ASSESSING THE CONTRIBUTIONS OF SCIENCE AND MATHEMATICS TEACHERS (SESEMAT) ON STUDENTS' ACADEMIC PERFORMANCE IN SELECTED PUBLIC SECONDARY SCHOOLS IN HOIMA MUNICIPALITY

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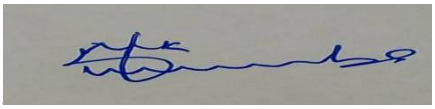
DECLARATION

I Irumba George Kazooba, hereby declare that this is my original work titled, "Assessing the Contributions of Science and Mathematics Teachers (SESEMAT) on Students' Academic Performance in Selected Secondary Schools in Hoima Municipality" is not plagiarized and has not been submitted to any institution for any award.

Signed  Date 14th May 2024

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APPROVAL

This work titled, “Assessing the Contributions of Science and Mathematics Teachers (SESEMAT) on Students’ Academic Performance in Selected Secondary Schools in Hoima Municipality” was supervised by me as a university supervisor for the award of the Degree of Master of education Planning and Administration.

Signed: ……  Date: 15/05/2024

Mr. Mulabbi Andrew

Supervisor

DEDICATION

This report is dedicated to my beloved wife and the rest of my family members whose efforts towards the success of my studies depict the highest degree of Love and Care.

ACKNOWLEDGEMENTS

I thank God Almighty for the inspiration, strength, vision, wisdom and understanding that enabled me to complete the course. I would like to express my gratitude to my supervisor, Mr. Mulabbi Andrew for the patience, guidance and the precious time committed to make this report a success. The guidance and advice given was vital in having this work accomplished. Thank you very much. I am very grateful to my beloved wife for her love and financial support towards my education with dedication, that enable me to accomplish this report. Special thanks go to my children who sacrificed a lot for the sake of my education. May God Almighty richly bless you. I also acknowledge the contributions of the study respondents from Secondary Schools in Hoima Municipality who gave the necessary information that enabled the researcher to come up with this report. More thanks go to my course mates. Their effort and support have contributed greatly towards the success of this report and other academic work.

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LIST OF ABBREVIATIONS

ALEI	Activity – based, Learner – centered, Encouraging with maximum Improvisation
BIO	Biology
CHEM	Chemistry
DV	Dependent Variable
ICT	Information and Communication Technology Training
INSET	In – Service Education and Training
IV	Independent Variable
JICA	Japanese International Cooperation Agency
MATH	Mathematics
NGO	Non-Governmental Organization
PHY	Physics
PIEI	Plan lessons well, Implement lessons effectively, Evaluate lessons objectively and make Improvements constantly.
RMC	Regional Management Committee
RTs	Regional Trainers
SESEMAT	Secondary Science and Mathematics Teachers
UCE	Uganda Certificate of Education
UNEB	Uganda National Examinations Board

ABSTRACT

Science and mathematics teachers (SESEMAT) create engaging lesson plans and activities for the learners, including laboratory works, group research, and field experiments. They also demonstrate methods and present scientific research to support their observations. The study was carried out in Hoima Municipality, Hoima District. The study aimed at assessing the contributions of science and mathematics teachers (SESEMAT) on students' academic performance in selected public secondary schools. The study objectives were; to find out the methods used by teachers while teaching Science and Mathematics in selected public secondary schools, to find out in which ways SESEMAT has contributed to students' academic performance in the selected public secondary schools and to identify the factors influencing teachers' methodology in teaching Science and Mathematics in selected public secondary schools. The study used a cross sectional survey design. A total of 232 respondents was used which included head-teachers, deputy head-teachers, teachers of Science and Mathematics and students; data was collected by use of questionnaire and interview guide. Respondents were purposively and simple randomly selected. Data was analyzed both quantitatively and qualitatively.

The study findings revealed that teachers while teaching Science and Mathematics majorly employ demonstration methods, student centered approach and discussion methods. The study also revealed that SESEMAT helps students to grasp content taught easily, gain practical skills, and makes it simple for teachers to attend to individual students' differences. The study further revealed that teachers training background, teachers' competence, availability of teaching aids and school education facilities are the major key factors influencing teachers' methodology in teaching Science and Mathematics in public secondary schools.

From the findings, it is concluded that SESEMAT has an impact on the academic performance in science and mathematics in the selected public secondary schools. It is recommended that teachers training institution should be well equipped to groom good and competent teachers with proper required training background for effective science teaching, and areas of further research were suggested.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The chapter deals with the background to the study, statement of the problem, purpose and objectives, scope of the study and research questions. It further gives detailed information concerning the justification of the study, significance of the study and conceptual framework.

1.1 Background to the Study

Academic performance is defined by Noburu (2018) as the extent to which a student has achieved his short or long-term educational goals in academics. Performance is the accomplishment of a given task measured against presently known standards of accuracy, completeness, cost, and speed. In a contract, performance is deemed to be the fulfillment of an obligation, in a manner that releases the performer from all liabilities under the contract. Performance of students can be measured in terms of students' exams scores, students' participation in class, students' regularity and punctuality. In this regard, the quality of science teachers and their professional development need more emphasis, if we are to achieve high students' academic performance in science subjects.

A secondary science and mathematics teacher (SESEMAT) is one of the interventions set up to improve students' academic performance and their attitude towards science (Komakech & Osuu, 2022). Science and mathematics teachers (SESEMAT) create engaging lesson plans and activities for the learners, including laboratory works, group research, and field experiments. They also demonstrate methods and present scientific research to support their observations (Eshiwani, 2023). The SESEMAT was introduced in 2005 with the purpose to improve the teaching ability of science and mathematics teachers at secondary level; and to

improve performance in those subjects (Komakech & Osuu, 2022). SESEMAT had the greatest impact on: improved teachers and student's attitudes towards science and mathematics; improved the performance of students in the national examinations; and has developed/promoted practical teaching as

Adnam and Ahmed (2016) assert that teachers' methodology in teaching have been emphasized with an emphasis of science subjects targeting to reduce on unemployment world over. In Bangladesh as one of the developing countries, most science and mathematics teachers are content/syllabus driven; thinking that covering the syllabus is the same as effective teaching. Lecture becomes the method of choice even in science subjects because it allows coverage of ground in terms of content, even when very little comprehension is attained (Drayer, 2023). Science and Mathematics teaching helps students to gain knowledge, skills and attitudes they need to be responsible citizens. It is also a means of passing science knowledge to the next generation.

Akinpelu (2021) revealed that with massive economic growth and global competition in Africa, science subjects have been massively emphasized in most Sub-Saharan countries, targeting to meet the economic and technology gaps. Teachers use different teaching methodology while handling science and mathematics subjects. These includes, field and practical work where students get involved directly and help them not to forget what they have learnt and practiced. A survey done by Chesire, Odindo, Oduor and Muriithi in 2023 indicated that countries like Nigeria and Ghana, have continued to experience low students' academic performance in science subjects compared to art subjects. Most students fail to score good marks in sciences, of which theoretical methods of teaching employed by teachers could have contributed a lot. Awotua – Efebo (2021) sees teaching as an interaction between a teacher and a student under the teacher's responsibility, in order to bring about expected

change in the student's behavior. The purpose of teaching, is to help students acquire, retain and be able to use knowledge, understand, analyze, synthesize and evaluate skills, establish habits and develop attitudes.

Eshiwani (2023) asserts that science subjects have been emphasized in all East African countries so as to promote scientific research and innovation, increase the number of science related workers like doctors. In Kenya, subjects like Mathematics, Biology, Chemistry and Physics have been emphasized and encouraged among all secondary schools to meet the employment demands. Though, the country has continued to face the challenges related to shortage of trained science teachers as a measure towards maintaining quality of science education with rapid expansion of secondary education. This is in line with Noburu (2018) that students' academic performance in science subjects has remained wanting; students in some secondary schools get low marks in science subjects which influence their general level scored. Some teachers have continued to use their old style of chalk and talk method in their science subject teaching-learning process, and this make some students fail to grasp some of the content being taught.

In Uganda, Mukasa (2021) states that with the introduction of free education for all, teaching of science subjects has become one of the pillars in promoting the USE program. Free refresher training courses have been emphasized, programs like SESEMAT (Secondary Science and Mathematics Teachers) introduced, science teachers given more incentives, all targeting to promote and equip science teachers with more skills and ability in handling science subjects. Over the past two decades or so, the academic performance in science (Physics, Chemistry and Biology) and Mathematics subjects at Uganda Certificate of Education (UCE) has not been pleasing, which has been and still, of great concern to the Government of Uganda and its development partners (Mukasa, 2021). In the same respect,

there has been and still there is much concern about the quality of teaching science and mathematics subjects in the secondary schools today to meet the ever-changing demands of industrialists, technologists, entrepreneurs and the rapidly changing tastes and needs of our societies and communities. Consequently, a number of interventions including but not limited to; construction of science laboratories in schools, renovation/remodeling of the existing ones, supply of laboratory equipment, chemicals, reagents and science kits, supply of text books, paying teachers of Science and Mathematics an additional ten thousand shillings incentive, purposeful recruitment of teachers of Science and Mathematics and lately the Government of Uganda through the ministries of Public Service and that of Finance has advocated for salary enhancement of teachers of Science and Mathematics plus other Scientists in the Traditional Public Service and Local Government (Eshiwani, 2023). Regrettably, all these have hitherto remained mere allegation without systematic answers to the predicament. This prompted the current researcher to consider the path of the research study.

In addition to the above, the Government of Uganda with the cooperation and support from the Government of Japan through the Japanese International Cooperation Agency (JICA), launched yet another intervention in 2005 known as the Secondary Science and Mathematics Teachers (SESEMAT) program, with an aim of providing the teaching and learning of Science and Mathematics a new dimension that would enable teachers of Science and Mathematics develop and deliver lessons that would enhance the learners' overall growth; in which the methods of teaching were to be Activity-based, Learner-centered, Encouraging and with maximum Improvisation (ALEI) expected from teachers (Njuguna, 2015). In this strategy, teachers are expected to "Plan lessons well, Implement the lessons effectively, Evaluate the lessons objectively and make Improvements constantly (PIEI)". Science teachers have been given and encouraged to join regular fresher courses and workshops organized by

the Ministry of Education so as to equip them with more teaching methodology and skills, and be able to effectively handle science as a subject leading to improved students' academic performance.

From a survey carried out in 2015 in central Uganda by Olembo, Wanga and Karagu (2015), the achievement scores of students taught by SESEMAT trained teachers were higher than those of students whose teachers had not undergone SESEMAT training, lacking experiences and skills in using different teaching methodologies. However, the trend of students' academic performance in science and mathematics subjects has remained low for the last five consecutive years; students perform much better in art subjects than science subjects. This is line with Njuguna (2015) who states that students' achievement is a reflection of the quality of teaching and learning.

It was broadly believed that this new strategy of ALEI/PIEI would help to make the lessons learner centered, practical and interesting to learners. "Student-centered also known as child-centered education broadly encompasses teaching methods that shift the focus of instruction from the teacher to the student". The teaching methods have to take into consideration the learners' different learning styles and interests (Komakech & Osuu, 2022). Particularly for science and mathematics, the units of instruction should stress inquiry, motivate learners, aim at problem solving and encourage high levels of interest where the teacher's role is to guide, demonstrate and act as a resource person in the learning process (Njuguna, 2015). Teachers of science have been emphasized to use different methods of teaching science inclusive of demonstration, lecturing, collaboration, classroom discussion, peer-to-peer teaching, cognitive development methods, effective development methods, psychomotor development methods and cognitive development methods that promote lessons delivery.

It is hard to imagine learning to do with science, or learning about science, without going to the laboratory or field work. Experimentation underlies all scientific knowledge and understanding. Laboratories are wonderful settings for teaching and learning sciences. They provide students with opportunities to think about, discuss, and solve real problems. Developing and teaching an effective lesson in the laboratory requires as much skill, creativity, and hard work as proposing and executing a first-rate research project. However, students' academic performance in science since 2021 has remained a challenge in most secondary schools (UCE Results, 2023). The academic performance of students in science and mathematics subjects in Hoima Municipality in Hoima district in Bunyoro region is not an exception to this observation as shown in UNEB-UCE results, which prompted the researcher to conduct an assessment on the SESEMAT program that was introduced in 2008 in the region has created a positive impact on academic performance in science and mathematics subjects. The policy and practice recommendations arising out of the study may contribute to enhance students' academic performance in selected public secondary schools in Hoima Municipality.

1.2 Statement of the Problem

Many secondary schools have been established by the Government of Uganda, private organizations, Non-Governmental organizations (NGOs) and individuals across the country. As a result, teaching and learning takes place under varying conditions and environments, which implies that virtually each school is operating under very unique classroom conditions yet the students are expected to sit the same standard examinations of Uganda Certificate of Education (UCE) at the end of their ordinary level of education cycle (Komakech & Osuu, 2022). Performance of science and mathematics at UCE has continued to be poor; as reflected in UNEB reports on candidates' work. "Performance in practical science examinations reflects

that the candidates have not been exposed to practical teaching as shown in the lack of skills in handling apparatus, making observations, recording data in tabular forms and plotting from such data" (UCE Report, 2023).

The SESEMAT in-service training program was launched in Bunyoro region in August 2008 to help improve instruction in these subjects. It was aimed at enabling teachers of science and mathematics to improve on their methods and use the available resources and environment hence teach more effectively. However, in spite of this intervention, the students' performance in science and mathematics at UCE in Hoima Municipality has continued to be poor as shown in the summary of performance for the years 2021, 2022 and 2023 for the schools under the study (UCE Report, 2023) as indicated in Appendix VI. Yet, empirical studies into the contributions of SESEMAT on the academic performance of students in science and mathematics subjects in selected public secondary schools in Uganda and Hoima Municipality in particular remain scanty. This study scenario contributes to filling this gap by assessing SESEMAT program on the academic performance of students in science and mathematics subjects in selected public secondary schools in Hoima Municipality, Hoima district.

1.3.0 Purpose and Objective of the Study

1.3.1 Purpose of the Study

The purpose of the study was to assess the contributions of SESEMAT on the students' academic performance in science and mathematics in selected public secondary schools in Hoima Municipality.

1.3.2 Objectives of the Study

The study was guided by the following objectives:

1. To establish the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality.
2. To find out in which ways SESEMAT has contributed to students' academic performance in selected public secondary schools in Hoima Municipality.
3. To identify the factors influencing teachers' methodology in teaching science and mathematics in selected public secondary schools in Hoima Municipality.

1.4 Research Questions

The study was guided by the following research questions:

1. What are the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality?
2. In which ways SESEMAT have contributed to students' academic performance in selected public secondary schools in Hoima Municipality?
3. What are the factors influencing teachers' methodology in teaching science and mathematics in selected public secondary schools in Hoima Municipality?

1.5.0 Scope of the Study

The content scope, geographical scope and time scope guided this research study as follows:

1.5.1 Content Scope

The study concentrated on assessing the contributions of science and mathematics teachers (SESEMAT) on students' academic performance in selected public secondary schools. The study put much emphasis on establishing the methods used by teachers while teaching science and mathematics in selected public secondary schools, finding out to which ways SESEMAT has contributed to students' academic performance in selected public secondary schools and identifying the factors influencing teachers' methodology in teaching science and

mathematics in selected public secondary schools. It looked at students' academic performance as the dependent variable and assessing the contributions of science and mathematics teachers (SESEMAT) as an independent variable.

