires

Makare Rukuni (2002) postulates that survey respondents may not complete the survey resulting in low response rates and items contained here in, may not have the same meaning to all respondents. Many atimes, the size and diversity of sample will be limited by people's ability to read. Thus, questionnaires may only be administered to literate individual(s) since they require respondent to read, understand and fill in. The absence of the researcher may probe the respondents to consult each other and, in a way, their course of action may affect the validity and reliability of the researcher's findings. This implies that given lack of contact with respondent as in some cases, one would never know who really completed the survey. Out of ignorance and negligence, the respondents may take it for- granted to repost the questionnaires after completion, even if the stamp and self-addressed envelope are provided. However, good survey questions are difficult to design and they take considerable time to develop and hone and there are limited chances for one to probe for additional details.

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Being displayed by learners.

3.3.4 Advantages of interviews

Provides flexibility to the interviewer to adjust questions in order to probe the interviewee further and also allows the explaining and simplification of ambiguous and vague questions to obtain more information.

Non verbal behavior such as facial expression and body movement will also be involved and is vital in depicting the respondent's behavior and attitude.

Deviation from the subject matter by the respondent can be minimized as the researcher will there to guide questions and answers to relevance of the subject matter.

It is time and cost efficient.

Disadvantages of Interviews

Interviews become time consuming and difficult to conduct if a large sample is involved

The researcher may be tempted to use leading questions which may require pre determined answers there by opening up the process to bias.

3.5 VALIDITY AND RELIABILITY

Reliability of data is the degree to which an assessment tool produces stable and constant results. The idea behind reliability is that any significant results must be more than a one off finding and be inherently repeatable. Other researchers must be able to perform exactly the same experiment under the same conditions and generate the same results (Moskaletal,2000). While reliability is necessary, it alone is not sufficient. For a study or a test to be reliable it also needs to be valid

(Moskaletal,2000). Validity of data refers to how well a test measures what it is purported to measure. Validity encompasses the entire experimental concept and establishes whether the results obtained meet all the requirements of the scientific research method. To test the reliability and validity of the data, the same questionnaires were used to all three selected schools, outside the research area. The H.O.D's were given interview guides and teachers were given the questionnaires and the results were compared to ensure that the results are replicable if applied elsewhere. This is in order to ensure that there is consistency with the results if a similar methodology is used elsewhere.

Reliability centers on the way you formulate your questions whether the item in question will yield consistent responds or interpretations. It evaluates the extent to which a research instrument consistently produces the same results when used in the same situation on repeated occasions. The researcher will also administer the study in other schools by pilot study. Validity refers to the accuracy of a measure. It indicates the extent to which research instruments accurately measures what it is supposed to measure. Population is the entire group which will be focused on during the research which is the biology students in Karoi rural secondary schools. Random sampling is representative of the population to be selected during the research either choose odd or even numbers. 10% of 100 pupils per three schools in Karoi rural.

.6 DATA ANALYSIS

This study examined the impact of various factors on cooperation and communication in a learning environment. To ensure that the measurement tools used in the research were reliable, the researchers used Cronbach's Alpha which is a statistical measure of internal consistency. A high Cronbach's Alpha (typically above 0.7) indicates that the items within each scale or factor reliably measure the same underlying concept. (Tavakol, M. etal, 2011).

To confirm that the factors being studied were distinct from each other, such that they measured different concepts, the study conducted a test of discriminant validity. Discriminant validity checks whether constructs that are supposed to be unrelated are indeed unrelated in the data.

The evaluation of discriminant validity was based on three important statistical criteria:

1. Inter-construct correlation (IC) values were checked to ensure they were below 0.80, as suggested by Hair et al. (2012). If the correlation between two constructs is too high, it might mean they are measuring the same thing, which would be a problem for the study's validity.

2. The Average Variance Extracted (AVE) was used. This is a measure of how much variance in the observed variables is explained by the underlying construct. An AVE of 0.5 or higher indicates that the construct explains at least half of the variance of its indicators, which supports convergent validity (a related concept).
3. According to Fornell and Larcker's (1981) criterion, the square root of the AVE for each construct should be greater than the correlations between that construct and all other constructs in the model. This means that each factor should relate more strongly to its own items than to other factors, supporting discriminant validity.

3.7 DATA COLLECTION PROCEDURES

The researcher obtained a letter of permission to conduct research from the Bindura University of Science Education and the Ministry of Primary and Secondary Education through the director's education office. Permission was granted by the school heads and the heads of science department. Upon obtaining the consent, the study was undertaken in two phases: Phase one involved the researcher visited participating schools in order to be introduced, familiarized and seek respondents "permission to be involved in the study. The researcher shall physically distribute the questionnaires to collect data.

