BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

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TITLE: CHALLENGES FACED BY FORM 1 LEARNERS IN USING SCIENCE APPARATUS WHEN CARRYING OUT PRACTICAL WORK AT MAHUSEKWA HIGH SCHOOL IN MARONDERA DISTRICT

BY

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE HBScEd Bio IN SCIENCE EDUCATION

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APPROVAL FORM

I, Mr. W. Munakandafa undersigned certify that I have read this project titled challenges faced by Form 1 learners in using Science Apparatus when carrying out practical work. A case study of a selected school in Marondera conducted by Masitala Simbiso and Mero Paul in partial fulfillment of the HBScEd Biology in Science Education. I further approve its submission and recommend Bindura University of Science Education for it to be examined

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Name of supervisor

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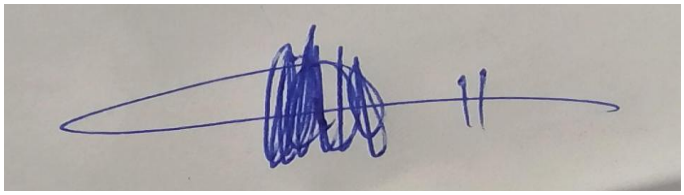
Signature of the supervisor



Date signed 05 January 2025

DECLARATION

I Masitala Simbiso B225845A and Mero Paul B225859A declare that the project is our own work. It is being submitted for HBScEd Biology in Science Education in the Department of Science and Mathematics Education, Faculty of Science Education of the Bindura University of Science Education has not been submitted before any degree program in any university.

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……Day of ……...2024

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DEDICATION

We dedicate this project to our spouses Talent Madzamba and Melody Mero who encouraged us to pursue our studies, and who also supported us emotionally during tough times of the years of study. Your love was unconditional and understanding.

Abstract

Most learners face difficulties when using scientific material in the laboratory. Using practical tools in the teaching and learning of biology helps pupils to easily master scientific process. Knowledge about the use of scientific apparatus enable students to master the concepts**.** It is therefore understandable that explaining the use of laboratory tolls should be the first topic taught ii secondary schools science syllabi. There is no doubt that practical work has positive impact on the teaching and learning of science. The use of practical work contributes to a successful classroom pedagogy. Previous researchers have raised questions on the effectiveness of practical methods of teaching and learning. The purpose of the study was to explain the challenges faced by form one learners in using science apparatus when carrying out practical work. Mahusekwa High school was used as a case study. The study situated in qualitative research paradigms. Qualitative data was collected through the use of questionnaire. Science teachers were selected through the use of purposive sampling methods and simple random sampling method was used to select 40 form one learners taking science at Mahusekwa High School.

According to the research results, it was noted that practical work was more effective in improving leaners performance. The findings of the research were presented in graphs and the results indicated that shortage of laboratory equipment, time frame, large class, lack of laboratory equipment and pedagogical content of the teacher are a major constrain towards the problems faced by form ones when carrying out practical work at Mahusekwa High School.

Further studies should be undertaken to explore the use of information and communication technology (ICT) in addressing the problems faced by form one learners in the problems faced by learners when carrying out practical work. There is need to carry out a country wide study that will shed more light on why they a challenge faced by

learners when using scientific laboratory equipment, when conducting practical work in secondary schools.

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LIST OF APPENDICES

CHAPTER 1 : INTRODUCTION

1.0 Introduction

The research aims at investigating the challenges faced by form one pupils in using science apparatus when carrying out practical work at Mahusekwa high School in Marondera district in Mashonaland East Province. The chapter discusses the background of the problem, statement of the problem, significance of the study, delimitations and limitations of the study and the definitions of terms as well as the conclusion.

1.1 Background to the research problem.

Form one pupils lack hands on manipulation during their primary level such that it will lead them to face some challenges when using Science apparatus at form one level. Pupils lack knowledge of laboratory rules. The performance of form one pupils at Mahusekwa high School in practical questions has drawn the attention of the researchers and therefore prompted there to carry out the research.

The researchers during observation period and as student teachers noticed that form one pupils are having challenges in using Science apparatus when carrying out practical work. The researchers have an attempt to find out the possible challenges faced by form one pupils of Mahusekwa high school when using Science apparatus.

1.2 Problem statement

An investigation into the challenges faced by form one pupils in using Science apparatus

when carrying out practical work at Mahusekwa high School. The different types of scientific apparatus that are used in laboratory setting pause a challenge to most form one learners who have a poor background on how to handle scientific equipment. Lack of scientific equipment by primary school surrounding Mahusekwa High. Who then provide the bulk of the form one learners contributed to the lack of diverse knowledge on handling and using of laboratory equipment. Recent studies have highlighted on having adequate knowledge scientific equipment aids the learners to produce better pass rate in their final exams. Having knowledge of the different apparatus that are used in laboratory gives the learner a proper foundation to perform well in science subjects.

1.3 Objectives of the study

This investigation seeks to:

1 Find out the challenges that form one pupil of Mahusekwa high School face when using Science apparatus.

2 Assess the attitude of form one pupils of Mahusekwa high School towards the use of Science apparatus.

3 Improve the learning of science through practical work.

1.4 Research questions

With respect to learners of Mahusekwa high school in Mashonaland East the research question are as follows.

1. What apparatus are learners using?

2. What challenges are faced by form one learners when using Science apparatus?

3. How are the apparatus used by the form one learners?

4. How frequent do form one learner at Mahusekwa high school carry out Practical work?

1.5 Significance of study

The importance of the research is to realize the challenges form one learner of Mahusekwa high School face when using Science apparatus, identify and explain the behavior of form one pupils when using Science apparatus. The research is going to benefit various stakeholders such as parents, students, teachers, policy makers and Non-Government Organizations (NGOs). The research was supported by theorist like Piaget with his theory of cognitive development, which emphasizes the role of hands-on experience in learning. Also, Vygosty who emphasized the importance of social interaction and practical experience learning. These founding fathers in education contributed in the research.

1.5.1 Teachers

Teachers as stakeholders are made to know various ways which they can use to overcome challenges Form 1 pupils of Mahusekwa High school face when using Science apparatus. Their teaching strategies are also improved. The teachers are also made aware of the need to upgrade and keep themselves abreast of modern trends in education for them to deliver quality education.

1.5.2 Parents

The work of this nature may help parents to understand the importance of science apparatus in secondary schools. This will encourage them to provide the necessary resources within their means for children to take part in experiments. Parents may also benefit from skills obtained by learners during experiments. Learners may apply the practical skills at home and this may benefit parents at home.