1.5.2 Geographical Scope

The study was conducted in (6) six selected public secondary schools in Hoima Municipality and focused mainly on the relationship between the methods used in teaching, attitudes of students towards science and mathematics subjects and academic performance in those subjects. The study was limited to O level section only i.e senior one to senior four and will cover physics, chemistry, biology and mathematics subjects only. The researcher selected this Municipality for this study because of the declining students' academic performance in science subjects (UCE Report, 2017).

1.5.3 Time Scope

The secondary data for the period of eight years from 2015 to 2022 was considered to make this study a success. This period was considered because it's the period when declining students' academic performance in science subjects has been witnessed and is on the rise. Again, the research study lasted for the period from February 2019 to January 2022 which helped the researcher to cope up with the UCU post graduate examination calendar.

1.6 Justification of the Study

Science and mathematics subjects play a vital role in many aspects of scientific, economic, technological and many other social, cultural, and political advancements. For any society to evolve, grow, advance, develop etc., it is critical that certain aspects of life are aligned with the world economic, scientific and technological trends and therefore, the persistent poor

performance in these subjects poses a serious threat and danger to the developments and growth of the disciplines herein mentioned.

1.7 Significance of the Study

The results of the study would benefit the following:

1. The teachers of science and mathematics to continuously improve on the methods used in classroom instruction.

2. School administrators and managers to plan for enabling environments for effective delivery of lessons in science and mathematics subjects. It would therefore be upon this study that more forward policies can be designed and formulated.

3. The regional trainers (RTs) for science and mathematics while monitoring and evaluating the SESEMAT program across Bunyoro region. It is likely to add on the existing body of knowledge as far as teachers' methodology in teaching science and the performance of students in secondary is concerned, which would be useful for forecasting and planning purpose.

4. The members of the Regional Management Committee (RMC) in policy formulation and implementation of SESEMAT programs.

5. The Ministry of Education and Sports in policy formulation and implementation of SESEMAT and other related interventions.

6. Academicians who would be interested in conducting studies similar to this particular one. Like any other research the findings would be used as a reference as far as further studies are concerned and spark research in the SESEMAT program and students' academic performance in secondary schools in Uganda.

1.8 Conceptual Framework

This frame work shows the relationship that exists between the variables as illustrated in the figure 1.1 below.

Figure 1.1: Conceptual Framework

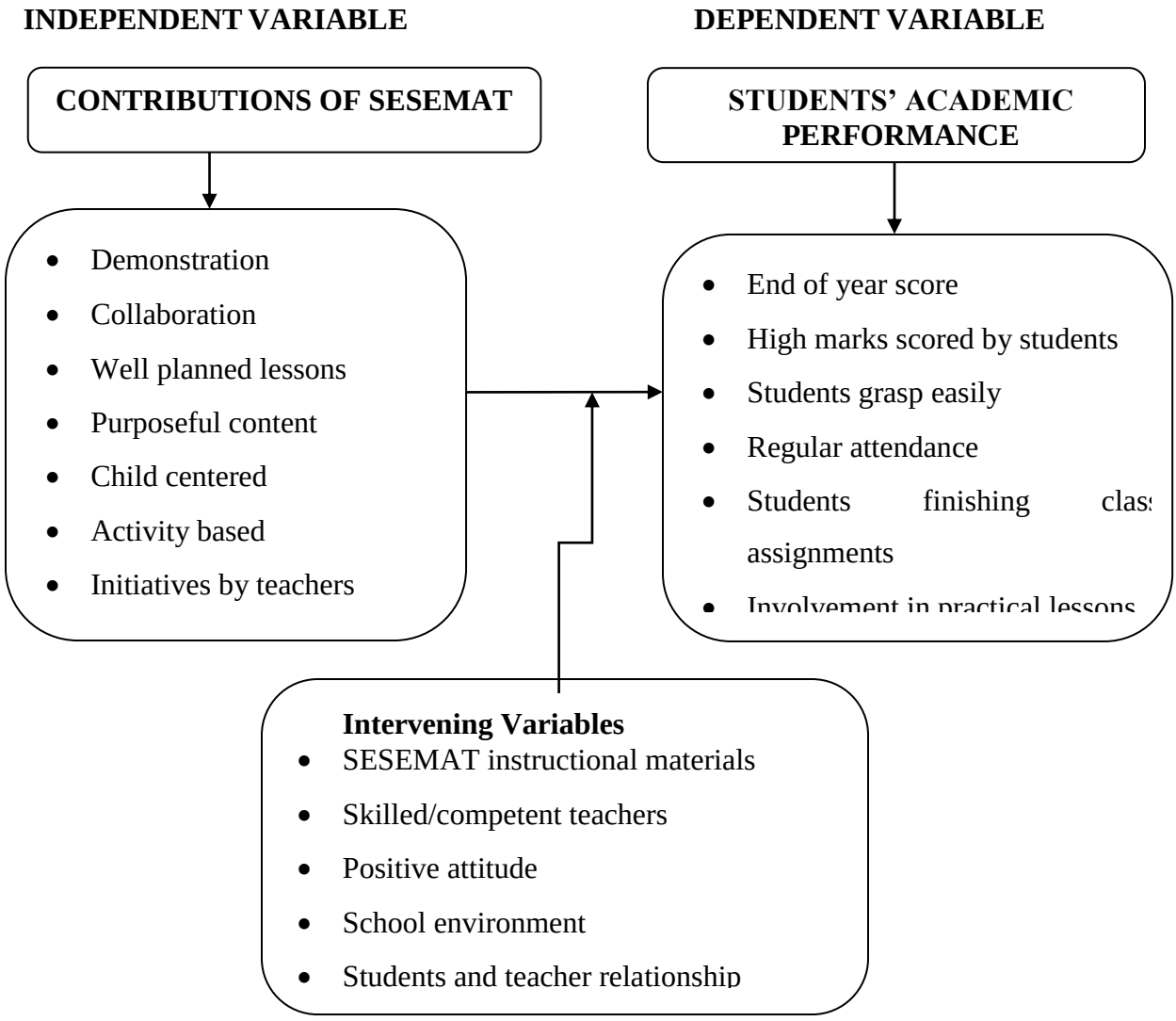


Figure 1.1: Conceptual Framework

Source: Adopted and modified from Akinpelu (2011)

Figure 1.1 shows the concept related to the two study variables namely contributions of science and mathematics teachers (SESEMAT) as an independent variable and the academic performance of students as the dependent variable. The figure depicts how the independent variables do affect the dependent variable. In the conceptual framework above, it is presumed

that contributions of SESEMAT has elements of demonstration, collaboration, well planned lessons, purposeful content, child centered, activity based, initiatives by the teacher, classroom discussion and peer-to-peer teaching. When all these above are in place, the improved students' academic performance can be witnessed. The performance of students has elements of high marks scored by students, students grasping easily, students finishing class assignment, regular class attendance, access to educational materials, involvement in practical lessons and improved results at UCE. It should also be noted the two variables (dependent and independent) are affected by moderating variables. Such moderating variables include having SESEMAT instructional materials, skilled/competent teachers, positive attitude, school environment; and students and teacher relationship.

1.9 Definition of Key Terms

Evaluation: To assess the value or worth of a program. In this context; the value of SESEMAT training.

Training: Equipping of teachers with necessary and relevant skills to translate information and knowledge into practice with a view to enhancing the teaching of science and mathematics.

Academic performance: The extent to which a student has achieved his short or long-term educational goals in academics.

In-service training program: A staff development effort, where professionals are retooled and accordingly discuss their work with others in the peer group.

Facilities: The materials that make it possible and easier to do something, such facilities in teaching include, desks, chairs, libraries etc, for easy teaching and learning to occur.

Respondents: A person who responds to a questionnaire, or a person who responds to question during a research study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature to the study to provide a theoretical basis and rationale for the study under the following headings: the methods used by teachers while teaching science and mathematics in public secondary schools, the ways in which SESEMAT has contributed to students' academic performance in secondary schools and the factors influencing teachers' methodology in teaching science and mathematics in selected public secondary schools.

2.1 The Methods Used for Teaching Science and Mathematics

Martin (2015) considers teaching methods as the manner in which teachers impart knowledge and skills while teaching and the students acquire knowledge and skills in the learning process. Dyer and Osborne (2015) revealed that "the selection of appropriate teaching approach is one of the most important achievement". Dyer and Asborne further stated that students react differently to different teaching methods, and that the selection of the proper method is critical to the learning style of those being served by the instruction. Also, student-centered also known as child-centered education broadly encompasses teaching methods that shift the focus of instruction from the teacher to the learner. However this research was not school based, thus need for the study to be conducted basing on selected secondary schools in Uganda.

According to Carkhuff (2021), teaching is an opportunity to help others to live their lives fully, which means we help to give learners' lives through their physical, emotional, intellectual and social growth. In support to this assertion, Anderson (2023), concluded that student's outcomes may heavily depend on the teachers' planned instructional methods and having a variety of learning activities. Science teachers have an exciting opportunity to teach

kids about how science makes the world work (Olembo, Wanga and Karagu, 2015). Unfortunately, reduced teaching budgets and apathy on the part of students sometimes makes it difficult to get students interested in topics like biology, earth science, anatomy, physics and chemistry. Some teachers are now using techniques such as peer learning, role-playing, and incorporating current events in science lesson plans. These techniques help engage students and help them understand the importance of science. They also make it fun to teach scientific concepts and help students understand common topics in the scientific world.

New Comb (2016) and Tayler (2023) observed that the teaching strategy must base learning on inquiry, investigation and critical study in situations in which genuine purpose needs and wants are experienced. For this reason, the role of the teachers and their teaching strategies must not be ending topics in all education settings. In addition, Walkin (2023) revealed that "good teaching methods involve presenting learners with situations in which they may experiment and hence learn by actively constructing their own knowledge through interacting with the learning environment". Regrettably, all these have hitherto remained mere allegation without systematic answers to the predicament. This prompted the current researcher to consider the path of the research study.

Further, Noburu (2018) posits that there is peer-to-peer teaching, which is used by teachers of science and mathematics in secondary schools. Buzz groups, solution and critic groups, and affinity groups are just three of the ways to use peer-to-peer teaching in the classroom. This is an active learning method that encourages students to discuss scientific topics, develop questions about the material, and work in teams to learn new information. Traditionally, science and mathematics teachers used the lecture format to teach children about science, which eventually does not engage students in their learning. Nowadays, peer-to-peer teaching tends to encourage rote memorization and note-taking instead of excitement about the world

of science and mathematics. There is emphasis of students to get involved in teaching each other about science. When students work in buzz groups, they spend some time studying a topic and gathering information. Affinity groups work together outside of the classroom and then present their findings during normal class time. All of these techniques help students develop research and presentation skills that will help them in the science classroom as well as other areas of life.

Radha (2015) classified that teaching methods into three categories; i.e. oral that involves talk and chalk, narrations, and discussions; observation that includes demonstrations, use of models, films and charts; and practical which covers conducting experiments and projects. He emphasized the need to use all these categories for students to be more active in the learning process. Also, Radha categorizes the factors to be considered for the selection of teaching methods as; the human factors (the teacher, the learner and the environment from which they come), objectives of teaching, time and materials. The teacher should know which method to use, when and how to use. The teacher may have the skills and knowledge to effectively select the teaching methods, but the situation where passing of exams seems to be the only measure of performance; teachers may resort to emphasizing rote learning among learners, justifying the reason for this study.

Adam and Ahmed (2016) also revealed that student centered approach has been the emphasis under SESEMAT program to enhance science teaching among secondary schools. Student-centered learning is a pedagogical paradigm shift that is currently attracting immense attention. For instance, Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA), Nairobi defines student-centered approach to learning, as teachers move from the center position to the side, from dispensers of knowledge and become advisors and

facilitators of learning. However, this study was carried out outside Uganda, not entirely secondary schools based and carried out almost four years ago. These constitute gaps in conducting a similar study in Uganda, thus a justification for this study.

Student-centered learning does not necessarily imply a particular methodology of teaching just like constructivism and inquiry learning from which it borrows or relates heavily (O'Neill & McMahon, 2015). Nevertheless, stated that certain methodologies may be better suited than others for student-centered classrooms. The definition of student-centered learning appears to differ among authors as some equate it with active learning, while others take a more comprehensive interpretation including: active learning, choice in learning, and the shift of power from the teacher to a student.

The SESEMAT in-service training program advocates for the teaching of science and mathematics to be Activity-based, Learner-centered and purposeful in content for a holistic and practical experience. Daneca (2023) confirms this when he states that "The retention of knowledge thus gained is permanent. They can freely try out the concepts they have learned". Therefore, methods of teaching science and mathematics have to be varied as learners have different learning styles, levels of achievement and interests but also, teachers possess different teaching styles as observed by Marlow (2016) and Mcnee (2023) when they asserted that the learners' individual differences such as inborn traits, sex differences, nature and nurture, talents and temperaments influence educational undertakings. This calls for individualized instructional methods. These authors confirm that all teaching methods place the learner, the teacher and the learning environment at center of the teaching-learning process. That the teaching methods have to be activity-based, child-centered and that the selection of teaching methods have to be considered against those principles. There is

therefore, a strong indication that learners exposed to monotonous rote learning methods for examination purposes may not positively perform well in science and mathematics.

Drayer (2023) argued that to achieve the ALEI condition, SESEMAT came up with the Plan, Do, See and Improve (PDSI) approach to teaching and learning. In terms of Plan, apart from schemes of work and lesson plans, the teacher carefully plans and tries out the teaching/learning activities, materials and examples before the lesson. Emphasis is on how instructional activities shall enable learners to understand individual concepts and connections among them, get the rationale/value for the lesson, retain the learning experience and apply it in real life situations, get rid of learning difficulties and misconceptions and have more interest in the lessons. In terms of do, the teacher conducts the planned lesson/activity as planned teachers are encouraged to; be innovative in lesson presentation, present lessons in varied interesting ways to arouse learners' interest e.g through role play, storytelling, ensure active learner participation, facilitate the teaching/learning, deal with students' questions and misconceptions and reinforce learning at each step. And in terms of See (lesson study), the teacher evaluates the teaching and learning process during and after lesson using various techniques and feedback from students. Teachers also allow their colleagues to observe their lessons and offer feedback, enables teachers to see the good practices in the lesson and strengthen them, see mistakes made in earlier lesson, avoid earlier mistakes in future lessons in the process teachers become more open to evaluation by fellow teachers, school administrators, quality and standards assurance officers and students.

Njuguna (2015) asserts that the lecture method is just one of several teaching methods, though in schools it's usually considered the primary one. While the lecture method gives the instructor or teacher chances to expose students to unpublished or not readily available

material, the students plays a passive role which may hinder effective learning. While this method facilitates large-class communication, the lecturer must make constant and conscious effort to become aware of student problems and engage the students to give verbal feedback. It can be used to arouse interest in a subject provided the instructor has effective writing and speaking skills. The lecture method is convenient for the institution and cost-efficient, especially with larger classroom sizes. This is why lecturing is the standard for most college courses, when there can be several hundred students in the classroom at once; lecturing lets professors address the most people at once, in the most general manner, while still conveying the information that he or she feels is most important, according to the lesson plan.