3.8 DATA ANALYSIS AND PRESENTATION

After the data collection, data analysis was carried out to show how each variable contributed to performance in Biology. Quantitative data from questionnaires were analyzed using descriptive statistics such as frequencies and percentages, while qualitative responses from open-ended questions were analyzed thematically. The analyzed data were then presented in the form of tables. Conclusions and recommendations were made based on both qualitative and quantitative data.

The qualitative and quantitative data obtained from the survey were analyzed. This was done when questionnaires were distributed to pupils and were grouped into some order and structure. The researcher shall present data on bar graphs and pie charts.

3.9 CHAPTER SUMMARY

The chapter mainly focused on various aspects relevant to methodology. This chapter outlined the process of data collection for the purposes of identifying the factors that influence outputs and outcomes of biology in Hurungwe District Secondary School. The processes included are: research methodology, population and sampling procedure, instruments for data collection, ethical consideration and data presentation and analysis.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 INTRODUCTION

The chapter presents an analysis of the data collected from a sample of 3 secondary schools, 12 Biology teachers, and 3 Headmasters of the sampled schools in Karoi rural District. In this chapter the data collected are presented, analyzed and discussed. The data is presented in the form of tables and verbatim. The chapter produces data on the findings of the demo-graphical data of the respondents. Coding was used to isolate any comment relating to key terms or themes. The chapter aimed at answering the following research questions:

- 1)What are the aspirations of Biology students in Karoi rural secondary schools?
- 2)How do biology students' learning outputs reflect their understanding of course content?
- 3)What are the personal, social and institutional factors that contribute to the learning outputs and outcomes of biology students?

4.1 DATA PRESENTATION, ANALYSIS AND DISCUSSION

A total of 15 respondents were targeted by the study (constituting 11 Biology teachers and 4 Sciences (H.O.D's). The researcher got a response rate of 100%. This section presents the demographic information of the respondents including gender is presented in the table below.

Table 4.1: Distribution of the Respondents by Gender

	Teacher		HODs	
Gender	Frequency	Percentages %	Frequency	Percentages %
Male	6	50	2	55
Female	6	50	1	45
Total	12	100	3	100

Table 4. 1s hows that 50% of the teacher respondents were females while 50% were male. On the other hand, 55% of the H.O.D's respondents were males while 45% were females. The general conclusion was that most of the teachers who teach Biology are males and H.O.D's have equal representation of both male and female. An attempt was also made to identify the factors that influence outputs and outcomes of Biology students in Hurungwe district Secondary schools.

Table 4.2: below gives the factors that influence the performance of Biology students in named schools. The table only gives the results collected from teachers through questionnaires.

Structure of Student Interaction	Characteristics
Competitive Learning	•Students work individually. •Students have common learning goals and tasks. •The instructor grades students using norm-referenced methods for example curve -based grading.
Individualistic Learning	•Students work individually. •Students have individualized learning goals and tasks, different from those of other students. •The instructor grades students using criteria-referenced methods for example rubric-based grading.
Cooperative Learning	•Students work in small groups. •Students have shared learning goals and tasks within a group which may be similar or different from other groups. • The instructor grades students both on their work as a group and on their individual work.

Source: Tanner, K., Chatman, L.S.,& Allen, D.(2003). Approaching cell biology teaching: cooperative learning in the science classroom—beyond students working in groups. Cell biology education,2(1),1-5.

4:2 THEME 1: FACTORS WHICH INFLUENCE OUTPUTS AND OUTCOMES OF LEARNERS AS REFLECTED BY BIOLOGY STUDENTS

Table 4.2: Teachers responses on the factors which influence the outputs and outcomes of Biology students.

From table 4.2 it can be noticed that from all the teachers questioned 100% had strongly agreed that learners from unstable environment are emotionally disturbed and therefore perform badly. 0% were against that is false which means no one disagreed.

Furthermore it was noted that attitude is one of the factor which influence outputs and outcomes of Biology learner's performance in the three named schools. 100% of teacher had supported the statement saying that is true while 0% was recorded as the statement being false which mean no teachers disagreed.

A gain on the table given, it can also be observed that from 90.9% teachers questioned, teachers were in favors of the motion that lack of resources such as lack of laboratories contributes to

poor performance in Biology regarding the statement as true and only 9.09% of teachers supported that is false about the statement.

