

Bindura University
of Science Education



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TEACHING
SHAPES IN MATHEMATICS AT GRADE FIVE AT A PRIMARY SCHOOL
IN BINGA DISTRICT.**

COMMENTS:

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The undersigned certify that they have supervised, read and recommended to Bindura

University of Science Education for acceptance a research project entitled.....Investigating the effectiveness of technology in teaching shapes in mathematics at grade 5 at a primary school in Binga District.....
.....

Submitted20/12/24.....in partial fulfillment of the requirement of the Bachelor of

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DECLARATION

I, Ngwenya Mejury Tashama declare that this research project for Honours Bachelor of Science Education in Mathematics degree at Bindura University is my own design and execution. I further certify that this document has never been submitted to this or any other university.

SIGNATURE: M.T. NGWENYA

DATE: 20/12/2024

ABSTRACT

This study investigates the effectiveness of technology in teaching shapes in mathematics to grade five learners. The integration of technology in mathematics education has gained significant attention in recent years, but its impact on students' understanding of shapes remains unclear. This mixed-methods study employed a quasi-experimental design, surveying 65 grade five learners and interviewing 5 teachers. The results show that technology-based instruction significantly improves students' understanding of shapes, particularly in identifying and classifying shapes. However, the study also reveals that teachers' technological pedagogical content knowledge plays a crucial role in effectively integrating technology into mathematics lessons. The findings have shown that there is need for trainings for teachers to be equipped in technology use and more tools are needed for a variety to help learners.

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Thank you.

DEDICATION

To my family, whose unwavering support and encouragement have been the driving force behind my academic pursuits. Your love and sacrifices have made this achievement possible.

CHAPTER ONE 1: INTRODUCTION

1.1 Introduction to the study

The use of technology in Mathematics is very crucial in providing opportunities for teachers to effectively give instructions and for learners to learn to operate in an information age. Technology in mathematics education not only provides dynamic opportunities for instruction but can also enhance the learning process and make concepts come alive. Therefore, the research mainly focuses on the effectiveness of technology in teaching Shapes under the topic Measures in Mathematics at grade five level at Chipale Primary School in Binga District. In chapter one the researcher is going to look at the background to the study, statement of the problem, research questions, significance of the study, delimitations of the study, limitations of the study, and definition of key terms.

1.2 Background to the study

Zimbabwe has adopted the use of ICT tools such as computers, Whiteboards as well as radios and televisions in education and these are improving the way teachers give instructions and as well as the way learners learn. The integration of technology in education simply refers to the use of technology to enhance the learners' learning experience. Utilizing different types of technology in the Mathematics, including a virtual classroom, creates learners who are actively engaged with learning objectives. Jones (2022) highlights that the use of new technologies in the mathematics classroom is very essential as it brings learning to life. Videos, animations and even interesting movies can be incorporated into teaching the topic shapes in Mathematics and this can highly motivate and engage learners during teaching and learning. Learners can look into sizes, and classifying shapes using technological tools such as computers, tablets and interactive white boards. Technology tools for teaching and learning in Mathematics encompass a diverse array of digital resources designed to enhance

educational experiences. Ranging from interactive software and multimedia platforms to online collaboration tools, these innovations empower educators to create dynamic, engaging lessons. Jones (2022) on his report on the use of computers in 5 primary schools throughout Matabeleland North, Zimbabwe, concluded that five schools in Matabeleland North have been equipped with computer labs bringing access to technology for 2,000 learners in its first phase, and 1,000 learners in the technology's lifecycle.

This means that teachers in these schools have a Laptop, assistive technologies including projectors, speakers, and printers, as well as training and support. The schools have also each received a Connect Device, which makes e-Learning accessible to environments with no internet connectivity. The device distributes interactive learning content, videos, digital textbooks and teaching resources, meaning the computers can be applied to a whole host of subjects beyond ICT itself. For these five schools in Matabeleland North, teaching and learning is made faster and easier, through the E- Learning resources, creating time efficiencies.