In addition, Drayers (2023) revealed that science teachers use demonstration which involves showing, doing or telling the students the point of emphasis. It is mostly used as a technique within a method of teaching and at times as a method of teaching itself. Here the role of the teacher is to illustrate how to do something or illustrate a principle first by explaining the nature of the act verbally, followed by demonstrating the act in a systematic manner and later the students repeats the act. Here, students are involved in doing things that will influence their behavior patterns through demonstrations students are exposed to physical materials that will illustrate some meaning to their cognitive framework. Direct experiences like this go a long way to enrich learning. Demonstration is useful mostly in imparting psychomotor skills and lessons that require practical knowledge. The gain of using demonstration method in teaching lies in the fact that it bridges the gap between theory and practice, enables learners to become good observers and generates their interest; students see immediate progress as a result of a correct effort and it enables the teacher to teach manipulative and operational skills. The problems encountered in this method amongst others include the fact that students' easily get frustrated and lose confidence when they fail to repeat accurately; creativity and

originality by students are hindered as students try to do it exactly the same way as their teacher did it and students have a limited opportunity to be familiar with learning materials.

Eshiwani (2023) states that science teachers use discussion methods. Discussion is usually at a higher cognitive level and helps to develop critical thinking. Successful discussions are guided by specific teaching goals. Discussions involve a process of free guided interactions and expression of views and ideas on a given topic, question or problem by the teacher. In the students' attempt to solve the problem or answer the question, students pair up in smaller groups for specific intervals of time, discuss the issue on ground and then they are brought back for a full group discussion. Student's participation is necessary for a successful classroom discussion. It is a student-centered teaching technique but requires careful planning by the teacher to guide discussion. A number of students are able to participate and are exposed to other student's ideas. In small group students can discuss a complex issue and when they are brought back to the larger groups, these students discuss their reactions, share ideas and build on each other's suggestions. This method encourages student's participation, develops critical thinking, student's ability to communicate, and problem-solving skills. It provides opportunities for all to participate.

Akipelu (2021) added that science teachers use questioning method. Questioning method of teaching aids learners in connecting concepts, increasing awareness, encouraging creative and imaginative thought and making inferences among others. Questioning technique generally helps learners to explore deeper levels of thinking, knowing and understanding. Questioning is more of a technique rather than a method of teaching and is used during various methods of teaching and helps in tickling the inquisitive mind of the leaner. The method is credited to Socrates, a Greek Philosopher. Questioning techniques may be used for the following

purposes: to arouse interest and curiosity: At the beginning of a lesson, questions can be used to secure interest, and focus the attention of the group to the subject and also stimulate discussion: Questions that are thought-provoking can get the group to start reactions. By skillful questioning, the teacher can steer the group to the objective already established, keep them on the right track and guide their thinking. The teacher can also help the group to move from the known to the unknown by a series of well-prepared questions and to determine how well the group understands the material. From the responses given to a question, the teacher can determine if the group has absorbed what is being presented and this provides an opportunity for the teacher to correct any misconceptions or to elaborate on points and to draw the attention of an individual or to help a timid learner to express his or her thoughts.

Mukasa (2021) emphasized use of role playing while teaching science subjects. This method of teaching can be used for solving real life situational problems. The technique of role lay develops practical professional skills and functioning knowledge. It enables students in the classroom to act as stakeholders in an imagined scene. In a role play, the teacher selects an event that illuminates the topic of study and students are assigned roles, which will be played or acted out, with a reflection stage that reinforces the concepts introduced by the role play. This method gives students the opportunity to explore together their feelings, attitudes, values and problem-solving strategies. Role play also creates a stimulating environment that brings reality to life and intensifies learners understanding of the event being acted on. Through this approach to learning, students learn through active involvement in role play. The problem with role playing method amongst others is that directing role playing is complex. Also, some students may be too self -conscious and may not be able to play the role for other students to observe.

2.2 The Contributions of Science and Mathematics Teachers (SESEMAT) on and Students' Academic Performance

According to Njuguna (2015), a teaching method comprises the principles and methods used by teachers to enable student learning. These strategies are determined partly by subject matter to be taught and partly by the nature of the learner. For a particular teaching method to be appropriate and efficient it has to be in harmony with the characteristic of the learner and the expected learning outcomes. The teachers are encouraged select teaching methods that put into account the nature of the subject matter level of the learners and the teaching resources required for meaningful learning to occur. Teachers must therefore be creative and propagate rational reasoning which constitute the order of human advancement in today's school. However, this study was carried out outside Uganda, not entirely secondary schools based and carried out almost two years ago. These constitute gaps in conducting a similar study in Uganda, thus a justification for this study.

Olembo, Wanga and Karagu (2015) state that essentially student-centered learning has student responsibility and activity at its heart, in contrast to a strong emphasis on teacher control coverage of academic content found in much conventional and didactic teaching. Student-centered learning abounds with the features which the various authors and researchers propose as distinguishing marks of student-centered learning from teacher centered learning. These characteristics are crystalized as follows: - active rather than passive learning (the student doing more than the teacher). Involvement and participation are necessary for learning, emphasis on deep learning and understanding of concepts, the teacher valuing and supporting (indirect) verbal and non-verbal interactions, the teacher utilizing students' prior knowledge and experiences, organizing learning around learning communities (for example groups, peers) and the teacher becomes a facilitator and resource person.

In addition, Mukasa (2021) stated that the approaches for teaching can be broadly classified into teacher centered and student centered. In Teacher-Centered Approach to learning, teachers are the main authority figure in this model. Students are viewed as “empty vessel” whose primary role is to passively receive information (via lectures and direct instruction) with an end goal of testing and assessment. It is the primary role of teachers to pass knowledge and information onto their students. In this model, teaching and assessment are viewed as two separate entities. Students learning is measured through objectively scored tests and assessments. In Student-centered approach to learning, while teachers are the authority figure in this model, teachers and students play an equally active role in the learning process. The teacher’s primary role is to coach and facilitate student learning and overall comprehension of material. Student learning is measured through both formal and informal forms of assessment, including group projects, student portfolios, and class participation. Teaching and assessments are connected; student learning is continuously measured during teacher instruction. Commonly used teaching methods may include class participation, demonstration, recitation, memorization, or combination of these.

Buseri and Dorgu (2021) states that demonstrating is the process of teaching through examples or experiments, for example, a science teacher may teach an idea by performing an experiment for students. A demonstration may be used to prove a fact through a combination of visual evidence and associated reasoning. Demonstrations are similar to written storytelling and that they allow students to personally relate to the presented information. Memorization of a list of facts is a detached and personal experience, whereas the same information, conveyed through demonstration, becomes personally relatable, demonstrations help to arouse students’ interests and reinforce memory retention because they provide connections between

facts and real-world applications of facts. Lectures, on the other hand, are often geared more towards factual presentation than connective learning. Teaching methods aid learning and help to communicate ideas and skills to the students. There are several teaching methods to use in the science classrooms; it is left for the teacher to use the ones most appropriate for the lesson. These methods if properly used shall enhance teaching and learning and bring about desired changes in the students. While the teacher's task is to ensure that learning is effective, one major way to achieve this is the use of appropriate teaching methods.

Ivowi (2023) added that demonstration and questioning methods aim at motor skills development in learners. This method requires that learners are able to illustrate, demonstrate, or perform certain skills using their manual dexterity. It is a heuristic method of teaching that involves inquiry and discovery and is a student activity-based method. Different teaching methods may elicit different types of changes in learning outcomes. Teaching methods are many and varied and could be used indifferent ways, considering among others the age of the learners, body configuration or physique of learners (able or disabled learners), academic ability/intelligence of the learners, number of learners and of course the type of curriculum discipline which recognizes the fact that certain teaching methods are much more suitable to some disciplines than others.

Eshiwani (2023) added that the most common type of collaborative method of teaching in a class is classroom discussion. It is the also a democratic way of handling a class, where each student is given equal opportunity to interact and put forth their views. A discussion taking place in a classroom can be either facilitated by a teacher or by a student. A discussion could also follow a presentation or a demonstration. Class discussions can enhance student understanding, add context to academic content, broaden student perspectives, highlight

opposing viewpoints, reinforce knowledge, build confidence, and support community in learning. The opportunities for meaningful and engaging in-class discussion may vary widely, depending on the subject matter and format of the course. Motivations for holding planned classroom discussion, however, remain consistent. It is clear from "the impact of teaching strategies in first-year higher education cannot be overlooked nor over interpreted, due to the importance of students' personality and academic motivation which also partly explain why students learn the way they do" that Donche agrees with the previous points made in the above headings but he also believes that student's personalities contribute to their learning style.

Akinpelu (2021) discussed the types of methods used for teaching science and added that they could be presets under these main categories: cognitive development methods, affective development methods, psychomotor development methods and cognitive development methods. Here, if the focus of the instructional objectives is to develop intellectual skills in learners, then the cognitive development methods of teaching are recommended. This method helps learners to comprehend, analyze, synthesize and evaluate information. It helps learners develop good cognitive abilities. In terms of affective development method, this domain includes objectives which describe changes in interest, attitudes and values. It further deals with the development of appreciation and adequate adjustment. Education has a lot to give the learner in order to assist him/her develop in these areas, hence teachers are encouraged to include learning experiences that are worthwhile, teach in ways that arouse interest and develop proper attitude in learners.

Science teaching requires methods that align practical and lecturing aspects that donate various strategies which the teacher uses to deliver his/her subject matter to the students in the

classroom based on the instructional objectives to bring about learning (Ivowi, 2023). There are several teaching methods to use in the science classrooms; it is left for the teacher to use the ones most appropriate for the lesson. These methods if properly used will enhance teaching and learning and bring about desired changes in the students. While the teacher's task is to ensure that learning is effective, one major way to achieve this is the use of appropriate teaching methods.

2.3 Factors Influencing Teachers' Methodology in Teaching Science and Mathematics in Secondary Schools

Learner's attitudes are very vital for learning and comprehension to occur. Research studies have shown that people's goals can powerfully influence how they react to a task (Lamb, 2023). The reaction and attitude towards a task can also be determined by the degree of the participants' motivation. According to Oxford and Shearin (2023), a positive attitude helps you cope more easily with the daily affairs of life. It brings optism into your life, and makes it easier to avoid worries and negative thinking. With a positive attitude, you see the bright side of life, becomes optimistic, and expect the best to happen. In addition, Waugh and Fredrickson (2016) revealed that positive attitudes manifest in the following ways; Positive thinking, Constructive thinking, Creative thinking, Optism, Motivation to do things and accomplish them, Happiness of achievement". Carr (2016) indicated that inducing a positive mood improves creativity while making thinking and behavior has more flexibility than negative behavior. Positive emotions are marked by contentment, enthusiasm, and enjoyment in the present moment (Seligman, 2011). In academic settings, positive emotions have been linked to acquisition of various skills that foster success. Cultivating happiness in the classroom has been suggested to help students sustain a sense of resilience, mindfulness, and even physical health.

Several studies have divided barriers into categories: Extrinsic and Intrinsic. In one study, Njuguna (2015) referred to extrinsic as first order and access, time, support, resources and training as extrinsic. He also cited intrinsic as second order; for instance, attitude, beliefs, practices, and resistance. However, Ivowi (2023) defined extrinsic barriers as pertaining to organizations rather than individuals and intrinsic as pertaining to teachers' administration and individuals. However, this study took one method research design (quantitative); the use of questionnaires collected data. Unlike this study, data will be analyzed by percentages, mean scores, standard deviation, and tables that used both quantitative and qualitative approaches.

Njuguna (2015) further grouped barriers according to whether barriers are related to an individual (teacher level barriers) these barriers can include lack of time, resistance to change or institutional (school level barriers). Lack of effective training in solving problems and lack of access to resources can be referred to as school level barriers. There are also other barriers that are personal; characteristics of teachers and they differ from one teacher to another; these are teacher level barriers, creating a gap for the study.

According to Ivowi (2023), instructional materials have a great influence on the teachers' methodology in teaching science in secondary schools. Science instructional materials play a vital role in participation in a science lesson. They form a focal point and attract attention, arouse interest and promote a desire to learn, supplement description and help to explain words and processes, give an accurate impression of the concept, illustrate relationships, promote retention and memory, help to consolidate what has been learned, help to save teaching time, make learners to have self-esteem, learners get motivated and have the idea of sharing in participation in science lesson. In making use of any instructional materials, such materials must be previewed that is, having full knowledge of the material; prepare the

environment where it will be used; prepare audience by means of making sure that the materials to be used will attract attention, arouse interest, motivate and provide the rationale that could be used in beginning, middle or end.

According to Lizzio, Wilson and Simon (2022), effective learning is the physical atmosphere of the classroom that can help prevent behavior issues as well as promote and improve learning. The structuring of the learning environment is essential for teachers. The emotional environment also shall affect the learning environment. Intelligence is not the only determinant of academic achievement of a student. Lizzio, Wilson and Simon (2022) noted that academic achievement of a student is most often associated with a lot of components of the learning environment. Teaching and learning environments ought to implement six (6) functions; inform, communicate, collaborate, produce, scaffold and manage. The teacher has a prime responsibility to organize the classroom environment to make it conducive for learning; manage resources and people; and ensure discipline and control of the class. Ochan (2015) observed that it is important to establish rapport or a cordial relationship between the teacher and the learner to create a good learning climate in the classroom. Ochan further states that the professional conduct of the teacher is instrumental if students are to respond as required in the class. It is common knowledge that good teaching depends on the democratic behavior of a teacher, good command of subject knowledge, readiness of the teacher to teach and students to learn, motivation styles and levels and the resource to use. All this put together constitutes, a good learning environment. Indeed, “the learning environment plays a major role in shaping the quality for academic achievement in mathematics”.

Learning experiences that are joyous and uplifting appear to be more effectual, especially for learning that takes place in classroom settings (Reschly, Huebner, Appleton & Antaramian,

2018). In sum, positive emotions have been shown to broaden the mind and make an individual more likely to notice details of their surroundings, as well as generate solutions that require thinking beyond the immediate setting. This finding may be particularly useful in the classroom. Students' attitudes towards mathematics should be given attention in teaching the subject if one is serious in advancing the performance of the students. This can only be developed in the presence of a healthy environment (Tran, 2022), aside, from this environment, teachers' attitudes and beliefs, teaching styles and parental attitudes were identified as explanation factors that account for the student's attitudes towards mathematics. Hence, there must be a positive learning environment so that students can develop a positive attitude towards the subject which would lead to better performance.

In addition, it is well known that the academic performance of students to a large extent depends on the quality, adequacy and types of teaching materials and facilities. Musaazi (2016) supports this view when he observes that supplies, equipment and facilities are integral in creating an optimum learning environment. It is common knowledge that students learn through different styles, speeds, levels of past experience and environments when the subject matter is presented by way of a variety of teaching strategies. Drayer (2023) view them as materials things which are composed of or purported to have elements that could make tremendous enhancement of intellectual use and impact on instructional materials. The materials and equipment presented in early childhood setting should be chosen to provide many and varied opportunities for learners to practice and master familiar skills. The influence of instructional materials in promoting students' academic performance and teaching and learning in educational development is indisputable. Instructional materials are tools locally made or imported to facilitate the teaching/learning process.

In addition, Akinpelu (2021) asserts that continuous development programs improve on science teachers teaching skills. Continuous professional development is a joint initiative of the employee as well as the employer to upgrade the existing knowledge of an individual. It is of utmost importance for teachers to keep themselves at least with the latest developments, if the school is to survive the fierce competition. Professional development aims to help science teachers to teacher more effectively together, improve school progress such as the formulation and implementation of strategy, and facilitate the transformation of the school and academic achievement. Akinpelu further noted that teachers have become more effective change agents in their schools, and thy need a deeper understanding of the nature of the institution that makes it difficult for teachers to function effectively. This is in consonance or agreement with Noburu (2018), who states that every teacher should attend development courses at least two times a year, this facilitates their effectiveness. Some teachers don't have competencies to teach, they lack content and ability to interpret concepts. This contributes a lot to the learners understanding. Science teachers, as a result of continuous professional development activities are better trained and equipped and work harder to yield higher profits both for their personal benefit and students' academic excellence.