1.5.3 Learners

This research motivates learners and stimulates their interests towards education. Learners can develop positive attitude towards science apparatus. Experiments will enable identification of talents from learners, develop learners' skills and enable them to become creative to solve social and economic problems.

1.5.4 Policymakers

Educational and curriculum planners can be guided in planning the curriculum taking note of some pupils who faces challenges in using science apparatus in experiments. They are also called to mobilize resources for various policy implementation in school and work hand in glove with Non-governmental organisations (NGOs). Finally, the research may add to available literature and may encourage further researches on this topic.

1.6 Assumptions of study.

It is assumed that

1. The use of apparatus in learning Science has long lasting impressions on pupil's memories.
2. The use of apparatus in Science learning can arouse interest in pupils during the

learning process.

3. All the pupils are mentally healthy except that they have different background.

Pupils will be willing to use Science apparatus.

1.7 Limitations of study.

The researchers anticipate a number of problems in trying to meet their objectives. There may be lack of cooperation by qualified practitioners. There may be misconceptions by other teachers for example; some members of staff may think that the researcher is incompetent if they ask for help. Some learners might not be willing to share their views with the researcher. If the researcher had experience in carrying out projects; the study could have surpassed the standards reached. Financial constraint can also be a chief limiting factor. For instance, lack of finance can be a hindrance in typing of questionnaires as well as the sending of questionnaires to various people. Another limitation is that the researcher uses interviews in trying to acquire data. Interviews with adolescents can be difficult in that some pupils might fear that their information might be disclosed by the researcher.

The researcher is not familiar with the society he will work with. This can affect the research in that people would not quickly give details to a stranger, so it will take time to establish a good rapport between the researcher and the society he will work with.

1.8 Delimitations

The school where the researcher is going to do the research is conducive as it is very much accessible. Mahusekwa high school is located in Marondera district and has a

catchment area of all pupils from both rural and semi-urban places. The research is only limited to Mahusekwa high School in Marondera District and form one teachers and pupils only.

1.9 Future research

Results from this research can be used by future researchers on the subject matter as a reference point and source of literature. The research will be an addition to the academic field with regards to the use of science apparatus in experiments in Zimbabwe.

1.10 Definition of terms

This is a list of some terms used in the chapter showing a few explanations on what they mean.

a) Science

According to Hewitt D. (2018), science is a systematic and logical approach to understand the natural world through observation, experimentation and evidence-based reasoning. Kasambira (2012) defines Science as a systematic enterprise that builds and organize knowledge in the form of testable explanations and predictions about the universe. Therefore, Science: is the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment. Three domains of Science are physical, life and earth science

b) Science Apparatus

Science apparatus are devices or equipment used in scientific experiments, research or demonstrations (Hounsell 2015). Examples of science apparatus are beakers,

microscopes, Bunsen burner, scales, pipettes and thermometers. This means that apparatus are integrated group of materials or devices used for particular purposes.

c) Investigation

According to Kasambira (2012) investigation refers to the systematic process of exploring, examining and analysing information or evidence to reach conclusions about an event. Investigation is a systematic thorough inquiry or research into a matter or problem to gather facts, evidence and information with aim of establishing the true, identifying causes of resolving issues. (Oxford Dictionary) This means that the goals of investigation are to find answers, clarify and ensure knowledge acquisitions.

d) Challenges

Challenges are situations that tests someone's skills or resources.(Oxford dictionary) Therefore a challenge is a task or situation that tests someone's ability and can serve as opportunities for learning, development and achieving goals.

e) Learners

A learner can be individual who acquire knowledge, skills, attitudes and values through experience, instruction or study (UNESCO 2024).Also Ksambira (2012) defines a learner as someone who engages in the process of acquiring knowledge, skills through study or instruction

Learners -is a child or young person in school or in the charge of a tutor.

f) Adolescents

Adolescents-persons between childhood and adulthood, who according to Piaget cognitive development are at concrete and formal operational stage.

1.10 Summary

In this chapter, the investigator has so far outlined the background to the problem. Objectives have been clearly stated and key terms to the problem were defined to make the research clear. The researcher has also highlighted delimitations of the research in this Chapter. Limitations of the research were also outlined whereby the researcher highlighted some problems likely to be faced in trying to meet objectives. In the next chapter the researcher will be looking at other people's views on the challenges faced by form one pupils when using science apparatus, that is literature review. Through this investigation we aim to illuminate the potential role of practical's in enhancing learner achievement and fostering a deep appreciation for practical in the teaching and learning of biology.

CHAPTER 2 : REVIEW OF RELATED LITERATURE

2.0 Introduction

Chapter One outlined the problem to be investigated, aims of the study and research questions to guide the study and to give answers after the study. Previous chapter stated the background to the problem, the rationale for the study and the purposes of the study. In this chapter the student reviewed the important literature related to the study carried to provide the reader with a brief account and discussion of literature on issues relevant on the problems faced by form one pupils when using science apparatus. Science apparatus play a pivotal role in the learning of science and it help the teacher and pupils to achieve their explicit and implicit goals.

2.1 Teachers as organizers of learning

Some of the obstacles affecting against effective science practical include lack of funds and teacher's inability to improvise. Amadalo and Wesonga (2016) reported lack of qualified teachers in addition to lack of equipment for laboratory work. Teachers must create a supportive learning environment free of disorders otherwise all pupils are deprived of education. A science teacher must be focused so as to attain certain objectives during a particular practical lesson.

2.2 Limited apparatus

Despite the fact that practical work is a unique source of teaching and learning in science, it is widely acknowledged that laboratory equipment is lacking in most schools Ojo (1981)

concluded from their suggestions that practical work was difficult to organize as a result of lack of apparatus. Shittu (1984) reported either complete absence of equipment and materials in most Secondary Schools.

For instance, Ogonniyi (2013) concluded from his studies that practical work was difficult to organize as a result of lack of apparatus. Ogonniyi (2013) sort to find out the status of practical wok in ten secondary schools of Kwara state. Some of the obstacles militating against effective science practical include lack of funds and teacher's inability to improvise (1981) reported lack of qualified teachers in addition to lack of equipment for laboratory work.

Onawola (1982) from her study, availability and adequacy of resources for science teaching in Kwara state reported lack of adequate equipment most especially in newly established schools. She also reported lack of improvisation of laboratory materials and equipment by the teachers.

Abdullah's (1982) stated that most of the scientific information or principles that pupils receive from their teachers come through lecture method resulting from not carrying out experiments mostly.