Coullts and Simpson (2001) also finds out that Matabeleland North there is a project which supported by local partners Computer Society of Zimbabwe (CSZ) and WordLinks who provide the necessary support and training to enable primary schools to make full use of their computer resources during teaching and learning. Through CSZ, teachers in Matabeleland North have undertaken training in ICDL modules, Computer Essentials, Online Essentials, Word Processing, Spreadsheets and ICT in Education. For those that were using computers for the first time, they also undertook a Digital Citizen Plus module, to raise their core skills and confidence with ICT.

Johnson (2021) carried out a research on the effectiveness of using technology in teaching some topics in Mathematics in the rural primary schools and found out that the major benefits

of using technology in Mathematics are high level of learners' engagement and motivation. This means that technology can make a difference in teaching measures as it assist learners to be involved in learning and create on them a spirit of learning. Banda (2016) on his study on the impact of technology in urban and rural Zimbabwean school concluded that 67% of both urban and rural Zimbabwean schools integrate technological resources in their classrooms to lessen teaching and learning. This shows that teachers in Zimbabwe therefore are trying by all means to use technology to improve teaching and learning.

Johnson (2021) highlighted that most teachers use two or more ICT tools in teaching Mathematics topics and this makes it easy for them to come up with meaningful instructions using ICT tools. This is because meaningful technology integration depends on more than device use and, professional development has tried to address teachers' technology struggles. Technology fosters deeper understanding of mathematical concepts and rules. Learners using calculators and computers are able to work at higher levels of generalization and abstraction.

Nziramasanga (1999) observed that teaching mathematics with technology enhances the teacher's ability to teach learners about problem solving. This is because technology assists teachers in the construction of realistic complex problems in the class setting. These problems are modeled after real world problems that the learners might encounter in real life. Mathematics uses problem solving to create contexts that simulate real life. Problem solving is an integral part of all mathematics learning and teachers are required to help learners develop the skills needed to solve problems through the subject of mathematics (Mkomange et al. 2012).

Technology also enables teachers to make use of learning aids that are designed to exploit the learners' visualization and modeling power to solve problems. Software applications such as Computer-Aided Design assist teachers to come up with simplified and interesting ways of

teaching these hard topics in mathematics. For example, some powerful 3D applications make it possible to manipulate concepts on measures therefore fostering understanding by the learners. By use of such technological tools, learners will find it easier to comprehend the subject matter and they will be inspired to learn. Teachers on the other hand will be inspired by the positive outcomes from the students.

Teaching mathematics with technology gives the teacher more tools with which to offer instructions to the learners. Begs (2000) A critical role of the teacher is to explain different concepts to the students and ensure that they understand the material being presented.

However, developing a common vision about the role of technology in education with stakeholders and creating a shared community of practice is important. Without holistic improvements to teacher and learners support and training that address the many issues that comes with using technology in the teaching and learning of Mathematics, there is the risk of creating a generation of ill-prepared learners for a digital future.

1.3 Purpose of the study

The study seeks to provide information on the effectiveness of using technology in teaching and learning, it encourages various stakeholders such as teachers and school heads to have a clear understanding on the need to upgrade and support technology integration at all levels to enhance classroom instruction.

1.4 Statement of the problem

Due to technology's importance in the society and possibly for the future of education, identifying the possible impacts on the use of ICT tools in the teaching and learning would be an important step in improving the quality of teaching and learning in the education system of Zimbabwe. This research therefore sought to explore the effectiveness of technology in teaching shapes in Mathematics at grade five level.

1.5 Main Research questions

- Which types of technological gadgets or devices teachers use when teaching the topic Shapes at grade five level in Mathematics at Chipale Primary School?
- What are the challenges teachers face when using technology in teaching the topic Measures at grade five level in Mathematics at Chipale Primary School?
- What can be done by teachers to improve the challenges faced by teachers in using technological tools when teaching the topic Shapes in Mathematics at grade five level at Chipale Primary School.

1.6 Research Objectives

- To find out the effectiveness of technology in teaching the topic Shapes at grade five level in Mathematics at Chipale Primary School.
- To identify the types of technological gadgets that teachers use when teaching Shapes at grade five level in Mathematics at Chipale Primary School.
- To discuss the challenges teachers face when using technology in teaching Shapes in Mathematics at grade five level at Chipale Primary School.
- To provide the solutions to the challenges teachers face when using technology in teaching Shapes in Mathematics at grade five level at Chipale Primary School.