Adman and Ahmed (2016) state that remedial tasks known as secondary remediation, developmental education, basic skills education, compensatory education and, preparatory education is assigned to assist students in order to achieve expected competencies in core academic skills such as literacy and numeracy. Remedial tasks given to science students determine their academic performance in science subjects. Remedial task is a form of academic upgrading composed primarily of sequences of increasingly advanced courses designed to bring underprepared students to the level of skill competency expected of new entrants to post-secondary education. Remedial tasks can be designed for any student with or

without special needs. Objectives of remedial teaching are to provide learning support to students who lag far behind their counterparts in school performance. By adapting school curricula and teaching strategies, teachers can provide learning activities and practical experiences to students according to their abilities and needs. They can also design individualized educational program with intensive remedial support to help students consolidate their basic knowledge in different subjects, master the learning methods, strengthen their confidence and enhance the effectiveness of learning.

Buseri and Dorgu (2021) revealed that level of incentives given to science teachers motivate and improve on their working ability. Remunerations are requirements and desires that drive animals (including humans) to behave in a particular way at a particular time and place. Remunerations are all those inner striving conditions described as wishes, desires and urges to stimulate the interest of a person in an activity. Employee remuneration is the key of a successful organization to maintain the continuity of the work in a powerful manner and help organizations to survive. Employee remuneration is crucial for the performance of school activities. Schools have tried to remunerate its employees through promotions, welfare packages like accommodation, organization transport system, increase in salaries and other allowances with the intention of increasing performance. Financial rewards are management tools that hopefully contribute to firm's effectiveness by influencing individual or group behavior. All business use pay promotions, bonuses or other types of rewards to remunerate and encourage high level performances of employees.

In order to carry out an effective teaching task below is a list of helpful guides for a successful teaching. Planned teaching results in more learning; the teacher must be clear in his/her mind right from the start on what/she intend to do. Teachers are encouraged to plan their lessons

extensively; such defined goals help the teacher to determine the methodology appropriate to the subject matter to aid teaching and learning. Teachers should be able to guide students effectively to achieve the objectives of lessons taught. Students tend to achieve in ways they are tested, teachers are encouraged to test students in different ways to enhance their achievement rates in various domains. Students learn from one another. Encourage students to work in groups while solving problems as this goes a long way to enhance learning.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the study design, area of study, information sources, population and sampling techniques, variables and indicators, measurement levels, procedure for data collection, data collection instruments, data quality control, data presentation, analysis and interpretation, ethical consideration and approvals and methodological constraints.

3.1 Study Design

Amin (2005) defines a study design as a plan which the research study will follow. This study employed a cross sectional survey drawing from both quantitative and qualitative approaches. Quantitative data was collected using questionnaires while qualitative data was obtained through interviews and interviews and observations. Quantitative technique was used for numerical data while qualitative techniques were used to analyze descriptive data. This design was selected because of the nature of the topic that requires assessing the SESEMAT program on the performance of students in science and mathematics.

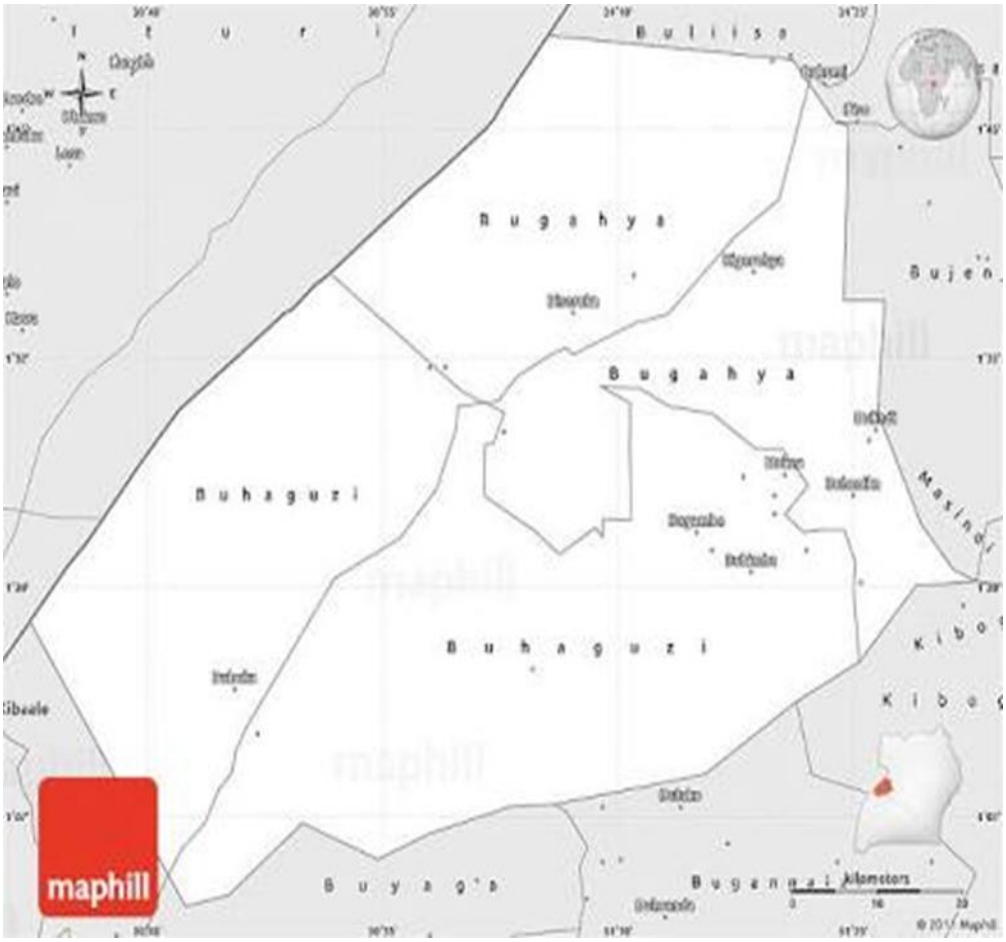
3.2 Area of Study

The study was conducted in Hoima Municipality in Hoima District, in Bunyoro region as indicated in Map 1, II and III below. Six (6) government aided secondary schools were sampled. The area had been chosen because it has many public secondary schools with poor performance in science and mathematics at UCE (UCE Report, 2017).

Map 1: Map showing Bunyoro Region

Map II: Map of Bunyoro Region

Map III: Map of Hoima District showing Hoima Municipality



3.3 Information Sources

Information sources refer to existing recognized literature whether published as long as it is worth and has been accepted by the leading academicians/institutions (Mubaazi, 2018). The researcher used both primary and secondary sources during the study. The information here was got for the first time, and they were obtained by use of questionnaires and interview guide. Secondary sources refer to documented data such as; journals, textbooks, dissertations, internet sources, internet sources, newspapers and reports.

3.4 Population and sampling Techniques

3.4.1 Population

Creswell (2013) defined population as the entire group of people or things that a researcher wishes to investigate. The study population included Head-teachers, Deputy Head-teachers, teachers of science and mathematics especially those who have attended SESEMAT programs because they are key players in students' academic performance; and students especially those performing poorly in sciences and mathematics. The targeted population consisted of 600 respondents from six selected government schools in Hoima Municipality.

3.4.2 Sample Size Determination

By use of Krejcie and Morgan table of 1970, the sample size of 234 respondents were considered and used for this study from the population size of 600. These include 6 Head-teachers (Head-teacher from each school), 8 Deputy head-teachers (1 deputy Head-teacher from 4 schools and 4 deputy Head-teachers from 2 schools), 60 teachers of science and mathematics (10 teachers from each school) and 160 students (26 students from 2 schools and 27 students from 4 schools). This selection enabled the researcher in order to obtain reliable and valid information. It's imperative to note that all respondents were interviewed and their responses were well captured.

Table 3.1: Sample Size and Selection

Category	**Number of respondents**	**Sample Selection**
Head-teachers	6	Purposive sampling
Deputy Head-teachers	8	Purposive sampling
Teachers	60	Simple random
Students	160	Simple random
TOTAL	**234**	

Source: Krejcie and Morgan (1970) table

3.4.3 Sampling

Sampling refers to the process used to select a portion of the population for the study (Maree, 2007). Sampling techniques are the descriptions of the strategies which the researcher uses to select representative respondents from the target population (Oso and Onen, 2009). In order to get better results, six secondary schools out of eight secondary schools in Hoima Municipality were conveniently selected. Three schools were urban and three were rural. The study employed simple random sampling and purposive sampling techniques. Purposive sampling is a type of sampling procedure used to select only respondents that are assumed to have unique information about the topic under investigation. The qualitative part of the study required purposive sampling targeting the head-teachers and deputy head-teachers. Head-teachers and their deputies were interviewed from their place of work, and also were purposively chosen because of their positions.

With the quantitative sample, science teachers and students were selected by proportionate representation using the stratified random sampling method to ensure that all of them were represented. Simple random sampling on the other hand is the sampling method whereby each of the population under study had an equal chance of being selected for the study. Simple random sampling technique was used for teachers and students because all of them had an equal and independent chance of being selected.

3.5 Variables and Indicators

3.5.1 Variables

Leedy and Omroid (2013) define a variable as any quality or characteristic in research that has two or more possible values. The researcher identified two variables; the independent variable (IV) and dependent variable (DV). According to the researcher, the independent variable was the contributions of SESEMAT while the dependent variable was the students' academic

performance in science and mathematics. The independent variable was the variable whose effect was established in the study. The researcher manipulated to ascertain whether or not the results obtained are a function of it.

3.5.2 Indicators

An indicator is a specific, observable and measurable characteristic or change that shows the progress a science and mathematics teachers (SESEMAT) are making towards achieving a specific outcome. The indicators of students' academic performance were high marks scored by students, students grasp easily, students finishing class assignments, regular class attendance, access to educational materials, involvement in practical lessons and improved results at UCE. The dimensions of the contributions of science and mathematics teachers (SESEMAT) included demonstration, collaboration, well planned lessons, purposeful content, child centered, activity based, initiatives by the teacher, classroom discussion and peer-to-peer teaching.

3.6 Measurement Levels

According to Mubaazi (2008), there are four levels of measurement; the ordinal, nominal, interval and ratio. The ordinal level orders the sequence and is characterized by categories that are ranked in terms of values. The nominal level is the one where data or variables are merely named. The interval level assigns spaces of equal interval to numbers. The ratio level represents values measured in equal units from zero. This scale has absolute zero and the measuring units are constant. The researcher used three measurement levels in this research namely; ordinal, nominal and interval. For ordinal, data was put into categories, nominal, data was named while interval data was assigned equal numbers. A Likert scale was used when responding to a questionnaire whereby respondents specify their level of agreement or disagreement to a statement. It is recognizable when you are asked to indicate your strength

about a particular issue on a 5-1 rating scale. The five-point scale which included the following kinds of answers were used; 5 = strongly agree, 4 = agree, 3 = undecided/neutral, 2 = disagree and 1 = strongly disagree, and the respondents were asked to indicate their degree of agreement with the statements.

3.7 Procedure for Data Collection

The researcher obtained a letter of introduction from the Ethics Research Committee and Faculty of Arts and Education of Uganda Christian University to the relevant authorities/institutions to collect data. The researcher then constructed data collection instrument and discussed them with the supervisor. The instruments were tested and re-tested in a school outside Hoima Municipality to ensure validity and reliability of the instruments. After testing and retesting the instruments; revision and restructuring, the researcher then proceeded to seek permission from the head-teachers of the secondary schools to collect data. Good rapport was established and data was collected by questionnaires from the respondents and also conducted interviews while noting down main points. Filled questionnaires were collected immediately.

3.8.0 Data Collection Instruments

The study was guided by the following research instruments: -

3.8.1 Questionnaires

Likert scaled self-administered structured questionnaires with open and closed question items were used for data collection to suit the research objectives and questions. These were constructed to collect data from the teachers of science and mathematics and students. Questionnaires were used because they ensure confidentiality of respondents, they were time saving and easy to administer. Kombo and Trop (2009) support the use of questionnaires

because in research they gather data over a large sample and minimize bias on the part of the researcher and the respondents.

Table 3.2: Participants by category and number answered questionnaire

Category	Expected number of respondents
Teachers	60
Students	160
Total	**220**

3.8.2 Interview Guide

Interview method was applied to head-teachers and deputy head-teachers so as to enable the researcher use probing and able to get detailed information about the study problem. These respondents were interviewed because the researcher believed that they were having adequate information that was needed for the study. An interview schedule with open ended questions was also used by the researcher to elicit detailed information regarding the study problem at hand. It was important because it was easier for the researcher to observe non-verbal behaviors for qualitative data. The interview is a conversation between the interviewer and interviewee in which the interviewer attempts to understand the world from the interviewee's point of view (Kvale and Brinkmann, 2009).

Table 3.3: Participants by category and number interviewed

Category	Expected number of respondents
Head-teachers	6
Deputy Head-teachers	8
Total	**14**

3.9.0 Data/Error Control

According to Kothari (2013), control refers to the restrain of experimental conditions. As a way of avoiding bias and personal prejudices, the researcher used both quantitative and

qualitative techniques in order to produce valid and reliable results. More than one instrument was used for data collection for triangulation purposes. Documents were analyzed to cross check the information given by respondents in order to eliminate any inconsistencies.

3.9.1 Validity

Validity, according to Leedy and Omroid (2013) refers to the degree to which results obtained from analysis-of the data actually represents the phenomenon under study. Validity is a test or instrument that accurately measures what it's supposed to. Validity of the instruments was ensured through the use of content validity. Here, content experts including the supervisor were given questionnaires to assess whether the items are worthy to measure the variables. After which a content validity index was calculated using the following formula;

$$CVI = \frac{\text{Number of items rated relevant}}{\text{Total number of items}}$$

Ten questionnaires were pilot-tested in secondary schools, outside the sample secondary schools in Hoima Municipality that did not participate in the study. Each questionnaire had 30 items. Hence;

Total items = 30 x 10 = 300

Invalid items = 45

Relevant items = 300 – 45 = 255

CVI = 255/300 = 0.85

The instrument was said to be valid since the CVI was 0.85 which was far above 0.7 the recommended value for validity. Results from the field helped to identify gaps and made modifications to the instrument where it was necessary. Similarly, the questionnaires items were constructed such that they were related to the questions in order to ensure that the research questions were well covered.

Similarly, the interview items were constructed such that they were related to the questions in order to ensure that the research questions were well covered. The validity of the interview guide was determined by pre-testing this tool, which helped to estimate the time it took to complete conducting the interviews, relevancy of the set questions in measuring the subject under research.

3.9.2 Reliability

According to Leedy and Omroid (2013), reliability of an instrument refers to the extent to which the research instruments are without bias thus, presenting consistent measurements especially in data collection process. The pre-test contributed to the credibility, dependability and trustworthiness of a questionnaire. Therefore, the researcher pre-tested and retested the instruments on a small number of key respondents in an interval of two days. Before real collection of data, the instruments were tested on six respondents to determine their reliability and these respondents were not among the respondents (interviewers). Reliability of the instrument on the other hand was ensured through the use of Cronbach's Alpha co-efficient index generated by SPSS. The results are presented in Table 3.4

Table 3.4: Reliability indices for the questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
.805	.796	20

The Cronbach's alpha is 0.805 as indicated in Table 3. above, 0.7 the recommended reliability value. This showed that the questionnaire was reliable. After pilot testing the instrument, reliability of the instrument, on multi-item variables was tested using the Cronbach's Alpha Method to provide by Statistical Package for the Social Scientists

On the other hand, the researcher ensured reliability of interview guide by ensuring consistent of selection method, that is, the five pilot study candidates were interviewed twice using the same questions to rate the candidate's similarity and get the reliable interview. Therefore, the researcher pre-tested and retested the instruments on a small number of key respondents in an interval of two days. Before real collection of data, the instruments were tested on six respondents to determine their reliability and these respondents were not among the respondents (interviewers).