2.3 Responsibility of a teacher into combined science practical teaching

It is very important to maintain a safe environment for students working in the laboratory as the teacher may be held accountable for injuries sustained by students (Opong 1987). The teacher should encourage children to explore and elated to the study carried to provide experiment within the actual activity. This implies that the experimentation helps

pupils to test whether they can correctly imitate the techniques demonstrated by the teacher so that they produce good results (www. Unitarian editing 18/02/14 at 2100)

2.4 Teaching methods

Instructional methods of teachers should be child centered. Teachers who are center of learning process should thoroughly prepare for their lessons constructively. Mandore (1995) points out that when good encouraging and motivating comments are given to a student, he/ she is likely to succeed in his/her work. Kilson (2000) says pupil demonstration impact knowledge that one can be able to make good results/ observations

2.5 Lack of problem analysis and planning

Hacking and Gonet (1995) found that the most notable weakness of pupils' investigation skills was their lack of problem. Very few pupils plan how they would measure variables or record data before they commenced data – collection procedures. In organizing and interpreting their information, pupils frequently make interpretations based on inadequate control of variables. They also have little awareness of the methodology weakness of their experiences.

Watson's (1994) study of 11 to 12-year-old pupils found that some less successful pupils arrived at a solution to the problem without even interpreting the results obtained and others started planning without even reformulating the problem.

These pupils seemed to be working on the activity without purpose and carrying out the experiment in a mechanical, unthinking way for a significant part of the time. Watson (1994) inferred that the lack of discussion about the problem lead to a lack of shared

purpose and to some pupils within the group taking little part to formulate the strategic plans to solve the problem.

2.6 Repeated measurements

In a study of pupils performing practical tasks carried out by the assessment of performance unit in the United Kingdom. Harlem, Black and Johnson (1981) found out that every 11year old pupils repeated observations or measurements as routine or made notes in the course of an investigation other than recording measurements. Pupils face difficulties with identifying, controlling and manipulating appropriate variables have also been documented by Donnely (1987) and Duggon, Johnson and Gott (1996). The study by Lubben and Millan (1996) revealed that same students aged 11-16 viewed repeated measurements as a waste of resource, materials and time as confirmation as science routines or a process of becoming familiar with equipment.

Coelho and Sere (1998) found that most 11 to 17-year old's believed in existence of a true value and did not accept the idea of measurement spread. That students do not really understand the need to take repeated measurements was also reported by Sero. Journeaux and Lorcher (1993) said that even among the first year college students, the general view is that the more measurements one makes, the better the results are without understanding the nature of the better.

2.7 Lack of understanding about the purpose and ultimate goals

Duggon etal (1996, p472) suggest that pupils' failure to keep the whole task in mind including about the purpose and ultimate goal of data collecting and maybe a barrier to rigorous experimental design and analysis.

2.8 Too many learners in practical classes

Too many students in practical classes and limited resources lead to formation of large group work, achieve the goals of group work, it should be carefully applied. Several factors play a role before applying group work as a teaching technique. Kagon (1988) advocates that the groups should accommodate many pupils thinking that the bigger the group, increased is the number of communication channels. However, Hughhes (1957) disagrees with the above point. He insists that groups should not be too large as they may lead to chaos. The researcher is of the view that each of these authors' views should not be ruled out completely. Sometimes a task might be too demanding hence, require large groups for more ideas. On the other hand, smaller groups can do a less challenging task.

2.9 Assessing large classes

Gonger etal (2007) states that larger class sizes during practical work pose significant teaching challenges, not least in the assessment of student learning. Large classes may limit the amount of feedback provided by students. The teacher will not be able to cater for individual differences since the teacher to group work as a method of teaching. Students will lack hands on skills. The classes range from forty-eight to fifty-five learners

2.9.1 Time consuming

From a similar view point Osborne (1993) proposes and discusses a range of alternatives to practical work. Practical work is time consuming because the periods are too short to cover the given work. Practical sessions are time consuming to organize, manage and assess.

2.9.2 Responsibility of teacher in practical work

The teacher should give room for self-explanation within students when teaching science practical's, this gives an opportunity to express their ideas and observation. Honey wood (2006) said that, a teacher should encourage children to explore and experiment with techniques before working with actual activity. This implies that the experimentation helps pupils to test whether they can correctly copy and apply the techniques demonstrated by the teacher so that they produce good results.

2.9.3 Teacher training and professional development

Lunetta etal (2007), states that, teaching practical and laboratory skills demands expertise from science teachers. For trainee teachers however, it is not clear who has the responsibility for this part of their training either their colleagues or their replacement schools. There is therefore a risk that it occurs in either or is overly dependent on the status of science in the trainee school. In addition, Osborne (1993) says that, teacher training is inadequate and rushed.

The constricted national curriculum, pressure to achieve targets and to move on to the next living little time to consider issues around a topic and the insistence on a narrow one size fits all, rigid and boring method of teaching, all conspired together to narrow the

range of, and opportunity for good class practical work. Lunetta et al (2007) also supports that teachers also need access to high quality professional development throughout their career indoor to develop their expertise of lessons based on practical work and field work. Such professional development opportunities should be identified by teachers themselves rather than imposed upon them.

2.9.4 The importance of practical work

Piaget stressed the importance of learning by doing especially in science. According to Piaget "a sufficient experimental training was believed to have been provided as long as the student has been introduced to the results of past experiments or have been allowed to watch demonstration experiments conducted by his teacher. It is true that this form of instruction by teacher and demonstration has often been supplemented by laboratory work by the students, but repetition of past experiments is still a long way from being the best way of exciting the spirit of invention, and even of training students in the necessity for checking for verification (1986 p. 703)

Brunner, (1983 p. 138), also stressed learning by doing. Brunner points out the quick rate of change in the world and says, "The principle emphases on education should be placed on skills. Skills in handling, seeing and imaging and in symbolic operations. Tobin, (1990) states that learning always is an interpretive process and always involves construction of knowledge. Laboratory activities appeal 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. Hands on learning have been shown to increase learning and achievement

in science content, Bredderman, (1982). Research indicates that activity-based science can improve leaners attitudes towards science. Evidence clearly indicates that practical work increases skill proficiency in processes of science, especially laboratory skill and specific science process skills such as graphing and interpreting data. Bredderman, (1982) says that practical work in science has shown to improve the development of language. Activity centered classrooms encourage student's creativity in problem solving, promote student independent and help low ability students overcome initial handicaps.

White, (1990) has opinion that students learn manual skills like fine movements, precisions and care and the acquisition of specific techniques through science practical work. The practical work is also a tool to teach students how to design and investigate in order to solve a scientific problem (Hofstein and Lunetta 2003).