1.7 Hypothesis/ Assumptions

Increased use of technology in teaching and learning results in better classroom instruction results. Technology facilitates teaching and learning

1.8 Significance of the study

The study seeks to encourage all educational stakeholders to incorporate technology in teaching and learning. Teachers, headmasters and other important educational stakeholders need to cooperate technology in all areas of teaching and learning.

1.8.1 TEACHERS

Identifying the fundamental advantages of using technology in teaching may assist teachers continue pushing for the use of technology in the classrooms and beyond.

1.8.2 SCHOOL HEADS

The findings of this research will enable school heads to value the effect of using technological tools in teaching and learning activities at their schools and support their teachers through professional development. This will eventually lead to their development of relevant skills and knowledge using technological resources within the schools.

1.9 Delimitations of the study

The research is being carried out at Chipale Primary School in Binga District in Matabeleland North Province in Zimbabwe. The school is in the North East of Binga. The present study sought to explore on the effectiveness of technology in teaching Shapes in Mathematics at grade five level. Therefore, the study was only restricted to teachers and learners at Chipale Primary School in Binga District.

1.10 Limitations of the study

1.10.1: Time was one of the major problem the researcher faced due to mounting pressure from the teaching and learning tasks. The researcher was faced with other important activities such executing lessons, planning and evaluating record books and lesson plans. The researcher had to work hard day and night to make ends meet and to curb the challenge of shortage of time.

1.10.2 : Financial constraints

The researcher faced financial problems in order to get the bundles to research information on the internet as well as for stationery. Finances were a major problem but to overcome this

challenge the researcher had to start a mini business of buying and selling clothes from runners so as to improve finances.

1. 11 Definition of Key terms

1. 11. 1 Technology

Nziramasanga (1999) is of the view that technology is the rational process of creating means to order and transform matter, energy, and information to realize certain valued ends. Brown (2015) states that technology is the set of means (tools, devices, systems, methods, procedures) created by the technological process. Technology is the knowledge that makes the technological process possible. Therefore, technology is the system consisting of the technological process, technological objects, technological knowledge, developers of technological objects, users of technological objects, and the worldview.

1.11. 2 Teaching

Albirini (2006) defines teaching as a process where teachers interact with learners and cultivate in them relevant competences. Simpson (2001) posits that teaching is a process where educators assess learning needs, establish specific learning objectives, develop teaching and learning strategies, implement plan of work. Therefore, teaching may be a process where teachers instill in learners the relevant competences for future.

1.11.3 Effectiveness

According to Gary (2015) effectiveness is the ability to be successful and produce the intended results. Likewise, Simpson (2001) says that effectiveness is producing a decided, decisive, or desired effect. Therefore, effectiveness means a degree to which a purpose is achieved for instance the degree at which ICT tools achieve intended goals in teaching and learning.

1.11.4 Shapes.

In Mathematics, shapes are graphical representation of an object's form or its external boundary, outline or external surface. According to Johnson (2021) a shape can be defined as the boundary or outline of an object and can be differentiated in many ways based on their proper properties. Therefore, shapes mean self-contained areas with defined boundaries, lines, curves or combination of all. might mean finding out the quantity of something.

1.12 Organization of the study

This chapter is organized into five chapters:

Chapter1: Introduction

Chapter2: Literature Review

Chapter3: Methodology

Chapter4: Data Analysis and Results

Chapter5: Conclusion and Recommendations

1. 13. Summary

This chapter looked at the background of the study, statement of the problem, research questions, significance of the study, delimitations of the study, limitations of the study, and definition of terms. The next chapter is going to focus on the related literature review of the study.

CHAPTER 2: REVIEW OF RELATED LITERATURE REVIEW

2.0 LITERATURE REVIEW

A literature review is a written analysis of the scholarly literature on a specific topic, theory, or research issue. It provides a summary, description, and critical evaluation of each source, and lays the foundation for further research. Editage 2024 says it is a comprehensive review and analysis of published literature that relates to a particular research topic or questions being studied. One can view it as a comprehensive and systematic analysis of existing research and scholarly writings on a specific topic or research questions.