3.10.0 Strategy for Data processing, Analysis and Interpretation

Data processing and interpretation was based in the objectives and research questions. Data collected was summarized according to categories of respondents, edited and coded for accuracy and completeness of the information given. The study was analyzed both qualitatively and quantitatively as follows:

3.10.1 Quantitative Data Analysis

Data collected by use of questionnaires from science teachers and students were analyzed quantitatively, which was presented by frequencies and percentages, and this was useful and helped in generating tables for easy presentation of the study findings. This was useful and helped in generating tables for easy presentation and interpretation of the study findings. The analysis of the data was made using the information given by the 220 teachers through questionnaires. The questionnaire was in form of objective questions.

3.10.2 Qualitative Data Analysis

Data collected by use of an interview guide from six (6) Head-teachers and eight (8) deputy Head-teachers were analyzed qualitatively. Data was analyzed manually by categorizing data in themes and presented according to themes (thematically), following the chronology of the

research objectives. Thematic content analysis was used, personal communication as well as data presentation.

3.11.0 Ethical Considerations and Approvals

3.11.1 Ethical Consideration

Ethical clearance was sought from Research Ethics Committee as well as School of Education, Department of Education of Uganda Christian University to conduct research. Permission to carry out the study in Hoima District was sought from the Town Clerk and Municipal Education Officer and Head-teachers for the selected public secondary schools. The researcher sought permission from head-teachers to carry out research study in their schools, assured the respondents that the information they gave were kept confidential and used only for research purposes. Also, the respondents were assured that their identities were not disclosed to anyone.

3.11.2 Informed Consent

The researcher did as expected to ethically consider the privacy or the secrets of his respondents, their names and responses were not disclosed and this left both the researcher and the respondents in clear terms and conditions that it allowed smooth research and quick data collection. Informed consent from that elaborates on the purpose of the study was filled by all those who participated in the study. Sometimes, verbal consent was also obtained from the participants to enhance confidentiality of the research which increased their participation. The respondents and participants were also informed that participation in the study was voluntary and they had a right to accept or decline to participate or withdraw from the study time.

3.11.3 Participants' Confidentiality

In trying to protect participants' confidentiality, each participant's record was given a unique ID number. Participants were given written consent before participating and confidentiality and anonymity was emphasized at every stage. Data identifying individual subjects were restricted to those involved in the study. Participants were adequately informed about the procedures of the data collection and the survey remained anonymous (no provision for identifying the participant on the survey questionnaire to exit). Names and other identifying information from subjects were obtained for quality assurance purposes only and no individual was identified by any study report. In addition, the researcher designed a consent letter before engaging any participant. The participants consented by signing or thumb print. The researcher assured them that their information was treated with confidentiality. The researcher also did not ask for their names or any form of contact.

3.12 Methodological Constraints

The study was faced with certain constraints as follows: -

There was limited range of information: The information required to compile background and literature review and discussion part was little. This was solved by the researcher through using internet sources and using UCU library to get more detailed literature sources for easy and comprehensive completion of this dissertation.

Extraneous variables were beyond the researcher's control such as respondents' honesty, personal biases and uncontrolled setting of the study. The researcher met un-co-operative participants who were unwilling to give relevant information. However, this was sorted by the investigator's through showing and giving them a copy of an introductory/authorization letter and promising them that the relevant information given was confidential.

Time constraints: The time for this study was limited considering that the researcher had other academic assignments he had to accomplish plus school administrative duties like panning and organizing the school. This made all this process of the research study to become hectic and tiresome. Notwithstanding, this was solved by trying to overwork and make sure he followed the time frame.

Limited funds: The research required a lot of funds for data collection, typesetting, photocopying and binding, yet the researcher was too again obliged to clear the university fees which was also too much. This was hectic and expensive to him. The researcher solved this through minimizing the little available resources, and he could still ask for financial help from friends and family members.

Testing: The use of research assistants can bring about inconsistency in the administration and conducting interviews in terms of time of administration, understanding of the items in interview schedule and explanations given to the respondents. To minimize this threat, the research assistants were oriented and briefed on the procedures to be done in data collection.

Attrition: Not all selected participants were willing to participate in this study and this due to circumstances on the part of the respondents such as travels, sickness, hospitalization and refusal/withdrawal to participate. In anticipation to this, the researcher reserved more respondents by exceeding the minimum sample size.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.0 Introduction

This chapter gives a detailed data presentation, analysis and interpretation. The study findings are presented according to the research questions, guided by the study objectives and they are presented in frequency tables as follows: -

1. What are the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality?
2. In which ways SESEMAT can contribute towards students' academic performance in selected public secondary schools in Hoima Municipality?
3. What are the factors influencing teachers' methodology in teaching Science and Mathematics in selected public secondary schools in Hoima Municipality?

Further, this information (quantitative data) from questionnaires which were filled by teachers and students, were further barked by the responses from interview guide given by Head-teachers and Deputy Head-teachers.

4.1 The Methods Used by Teachers While Teaching Science and Mathematics among Selected Public Secondary Schools in Hoima Municipality

The first question was to find out the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality. Findings from teachers and students are indicated in table 4.1 below:

Table 4.1: Finding on the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality (n = 220)

Methods used by the teachers while teaching science and mathematics	SA		A		NS		D		SD	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
In schools, teachers of science and mathematics employ demonstration methods while teaching.	190	86.4	30	13.6	0	00	0	00	0	00
Teachers of science and mathematics employ student centered approach and discussion methods	176	80	44	20	0	00	0	00	0	00
In schools, teachers of science and mathematics use questioning method while teaching.	160	72.7	60	27.3	0	00	0	00	0	00
In schools, teachers of science and mathematics employ role playing while teaching	150	68.2	55	25	15	6.8	0	00	0	00
In schools, teachers of science and mathematics employ practical and field work methods of teaching	146	66.3	58	26.3	16	7.2	0	00	0	00
Teachers of science and mathematics employ lecture method for teaching	138	67.7	62	28.1	20	9	0	00	0	00
In schools, some teachers of science and mathematics use collaborating method of teaching	134	60.0	58	26.3	28	12.7	0	00	0	00
In schools, teachers of science and mathematics have been employing role playing and stimulation method while teaching	128	58.1	56	24.5	36	16.3	0	00	0	00
In schools, inquiry/discovery method have been emphasized by teachers of science and mathematics.	124	56.3	63	28.6	30	13.6	3	1.4	0	00
In schools, teachers of science and mathematics accord the students an opportunity to conduct experiments so that they can discover on their own	120	54.5	60	27.2	30	13.6	10	4.5	0	00

Source: Field Data, 2020

To the methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality, the respondents were asked rated on a five-point Likert scale and gave various responses as follows.

The research revealed that only 190(86.4%) of respondents strongly agreed that in secondary schools, science teachers employ demonstration methods while teaching, and 30(13.6%) agreed respectively with the above statement under study. In support of the above findings, interviewed participant revealed that:

> "….teachers of science and mathematics employ demonstrations methods to communicate an idea with the aid of visuals such as flip charts, posters and power point. It is a technique of teaching someone how to make or do something in a step-by-step process….." (Head-teacher from School A)

The above study finding implies that teachers of science and mathematics often use demonstrations either in class, laboratory and in field for practical work when teaching.

From the field study, respondents totaling to 176(80%) and 44(20%) strongly agreed and agreed respectively that in secondary schools, teachers of science and mathematics employ student centered approaches and discussions while teaching. Interviewed participant revealed that;

> "….teachers of science and mathematics strive to employ interactive methods of teaching with a view of maximizing students' participation in the lesson…." (Deputy head-teacher from School C)

This means that students' centered approach is one of the best teaching methods employed by teachers in secondary schools since students themselves have to participate in the class work. It helps to develop learners' autonomy and independence by ensuring responsibility for the learning path in their hands.

In addition, it was revealed that in secondary schools, science teachers use questioning method during the teaching-learning process, and this was strongly agreed by 160(72.7%), and only 60(27.3%) agreed with the above-mentioned idea. One of the Head teachers who were interviewed revealed that;

> "……teachers of science and mathematics use the questioning technique while teaching. Teachers tend to narrow the scope of the topic by use of guiding questions as a way of connecting what students know about the topic and the new knowledge they are about to acquire. The questions may be somewhat complex enough to deserve thoughtful answers…." (Head teacher from School A)

This implies that teachers of science and mathematics sometimes prefer to use the questioning techniques where students are probed to answer. In this respect, when teachers raise the level of their questions, there is a likelihood that the students will also raise the level of their responses. Questioning methods is a key means by which teachers find out what students already know, identify gaps in knowledge and understanding and scaffold the development of their understanding to enable them close the gap between what they currently know and the learning goals.

Additionally, 150(68.2%) and 55(15%) of the respondents strongly agreed and agreed respectively that in secondary schools, teachers of science and mathematics employ role playing while teaching and only 15(6.8%) were non-committal. One of the Deputy Head-teacher who were interviewed revealed that,

> "….some teaching staff of science and mathematics employs role playing while teaching science subjects….." Deputy head-teacher from School D)

This means that role playing as a method of teaching science and mathematics subjects in secondary schools remained among the best option for teachers to use. Role playing in teaching allows students to explore realistic situations by interacting with other people in a

managed way in order to develop experience and try different strategies in a support environment.

The study revealed that 146(66.3%) of respondents strongly agreed that in secondary schools, science teachers employ practical and field work methods of teaching; 58(26.3%) of respondents agreed, and 16(7.2%) were neutral. Interviewed Head-teacher also revealed that:

> "….Teachers of science and mathematics employ practical and field work methods of teaching. They arrange practical lessons especially in laboratory and group work where applicable…." (Head teacher from School A)

This means that students usually get involved in practical lessons especially in the laboratory and group work to grasp concepts very easily. Practical lessons and group work engage students and help them to develop important skills, understand the process of scientific investigation; and develop a broad understanding of scientific concepts.

From the field study, respondents totaling to 138(67.7%) strongly agreed that in secondary schools, teachers of science and mathematics employ lecture method during class work, 62(28.1%) agreed while 20(9%) were neutral. One of the interviewed Deputy Head-teacher revealed that;

> "…..some teachers of science and mathematics in secondary schools tend to concentrate on the usage of lecturer methods of teaching, in which students' involvement is characterized by listening and most times writing notes…." (Deputy head-teacher from School D)

This means that some science teachers employ lecturing method of teaching where teachers spoon-feed students with a lot of notes. Lecturer method of teaching provides an economical and efficient method of delivering substantial amounts of information to large numbers of students.

Further, respondents totaling to 134(60.9%) strongly agreed that in secondary schools, some science teachers use collaborating method of teaching, followed by 58(26.3%) agreed with the above statement, and only 28(12.7%) were neutral. Interviewed Head-teacher revealed that;

> "……teachers of science and mathematics tend to use collaborative methods of teaching, which involves groups of students working together to solve any academic problem, completes a task or creates a product….." (Head-teacher from School B)

This means that collaborative methods of teaching are commonly applied in first world schools where schools tent to hire well qualified and competence science teachers from different schools to teach their students for specific subjects and lessons.

The above findings show that in secondary schools, inquiry/discovery method have been emphasized among science teachers, of which 124(56.3%) of the respondents strongly agreed, followed by 63(28.6%) agreed with the above stated idea, and only 3(1.4%) were neutral. Interviewed Head-teacher from School A revealed that;

> "……science teachers tend to apply such inquiry method of teaching which is a student – centered method of education focused on asking questions. Science teachers use inquiry methods to promote learning through student investigation, and rely on the teachers presenting facts and his or her knowledge about the subject….." (Head-teacher from School A)

The researcher found out that inquiry/discovery methods have been emphasized among teachers of science and mathematics in secondary schools to enhance students' academic achievement in science subject. Students exposed to inquiry-based learning are given the opportunity to nurture their talents and passions. They take control of their learning during the unit of work being taught. In this, through inquiry, students engage in research and self-revision around interesting idea and essential questions.

Last but not least, respondents to 120(54.5%) and 60(27.2%) strongly agreed and agreed respectively that in secondary schools, science teachers accord the students an opportunity to conduct experiments so that they can discover on their own, 30(13.6%) were neutral, and 10(4.5%) disagreed. Interviewed deputy Head-teacher from School D revealed that;

> "…..Science teachers tend to use more of experiments which play many roles in science. One of its important roles is to test theories and provide the basis for scientific knowledge….." (Deputy Head-teacher from School D)

This means that experiments tend to improve the quality of students learning by enabling them to acquire the abilities of inquiry, develop knowledge of scientific ideas, and understand the work of scientists.

4.2 The Ways in Which SESEMAT has contributed to Students' Academic Performance in selected Public Secondary Schools in Hoima Municipality

The question was posed to find out tin which ways SESEMAT has contributed to students' academic performance in selected public secondary schools in Hoima Municipality. Findings from teachers and students are indicated in Table 4.2 below:

Table 4.2: Findings on the ways in which SESEMAT has contributed to students' academic performance in selected secondary schools in Hoima Municipality

SESEMAT program contributes to students' academic performance	**SA**		**A**		**NS**		**D**		**SD**	
	f	**%**	***f***	**%**	***f***	**%**	***f***	**%**	***f***	**%**
SESEMAT makes it easy for students to grasp content	190	86.4	30	13.6	0	00	0	00	0	00
SESEMAT makes it easy for students to gain practical skills	186	84.5	34	15.4	0	00	0	00	0	00
SESEMAT makes it easy for students to achieve improved academic results	182	82.7	35	15.9	3	1.4	0	00	0	00
SESEMAT makes it easy for students to compare theoretical and practical notes	178	80.9	34	15.4	8	3.6	0	00	0	00
SESEMAT makes it simple for teachers to attend to individual students' differences	172	78.1	35	15.9	13	5.9	0	00	0	00
SESEMAT encourages creative and imaginative thoughts	168	76.3	38	17.2	14	6.3	0	00	0	00
In schools, SESEMAT accords the students an opportunity to conduct experiments so that they can discover on their own	156	70.9	40	18.1	24	10.9	0	00	0	00
SESEMAT promotes lesson delivery and student's involvement in practical lessons	144	65.4	33	15	25	11.3	18	8.1	0	00

Source: Field Data, 2020

To examine the ways in which SESEMAT has contributed to students' academic performance in selected public secondary schools in Hoima Municipality, respondents were asked to rate the above relationship on a five-point Likert scale and various responses were given as follows.

From the field study, respondents totaling to 190(86.4%) strongly and 30(13.6%) agreed that in secondary schools, SESEMAT makes it easy for students to grasp content taught. Interviewed Head-teacher from School C revealed that;

> "…..SESEMAT involves students in practical work than ever before and that such practical assignments are often carried out in groups, which help to inculcate skills and values such as sharing, cooperation and team spirit among students….."

One Deputy Head-teacher from School B had this to say;

> "…..the teaching methodology employed by teachers of science and mathematics under the SESEMAT program make students grasp content taught easily. When teachers use practical methods, students get involved directly and thus help them to master the concepts taught to them….."