Gungor et al, (2007) adds that, the value of practical work is that it enhances motivation and stimulates excitement by providing unusual objects and events thus a contrast with the usual learning experience of sitting still and listening or doing exercises. Moreover, the laboratory is said to be a place where personal experience can be linked to a scientific way with real world. The students' personal experiences are either their direct observations of a phenomenon through hands on manipulation or their recollection of past experiences.

From a similar view point Goodin (1992) adds that science practical work is essential in order to create a learning situation that encourages and challenges students to develop experimentally based inquiry skills. In addition, Millar, (2004) agrees that practical work

gives understanding of material world. The aim of science is to gain and understand the material world and learners may be able to explain events and phenomena around him in physical environment and become able to control some of them. To disseminate knowledge and understanding of material world is important for learners to adjust in scientific society.

Furthermore, Klein, (2006) agrees that practical work provides ample opportunity to learner to develop science related skills. The science laboratory is important to science teaching and it offers a different environment from traditional classroom. Scientific knowledge deals with experiments, practical and theoretical knowledge of laws, principles and theories of content. In addition, various skills are needed and used such as observation, measurement, and recording analysis, handling equipment following instructions, decision making and problem-solving skills (Talisayon, 2008).

2.9.5 The perception of science teachers on practical's

Teachers who embrace hands on learning in science seem to recognize certain desirable outcomes and endorse student centered instructional approaches. Research has confirmed many of the seemingly intuitive benefits of hands on learning and has also documented a variety of unanticipated benefits. Mary Wiser (1982), says that enhance on science programmed will remember the material better, feel a sense of accomplishment when the task is completed and be able to transfer that experience easier to other learning situations. Students who are in labs and activities are imposed in their own learning process. The benefits of hands on learning revolve around those children

who are not academically talented or have not shown interest in school. This method tends to stimulate these types of students, into participating and eventually absorbing information that is believed that they will not get from normal show me, tell me methods.

Marv Hougland, Seventh and eighth Grade Teacher, Clearview School states that, the single most important benefit is that once a system is developed, hand on teaching makes teaching fun. Jeff G. Broodie, Fith and Sixth Grade teacher, I Hear and I Forget, I See and I Remember and I Do and I Understand. Hands-on and learning by experience are powerful ideas and we know that engaging students actively on thoughtfully in their studies pays off in better learning, Retherford (1993).

In addition, Pausen (2007) agreed that the most prominent factor appears to be the teachers' perceptions of their learners. Teachers who perceive there to be motivated and non-destructive are more likely to engage learners in higher level types of practical work. Also, important, but to a lesser extent is the attitude of teachers in the school towards innovation. It would appear that in a school where innovation is generally supported, teachers engage in higher levels of practical work.

Hacker, (1984) states that doing practical work is not significantly dependent on whether teachers have physical resources (e.g. laboratories science apparatus or potable laboratory stations). It seems that who are motivated to do practical work will find ways to do so even in the most poorly resourced schools. Conversely, those who are not motivated will not do practical work even when they have access to the best of resources. From another point of view Herron (1971), argues that, it appears that in situations where

teachers perceive their colleagues as being willing to try new teaching methods, they themselves are motivated to do so as well.

2.10 Conclusion

This chapter views opinions from different authors on the problems faced by form one pupils in using science apparatus when carrying out practical. Most of the authors identified practical's as the back bone of successful future on the study and scientific career. The next chapter is going to focus on the data presentation and analysis.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This chapter focused on the research methodology that will be used to collect information on the challenges faced by form one pupils when using science apparatus. The researcher also focused on the research design that was used. An explanation also provided how the researcher chose the research subjects. The researcher investigated the challenges faced by form one pupils when using science apparatus, a variety of research instruments are used. They included interviews (written and oral), observation schedules, and questionnaires.

This chapter thus, looked at the design of the study, that is how the research data collected can had solutions to the research problem, questions already cited. In short, this chapter focused on the road map to obtaining data on the challenges faced by form one pupils when using science apparatus.

3.1 Research design

Research design is the conceptual blue print within which research is conducted (Driscoll 1994) Macmillan et al (1993) pointed out that a research design is the plan and structure of an investigation which must answer the research. The research design referred to a plan selecting research subjects, research sites and data collection procedures to answer research questions. The research used descriptive survey. The advantage of using descriptive is that it allows the researcher to draw information from respondents either

verbally through the use of interviews or in writing and answering questions. Borg and Gall (1989) preferred a descriptive survey method to enter a subject population to measure specific set of respondents on given topics. In other words, a research design encompasses the initial set up of the research and the methods used to collect data and information. The research also needed to carefully scrutinize the condition or the stages which the researcher used to answer any problem.

3.2 Population

Population refers to the total number of people the researcher is going to deal with in an area involved. The population of the research is going to be constituted by form one science teachers, Head of department and form one pupils at Mahusekwa High School. The researcher worked with all the form one classes so as to try and deal with pupils of different abilities. According to Birn (2000) population consist of the aggregate of items from which a sample is drawn. A population includes all individuals from which a researcher desire to obtain information upon which to make conclusions on the basis of the sample drawn from the population. Accordingly, the population of this study was taken from all form one leaners taking science at Mahusekwa High school

3.3 Sample size

3.3.1 Sample

Macmillan (1970) defined a sample as individuals selected from a large group of people for a purpose. From the number of learners, say 70, 40 pupils participated and the ratio of boys to girls will be 1:1. Therefore the technique is not biased towards one sex group.

All the form one Science teachers were selected and the head of department was included to represent the department as well as the administration, fortunately among the Science teachers there is one student teacher. Zikmund (1988) suggest that the purpose of sampling is to enable researchers to estimate some unknown characteristic of the population.

Sampling procedure's

Moore and McCabe, (2015) defined sampling as the process of selecting units from a population of interest so that by studying the sample one may fairly generalize the results back to the population from which they were chosen

3.3.2 Random sampling

According to Macmillan (1970), random sampling refers to a selection of people without using any strategy, giving everyone a chance to be selected. Therefore, meant that all the members of the population have an equal opportunity of being included in the research. This method is to be used because it is methodical and purposeful. It is also apparent that a sample selected randomly is not subject to the bias of the researcher as noted by Ary (1996), who says "The investigator commit himself to select a sample in such a way that his bias is not permitted to operate. Four types of random sampling are simple random, systematic random, stratified and cluster random sampling.