2.1 INTRODUCTION

The integration of technology in education has revolutionized the way students learn and teachers teach. The 21st century has witnessed an unprecedented growth in technology advancements and education has been at the forefront of this transformation. Technology has become an indispensable tool in modern education. Mupinga and Redmann (2005)

The effective use of technology in education can:

- enhance students engage and motivation
- improve access to educational resources and information
- facilitate personalized learning and differentiation
- develop essential skills such as critical thinking, problem-solving, and collaboration.
- bridge the gap between theory and practice, making learning more relevant and applicable.

This study aims to investigate the types of technological gadgets or devices used by teachers when teaching shapes at grade five level in mathematics, the challenge the challenge they face and potential strategies to address these challenges. By exploring the role of technology

in mathematics education this research seeks to contribute to the on-going conversation about effective technology integration in the classroom.

2.2 REVIEW OF RELATED LITERATURE

2.2.1 Technological gadgets or devices teachers use when teaching in Mathematics at Primary School

C.MUSARURWA 2021

Journal Title; Teaching With and Learning Through ICTs in Zimbabwe's Teacher Education Colleges.

The provision of ICT resources to the education sector in Zimbabwe has been growing in leaps and bounds since 2002. The Zimbabwean government developed a national ICT policy in 2005. According to Isaacs (2007), the policy was formed both by a Harvard University-guided e-readiness survey, which suggested the country was not e-ready, and by a host of preceding general and sector policy of 2002 and vision 2020. In particular, the Nziramasanga Commission recommended the use of computers for teaching and learning in educational institutions. President's office also launched a campaign to provide most schools with computer related equipment. Computers are one of the gadgets Computers play a vital role in education by enhancing instruction, enabling practical digital skills, supporting collaboration and expanding access to a variety of information. Domborembwa (2021) says that teachers can use computers to create multimedia presentations, videos, and simulations that aid in explaining complex concepts. Computers also help learners learn better by enhancing their learning environment and have the ability to increase learning resources. This with computers, learners can find information quickly, practice skills through interactive games, and even join online classes anywhere. Tablets also are also used in Mathematics lessons. One of the simplest ways to use a tablet to encourage mathematics teaching and learning is to

use the features that come with it, such as the photo and videos. Learners can draw and learn using tablets.

Technologies such as Mathematics software, scientific calculators, spreadsheets, and statistical packages have become common place in many classrooms. This is in sharp contrast to the traditional mathematics classroom, which was dominated by pen and paper. Mugaviri (2020) asserts that technological gadgets have “changed the nature of teaching and learning in math and the changes have been widespread due to government action through the National Curriculum. The National Curriculum has made the use of technology in Mathematics a statutory requirement and all learning institutions.

2.2.1 Challenges teachers face when using technology in teaching Shapes at grade five level in Mathematics at Primary School level

Author : Dr FLORA MERCURY KIWONDE

YEAR OF PUBLICATION: 2020

TOPIC OF THE JOURNAL: Opportunities and Challenges of Integrating ICT in the Teaching and Learning of Environmental Education in Primary Schools.

Numerous scholars have highlighted various challenges for effective integration of ICT in teaching and learning processes. Most challenges hinder effective pedagogical practices of ICT in the classroom. The identified challenges are categorized as either external or internal challenges. External challenges include inadequate access to the technologies, lack of funding, lack of digital resources and infrastructure, inadequate training, and staff support. The internal challenges include teacher related factors such as teachers’ beliefs, teacher self-efficacy and teachers’ attitudes and willingness to teach using ICT facilities as well as school factors. Teacher level challenges include lack of teacher confidence, lack of teacher competence, resistance of change and negative attitudes, while school level challenges

include lack of time, lack of effective training, lack of accessibility to ICT-based resources and lack of technical support in Classroom (Unal and Ozturk, 2012).

Using technology is a complex process and teachers may encounter a number of difficulties. These difficulties are known as “challenges” (Schoepp, 2015). A challenge is defined as “any condition that makes it difficult to make progress or to achieve an objective” Begs (2000). The following are some of the key challenges that have been identified in the literature regarding the use of technology in Mathematics .

i) Limited accessibility and network connection problems

Several research studies indicate that lack of access to resources, including home access, is another complex challenge that prevent teachers from integrating new technologies into teaching Mathematics. At Chipale Primary school in Binga District network is is very poor and sometimes the area can go for more than eight hours without network during the day which becomes difficult for teachers to conduct some lessons using ICT tools as media. Especially online pictures and videos.