Moreover, 100% of teachers also indicated that is true that parents enable schools to achieve good results when parents are involved and work together with school and 0% recorded in favors strongly disagree. It was also recorded for same as that lack of financial support at any school affects performance negatively. Lastly, it can also observe that records was also one of the factors influencing performance of Biology students. It can be seen that a 100% of teachers that supported by saying true to the statement. 0% was recorded for the statement being false.

Teachers were also given chance to specify some other strategies which can influence the performance of Biology students and their results were noted like as below.

4:2.1 RESPONSES COLLECTED FROM TEACHERS THROUGH INTERVIEWS.

Attitude

From the information collected it had shown that student' attitudes towards biology shows that most students do not have positive attitude towards Biology. This shows that only few students have positive attitude towards the subject biology. This might be because these students don't know the significance of learning biology.

One respondent said that: attitude can affect student performance in Biology badly or in a good way. Most learners doing Biology they have a negative attitude toward the subject and these cause them to hate the subject and therefore failure as well. Only few have positive attitude toward the subject and they perform well.

Attitude could be positive, negative or neutral. Any concept that specifies an individual's feeling of likeness or dislike to anything is termed his or her attitude towards that item Khanand Ali, (2012). Kim and Song (2009) conducted a study in which they differentiated accepted instruments for a disposition towards science under either, in a lien able (related straight forwardly to students) and outward (related with social view point). They found inert attitudes towards science, such as school science will be easy", impacted students" Investment as well as applied seeing. Conversely, findings students" extraneous attitudes toward science, such as science offers better openings for work for the future Sharpe, (2012)

Home environment

It was found out that most of H.O.D's agreed that home background affects performance of learners in Biology and other subjects where as few disagreed with the statement that background affects performance of learners in Biology and other subjects. The findings of the study therefore showed that many H.O.D's have positive mind that home background is a factor which influence the performance in Biology. Home background can include things such as family, behaviors and cultures. If you combine these things one or the other can be an influence

in the child performance in the subject. One of the respondents emphasized that some learners they do not perform very well because they are affected emotionally back from home example those from homes where by their parents are abusive or drug users. Some learners they are orphan and they do not have people to take care of them at home and no one can control them.

Physical resources

It was also noted that most of H.O.D's disagreed that enough resources such as equipped laboratories contribute to poor performance in Biology. The findings of the study therefore showed that many H.O.D's have positive mind that physical resources such as laboratories are needed in the teaching and learning in Biology but not contributing to poor performance rather improve it. Biology normally needs more practical's works rather than theory teaching. If there are no laboratories, where is the practical going to take place except for field experiment? Laboratory is a room where practical was supposed to take place where you can find all the instruments and all the chemicals for carrying out experiments. One respondent said that: our learners they lack knowledge on Biology because of lack of laboratory room where practical can take place. Most of the lessons are just theoretical because no practicals are carried out because there is no laboratory in our school. Another indicated said that: there is no science library at our school and this limits our learners to get more information on the subject.

Parents

It was also find out that many H.O.D's strongly agreed that involvement of parents in school contributes to the good performance of learners in Biology. In order for the school to achieve good results, people involved including parents should work together Norlin (2009). The major role of parents in education is to pay schools fees on time and to buy books for their children. However, most parents do not play this role as expected. And this affects Biology performance negatively as some learners are expelled from school for fees and come after a longer period of time. Nzelum(2010) explains that parental involvement in children, seduction has a definite impact on learners "level of academic success. Rouse and Barrow (2006) have observed that economically disadvantaged parents are less able to afford the cost of education of their children and learners do not do their work to their fullest potential because sometimes they are expelled from school for fees. During their absence, the learning and teaching still occur as normal and this affects performance as some learners who would get better grades would not make it to the end of the course. One of the respond said that parents have a bigger role to play in the child education, what a child bring at school is normally from parents example behaviors.

32 The respondent further said that there are some parents who did not raise their children well and they tend to be rude to their teachers.

4.2.2 THEME 1 DISCUSSION

The school is an example of an open system composed of sub-systems that work together to achieve desired goals Norlin (2009). One of the major goals of the school is to produce good results. However, if parts of the system (school), the inputs, transformation process and the environment do not work in harmony with one another, the goals set cannot be achieved (good results). The sub-systems turn to be other factors which affect performance if they do not function as expected. This means that the inputs, transformation process, and management affect the outputs (performance) differently, either positively or negatively. Positive feedback means that there were no deficiencies in the system while negative feedback implies that there were deficiencies that ought to be corrected. Deficiencies can be the transformation process or the inputs or both which in turn will have an effect on the schools future outputs Lunenburg (2010).