3.3.3 Stratified random sampling

Stratified random sampling is whereby the population is separated into a number of non-overlapping units called strata and then select a simple random sample from each group

.Form 1A has 36 pupils and form 1B has 34 pupils .The researcher was to determine the size of the population in each category and make sample size proportional to the stratum .The researcher used two chalk boxes in form 1A , and one chalk box for the boys and the other chalk box for the girls and do the same to form 1B . In the chalk box there was an equal sized small card written (yes) and the others written (no). The researcher asked the learners to pick a card from these boxes without looking at what is written on it Those who picked yes would be involved in the research and those who pick no will be excluded from the research.

3.4 Research instruments

Research instrument refers to the devices used to measure the intensity of the problem These instruments are methods of getting data for research purposes. The researcher used questionnaires, interviews and observations as tools to collect data. George (1995) states that a research instrument is any relevant tool used in research to gather information. Appropriate tools are required if desired and valid feedback is to be derived which gives consistence and accurate information. For the purpose of this study, data was collected using questionnaires in appendix A and interviews in appendix B.

3.5.1 Questionnaires for learners

Saunders (2007) defines questionnaire as a list of all questions which address the objectives or hypothesis of s research study. Best and Kahn (2006) states that questionnaire is a preformulated written set of question to which respondents record their answers within rather closely alternatives. Cohen and Manion (1980 :37) states that,

questionnaires are research-drafted questions used as guidelines in order to achieve the best results.

A single set of questionnaires was developed by the researcher for form one science leaners. The teacher physical distributed the questionnaires to the respondents on the agreed dates and was given dates to come and collect the completed questionnaire on an agreed date and was given dates to come and collect the completed questionnaires. Questionnaires can be open or closed questions.

3.5.2 Questionnaires **for Science teachers**

A questionnaire is a list of structured questions eliciting reliable responses from the research sample (Henning 2004).The investigator distributed the questionnaires to form one science teachers plus the head of department of Mahusekwa High School. The questionnaires concern of information concerning the challenges faced by form one pupils when using Science apparatus.

Questionnaires for form one teachers at Mahusekwa High school. The respondents were asked to indicate their view on the questionnaire by ticking the appropriate answer or write in the space provided. The respondents were given enough time to answer the question and were allowed to ask on areas which needed clarification. After completion on the questionnaire, the researcher collected the questionnaire and analyzed the answers.

The advantages of using questionnaires as a tool of collecting data is that it is a fast way of collecting data from many respondents at the same time. Another advantage is that,

it has a high degree of anonymity according to Masuku (1991).In addition, questionnaires reduce bias since respondents completed them in the absence of the researcher whose presence might influence responses and the respondents can answer questions on their spare time and they get enough time to clearly read and understand the questions from the questionnaires. This method was less costly when it came to labour and respondents can express their views freely without fear. The cost of sending the questionnaire is low and they are free from bias which would otherwise arise in an interview

Weakness encountered in the use of questionnaires is that, questionnaires are restrictive and confine the respondents to certain issues thus limiting the respondents who otherwise might want to give more information on something which might not have been asked which the respondents sees it relevant to the topic. In addition, the respondents might fail to understand the question or may be shy to divulge their background information. Some questionnaires were not answered, some respondence did not respond to the entire question and the method was not suitable when the researcher was absent as the participants failed to interpret some questions correctly hence the researcher did not have control or say over the information collected. And also, the researcher had to make several reminders to the participants before the due date for collection.

According to Cohen and Manion (1994) questionnaires may have a low response rate as some respondents may not return the compiled questionnaires and some respondents may be too busy to complete questionnaires. Furthermore, the researcher may not have control as to who finally fills the questionnaires, as the researcher and respondents might be separated by a great distance. Lastly the respondents who may be near each other

may be attempted to compare and influence each other responses. Also, some respondents may tend not to answer all questions thus leaving some blank

In spite of their short comings as seen above, the questionnaires cannot be completely done away with. Questionnaires remained an important tool and very useful tool to collect data. To overcome these short comings, first the researcher carefully constructed the questionnaires and carefully revised the question so that they do not offend the respondents.

3.6 Observations guide

According to the Longman dictionary, observation is the process of watching something or someone carefully for a period of time. Under supervisions, human beings or groups are being carefully watched continuously and at the end there should be a critical analysis of events. In this case the researcher will observe pupils as they use Science apparatus and note all the challenges they face.However,the researcher may not be there at the time of a spontaneous occurrence which may be of interest. Also, there might be no access to the targeted respondents.

3.7 Interviews guide for students

An interview can be defined as a questionnaire administered by an interviewer who is not allowed to deviate in any way from the questions provided (Haralambos and Holborn, 2013). Interviews are used again as an important tool of research. The interview had great flexibility in the questioning process. It allows the interviewer to determine the ordering of the question to clarify the terms that maybe under so as to draw information

from the respondents and it allows room for the researcher to robe for tradition. The interviews guided with questions were used. The researcher interviewed all form one science teachers, the head of Science department and 40 form one pupils with open ended questions on the subjects that the respondents express their views without fear. The researcher encouraged this so that he will get as much information in order to get credible research findings.

The advantages of using interviews are that they give an opportunity to fully explain the purpose of the study to the respondents and then high rate of confidentiality which the data will be treated. Furthermore, there is an ability to get direct and probe for more feedback and the ability to observe nonverbal communications. Interviews are interactive, flexible and adaptable. However, interviews were time consuming and respondents sometimes gave false information while being interviewed. Non-standardized responses may be difficult to evaluate. Woods and Wolf (2017) says that when conducting interviews, respondents may provide inaccurate or unreliable data.

3.8 Data collection procedures

Questionnaires are going to be distributed to all form one Science teachers and Science teachers an head of department at Mahusekwa High school is also going to be given the questionnaires. Likewise, the researcher interviewed these teachers including the head of Science department. They all filled in the spaces provided and answer the interview questions. The respondents returned the questionnaires back on an appointed date that they agreed between them and the researcher.

3.9 Data presentation

Data analysis is the process of inspecting, cleaning, transforming and modelling data with the goal of highlighting useful information, suggesting conclusions and supporting decision making (Musingafi and Hlatywayo,2013) The information the researcher is going to get is to be presented on a bar graph, tables and pie charts to interpret the problems faced by form one pupils when using Science apparatus.

3.10 Summary

In this chapter the scholar fully explained the way the researcher used to collect data and the source of data. The researcher also scrutinized the instruments used to collect data and their advantages as well as disadvantages. The data obtained from the use of these instruments is going to be presented in form of bar graphs and tables.