The challenges related to the accessibility of new technologies for teachers are widespread and differ from school to school. Similarly, Kotowa and Hungwe (2017) found out that in Zimbabwean primary schools, there are some infrastructure barriers and computers are not readily available. They concluded that one third of Zimbabwean rural primary schools still lack broadband Internet access. Pongweni (2021) explored practitioners’ views from four schools in Matebeleland province on the main obstacles to using technology in teaching. He concluded that four of the top ten barriers were related to the accessibility of technology.

ii) limited technical support at school level

Without both good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the obstacles preventing them from using technology (Lewis, 2020). In Mombeshora's study (2015), technical problems were found to be a major barrier for teachers on technology integration. These technical barriers included waiting for websites to open, failing to connect to the Internet, printers not printing, malfunctioning computers, and teachers having to work on old computers. "Technical barriers impeded the smooth delivery of Mathematics lessons or the natural flow of the classroom activity" (Mombeshora, 2015p. 43).

Mbonga (2017) argued that technology support or maintenance contracts in schools help teachers to use technological resources in teaching Mathematics without losing time fixing software and hardware problems. The Becta (2004) report stated "if there is a lack of technical support available in a school, then it is likely that technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns" (p. 16). Many of the respondents to Becta's survey (2004) indicated that technical faults might discourage them from using ICT in their teaching because of the fear of equipment breaking down during a lesson. In teaching, several studies indicated that lack of technical support is a main barrier to using technologies.

According to Gomes (2015), ICT teaching needs a technician and if one is unavailable the lack of technical support can be an obstacle. In Binga, Muhle (2016) found out that lack of technical support was one of two significant barriers to technology integration in Mathematics teaching in primary schools and might be considered "serious".

iii) Lack of effective teacher training

The challenge most frequently referred to in the literature is lack of effective training (Albirini, 2016). One finding of Domborembwa's (2016) study was that there were not

enough training opportunities for teachers in using technology in a classroom environment. Similarly, Bongoma (2020) put forward that one of the top three barriers to teachers' use of technology in teaching Mathematics was the lack of training. Recent research in Zimbabwe found that the main problem with using technology in teaching Mathematics was the insufficient amount of in-service training for teachers. When there are new tools and approaches to teaching, teacher training is essential (Osborne, 2020). However, according to Balanskat (2016), inadequate or inappropriate training leads to teachers being neither sufficiently prepared nor sufficiently confident to carry out full integration of technology in the classroom. Newhouse (2022) stated "teachers need to not only be computer literate but they also need to develop skills in integrating computer use into their teaching/learning Mathematics programmes" (p. 45).

iv) Limited time

A study conducted by Mupfuti (2020) in Zimbabwe indicates that many primary school teachers have competence and confidence in using technology in teaching Mathematics but time is a major challenge. A significant number of researchers identified time limitations and the difficulty in scheduling enough computer time for primary classes as a barrier to teachers' use of technology in their teaching Mathematical concepts. According to Huruva (2018), the most common challenge reported by all the teachers was the lack of time they had to plan technology lessons, explore the different Internet sites, or look at various aspects of educational software.

iv) Lack of teacher competency

Another challenge is lack of teacher confidence and competences in using technology in teaching Mathematics. In a Zimbabwean research, Huruva (2018) found out that many primary school teachers lacked the knowledge and skills to use computers and other gadgets

in teaching and learning. In developing countries like Zimbabwe, teachers' lack of technological competence is a main barrier to their acceptance and adoption of technology. In Matabeleland North province, for example, teachers' lack of technological competence has been cited as the main barrier (Albirini, 2016). The findings show that teachers who do not use computers in Mathematics claim that "lack of skills" are a constraining factor preventing them from using technology for teaching Mathematics concepts.

2.2.3 Solutions to the challenges faced by teachers in using technological tools when teaching in Mathematics at Primary School.