4.2.2.1 Learner profiles

In order for the school to produce desired outcomes, people involved should work hand in hand. However, this is not the case as at schools where research was carried. Learners too contributed in various ways to the level of performance in Biology. One of the respondent said, “some students do not attend Biology lessons as expected and it is very difficult for me to work with such students. They come to class when they feel like coming”. Jackson (2009) also indicates that learners affect performance negatively as they deliberately ignore instructions from teachers, leave classes while lessons are still in progress, come to school late or disappear before school closes and they miss a lot of content presented in their absence. The correspondent further disclosed that learners contributed to the failure rate in Biology at school as they did not do the work assigned to them most of the time. He said, they wait so that they can be pushed to read. Unless this is done they will not do the work on their own. This indicates that learners as inputs into the system did not work in harmony with their teachers. And of course this affected performance negatively. The respondent further explained that poor performance in Biology due to admission standards into Senior Secondary at form four. He explained that sometimes most learners who were admitted into the school lacked the basics or had not done science at junior level at all. That affected Biology performance as it was difficult for them to understand the subject. At the end they performed badly. He added that learners performed badly in Biology because they could not answer questions as expected. They always write almost everything they knew about a certain concept, not answering what had been asked. Physical resources (Biology laboratory and library)

Lack of physical resources at researched school had affected Biology negatively. As a result, teachers did not teach Biology to their fullest potentials. These included the absence of an equipped Biology laboratory and an equipped library. Biology is demanding and it is taught best by involving learners. The lack of an equipped laboratory at these schools made the provision of education difficult. Tobin (1990) asserts that hands-on activities facilitate the understanding between the relationships among the variables studied. At these schools, learners were not exposed to investigations which equipped them for a practical paper due to lack of Biology laboratory. Instead some experiments involving simple apparatus were only taught by

demonstration. Jackson (2009) argues that many of the laboratories are in operative because of lack of equipment to carry out practical exercises.

These include: “lack of gas, running water, electricity to name a few. The respondent explained: lack of laboratory at our school hinders teaching and learning and most students fail to produce outputs and outcomes because they are not involved in carrying out experiments due to lack of laboratory equipment. Machobane (2000) points out that more are talk-chalk and they do not have proper resources hence teaching and learning becomes difficult. Therefore, the unavailability of resources such as equipped laboratories contributes to poor performance since Biology is learned better through hands-on activities. Words alone are insufficient to explain concepts to learners to capture and retain their attention and interest. Tobin (1990) argues that laboratory activities appear as a way of allowing students to learn with understanding and, at the same time, engage in a process of constructing knowledge by doing science.

One of the respondents pointed out that in some topics where demonstrations were done, some students performed better during tests and internal examinations and one as summed that they would do better if there is equipped laboratory. Indeed lack of laboratory affected performance in Biology negatively at researched schools. Laboratory work is an important medium for enhancing attitudes, stimulating interest and enjoyment, and motivating learners to learn science (Tobin1990). Learners recall easily things they have seen with their own eyes. In agreement with respondents, whenever possible teachers should demonstrate to enhance the teaching and understanding of Biology.

Moreover, there was no equipped library at these schools. At one of the school, the present library did not meet the demands of Biology learners. The respondent said,

“There are no Biology books in the library as they are using soft copies and hand outs from the teacher to benefit information required by the syllabuses.

“Biology requires the use of various standard Biology text books to enhance the understanding of learners. Therefore, for the fact that the library had no Biology text books it meant that the performance of Biology at these high schools would be negatively affected, especially when learners could not extent their reading by using library books. And indeed they only depended on notes from teachers which were, too, not enough for Biology.

Language as a medium of Instructions

Language is not only a tool for communication but it is also a resource for creative thought, a framework for understanding the world, a key to new knowledge, human history and a source of pleasure and inspiration Kern (2008). English is the language of power worldwide, and it is the main language of communication, learning, teaching, and assessment in Zimbabwe schools. It

carries most of the world's written knowledge and it is the second or foreign language to the majority of the learners in Zimbabwe. Setoi (1999) indicates that the language policy in Zimbabwe prescribes English as a medium of instruction in schools. The policy does not make provision for any special support or preparation to assist learners in meeting the challenges that English, as a second language and medium of instruction present to COSC learners.

Accordingly, English has been designated as a medium of instruction in all educational establishments however acquiring English literacy is a challenging task facing learners in these schools. English as a medium of instruction in schools were researched was carried plays a vital role in affecting Biology performance negatively. Most learners fail because they do not have enough English. When trying to explain concepts in Shona or Ndebele, that leads to misconceptions. In addition, failure can also be attributed to the level of content or the type and standard of questions asked. One of the correspondents had noted that being unable to understand English prevents them to understand examination questions as they refuse to speak English at school.