CHAPTER 4: DATA PRESENTATION ANALYSIS AND DISCUSSIONS

4.0 Introduction

The chapter focuses on presenting, analyzing and discussing data collected on the challenges faced by form one pupil when using science apparatus at Mahusekwa High School. To illustrate the comprehensive meaning of the data, frequency tables and charts were used. The data was collected through manly questionnaires given to teachers and interview questions given to pupils. All the questionnaires given to respondents were returned representing a 100% feedback.

4.1 Data presentation

4.1.1 Biographical background of the learners

This section provided information about the learner's age group and gender. This variable was investigated in order to ascertain if their gender has an impact on how to use science apparatus when in practical works. The results on the biographical background of the learners are presented in table 4.1

Table 4.1 Learners age distribution

Ages	**Boys**	**Girls**	**Total**	**Total**
11-12	8	14	22	55
13-14	12	6	18	45
15	-	-	-	-

15+				
Total	20	20	40	100

Table 4.1 shows that most form one pupils at Mahusekwa High School are found between those ages of 11-12, 13 and 14 years. Fifty-five percent of the learners were aged between eleven and twelve. Data was collected from all representatives of each category. Therefore, forty-five percent were aged between thirteen and four-teen.

The questionnaires reached all age groups in Form 1 and most of the data which helped the researcher was from age groups of 11 to 12 years. Also it covered the gender of the pupils as from 40 pupils participated 20 were boys and 20 were girls.

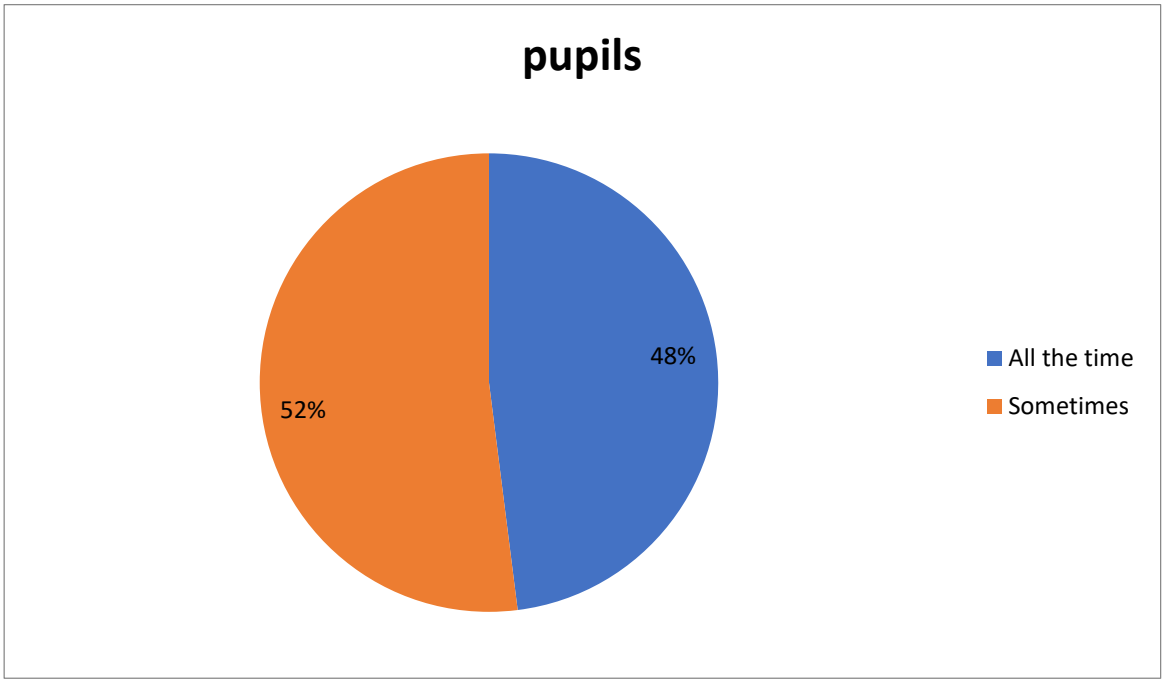

Fig 4.1 School attendance of pupils

Form 1 pupils of Mahusekwa School attendance. From the above figure 4.1 it is showing that 52% of the form one pupils at Mahusekwa High School do not attend school always because of fees problem or other reasons. Only 48% attend school all the time the number of pupils who do not attend school all the time is quite high. This is the problem as it will affect their academic achievements

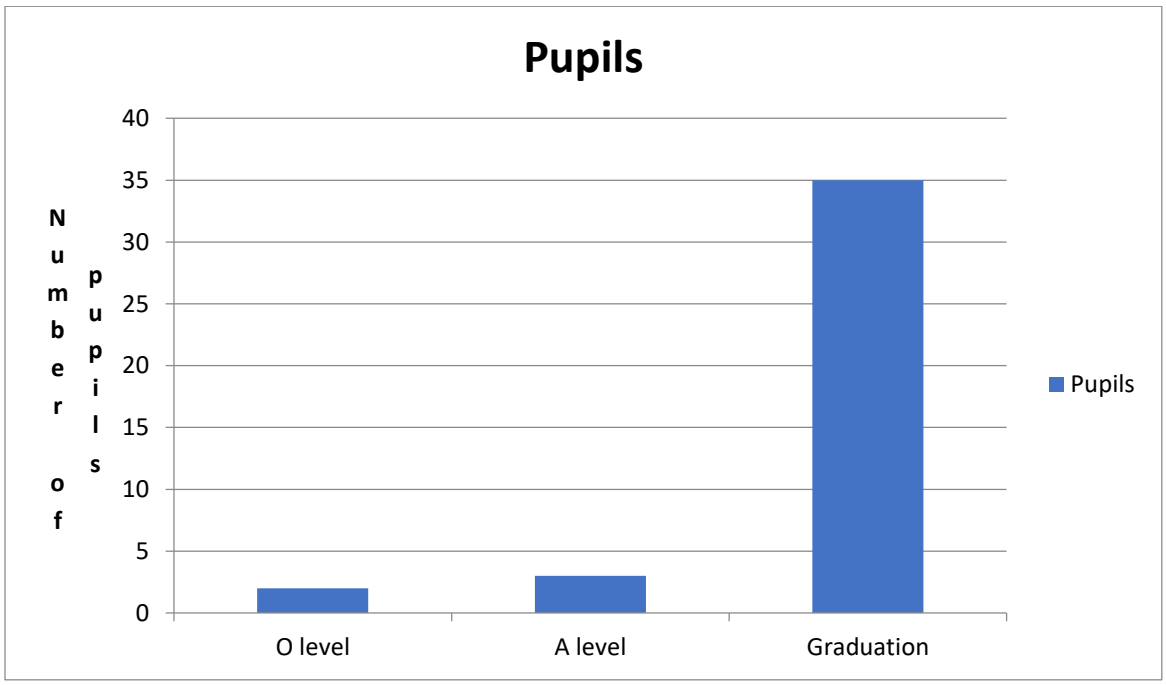

Fig 4.2 Aspiration in education and development.