AUTHOR: S GHAVIFEKN

YEAR: 2016

TOPIC OF THE JOURNAL PAPER: Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions

Wallace (2018) points out that there is need for primary schools to acquire appropriate software for the teaching and learning of Infant content and concepts. Primary school need to acquire classroom computers for teachers and learners, projectors, scanners and printers to use at primary school level (Graham, 2013). Schools need to set up policies on the implementation and teaching of technology in the classrooms. Teachers should do computer courses in order to equip themselves with computer knowledge (Watts, 2011). They should adapt to the new system of e-learning in their teaching. They should also upgrade and appraise themselves on current matters in the use of technology in the classroom.

The district office and schools should organise effective staff development programmes for teachers on how to use technology at primary school level according to Eisner (2020). There is need for head-teachers and teachers to develop clear policies on using technology in the classroom. The Government should consider assisting primary schools to acquire adequate

technological resources such as classroom computers for teachers and learners. It should also consider a rigorous programme for in-servicing teachers through workshops with a focus to capacitate teachers to use technology in the classroom for lesson delivery.

Sketee (2016) highlighted that there are strategies which are appropriate for teachers when teaching learners using technology so that they can have enough confidence. They have to familiarise themselves with the computers and other technological gadgets as well as software programs before assisting learners. Teachers should help learners become familiar with a particular software activity, like the drawing tool options (Watts, 2021). They should explain the activity during a morning meeting, so learners know how to select, do, and exit the activity. Show the computer screen or a printed image of the activity.

2.3 THEORETICAL FRAMEWORKS

The Constructivist learning theory has been used to investigate teaching using technology in Mathematics. This learning theory contributes greatly to understanding both the construction of curricula and events related to teaching and learning. The use of multimedia tools is entirely compatible with the open-ended, non-linear, constructivist model of learning.

Various technologies allow teachers and learners to create interactive lessons, presentations and projects through the integration of images, graphics, text, animation, audio and motion video. It also provides direction for research and implementation. Gredler, (2020) notes that constructive learning emphasises the teachers` central role in academic curricula and suggests improvement according to the teachers` needs and interests. This theory supports the individual`s growth and enables the learners to explore their learning potential.

John Dewey, Lev Vygotsky and Jean Piaget are the most renowned proponents of the constructivist theory in education. Piaget specialised on individual cognitive and personal

constructivism while Vygotsky was interested in social constructivism. According to Denby and Campbell (2018) constructivism emphasises on learner centred approach rather than teacher centred approach. The proponents believe that learners construct knowledge from interaction, collaboration and prior knowledge. Learners are presumed to construct new knowledge from their social interaction and prior knowledge. Therefore, the use of technology in teaching Mathematics can be a springboard for such a social interaction and personal experience.

According to constructivists, the role of the teacher shifts from the traditional one of being the imparter of knowledge to a facilitator of learning (Taber, 2016). The teacher is expected to support the learning process by using appropriate tools which facilitate collaboration of learners themselves and the teacher. This constructivist view showed teachers and learners as collaborators in the learning process and implied the need for learner motivation which can be enhanced by the use of technology. Prichard (2019) asserts that in the context of constructivist theory, learning is an active, not passive activity.

2.4 RESEARCH GAPS

2.4.1 Knowledge Gap

Desired research results could not exist since theories or literature from similar areas are not be available. For example, in technology literature, there is a knowledge gap in understanding how technological gadgets such as computers can develop skills such as problem solving and critical thinking through interaction with Mathematical concepts inform of vedios While there have been studies exploring the potential benefits of videos in developing mathematical skills, there is still a dearth of research into the cognitive benefits of playing specific types of video in Mathematics.

2.4.2 Unexpected study results.

Many current studies from Banhure, Choga and Muriti (2022) in Zimbabwe have found out that playing a video in Mathematics improve cognitive performance in learners, while a previous study by Nhungunwa (2019) found out that playing videos designed to improve executive functioning had no effect on cognitive abilities in Mathematics.

2.4.3 Methodological Gap

The researcher encountered methodological gaps because sampling, measurement, and data analysis methods were different. These methodological problems led to inconsistencies and contradictory findings, making it hard for other researchers to validate the study's conclusions. Ruben (2020) highlights that researchers are better able to understand many phenomena and make better policy decisions if they address these methodological gaps. Therefore, there is need to address issues with existing research methodologies. For example, mixed methodologies can provide a more holistic look at the phenomenon being studied. They can also help to identify underlying factors that might not be seen with one specific methodology.