This means that when teachers use practical methods, students get involved directly and thus can easily grasp what they have been taught. Practical work enhances the learning of scientific knowledge, gives insight into scientific methods of inquiry and accordingly helps in retention of knowledge.

From the field study, 186 (84.5%) respondents strongly agreed and 34(14.4%) agreed respectively that in secondary schools, SESEMAT makes it easy for students to gain practical skills as indicated by the table 5 above. Interviewed Head-teacher revealed that;

> "……..the teaching methodology advocated by the SESEMAT in teaching science and mathematics subjects makes students to gain practical skills. This is supported by the common adage that "practice makes perfect……".

This means that students gain practical skills when they are involved in practical lessons such as laboratory experiments, plotting graphs, working with apparatus etc.

Majority of the respondents 182(82.7%) strongly agreed and 35(15.9%) agreed respectively that in secondary schools, SESEMAT makes it easy for students to achieve improved

academic results; and only 3(1.4%) were neutral. Interviewed Deputy Head-teacher from School A stated that;

> "…..teaching methodology employed under SESEMAT in teaching science and mathematics has made students achieve improved academic results. Students have academically performed well when science teachers apply better teaching methods that involve students' participation…."

This means that students have academically performed well when science teachers apply better teaching methods that involve students' participation. Teaching methodology employed in teaching science promote lesson delivery promoting students' academic achievement. Teaching methodology employed in teaching science make teachers attend to individual students' differences.

From the field study, respondents totaling to 178(80.9%) strongly agreed that in secondary schools, SESEMAT make it easy for students to compare the theoretical and practical notes; followed by 34(15.4%) who agreed, then only 8(3.6%) were neutral as indicated by the table 4 above. Interviewed deputy Head-teacher from School C stated that;

> "…..SESEMAT tend to enhance demonstration which tend to provide students with experiences of real events, phenomena and processes; helping them learn, raises students' interest and motivation. It enables teachers to focus on students on a particular phenomenon or event, such as the starch text for foods….."

According to the findings in the table 4.2 above that students are able to compare and theoretical study content when proper teaching method is employed. Teaching methodology employed in teaching science make students compare the theoretical and practical notes. Students are able to compare practical and theoretical study content when proper teaching method is employed.

In addition, respondents totaling to 172 (78.1%) strongly agreed and 35 (15.9%) agreed that in secondary schools, SESEMAT make it simple for teachers to attend to individual students' differences; and 13 (5.9%) were neutral. Interviewed deputy Head-teacher from School B stated that;

> "…..Science teachers are able to attend to individual students' academic differences which help them to grasp what they have been taught easily. Individual students' differences are solved or handled effectively by science teachers during teaching – learning process….."

This means that teachers are able to attend to individual differences thus able to guide them academically properly when proper method of teaching is employed. SESEMAT tend to help students to acquire, retain and get equipped with more knowledge and information of science subjects. It encourages science teachers from using their old style of chalk and talk method in their science subject teaching – learning process which make some students fail to grasp some of the content being taught.

Majority of the respondents 168(76.3%) strongly agreed and 38(17.2%) agreed that in secondary schools, SESEMAT encouraging creative and imaginative thought; and only 14(6.0 %) were neutral. A head-teacher from School E who was interviewed revealed that;

> "……SESEMAT encourage teachers to provide students with opportunities to think about, discuss, and solve real academic gaps as much skill, creativity, and hard work as proposing and executing a first – rate research project……"

This means that under SESEMAT, science teachers allow their colleagues to observe their lessons and offer feedback, enables teachers to see the good practices in the lesson and strengthen them, see mistakes made in earlier lesson, avoid earlier mistakes in future lessons; and in the process teachers become more open to evaluation by fellow teachers. Teachers that use questioning method of teaching aids learners in connecting concepts, increasing awareness, encouraging creative and imaginative thought and making inferences.

From the field study, 156(70.9%) and 40(18.1%) of the respondents strongly agreed and agreed respectively that in secondary schools, SESEMAT accord the students an opportunity to conduct experiments so that can discover on their own; and only 24(10.9%) were neutral. The interviewed deputy Head-teacher found out that;

> "…..SESEMAT enhance science teacher to carry out the planned lesson/activity, be innovative in lesson science presentation, and present lessons in varied interesting ways to arouse learners' interest. For instance, through having regular science experiments, role play and storytelling, all ensure active learner participation and deal with students' questions and misconceptions and reinforce learning at each step….."

This means that role playing while teaching science subjects solve real life situational problems, develops practical and professional skills and functioning knowledge. Teaching methods lie practical and lecturing methods denote various strategies that the teacher uses to deliver his/her subject matter to the students in the classroom based on the instructional objectives to bring about learning. Teaching methods aids learning and help to communicate ideas and skills to the students.

Last but not least, 144(65.4%) and 33(15%) of the respondents strongly agreed and agreed respectively that in secondary schools, SESEMAT promote lesson delivery and students' involvement in practical lesson; 25(11.3%) were neutral and 18(8.1%) disagreed with the above statement under study. Head-teacher from School B who were interviewed revealed that;

> "……teachers of science have been emphasized to under different methods of teaching science inclusive of demonstration, lecturing, collaboration, classroom discussion, peer – to – peer teaching, cognitive development methods, affective development methods, psychomotor development methods and cognitive development methods that promote lessons delivery……"

This means that teaching methodology employed in teaching science promote lesson delivery promoting students' academic achievement. There are several teaching methods to use in the science classrooms; it is left for the teacher to use the ones most appropriate for the lesson. These methods if properly used will enhance teaching and learning and bring about desired changes in the students.

4.3 The Factors Influencing Teachers' Methodology in Teaching Science and Mathematics in Selected Public Secondary Schools in Hoima Municipality

The question was posed to identify the factors influencing teachers' methodology in teaching Science and Mathematics in selected public secondary schools in Hoima Municipality. Findings from teachers of science and mathematics and students are indicated in the table below:

Table 4.3: Findings on the factors influencing teachers' methodology in teaching science and mathematics in secondary schools in Hoima Municipality (n = 220)

Factors influencing teachers' methodology in teaching science and mathematics	SA		A		NS		D		SD	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
In our schools, teachers training background has an influence on the teacher's ability in teaching science and mathematics subjects.	212	96.4	08	3.6	0	00	0	00	0	00
In our schools, teacher's competence has an influence on the teacher's ability in teaching science and mathematics subjects	203	92.3	17	7.7	0	00	0	00	0	00
In our schools, availability of teaching aids has an influence on the teacher's ability in teaching science and mathematics subjects	174	79.1	35	15.9	11	5	0	00	0	00
In our schools, job rotation has an influence on the teacher's ability in teaching science and mathematics subjects	166	75.5	40	18.2	14	6.3	0	00	0	00
In our schools, job rotation has an influence on the teacher's ability in teaching sciences and mathematics subjects	153	69.5	45	20.5	22	10	0	00	0	00
In our schools, school education facilities like laboratory has an influence on teacher's ability in teaching sciences and mathematics subjects	148	67.3	40	18.2	25	11.4	7	3.1	0	00
In our schools, teachers attitude has an influence on teacher's ability in teaching sciences and mathematics subjects	139	63.2	45	20.4	27	12.3	9	4.1	0	00
In our schools, continuous professional development programs have an influence on teacher's ability in teaching sciences and mathematics subjects	133	60.5	48	21.8	28	12.7	11	5	0	00
In our schools, the level of remuneration has an influence on teacher's ability in teaching sciences and mathematics subjects	170	77.3	50	22.7	0	0	0	0	0	00

Source: Field Data, 2020

The findings by the researcher from the above table indicate that there are a number of factors influencing teachers' methodology in teaching Science and Mathematics in secondary schools in Hoima Municipality. Also, information (quantitative data) from questionnaires which were filled by teachers and students confirms the findings. The findings were further backed by the responses from interview guide and given by head-teachers and Deputy head-teachers.

From the field study, respondents totaling to 212(96.4%) strongly agreed that in secondary schools, teachers' training background has an influence on the teacher's ability in teaching sciences and mathematics subjects; only 8(3.6%) agreed with the above-mentioned idea under investigation. Interviewed Deputy Head-teacher mentioned that;

> "……a teacher's training background has a substantial influence on his/her methodology in teaching science and mathematics subjects. The training background influences their skills and competence in handling science and mathematics subjects….."

The above finding implies that teachers training background greatly determines the competence in teaching and the methods they have to use. In secondary schools, the teachers' ability to use the available teaching aids has an influence on the teachers' methodology in teaching science subjects, which tend to be determined by their training background.

Respondents totaling to 203(92.3%) strongly agreed that in secondary schools, teacher's competence has an influence on the teacher's ability in teaching sciences and mathematics subjects; while 17(7.7%) agreed with the above-mentioned idea. Interviewed Head-teacher revealed that;

> "…..Science and mathematics teachers' competences greatly impact on the effectiveness of teaching and interpretation concepts. Some of the science and mathematics teachers lack skills, competences and abilities to interpret some of the science subjects' concepts….."

This is true in that teachers' competences will determine the methods to use in teaching science and mathematics subjects. Science and mathematics teachers must be creative and analytical in handling science and mathematics subjects.

In addition, those who strongly agreed that in secondary schools, availability of teaching aids has an influence on the teacher's ability in teaching science and mathematics subjects was equivalent to 174(79.1%) of the total respondents, followed by 35(15.9%) who agreed with this notion while only 11(5%) were neutral with the above stated idea. Deputy Head-teacher who were interviewed revealed that;

> "….teachers' methodology in teaching science and mathematics subjects can be attributed to the availability of teaching aids that facilitate effective implementation of lessons…."

This implies that teachers' methodology in teaching science and mathematics subjects have greatly been influenced by the availability of teaching aids (resources) within secondary schools. Science and mathematics teachers are required to use current, relevant and up to date teaching aids to effectively deliver subject content to learners in clear and precise formats that make students grasp what they have been taught in class.

Further, 166(75.5%) and 40(18.2%) strongly agreed and agreed respectively that in secondary schools, the location has an influence on the teacher's ability in teaching sciences and mathematics subjects; only 14(6.3%) were neutral. Interviewed Head-teachers and their Deputies revealed that;

> "…..the location of a school greatly influences the teacher's ability and morale to effectively deliver science and mathematics lessons. School located in rural areas tend to lack access to basic, modern and up to date instructional and experimental materials….."

This means that teacher's methodology in teaching science and mathematics subjects is greatly influenced by the location of the schools; for instance, urban schools can easily access resource centers and borrow laboratory apparatus and equipment which may not be the case for rural schools and thus influencing the choice of the methods to use to teach.

Further, in secondary schools, job rotation (allowing teachers to teach vertically) has an influence on the teachers' ability and competence and methodology in teaching science and mathematics subjects. This observation was supported by 153(69.5%) of the respondents who strongly agreed while 45(20.5%) agreed, and only 22(10%) were neutral. Interviewed head-teacher revealed that;

> "……involvement teachers of science and mathematics in job rotation greatly impacted on their choice of methods for teaching. They added that job rotation helps to equip them with more skills, knowledge and competences on teaching science and mathematics subjects…." (Head teacher from School E)

This means that teachers' methodology in teaching science and mathematics subjects can be influenced by the job rotation. Teachers acquire more skills when they are involved in job rotation, that is moving from one class to another; which eventually help them to develop skills and competence to teach science and mathematics subjects.

In addition, respondents totaling to 148(67.3%) strongly agreed that in secondary schools, school education facilities like laboratories have an influence on teacher's abilities in teaching science and mathematics subjects; 25(11.4%) % were neutral and only 7(3.1%) disagreed. Interviewed deputy head-teacher revealed that;

> "……availability of operational school educational facilities like science and IT laboratories with relevant and up to date equipment motivate science and mathematics teachers to do their job better because they aid teaching/learning processes….." (Deputy head-teacher from School F)

This means that teachers' methodology in teaching science and mathematics subjects can be determined by the availability of school facilities like laboratory that facilitate the teachers conduct their practical lessons effectively.

Furthermore, in secondary schools, teachers' attitudes have an influence on their ability in teaching sciences and mathematics subjects, and this was supported by 139 (63.2%) who strongly agreed while 45(20.4%) of the respondents just agreed, 27(12.3%) were neutral while 9(4.1%) disagreed with idea under investigation. Interviewed head-teacher revealed that;

> "….. teachers' attitude towards science and mathematics subjects has an influence on their methodology in teaching them. Some teachers find certain methods as time consuming, while others are simple and easy to use. Teachers with a positive attitude will tend to employ those methods that promote comprehension rather than rote learning….."

This means that teachers' methodology in teaching science and mathematics subjects can been influenced greatly by teachers' attitudes. Lazy teachers with negative attitudes will tend to incline to methods that are very simple rather than those that require concentration and ample preparation.

In addition, respondents totaling to 133(60.5%) strongly agreed that in secondary schools, continuous professional development programs have an influence on teacher's ability in teaching science and mathematics subjects; 48(21.8%) agreed with the above statement, 28(12.7%) were neutral and 11(5%) disagreed. Interviewed Deputy head-teachers revealed that;

> "……continuous professional development aims to help teachers to teach more effectively, improve school progress and facilitate the transformation of the school and academic achievement. Continuous professional development in form of workshops, conferences, further studies, coaching, on-job training, and refresher training are

> commonly given to teachers in order to boost their morale and enable them to do their work better…..” (Head-teacher from School C)

This means that teachers’ methodology in teaching science and mathematics subjects can be influenced by continuous staff development efforts; where teachers gain more teaching skills and become able to handle the subject content properly. Professional development efforts lead to proper planning and management of human resources with the schools which is essential to increase the capabilities, motivation and overall teachers’ performance.

Last but not least, in secondary schools, the level of remuneration has an influence on teacher’s ability in teaching sciences and mathematics subjects; and this was strongly supported by 170(77.3%) and 50(22.7%) who agreed with the statement. One of the interviewed head-teacher revealed that;

> “….good teacher welfare and remuneration levels motivate teachers and greatly influence performance levels. Good financial rewards lead to high productivity returns which are a function of good methods of work…..” (Head-teacher from School D)

This means that teachers’ methodology in teaching science and mathematics subjects can be influenced by the level of remuneration. Teachers tend to perform well when they are remunerated well and discouraged at work place when their level of remuneration is low. Teachers’ welfare is the key of a successful organization to maintain the continuity of the work in a powerful manner and help secondary schools to survive.

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CHAPTER FIVE

DISCUSSION OF RESULTS

5.0 Introduction

In this chapter, the researcher interprets and discusses the trends that emerged from research field findings. The discussions are based on the research questions and the objectives of the study as stated in chapter one of this dissertation. The subsequent discussion in this chapter is based on the results presented in chapter four of this report as given by the respondents.

5.1 Discussion of Findings

The discussion of the findings is done in line with the study objectives as follows: -

5.1.1 The methods used by teachers while teaching science and mathematics

The findings revealed that the teachers of science and mathematics employ various methods while teaching science and mathematics in selected public secondary schools in Hoima Municipality which include but are not limited to; demonstration methods of teaching. This finding is in line with Noburu (2018) who stated that science teachers tend to use demonstrations either in class, laboratory and during group work sessions during the teaching/learning process. Teachers of science and mathematics most often employ demonstration methods to illustrate abstract ideas with the help of visual aids such as flip charts, posters and power point presentations tec. It is a technique of teaching someone how to perform a task or do something in a step by step process.

From the field study, it was discovered that in secondary schools, teachers of science and mathematics employ student centered approaches and discussion methods while teaching.