In fig 4.1, form one pupils of Mahusekwa High School have high hopes in education. 87% (35 out of 40) hope to attain University degrees whilst 8% (3 out of 40) want to go for A level and only 5% (2 out of 40) wish to go for O" levels only.

Table 4.2 Career aspirations of pupils

Career	Total Frequency	Percentage
Teachers	8	20
Doctors	5	13
Accountants	2	5
Lawyer	5	12
Pilots	6	15
Tea Boy	1	3
Farmer	3	7
Nurse	7	17
Soldiers	3	8
Total	40	100

Form one pupils of Mahusekwa high School have a wish to get good careers as well.

Most of them wish to be teachers 20% (8 out of 40) whilst 17% (out of 40) want to be

pilots. There are several other jobs. Others maybe because they lack counseling have hopes to be tea boy (1 out of 40)3% as shown in the above table 4.4

Table 4.3 Problems faced by form one pupils of Mahusekwa High School when using Science Apparatus

N=40

Challenges Faced	**Yes**	**%**	**No**	**%**	**Total**
Shortage of apparatus	24	60	16	40	40
Breakages	13	33	27	67	40
Lack of motivation from teachers	32	80	8	20	40
Errors	28	70	12	30	40
Limited Time	34	85	6	15	40

Table 4.3 shows that form one pupil at Mahusekwa High School have problems and challenges such as shortage of apparatus, breakages, lack of motivation from teachers, errors and limited time. From the table 60% (24 out of 40) do not have problems of shortage of apparatus at the number of apparatus at the school.

The main challenge being faced by form one pupils when using Science apparatus is that of the limited lesson time to carry out practical's at the school 85% (34 out of 40). From chapter 2 practical work are sometimes time consuming if the time is not managed. From the data which has been taken it proved that practical works are time consuming to organize, manage and assess.

Table 4.4 Teachers age distribution N=4

Age (years)	**Total**	**Total %**
21-30 31-40 41-50	2 1 1	50 25 25
Total	4	100

Table 4.4 shows that science teachers are found between the ages of 50% (21 to 30), 25% (31-40) and 25% (41-50). Most science teachers are found between the ages 21 and 30 years and they constitute 50%. All the teachers in the sample responded to the questionnaires.

From the above table 4.4 it showed that most of the teachers are below 30 which produced data which was current and active

Table 4.5 Distribution of science teacher's participants by Gender

Sex	Frequency of Teachers	Percentage
Males	2	50
Females	2	50
Totals	4	100

From the findings in table 4.5 above there are equal number of science female teachers to male teachers. They all constitute 50%.

Table 4.6 Frequency distribution of Science teachers by experience.

Age Range (years)	Frequency of Teachers	Percentage %
Below 5	1	25
6-10	2	50
Above 10	1	25
Total	4	100

The result of this study indicated that all Science teachers in the sample had teaching experience. One teacher was below 5 years' experience. Most Science teachers were above 6 – 10 years of experience that is 50% and only one teacher was above 10 years' experience. Establishing this fact was important because it means collectively their experience in teaching for a specified period would help the researcher in dressing the problem under study. The level of experience the teacher has indicates that they

were knowledgeable about the challenges faced by form one pupils when using Science apparatus.

Table 4.7 Distribution of how often the teachers carry out practicals with their pupils.

How often are apparatus used	**Total teachers**	**Percentages**
In every lesson.	-	-
As per need.	3	75
Once a while.	1	25
Not at all.	-	-
Total	4	100

Most of the Science teachers 75% (3 out of 4) responded by saying they use apparatus as per need. 25% (1 out of 4) use the apparatus once a while. From the results it proves that teachers are do not have a positive well perception of science teachers on practical's

4.4 Conclusion

In this chapter the investigators have systematically presented her findings in their researcher. That is, the demographic data, methods and the instrument used in the research project. The information gathered was presented using tables and charts. In the next chapter, the researcher will draw conclusions from his findings and make

recommendations on possible solutions to eliminate problems faced by form one pupils when using Science apparatus at Mahusekwa High School.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.0 Introduction.

The chapter summarized the previous chapters on introduction, literature review, research methodology and research findings and analysis. It also focused on the summary, conclusion and recommendation on the problems faced by form one learners in using science apparatus when carrying practical work. The thrust of this chapter is a summary of the main findings facilitating the drawing up of a conclusion of the entire research project.

5.1 Summary of the project including constraints

The aim of the study was examining the challenges faced by form one learners in using science apparatus when carrying out practical work. Chapter one set out the introduction of the study through a description of background, statement of the problem, research objectives, research questions, significance of the study, limitations, delimitations, assumptions and conclude by giving definitions of important terms in the study. The aim of this chapter was to give readers background understanding of the research problem. This chapter gives an overview of the study. Challenges faced by form one learner in using science apparatus when carrying out practical work was explained. Emphasis was given on the need to use science apparatus at primary level so that learners have the knowledge about different scientific apparatus.

Chapter 2 role was to examine previous theoretical and the challenges faced by leaners when using science apparatus. The chapter identified gaps between existing literature and the current research topic and establish then through which knowledge gaps can be filled. Also included in this chapter is the theoretical framework of the study. The chapter focused also focused on the history of practical work and other teaching methods. Also included in this chapter are the benefits of practical work in trying to solve the challenges faced by form one learner in using science apparatus when carrying out practical work.

Chapter three was to give a detailed description of research design employed to provide the overall strategy for answering the research questions for the project.it highlighted tools and techniques used in primary data collection.

The study set out to establish the challenges faced by form one pupils of Mahusekwa High school when using Science apparatus. The population constituted of all the form one science teachers, the head of department and 40 form one pupils at the school. The descriptive survey method was adopted for in this study. The researcher made use of questionnaires, interviews and observations as tools for data collection. The research problem was placed in its context by the use of the background to the study, statement problem, research questions, significance of the study and the assumptions of the study, limitations and delimitations as well as definition of key terms were presented. Findings from the literature review pointed out that pupils were facing different problems in educational circles when learning Science. Mahusekwa High School form one pupils were used and some pupils failed to interpret on what a beaker is and what it is used for in

the learning of Science. The results obtained were recorded in form of tables, graphs and charts.