2.5 SUMMARY

The literature review clearly indicated that there are various perspectives on using technology in teaching Mathematics and it has indicated that technological tools have high potential to enhance Mathematics teaching. Technology, in all its forms, old or modern, simple and complex, can provide effective tools that engage teacher and learners in reflection and development. These tools enable learners and teachers to rethink their old beliefs, attitude, knowledge, and understanding. They may allow learners to compare new approaches and ideas with other individuals. Teachers and learners might assess whether new concepts and ideas are realistic and might be fruitful. Technology can remove barriers that inhibit educators' access to information. In the chapter, the relevance of the principle of

constructivism in the use of technology in teaching was deeply explored. The next chapter will be looking at the methodology of the study.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The thrust of this chapter is to present the research methodology including an outline on research approach, research design, population, sample and sampling procedures, data collection methods and instruments, ethical considerations and data analysis procedures . All these will be discussed from a scholarly perspective.

3.2 Research design

A research design is a detailed outline of how an investigation will take place (Borg and Gall 2017). In this research the researcher adopted the case study which is qualitative. Burns and Grove (2013:195) define a research design as “a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings”. Parahoo (1997:142) describes a research design as “a plan that describes how, when and where data are to be collected and analysed”.

A research design is a detailed plan that outlines how a research study will be conducted. It includes the research methodology, sampling strategy, data collection methods, data analysis techniques. A well-crafted research design helps ensure that the study is conducted in a systematic, rigorous, and unbiased manner. According to... a research design is the plan or framework used to conduct a research study. It involves outlining the overall approach and methods that will be used to collect and analyze data in data in order to answer research questions or test hypotheses. A well designed research study should have a clear and well

defined research question, a detailed plan for collecting data, and a method for analyzing and interpreting the results. A well-thought-out research design addresses all these features.

3.2.1 Research Paradigm

1. Ontology

Ontology is a branch of philosophy that deals with the nature of existence, being and reality. In this study I adopt a social constructivist ontology, which assumes that reality is constructed through social interactions and agreements. This perspective recognizes that the meaning and understanding of shapes are not fixed or absolute, but rather are shaped by the social and cultural contexts in which they are taught and learned. The use of technology in teaching shapes is seen as a tool that can facilitate the construction of meaning and understanding, rather than simply transmitting fixed knowledge. This ontological perspective informs the research design, data collection, and data analysis, and is reflected in the findings and conclusions of the study.

2. Epistemology

This perspective recognizes that learners actively construct their own understanding of shapes through their experiences and interactions with the learning environment. The use of technology in teaching shapes is seen as a tool that can facilitate this constructive process, rather than simple transmitting fixed knowledge. This epistemological perspective informs the research design.

3. AXIOLOGY

Axiology is the branch of philosophy that deals with the nature of values and value judgments. It promotes critical thinking and reflection by encouraging educators to examine their assumptions about teaching, learning and technology. It also helps teachers evaluate

their values and beliefs about the role of technology in education and its impact on student learning. It also enhances personal and professional growth.

1.1.2 Research Methodology

Methodology for the study

This study will employ a mixed-methods research design, combining both quantitative and qualitative approaches. The quantitative approach will involve collecting and analyzing numerical data to measure the effectiveness of technology in teaching shapes at grade five. The qualitative approach will involve collecting and analyzing non-numerical data to gain a deeper understanding of the experiences and perceptions of teachers and learners.

Rationale for the chosen methodology

By combining quantitative and qualitative approaches, this study aims to provide a comprehensive and nuanced understanding of the effectiveness of technology in teaching shapes, which can inform practice, policy and future research.

Which includes;

1. Triangulation: combining quantitative and qualitative approaches enables triangulation, which increases the validity and reliability of the findings.
2. Comprehensive understanding: a mixed-methods approach provides a comprehensive understanding of research phenomenon, which is essential for developing a nuanced and informed understanding of the effectiveness of technology in teaching shapes.
3. Practical implications: a mixed-methods approach provides practical implications for educators, policymakers, and other stakeholders, which is essential for informing practice and policy

1.1.3 Research strategy

This study will employ a quasi-experimental design, specifically a pre-post design, to investigate the effectiveness of technology in teaching shapes at grade five.