The respondent further explained that as a way of improving performance the management tried to punish them in order to speak English. However, all the strategies employed failed as learners refused to obey the orders. Indeed that led to the low outputs and outcomes shown in Biology at school. Learners did not answer questions as expected due to poor of English, and that came out clearly during tests and internal examinations. For teaching and learning to occur as expected the mode of communications should be easier to everybody. The inadequacies English which learners had at the school affected performance negatively as some learners struggled with the language rather than content presented.

4.2.2.3Parents

In order for the school to achieve good results, people involved including parents should work together Norlin (2009). The major role of parents in education is to pay schools fees on time and to buy books for their children. However, most parents do not play this role as expected. This affects Biology performance negatively as some learners are expelled from school for fees and come after a longer period of time. Nzelum (2010) explains that parental involvement in children's education has a definite impact on learners' level of academic success to produce outputs and outcomes. Parents according to the system theory are regarded as external inputs. They have influence in the learning process so that achievement can be good. Parental involvement in children's education has a definite impact on the children's level of academic success Nzelum (2010). Parents do affect learners' academic performance either positively or negatively. The major role played by parents in education is to pay fees on time and buy books, assisting in the learning of their children.

Failure to do their roles in time affects performance negatively. Barrow and Rouse (2006) observe that economically disadvantaged parents are less able to afford the cost of education of

their children and learners do not do their work to their fullest potential because sometimes they are expelled from school due to unpaid fees. In their absence the learning and teaching continue and this affects performance. Even the most capable learners' fall short of achieving what was within their reach. At one of the school where research was carried, some parents did not pay school fees on time and that resulted in learners missing some concepts treated in their absence. The respondent said:

“That parents do not pay schools fees on time and this result into low performance to produce outputs and outcomes as learners are expelled for fees and they come back after some time.”

The lengthily syllabus and use of biology textbooks

The other cause of low performance in Biology at this researched school was the failure to finish the syllabus. Biology syllabus is long, and in order to complete it, teachers and learners should sacrifice and have extra lessons beyond the school time. This helps a great deal because teachers would be able to cover the content which would otherwise not be easy to cover. Cimer (2011) argues that Biology curriculum is broad and in order to let learners to perform better it would be of advantage to reduce the content of the Biology curriculum. This may increase the quality of learning.

He further explains that the biological level of organization and the abstract level of concepts makes learning Biology difficult. Zaiden (2010) is of the opinion that Biology performance is affected negatively by the broad curriculum laden with concepts. He asserts that overloaded biological curriculum, the abstract and interdisciplinary nature of Biology, and difficulties with the textbooks are the other factors preventing students from learning Biology effectively. The respondent indicated that the Biology syllabus is broad and sometimes questions were asked on parts of the syllabus not treated. And this resulted in failure as most learners would leave questions not attempted.

4.2.2.4 Records (data)

There are various advantages of keeping records at school. Silverman (2010) explains that records reveal what people did and what they value. They are used to gain knowledge and insight on the behaviour of people involved. School records tell the history of the school and are useful historical sources (Durosaro 2007). Records further provide the information needed on ex-students either for institutions or for the research purposes. The researcher was not provided with the question papers for the tests and the marks obtained. However, the respondent indicated that he used testing as a way of assessing learners. But there was no proof indicating that learners had been tested. That raised some doubts about whether learners at these schools had ever been tested. Lack of records on learners assessment could be paired with low performance as one may conclude that learners were never given tests at these schools in order to see whether they

understood content presented to them. This implied that the teachers did not do what they were supposed to do as an input into the system. System theory indicates that if any part of the system does not work in harmony with other parts, the whole system is affected and set goals would not be met Kyoshiba (2009). In the case low performance in Biology was indeed caused by poor assessment.

Financial resources

Financial resources refer to the capital the school uses to finance both the ongoing and long term operations Lunenburg (2010). Lack of financial support at any school affects performance negatively. In order for the transformation process to occur as expected there must be aids facilitating the process of teaching and learning. Learners understand better if teaching aids are used. Jackson (2009) supports this by explaining that words alone are insufficient to explain concepts to learners to capture and retain their attention and interests. Educational resources prevent the blind memorization of words without any association to definite object. Chilisa (1997) states that educational resources boost the morale of both the teacher and the learner. They also inspire both the spirit of teaching and learning.