Adman and Ahmed (2016) support this discovery when they assert that student-centered approach is one of the best teaching methods employed by teachers in secondary schools since students themselves have to participate in the class work. It helps to develop learners' autonomy and independence by ensuring responsibility for the learning path in their hands.

In addition, it was discovered that in secondary schools, science and mathematics teachers use questioning method during the teaching/learning process. This is in line with Drayer (2023) who stated that questioning method is a key means by which teachers find out what students already know, identify gaps in knowledge and understanding and scaffold the development of their understanding to enable them to close the gap between what they currently know and the learning goals. Science and mathematics teachers sometimes prefer to use questioning methods where students are asked some questions to answer. Teachers tend to narrow the scope of the topic by use of guiding questions as a way of connecting what students know about the topic and the new knowledge they are about to acquire. Questioning methods is a key means by which teachers find out what students already know, identify gaps in knowledge and understanding and scaffold the development of their understanding to enable them close the gap between what they currently know and the learning goals.

From the field, the survey revealed that in secondary schools, teachers of science and mathematics subjects employ role playing while teaching. In support of the above, Akinpelu (2021) stated that employing role playing and stimulation method while teaching science subjects in secondary schools remained among the best option for science teachers to use. Role playing in teaching allows students to explore realistic situations by interacting with others in a managed way in order to develop experiences and explore different strategies in a

supported environment. Implying that role playing is more affective, cognitive and behavioral, thus make students to take on the role of another person.

The study revealed that in secondary schools, science and mathematics teachers employ practical and field work methods of teaching. In support of this, Eshiwani (2023) asserts that science teachers should employ practical and field work methods of teaching because they involve students in having practical lessons especially in laboratories and groupwork which helps them to grasp easily. This implies that practical and field works engage students and help them to develop important skills, understand the process of scientific investigation; and develop a broad understanding of scientific concepts.

From the field, it was revealed that in secondary schools, some teachers of science and mathematics employ lecture method during class work. This is supported by Noburu (2018) when he states that some science teachers employ lecturing method of teaching where teachers' spoon feed students with a lot of notes in classes. Lecture method of teaching is preferred by some teachers because it provides an economical and efficient method of delivering substantial amounts of information to large numbers of students. Student involvement is minimal and reduced to listening and writing notes. It is not a good method of teaching science and mathematics subjects.

The study also revealed that in secondary schools, some science and mathematics teachers use collaborative methods of teaching. This revelation agrees with Mukasa (2021) who stated that collaborative methods of teaching are commonly applied in "first world schools" where schools tend to hire well qualified and competent teachers of science and mathematics from different schools to teach their students specific aspects and concepts. In these approaches,

teachers strive to involve groups of students working together to solve specific academic problems, complete a task or creates a product as a means of evaluating the learning process.

The above findings revealed that in secondary schools, inquiry/discovery method have been emphasized among science teachers. This is in line with Njuguna (2015) who states that inquiry/discovery methods have been emphasized among science teachers in secondary schools to enhance students' academic achievement in science subject. Science and mathematics teachers tend to apply such inquiry method of teaching which is a student-centered method of education focused on asking questions. Science teachers use inquiry methods to promote learning through student investigation, and rely on the teachers presenting facts and his or her knowledge about the subject. Students exposed to inquiry-based learning are given the opportunity to nurture their talents and passions. They take control of their learning during the unit of work being taught. Through inquiry, students engage in research and self-revision around interesting ideas and essential questions.

5.1.2 The SESEMAT and Students' Academic Performance

The findings revealed that key ways in which SESEMAT has contributed to students' academic performance in selected public secondary schools in Hoima Municipality includes:

From the field study, it was revealed that in secondary schools, SESEMAT make it for students to grasp content taught easily. This is in line with Radha (2015) who stated that SESMAT tend to involve students in more practical work; and such practical assignments are often carried out in groups, which help to inculcate value; and values like sharing, cooperation and team spirit among students. Laboratories are wonderful settings for teaching and learning science. They provide students with opportunities to think about, discuss, and solve real problems. The teaching methodology employed in teaching science make students grasp

content taught easily. When teacher use practical methods, students get involved directly and thus can easily grasp what they have been taught. Practical work enhances the learning of scientific knowledge, give insight into scientific method and develop expertise in using it.

It is also revealed that in secondary schools, SESEMAT makes it easy for students to gain practical skills. This is in line with Adam and Ahmed (2016) who also revealed that the teaching methodology employed in teaching science makes students gain practical skills. Students gain practical skills when they are involved in practical classes like laboratory practical. Students gain practical skills when they are involved in practical classes like laboratory practical. Questioning method of teaching aids learners in connecting concepts, increasing awareness, encouraging creative and imaginative thought, making inferences. In addition, Olembo, Wanga and Karagu (2015) further stated that essentially student – centered learning has student responsibility and activity at its heart, in contrast to a strong emphasis on teacher control and coverage of academic content found in much conventional and didactic teaching. Student – centered learning abounds with the features which the various authors and researchers propose as distinguished marks of student – centered learning from teacher learning.

In addition, it was found out that in secondary schools, SESEMAT make it easy for students to achieve improved academic results; and this concurs with Daneca (2023) who confirms that teaching methodology employed under SESEMAT in teaching science make students achieve improved academic results. Students have academically performed well when science teachers apply better teaching methods that involve student's participation. Teaching methodology employed in teaching science promote lesson delivery promoting students' academic achievement. Teaching methodology employed in teaching science make teachers attend to

individual students' differences. Students have academically performed well when science teachers apply better teaching methodology that involves students' participation.

From the field study, it was revealed that in secondary schools, SESEMAT make it easy for students to compare the theoretical and practical notes. This concurs with Drayer (2023) who argues that SESEMAT tend to enhance demonstration which tend to provide students with experiences of real events, phenomena and processes; helping them learn, raises students' interest and motivation. It enables teachers to focus on a particular phenomenon or event, such as the starch text for foods. Students are able to compare practical and theoretical study content when proper teaching method is employed. Students are able to compare practical and theoretical study content when proper teaching method is employed. Teaching methodology employed in teaching science make students compare the theoretical and practical notes.

In addition, it was revealed that in secondary schools, SESEMAT makes it simple for teachers to attend to individual students' differences. In support of the above, Njuguna (2015) asserted that science teachers are able to attend to individual students' academic differences, which help them to grasp what they have been taught easily. Individual students' differences are solved or handled effectively by science teachers during teaching – learning process. SESEMAT tend to help students to acquire, retain and get equipped with more knowledge and information of science subjects. It discourages science teachers from using their old style of chalk and talk method in their science subject teaching – learning process which make some students fail to grasp some of the content being taught. Teachers are able to attend to individual differences thus able to guide them academically properly when proper method of teaching is employed.

Additionally, it was revealed that in secondary schools, SESEMAT encouraging creative and imaginative thought. This is in line with Drayers (2023) who also revealed that SESEMAT encourage teachers to provide students with opportunities to think about, discuss, and solve real academic gaps or problems. For instance, developing and teaching an effective laboratory requires as much skill, creativity, and hard work as proposing and executing a first – rate research project. In this under SESEMAT, teachers that use questioning method of teaching aids learners in connecting concepts, increasing awareness, encouraging creative and imaginative thought and making inferences. Science teachers allow their colleagues to observe their lessons and offer feedback, enables teachers to see the good practices in the lesson and strength them; see mistakes made in earlier lesson, avoid earlier mistakes in future lessons; and in the process teachers become more open to evaluation by fellow teachers.

From the field study, it was also revealed in secondary schools, SESEMAT accord the students an opportunity to conduct experiments so that they can discover on their own. This occurs with Eshiwani (2023) who stated that SESEMAT enhance science teacher to carry out the planned lesson/activity, be innovative in lesson science presentation, and present lessons in varied interesting ways to arouse learners' interest. For instance, through having regular science experiments, role play and storytelling, all ensure active learner participation and deal with students' questions and misconceptions and reinforce learning at each step. Role playing while teaching science subjects solve real life situational problems, develops practical professional skills and functioning knowledge. Teaching methods lie practical and lecturing methods denote strategies that the teacher uses to deliver his/her subject matter to the students in the classroom based on the instructional objectives to bring about learning.

Last but not least, it was also revealed that in secondary schools, SESEMAT promote lesson delivery and student's involvement in practical lessons. In support of the above, Akinpelu (2021) further added that teachers of science have been emphasized to use different methods of teaching science inclusive of demonstration, lecturing, collaboration, classroom discussion, peer – to – peer teaching, cognitive development methods, effective development methods, psychomotor development methods and cognitive development methods that promote lessons delivery. There are several teaching methods to use in the science classrooms; it is left for the teacher to use the ones most appropriate for the lesson. These methods if properly used will enhance teaching and learning and bring about desired changes in the students. Teaching methodology employed in teaching science promote lesson delivery promoting students' academic achievement.

5.1.3 The Factors Influencing Teachers' Methodology in Teaching Science and Mathematics in Public Secondary Schools

The findings revealed that the key factors influencing teachers' methodology in teaching Science and Mathematics in selected public secondary schools in Hoima Municipality includes:

From the field study, it was revealed that in secondary schools, teachers training background had an influence on the teachers' ability in teaching sciences and mathematics subjects. This concurs with Waugh and Fredrickson (2016) who revealed that teachers training background greatly determine the competence in teaching – learning and the method they have to use. In secondary schools, the teacher's ability to use the available teaching aids has an influence on the teachers' methodology in teaching science subjects, which tend to be determined by their training background. Teachers training background tend to influence their skills and

competence in handling science and mathematics subjects. Teachers training background have an influence on the teachers' methodology in teaching science subjects.

In addition, it was also revealed that in secondary schools, teachers' competence has an influence on the teachers' ability in teaching sciences and mathematics subjects. This is in line with Seligman (2021) who revealed that teachers' methodology in teaching science subjects greatly influenced by their skills and competence to handle the subject competently. Science teachers require to be more creative and analytical in handling science and mathematics subjects. Science teachers' competence to effectively teach and interpret science subjects' concepts has a great influence on the science teachers' ability in teaching sciences and mathematics. Some of the science teachers lack skills, competence and ability to interpret some of the science subjects' concepts.

Further, it is also revealed that in secondary schools, availability of teaching aids has an influence on the teachers' ability in teaching sciences and mathematics subjects. In support of the above, Njuguna (2015) noted that teachers' methodology in teaching science subjects have greatly been influenced by the teaching aid available within secondary schools for teachers to use. Science teachers required to use current and up–to – date teaching aids to effectively deliver subject content clearly make students grasp what they have been taught in class. Teachers' methodology in teaching science subjects can be determined by the availability of school facilities like laboratory that can facilitate teachers to do their practical science work effectively.

Furthermore, it is also revealed that in secondary schools, school location has an influence on the teachers' ability in teaching sciences and mathematics subjects. In support of the above, Ivowi (2023) also revealed that teachers' methodology in teaching science subjects greatly

influenced by the location of the schools; for instance, urban school tend to lack enough land where teachers can take his/her learners for agricultural practical study. School located in rural areas tend to lack access to modern instructional materials and experimental materials. School location tend to influence teacher's ability and morale in science subjects teaching.

In addition, in secondary schools, job rotation has an influence on the teachers' ability in teaching sciences and mathematics subjects. This concurs with Lizzio, Wilson and Simon (2021) who stated that teachers' ability in teaching science and mathematics subjects tend to be determined by their involvement in job rotation; which equips them with more skills, knowledge and competence on teaching science subjects. Teachers tend to gain more skills when they are involved in job rotation; which equips them with more skills, knowledge and competence on teaching science subjects. Teachers' methodology in teaching science subjects can be influenced by the job rotation. Teachers tend to gain more skills when they are involved in job rotation, that is moving from one class to another; which eventually help them to develop skills and competence to teacher science and mathematics subjects.

Additionally, it was revealed that in secondary schools, school education facilities like laboratory has an influence on teachers' ability in teaching sciences and mathematics subjects. In support of the above, Ocham (2015) observed that teachers' methodology in teaching science subjects can be determined by the availability of school facilities like laboratory that can facilitate teachers to do their practical science work effectively. Presence of school educational facilities like laboratory and its relevant equipment encourage science teachers to do their job better. It accelerated science subjects' teaching– learning processes.

Furthermore, in secondary schools, teachers' attitude has an influence on teachers' ability in teaching sciences and mathematics subjects, and this occurs with Tran (2022) who revealed that teachers' methodology in teaching science subjects has been influenced by teachers' attitude on certain methodology they are supposed to use while teaching certain subjects. Teachers' attitude to us available school facilities has an influence on their methodology in teaching science subjects. Teachers' methodology in teaching science subjects can be influenced by teachers' attitude on certain methodology in teaching science subjects can be influenced by teachers attitude on certain methodology they are supposed to use while teaching certain subjects.

In addition, it was also revealed that in secondary schools, continuous professional development program has an influence on teacher's ability in teaching sciences and mathematics subjects. Musaazi (2016) supports this view when he observes that continuous professional development aims to help teachers to teacher more effectively together, improve school progress such as the formulation and implementation of strategy, and facilitate the transformation of the schools and academic achievement; where teachers tend to gain more teaching skills and able to handle the content syllabus properly.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

In this chapter, the researcher presents the conclusion and recommendations in relation to the objectives of the study. Suggested areas for further research are also presented.

6.1 Conclusions

From the findings and discussion in chapter four and five respectively, the following conclusions were drawn.

Reference to the study objective one, it is concluded that employing demonstrations methods, student centered approach and discussion methods and questioning method as the major existing methods used by teachers while teaching science and mathematics in selected public secondary schools in Hoima Municipality.

Reference to study objective two, it is concluded that SESEMAT make it for students to grasp content taught easily, gain practical skills, and make simple for teachers to attend individual students' differences. These are the major ways in which SESEMAT have contributed to students' academic performance in selected public secondary schools in Hoima Municipality.

Reference to study objective three, it is concluded that teachers training background, teachers' competence, availability of teaching aids and school education facilities are the major key factors influencing teachers' methodology in teaching Science and Mathematics in selected public secondary schools in Hoima Municipality.

6.2 Recommendations

In the light of findings of the study and discussion above, the researcher has the following recommendations were suggested:

It is recommended that teachers training institution should be well equipped with SESEMAT materials to groom good and competent teachers with proper required training background for effective science subject teaching.

It is recommended that government of Uganda through the Ministry of Education and Sports should equip secondary schools with science teaching aids to help teachers to having effective science teaching.

It is recommended that secondary schools should be equipped with enough science equipment and materials to facilitate easy teaching – learning process.

It is also recommended that there is also need to train and retain more science and mathematics teachers. Indeed, further training needs to be given to enable teachers to carry out practical. Refresher course should also be ongoing to ensure that teachers remain interested, enthused and able to demonstrate up – to – date knowledge.

To add on, there is need to recruit sufficient members of teachers with specialist's knowledge of these subjects so that they bring the subjects for life; to support and motivate their students so that they may fill their potential. These will also help to reduce the teaching work load.

It is recommended that the government through the MoES should ensure that, there is right balance of the teaching staff within a department in order to meet the needs of the science students.

It is suggested that the curricula of science and mathematics should be revised in consultation with the subject teachers, Uganda National Examination Board (UNEB) and National Curriculum Development Center (NCDC). Thus, the content must be up to date in order to fill the knowledge gaps on non – specialist teachers and develop their intrigue in the subject.

It is further suggested that there is need to reduce the teacher-student ratio/decongest the classes so as to enhance effective teaching and learning. Thus, both teachers and students feel convenient to study in a decongested environment.

It is suggested that there is need to motivate the teachers by increasing and improving their pay and welfare. This is because; a well-motivated teacher will persuade the learners to put their interest in science and mathematics subjects.