Nevertheless, Due to lack of finance, the researcher was not able to provide so much research instruments to cover for other teachers besides form 1 teachers. Also, during interviews, the researcher struggled much to establish good rapport to other students as the students were not familiar to the one who was asking questions. Attitudes of Science teachers towards the practical work made the research become more difficult as some were not clearly answering questions as they refer practical work as tiresome lessons.

5.2 Conclusion

From the data collected and its analysis, it is convincing that form one pupils are using different types of apparatus. The apparatus was used when carrying out experiments. The challenges that the form one pupils at Mahusekwa High School are facing when using Science apparatus, errors, limited time and lack of motivation from the teachers.

5.3 Recommendations

Against the backdrop of the findings made, the researcher proffers therefore following recommendation that could enhance and mitigate the problems faced by form one learner when using science apparatus at Mahusekwa High school. The research established various problems and it can be recommended that a variety of research instruments can be used. The school should make sure that it constructs a laboratory for the Science pupils. Pupil's interest should be maintained by linking the concepts taught to learner's experiences since Science is a living subject and affects everyday life. The school should

motivate teachers by giving them incentives and token of appreciation to teachers who use Science apparatus in their lessons.

The school should by all means try to buy more Science apparatus. Apparatus in Science should be recognized officially as a compulsory component. The Science teachers should create a conducive environment for teaching and learning of Science. Practical activities should be well planned, effectively conducted and made an integral part of the pedagogy.

Additional resources for fully furnishing the laboratories, buying inputs and training should be made available.

The school administration, teachers, relevant government bodies, NGOs and the community should work closely to make sure that the practical work is conducted effectively

Provision of standard laboratory and adequate laboratory equipment's for secondary schools.

Teachers should improve their teaching methodology to sustain the interest of the students.

Enough qualified Biology teachers should be employed to cater for increase population of students.

Students should be allowed access to laboratory equipment's

The administration of schools should supply their schools with all necessary equipment and chemicals needed to facilitate practical work in the teaching of biology and other science subjects. For any teacher or educator wishing to researcher in the same area, it is advisable to broaden the scope of the study.

The MoPSE must assist and insure, through policy and action, that schools establish and maintain adequate science laboratories that are also fully equipped with materials that are necessary to conduct science experiments in both primary and secondary schools.

The school administration at Mahusekwa High school and the SDC should invest in more infrastructure, material and personnel resources.

5.4. Recommendations for further study

- Further research study needs to undertake a deeper analysis on the extent to which learners in schools around Zimbabwe have the access to laboratory equipment when they are still in primary school
- More research is needed to simplify the teaching of different scientific equipment, their names and how they are used.
- Further studies should be undertaken to explore the use information and communication technology (ICT) in the problems faced by form one in the learning of sciences.

- Further studies should examine the impact of learner centered activity on the efficacy of practical work which can give room for learners to design their own experiments.
- There is need to conduct a countrywide study that will shed more light on why Biology teachers are reluctant to conduct practical work at secondary school level.

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APPENDIX I: QUESTIONNAIRE FOR SCIENCE TEACHERS

TOPIC : CHALLENGES FACED BY FORM 1 LEARNERS IN USING SCIENCE APPARATUS WHEN CARRYING OUT PRACTICAL WORK AT MAHUSEKWA HIGH SCHOOL IN MARONDERA DISTRICT**.**

Introduction.

Thank you for participating in this study. Your responses will help us understand why form 1 learners are facing challenges when using Science apparatus when carrying out a practical work.

1a) Demographic Information

Name:(optional)

Years of teaching experience:

Grade levels taught:

b). Which teaching methods do you use when teaching?

Teaching method	Group discussion	Pair work	Outdoor activities	Laboratory experiments	Lecture method
responses					

c). When teaching Biology concepts do you use science apparatus

2. Do Science apparatus help students retain information better?

YES	NO	UNDECIDED

3.Do all students be able to use Science apparatus well

YES	NO	UNDECIDED

APPENDIX II: QUESTIONNAIRE FOR BIOLOGY STUDENTS.

Thank you for participating in this study. Your responses will help us understand why form 1 learners are facing challenges in using Science apparatus in practical work

1. Demographic information

- Age
- Gender
- Academic level

2. How do you often participate in Biology practical activities (tick)

Never	rarely	sometimes	Often	always

3. What teaching methods do your teacher use in teaching you biology?

Teaching method	Lecture methods	Group discussions	Pair work	Outdoor activities	Laboratory experiments
Responses					

4. Do your teacher uses Science apparatus when teaching practical work?

Yes	No	Sometimes

5. Are you able to use Science Apparatus (circle) YES/NO

6. Use of Science apparatus does it help you comprehend biological concepts most?

Yes	No	Sometimes

APPENDIX III: INTERVIEW GUIDE FOR SCIENCE TEACHERS

SECTION A

Information about the researchers

We are Masitala S.E. and Mero, P., students at Bindura University of Science Education, we are carrying out the research on the above mentioned topic. You are requested to truthfully answer all the questions below to the best level you can.

Note that your responses will only be used for the purpose of this research work and your identity will be protected from the public, revealed only to this researcher.

SECTION B (questions)

1. Which teaching methods do you use when teaching biology?
2. Do you often use Science apparatus when teaching practical work
3. From your observation, do all students be able to use Science apparatus in practical work? Why?

SECTION D (Future Recommendations)

- What recommendations do you have for improving students to be able to use Science apparatus in practical work
- **SECTION E (CLOSING)**
- Thank you for sparing your time to answer to these research questions.
- Any information you can share concerning use of Science apparatus in teaching practical work in biology?

APPENDIX IV: INTERVIEW GUIDE FOR BIOLOGY STUDENTS

SECTION A (Introduction and Background)

We are Masitala S. and Mero P., students at Bindura University of Science Education studying Honors'-Bachelor of Science education degree in biology. We are carrying out a research on the above mentioned topic. You are requested to truthfully answer all the questions below to the best level you can.

Note that all your responses will only be used for the purpose of this research work and your identity will be protected from the public, revealed to this research only.

SECTION B (Questions)

1. How often do you do practical work?
2. Do you use Science apparatus during practical work?
3. How would you rate the impact of using Science apparatus on your understanding of biology concepts?

4.Are you able to use Science apparatus in practical work

SECTION C (Future Recommendations)

- What do you recommend on the use of Science apparatus with Form 1 in practical work?

SECTION D (CLOSING)

- Thank you for answering these research questions.
- Anything you want to ask or add about the research project.

APPENDIX V* :*REQUEST TO CONDUCT A RESEARCH