The respondent indicated that “It is even impossible sometimes to run some simple Investigations in the laboratory as my school doesn’t have enough funds and most learners are orphans”. “This prevented me from carry out simple investigations to facilitate the understanding of the learners”. The respondent further explained that due to lack of money the school library was empty of relevant Biology textbooks. The available textbooks were of low standard, and of course, it was difficult for learners to carry out mini-researches due to lack of textbooks. Akiri and Nkechi (2009) support this by saying that ineffective teaching is due to conditions such as lack of resources facilitating teaching and these result into negative influence on the instructional quality in schools which may translate to poor academic performance, attitude and values. The interview conducted disclosed that sometimes Biology was taught by unqualified teachers due to lack of money to hire qualified teachers. This is also considered as another factor affecting performance in Biology at these schools. Biology is a rigorous syllabus and it has to be taught by qualified teachers, if not, performance would remain very poor. The respondent disclosed that sometimes it is difficult to get qualified teachers and Biology was not taught for the whole session. That led to the management hiring unqualified teachers. Printy (2008) is of the opinion that when educators are unqualified, the aim and purposes of the curriculum will not be fulfilled because such educators lack skill to address and implement the curriculum as desired. Unqualified teachers are not even aware that there are various methods to use when teaching it. As a result, they experience many problems in delivering the content and that lead to poor performance.

Transformation process and assessments

Assessment is a basic tool in teaching and learning. Assessment of learners is defined as a participatory, interactive process that provides data or information one needs on learners’ learning and on teaching Banta and Palomba (1999). The purpose of assessment is to improve learning, inform teaching, help learners to achieve the highest standards they can and provide meaningful reports on learners’ achievements. Methods used by teachers to assess learners’ performance in Biology can affect outputs and outcomes negatively or positively. The most

common methods of assessing learners at one of the school use question and answer method and tests.

Question and Answer Method

In the teaching and learning of Biology one of the respondents said used question and answer method in assessing learners. He explained that he uses question and answer method at the beginning of the lesson, during the lesson and at the end of the lessons. “I use it in order to find out if students had understood concepts presented to them or not”. He explained that this method was advantageous as he was able to see whether learners were still on the right track or not.

Tests

There are different types of tests used in assessing Biology. These include weekly tests, topic test, and practical test. Amongst these, the respondent explained that they frequently used topic tests in order to reflect on learners’ performance. He administered tests to learners at the end of every topic. He explained that it was indeed important to give learners topic tests because they reflected whether learners had understood the topic or not. Should they perform badly in the topic test; he was in the position to find the remedy for the existing problem before moving to the next topic by re-teaching parts of test where they had not scored well. This type of assessment is very important as it recalls school science knowledge, the content taught at schools which is from simple to complex as postulated by Blooms Taxonomy.

Home environment

The home environment was found to be of no assistance to learners due to the parents’ low level of education and that made it impossible for learners to achieve the outputs and outcomes standards required at school for them to pass with results that allow university entrance.

Lack of parental support

The importance of parents’ role in the education of the child determines the achievement and success of children at school. The family background is the major factor in determining the outputs and outcomes Academic performance of learners because unstable families contribute towards poor performance Adell, (2002). One the respondents said that some parents are illiterate thus why they fail even to help their kid with homework. Some they give kids to do house chores more often than giving them time to study.

THEME 2: STRATEGIES WHICH CAN BE USED TO IMPROVE STUDENTS PERFORMANCE IN BIOLOGY.

Table 4.3 : Teachers response on the strategies which can be used to improve Biology Performance (N=11)

Table 4.5 shows strategies to improve performance in Biology from the findings of the study. 100% of teachers agreed that fieldwork is one of the effective methods of teaching Biology at all levels and another 100% were also noted that fieldwork is where science becomes alive and where acting locally becomes thinking globally. This can be strongly supported by the researcher observation when she visited the schools where at one school she found learners outside doing some observation on the grasses which is one of example of fieldwork. 0% was recorded that no one disagreed (said no) about such a strategy.

Furthermore it can also be observed that inquiry approach was also another strategy given. It can be observed that only 18.18% of teachers agreed (said yes) that inquiry approach does not enable teachers to be creative and enrich learner's abilities in understanding biology concepts and processes and 81.82% disagreed (said no). From the observation it shows that 100% of teachers had strongly supported that inquiry approach involves learners investigating, asking authentic questions and constructing reasonable explanation for the question formulated. 0% was recorded in favor of the strategy being not relevant which means no one disagreed (said no) about the strategy.