Field fielding recommended that relevant instructional materials and science laboratories should be provided and appropriate teaching methods should be adopted for the teaching of mathematics to obviate the negative feelings and enhance students' in the subjects.

6.3 Areas Recommended for Further Research

The researcher carried this study in order to examine the "Assessing the Contributions of Science and Mathematics Teachers (SESEMAT) on Students' Academic Performance in Selected Public Secondary Schools in Hoima Municipality", but the study was not exhaustive

owing to constraints in terms of scope, time and finance. The following are the areas the researcher has seen prudent for the further researcher:

1. Teacher's methodology in teaching science and its impact on the content syllabus coverage in Uganda.
2. School environment and its impact on the performance of students in Uganda.
3. Remedial teaching of science subjects and its impact on the performance of students in Uganda.
4. Teacher's methodology in teaching science and its impact on the content syllabus coverage in Uganda.

There is need for more research or similar studies should be conducted in other secondary schools in other part of Uganda, so as to compare with the results got from Hoima Municipality, Hoima District, Bunyoro Sub Region and have a better ground of recommendation for further study.

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APPENDICES

APPENDIX I: CONSENT FORM FOR PARTICIPANTS

Introduction: Good morning/Afternoon. I am called **IRUMBA GEORGE KAZOOBA**, a researcher from the Uganda Christian University. I am conducting a study entitled "Assessing the Contributions of of the Science and Mathematics Teachers (SESEMAT) on Students' Academic performance in Selected Public Secondary Schools in Hoima Municipality".

Purpose of the study: The purpose of the study is to assessing the contributions of SESEMAT on the academic performance in science and mathematics in the selected public secondary schools in Hoima Municipality, Hoima District.

Procedure of study: You have been identified to participate in the study and I wish to ask a few questions regarding the contributions of Science and Mathematics teachers (SESEMAT) on students' academic performance in selected secondary schools in Hoima Municipality. Your responses/answers will help us to establish how best we can improve on students' academic performance in science and mathematics in selected public secondary schools in Hoima Municipality and consequently reduce on decline in students' performance scores. The responses will be recorded on the questionnaire.

Confidentiality: Your answers will be taken as a contribution from one member of their participants. The answers will be treated in confidence and used for purposes of this study only. It is not necessary that you give your name and nobody will be allowed access to the questionnaires used as they will be immediately and kept by the principal investigator only.

Benefits and Risks: The results of this study will be beneficial to the secondary schools in Hoima Municipality, entire district and the country at large as they will go a long way in

improving the students' academic performance. There are no anticipated risks as a result of your participated risks as a result of your participation in this study.

Voluntary consent: You are free to choose whether you should take part in this study or not. You will not be persecuted in any way for declining to take part in the study neither will it affect you at work place. We shall only proceed beyond this point if you accept to take part in the study. You are free to stop any stage of the study if you feel uncomfortable. If you have any questions about the study now or at any time during the study, you may contact the principal investigator: IRUMBA GEORGE KAZOOBA, on Telephone 0774487030.

Consent statement: I have been informed about the study on assessing the contributions of science and Mathematics teachers (SESEMAT) on students' academic performance in selected public secondary schools in Hoima Municipality. The purpose and nature of the study, the benefits and risks have been explained to me. I have been informed that the information given will be kept confidential and that participation in the study is voluntary and that no consequences will result if I refuse to participate or withdraw from the study.

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Participant's Signature Date

Name of researcher Signature Date

…… …… …….

APPENDIX II

QUESTIONNAIRE FOR TEACHERS AND STUDENTS

TOPIC: ASSESSING THE CONTRIBUTIONSOF SECONDARY SCIENCE AND MATHEMATICS TEACHERS (SESEMAT) ON STUDENTS' ACADEMIC PERFORMANCE IN SELECTED PUBLIC SECONDARY SCHOOLS IN HOIMA MUNICIPALITY

Dear Respondent,

You have been selected to take part in this important study on the "Assessing the contributions of secondary science and mathematics teachers (SESEMAT) on academic performance in selected public secondary schools in Hoima Municipality". The information you give will be confidential and used for this study only. Feel free to participate in this study by answering all the questions to the best of your knowledge and ability. Kindly fill in the blank spaces or tick as appropriate.

Note: Do not write your names on the questionnaire.

PART 1: Background information

1. Your gender: Male Female
2. Teaching subjects: 1 …… 2. ……..
3. Subject of specialization …… (major)
4. Number of periods taught per week ……

Please indicate the extent to which you agree or disagree to the following statements' by ticking the appropriate number.

Strongly agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
5	4	3	2	1

Part II: The Methods Used by Teachers While Teaching Science and Mathematics among Selected Public Secondary Schools in Hoima Municipality

No. Qns	**Questions**	**5 SA**	**4 A**	**3 UD**	**2 D**	**1 SD**
1	In our schools, science teachers employ demonstration methods while teaching – learning process					
2	In our schools, science teachers employ student centered approach and discussion methods					
3	In schools, science teachers use questioning method during teaching – learning process					
4	In our schools, science teachers employ role playing while teaching science subjects					
5	In our schools, science teachers employ practical and field work methods of teaching – learning					
6	In our schools, science teachers employ lecture method during class work					
7	In our schools, some science teachers use collaborating method of teaching					
8	In our schools, science teachers have been employing role playing and stimulation method while teaching					
9	In our schools, inquiry/discovery method have been emphasized among science teachers					
10	In our school, science teachers accord the students an opportunity to conduct experiments so that they can discover on their own.					

Part III: The Ways in Which SESEMAT have contributed to students' Academic Performance in selected public secondary schools in Hoima Municipality

No. Qns	**Questions**	**5 SA**	**4 A**	**3 UD**	**2 D**	**1 SD**
1	In our schools, SESEMAT make it for students to grasp content taught easily					
2	In our schools, SESEMAT make it easy for students to gain practical skills					
3	In our schools, SESEMAT make it easy for students to achieve improved academic results					
4	In our schools, SESEMAT make it easy for students to compare the theoretical and practical notes.					
5	In our schools, SESEMAT make it simple for teachers to attend to different students' differences					
6	In our schools, SESEMAT encouraging creative imaginative thought					
7	In our schools, SESEMAT accord the students an opportunity to conduct experiments so that they can discover on their own					
8	In our schools, SESEMAT promote lesson delivery and student's involvement in practical lessons					

Part IV: The Factors Influencing Teachers' Methodology in Teaching Science and Mathematics in Selected Public Secondary Schools in Hoima Municipality.

No. Qns	Questions	5 SA	4 A	3 UD	2 D	1 SD
1	In our schools, teachers training background has an influence on the teachers' ability in teaching sciences and mathematics subjects					
2	In our schools, teacher's competence has an influence on the teacher's ability in teaching sciences and mathematics subjects					
3	In our schools, availability of teaching aids has an influence on the teacher's ability in teaching sciences and mathematics subjects					
4	In our schools, school location has an influence on the teacher's ability in teaching sciences and mathematics subjects					
5	In our schools, job rotation has an influence on the teachers' ability in teaching sciences and mathematics subjects					
6	In our schools, school education facilities like laboratory has an influence on teachers' ability in teaching sciences and mathematics subjects					
7	In our schools, teachers attitude has an influence on teachers' ability in teaching sciences and mathematics subjects					
8	In our schools, continuous professional development programs has an influence on teachers' ability in teaching sciences and mathematics subjects					
9	In our schools, the level of remuneration has an influence on teachers' ability in teaching sciences and mathematics subjects					

Thank you for your time

APPENDIX III

INTERVIEW GUIDE FOR HEADTEACHERS/DEPUTY HEADTEACHERS

Guiding Questions

1. In your view, what are the methods used by teachers while teaching science and mathematics in your school?
2. In which ways SESEMAT can contribute towards students' academic performance in your school?
3. What are the factors influencing teachers' methodology in teaching Science and Mathematics in your school?
4. How best do you want the contributions of SESEMAT to be done?
5. How best should students' academic performance be improved?

Thank you for your time

Irumba George Kazooba

APPENDIX V
STUDENTS ACADEMIC PERFORMANCE RESULTS FROM SELECTED SCHOOLS

School A: Performance in science and mathematics for the year 2021, 2022 and 2023 at Duhaga Secondary School (Government Aided Non – USE)

	2021				2022				2023			
Grade	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math
D1	00	00	00	01	01	00	01	01	01	01	01	02
D2	02	00	02	00	01	00	02	02	02	01	03	02
C3	06	01	05	04	05	03	07	05	02	02	04	06
C4	06	03	06	05	05	04	07	07	06	04	06	05
C5	08	05	10	08	08	04	12	06	10	04	13	05
C6	10	07	10	12	12	10	09	10	15	10	12	12
P7	14	20	12	14	11	18	15	16	15	18	15	15
P8	12	18	11	14	22	20	14	18	18	25	17	21
F9	18	22	20	18	20	26	18	20	22	26	20	23
Tot	**76**	**76**	**76**	**76**	**85**	**85**	**85**	**85**	**91**	**91**	**91**	**91**
%Cr	**42**	**34**	**43**	**39**	**38**	**23**	**45**	**36**	**40**	**24**	**43**	**35**

School B: The performance in science and mathematics for the years 2021, 2022 and 2023 at Kitara Secondary School (Government Aided USE)

	2021				2022				2023			
Grade	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math
D1	00	00	00	00	00	00	00	00	00	00	00	01
D2	00	00	00	00	01	01	00	01	01	00	00	02
C3	02	00	01	03	04	02	03	02	03	03	04	06
C4	06	03	04	03	06	04	06	02	04	05	08	08
C5	10	05	07	10	15	08	05	15	08	13	10	13
C6	15	12	13	18	18	10	16	22	25	20	12	18
P7	20	21	20	26	26	28	24	30	22	29	30	30
P8	62	67	60	50	52	63	58	49	68	65	63	57
F9	58	65	68	62	63	70	72	64	70	65	73	65
Tot	**173**	**173**	**173**	**173**	**185**	**85**	**185**	**185**	**185**	**200**	**200**	**200**
%Cr	**19.1**	**11**	**14.5**	**20.2**	**24**	**13**	**17**	**23**	**20**	**21**	**17**	**24**

School C: The performance in science and mathematics for the years 2021, 2022 and 2023 at Bwikya Muslim Secondary School (Government Aided USE)

	2021				2022				2023			
Grade	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math
D1	00	00	00	01	01	00	01	01	00	00	01	01
D2	01	00	02	01	02	02	03	02	02	00	02	01
C3	03	02	03	05	07	03	07	06	04	03	04	04
C4	06	05	07	04	07	03	09	10	06	05	06	07
C5	07	05	10	12	15	04	15	12	10	14	12	10
C6	15	09	19	22	18	10	23	20	25	22	25	23
P7	25	22	21	34	31	33	25	36	28	30	29	33
P8	42	38	41	36	40	48	50	38	43	35	37	35
F9	58	76	54	43	55	73	43	51	52	61	54	56
Tot	**157**	**157**	**157**	**157**	**176**	**176**	**176**	**176**	**170**	**170**	**170**	**170**
%Cr	**20**	**13**	**26**	**28**	**28**	**13**	**33**	**29**	**28**	**26**	**29**	**27**

School D: The performance in science and science and mathematics for the years 2021, 2022 and 2023 at Buhanika Seed Secondary School (Government aided USE)

	2021				2022				2023			
Grade	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math
D1	00	00	00	00	00	00	00	00	00	00	00	00
D2	00	00	02	01	03	00	01	00	00	00	00	00
C3	02	01	02	02	05	04	03	04	06	01	04	03
C4	03	04	03	06	09	07	10	08	10	03	06	05
C5	05	06	05	10	16	09	13	12	10	14	12	13
C6	10	07	09	12	18	20	15	25	21	20	19	14
P7	15	12	18	20	32	29	28	30	20	22	23	28
P8	22	29	24	22	30	36	40	38	28	30	33	30
F9	38	36	34	22	35	43	38	31	30	35	28	32
Tot	**95**	**95**	**95**	**95**	**148**	**148**	**148**	**148**	**125**	**125**	**125**	**125**
%Cr	**21**	**19**	**20**	**33**	**35**	**27**	**28**	**33**	**38**	**30**	**28**	**28**

School E: The performance in science and mathematics for the years 2021, 2022 and 2023 at St. Andrea Kaahwa's Secondary School (Government Aided Non – USE)

	2021				2022				2023			
Grade	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math	Phy	Chem	Biol	Math
D1	02	01	03	06	02	02	03	06	01	00	02	03
D2	03	02	05	04	02	02	03	06	02	01	02	04
C3	03	05	05	06	05	06	05	04	05	03	04	06
C4	06	08	10	08	06	08	14	12	09	05	07	10
C5	17	20	18	22	18	24	17	12	12	14	15	20
C6	25	29	25	32	21	15	23	20	25	22	25	23
P7	45	32	30	31	28	23	25	36	38	30	39	35
P8	42	38	41	33	43	48	42	38	53	55	47	44
F9	38	46	44	39	50	47	43	41	50	65	54	50
Tot	**181**	**181**	**181**	**181**	**175**	**175**	**175**	**175**	**195**	**195**	**195**	**195**
%Cr	**31**	**36**	**39**	**43**	**31**	**33**	**37**	**34**	**28**	**23**	**28**	**34**

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SCHOOL OF RESEARCH & POSTGRADUATE STUDIES

DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

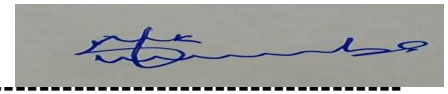
Date: **14 May 2024**

Name of Candidate: **IRUMBA George Kazooba** Reg. No: **RJ18M06/102**

Title of Dissertation: **ASSESSING THE CONTRIBUTIONSOF SECONDARY SCIENCE AND MATHEMATICS TEACHERS (SESEMAT) ON STUDENTS' ACADEMIC PERFORMANCE IN SELECTED PUBLIC SECONDARY SCHOOLS IN HOIMA MUNICIPALITY**

SN	COMMENTS BY VIVA VOCE PANNEL	ACTION TAKEN	INDICATOR
1.7	Topic: What is SESEMAT, it is the teacher of science and math and how it contributes to student performance? you need to give a clear background about SESEMAT. Also include it in your problem , you only included it in the topic	Corrected as suggested	Background (Page 1)
2.	In objectives, each objective looked like a topic of its own. Why those different objectives yet the topic is contribution of SESEMAT. Objective 2 is the same as topic, and Objective 1 & 3 are the same.	Corrected as suggested	Objectives (Page 7-8)

3.	Conceptual framework, there were things, what were the indicators of well planned lesson or in each IV	Corrected as required	Conceptual Framework (Page 11)
4	You did not seem to have utilized your conceptual framework, your questions should have come from the conceptual framework. Questions would be how IV contribute to DV. All questions are outside your conceptual framework, they are all strange.	Corrected as proposed	Conceptual Framework (Page 11)
5	What was the intention of SESEMAT?	Corrected as suggested	Background (Page 1)
6.	How does the student comes in the objective 2 about the contribution to academic performance, you can may be tie it to SESEMAT that because if SESMAT performance is	Corrected as suggested	Objectives (Page 7-8)
7.	Problem statement, you talked about a gap, where is it, you need to be clear. You did not cite any literature, where did you get the statistics that included in your gap. You needed to cite. It looks like your alleging.	Corrected as suggested	Problem Statement (Page 7)



---------- **Dated 14/5/2024**

IRUMBA GEORGE KAZOOBA

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MR. MULLABI ANDREW