Lastly teamwork was the last strategy given. It can be observed from the table that 18.18% of teachers agreed (said yes) that teamwork does not enable the transformation process to occur at ease because teachers help one another and through teamwork, teacher would work together to achieve a common goal and 81.82% of them disagreed about the strategy. 100% of teachers supported by saying yes with teamwork teacher work together to achieve a common goal which means no one were against the strategy. Teamwork is important because is very difficult to work on isolation, at least if one do not know the way, the other one might know. Furthermore teachers were also asked to specify some of the strategies which can be used to improve performance of students in Biology. Strategies were given and listed as below: (Where?) This portion appears incomplete

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

This last chapter of the dissertation focuses on the summary of each chapter. It also discusses on results obtained in this study and provides conclusions derived from the research problem, aim of the study and the research assumptions. Recommendations for school management, parents and teachers are also provided as well as recommendations for further research. The purpose of the study was to investigate the factors which influence performance of Biology students in Hurungwe district secondary schools. This chapter will present a summary of the whole study. It will also outline conclusions that were drawn from the research findings. Finally, recommendations are suggested based on the research findings and conclusions.

5.1 Summary of Chapters

The purpose of the study was to investigate the outputs and outcomes of learning as reflected by Biology students, using a case study of Karoi rural secondary schools in Hurungwe District. It sought to find answers to the following research questions:

- 1.) What are the aspirations of Biology students in Karoi rural secondary schools?
- 2.) How do biology students' learning outputs reflect their understanding of course content?
- 3.) What are the personal, social, and institutional factors that contribute to the learning outputs and outcomes of biology students?

The study adopted the descriptive survey method, making it qualitative and quantitative in nature. The population consisted of 3 rural secondary schools in Hurungwe district, offering Biology at O' Level and High Level. These three schools were selected using stratified random sampling to ensure representation of government boarding and day, government day, and mission schools. The sample included 15 Biology teachers who were chosen purposely, as well as four science H.O.D's. Data was collected using questionnaires with both closed and open-ended questions, and interview guides. Descriptive statistics, including tables, were used to present the collected data, which was then analyzed both quantitatively and qualitatively, followed by a discussion of the findings.

The study revealed that inadequate teaching and learning resources such as apparatus, laboratories and textbooks, attitude, home environment, physical resources, educational resources at home, learner's profile, parents, language use in the teaching and learning of Biology, Biology content, lack of data, financial resources, and the transformation process were the major factors influencing Biology performance in Hurungwe district secondary schools. The study further discovered that positive attitude, fieldwork, teamwork, teacher's competency, inquiry approach and the development of resource centers are some of the strategies that can be used to improve the performance of Biology students. The researcher faced some challenges, including limited time due to juggling the study with final examinations, and delays caused by

busy school administrators, which required rescheduling for data collection. The researcher presented a permission letter from the District office to address the administrative constraint.

APPENDIX 1: QUESTIONNAIRE (learners)

My name is Cathrine Mtambu, I am currently studying for a Bachelor of Science Degree in Biology with Bindura University of Science Education, Department of Science Education. As part of my degree program I am currently carrying out a research on the investigation into the outputs and outcomes of learning as reflected by Biology students among Form 3 learners in

Karoi rural secondary schools around Zimbabwe. This information will only be used for purposes of this study.
Your participation in the study is voluntary and the information you give will be treated as confidential.

QUESTIONNAIRE IDENTIFICATION

Name of Enumerator.....Questionnaire Number.....
Name of Respondent:.....

Section A: DEMOGRAPHIC DETAILS

A.1. Gender: Male Female (Tick where appropriate)

A.2. Type of school (Tick where appropriate)

Day school Boarding school Private school Others(specify)

A.3. Location of the school

Rural Growth point Mine Others(specify)

A.4. Age of the student.....years

A.5. Level of the student

Form1 Form2 Form3 Form4

Section B: Learning indicate your agreements by choosing the response that best represents your opinion. Use the following scale:

1- Strongly Disagree

2- Disagree

3- Neutral

4- Agree

5- Strongly Agree

- B.1. The biology curriculum adequately covers all the necessary topics.
- B.2. The teacher explains the concepts clearly during class.
- B.3. I have sufficient access to relevant learning resources (textbooks, laboratory equipment).
- B.4. I feel confident in my ability to apply the knowledge and skills learned in biology.
- B.5 .The assessments (tests,quizzes,assignments) effectively measure my understanding of biology concepts
- B.6. I receive prompt and constructive feedback on my biology assignments
- B.7. The learning activities (class discussions, group work ,experiments) engage me and enhance my understanding.
- B.8. I can effectively use technology and digital tools to support my biology learning
- B.9. The biology curriculum connects well with real-world issues and applications.
- B.10. I feel motivated to actively participate in biology lessons and activities.

SectionC: Learning Outcomes

Please indicate the extent to which you have achieved the following learning outcomes. Use the following scale:

- 1- Not at all
- 2- To a small extent
- 3- To some extent
- 4- To a large extent
- 5- To a great extent

- C. 11. Ability to recall and understand key biology concepts.
- C.12. Ability to analyze and interpret biological data.
- C.13. Ability to apply biology knowledge in solving real-life problems.
- C.14. Ability to communicate biological ideas effectively.
- C.15. Critical thinking skills developed through biology education.

C.16. Interest and enthusiasm towards biology as a subject.

C.17. Preparation for further studies or a career in biology.

Section D: Feedback and Suggestions

D.18 .In what ways do you think the biology learning experience could be improved?

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APPENDIX 2: QUESTIONNAIRE (Teacher)

My name is Cathrine Mtembu; I am currently studying for a Bachelor of Science Degree in Biology with Bindura University of Science Education Department of Science Education. As part of my degree program I am currently carrying out a research on the investigation into the outputs and outcomes of learning as reflected by Biology students in Karoi rural secondary schools among form 3 learners' studying Biology rural areas of Zimbabwe. This information will only be used for purposes of this study.

Your participation in the study is voluntary and the information you give will be treated as confidential.

QUESTIONNAIRE IDENTIFICATION

Name of Enumerator:Questionnaire Number.....

Name of Respondent:

A. DEMOGRAPHIC DETAILS

A.1. Gender: Male Female (Tick where appropriate)

A.2.Type of school (Tick where appropriate)

Day school	Boarding school	Pvt school	Others(specify)

A.3.Location of the school

Rural	Growth point	Mine	Others(specify)

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A.4.Age of the teacher..... years

A.5.Marital status of the teacher

Single	Married	Widowed	Divorced

A.6.What is the highest educational level the teacher has completed?

Secondary level	Diploma in Education	First Degree	Post Grad.	Others(specify)

A.8.Please indicate your area of specialization:

Mathematics	Physics	Biology	Chemistry	Other(specify)

A9. Please indicate your teaching experience.

0–2years	3–5years	6–10years	11–15years	>15years

A10. Please indicate the average teacher pupil ratio in your school

1:20	1:21-30	1:31-40	1:41-50	>1:50

2.Attitudes Towards Inquiry-Based Learning

-"Please rate your agreement with the statement: 'Inquiry-based learning is an effective method for promoting critical thinking skills in Biology students.'"

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-"To what extent do you believe that inquiry-based learning enhances the practical application of Biology concepts?"

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3.Perceptions of Student Engagement

-"Indicate your level of agreement with the statement: 'I believe that the majority of my students actively engage with the learning material in Biology.'"

.....
 (Tick where appropriate)

A.2.Type of school (Tick where appropriate)

Day school	Boarding school	Pvt school	Others(specify)

A.3.Location of the school

Rural	Growth point	Mine	Others(specify)

A.4.Age of the teacher..... years

A.5.Marital status of the teacher

Single	Married	Widowed	Divorced

A.6.What is the highest educational level the teacher has completed?

Secondary level	Diploma in Education	First Degree	Post Grad.	Others(specify)

A.8.Please indicate your area of specialization:

Mathematics	Physics	Biology	Chemistry	Other(specify)

A9. Please indicate your teaching experience.

0–2years	3–5years	6–10years	11–15years	>15years

A10. Please indicate the average teacher pupil ratio in your school

1:20	1:21-30	1:31-40	1:41-50	>1:50

2.Attitudes Towards Inquiry-Based Learning

-"Please rate your agreement with the statement: 'Inquiry-based learning is an effective method for promoting critical thinking skills in Biology students.'

"

-"To what extent do you believe that inquiry-based learning enhances the practical application of Biology concepts?"

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3.Perceptions of Student Engagement

- "Indicate your level of agreement with the statement: 'I believe that the majority of my students actively engage with the learning material in Biology.'"

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- "How effective do you think the current teaching methods are infostering student engagement in Biology classes?"

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4.Impact of Curriculum Policy Changes

- "Please rate the extent to which recent curriculum policy changes have positively influenced the learning outcomes of Biology students."

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- "To what degree do you feel that there vised curriculum has improved the overall academic performance of Biology students?"

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5.Support for Student Learning

- "Rate your level of agreement with the statement: 'I feel adequately supported in facilitating the learning and development of Biology students.'"

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- "How effective do you perceive the current level of support provided to teachers in enhancing the learning experience for Biology students?"

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These Liker t-type scale questions can provide valuable insights into the perspectives of Biology teachers regarding the outputs and outcomes of learning among students in Zimbabwe.

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