Case study

A case study is a research methodology, typically seen in social and life sciences. It is an intensive study about a person, a group of people or a unit which is aimed to generalize over several units. The research takes the form of a case study so as to explore the teaching and learning of the topic shapes in Mathematics at grade five level at Chipale primary school in Binga district. The purpose of the research is to explore and to investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions.

3.3 Research methods

3.3.1 Population and sampling Population

Dooley (2013) defines target population as the group to which the researcher would like the results of the study to be generalized. Miller (2013) views population as all possible elements to be included in a research. Therefore, the concept population refers to the whole group selected by the researcher for a research study. In this study, the target population for the study consisted of the teachers and some grade five learners at Chipale primary school in Binga district..

3.3.2 Sampling procedures and sample

Webster (2016) defines sampling as a process of selecting a number of individuals for the study as a way that the individual represents the larger group from which they are selected. The purpose of sampling was to gain information about a population. Borg and Gall (2013)

say that selection of a sample is a very important step in conducting a research study. In this research the researcher 20 pupils, 10 boys and 10 girls were chosen on a sample.

Rutter (2022) says that a sample is a part of the whole population that can be used and examined in an effort to find out how the population look like. Tony (2002) state that a sample is a smaller but representative collection of units from a population used to determine truths about that population. Therefore, a sample is a selected number of people or items in a population under research for the sole purpose of specified outcomes since a very big group may generalize the results of teaching and learning of the topic shapes in Mathematics at grade five level at Chipale primary school in Binga district.

3.3.2 DATA COLLECTION METHODS/ INSTRUMENTS

The researcher used two methods of data collection which were interview method and questionnaires.

Interview

Interviews are a qualitative data collection method that involves conducting conversations with participants to gather in-depth, detailed information about their thoughts, feelings, and experiences. As the aim of this study is to examine teachers` perspectives on the effectiveness of technology in teaching shapes in Mathematics. Interviews seemed suitable as a data collection method. The purpose of using interviews in this study is to gather rich, contextualized data about the experiences and perceptions of teachers and students regarding the use of technology in teaching shapes in mathematics at grade five.

Types of interview

This study will employ semi-structured interviews, which will allow for flexibility and probing while maintaining a structured format.

Sampling strategy

A purposive sampling strategy will be used to select participants for the interviews. The sample will consist of 10 teachers who have experience with technology-integrated instruction in mathematics.

Interview protocol

The interview protocol will consist of a set of open-ended questions that will explore the following topics;

1. Experiences with technology-integrated instruction: participants will be asked to share their experiences with technology-integrated instruction in mathematics, including their perceptions of its effectiveness.
2. Perceptions of technology-enhanced learning: participants will be asked to share their perceptions of technology-enhanced learning, including its benefits and limitations.
3. Challenges and limitations: participants will be asked to share their experiences with challenges and limitations related to technology-integrated instruction in mathematics.

Data collection procedure

The interview will be conducted in a quiet, private room at the school. Each interview will last 30-45 minutes. The researcher will take notes during the interview and will also conduct a follow-up interview to clarify any points that need further elaboration.

Data Analysis

Step1:Transcription

Transcribe the audio recordings of the interviews verbatim, ensuring that all words, phrases, and pauses are accurately captured.

Step2: coding

To assign to the transcribed data to identify patterns, themes, concepts related to the research questions. Using a combination inductive and deductive coding approaches.

Step3: theme identification

To identify themes and sub-themes that emerge from the coded data. Using of techniques such as constant comparative analysis and memoing to refine the themes.

Step4: data reduction

Reduce the data by selecting the most relevant and representative quotes, phrases, and sentences that illustrate the themes and sub-themes.

Step5: data interpretation

To interpret the reduced data by making connections between the themes, sub-themes, and research questions. To use theoretical frameworks and literature to support the interpretation.

Step 6: validation

To validate the findings by checking for consistency, coherence, and credibility. Using techniques such as member checking, peer debriefing and audit trails to ensure the trustworthiness of the findings.

Outcome Results

Theme1: enhanced engagement

Participants reported that technology-enhanced instruction increased student engagement and motivation in learning shapes.

“technology makes learning fun and interactive. Learners are more engaged and motivated when using technology.” (teacher 3)

Theme 2:improved understanding

Participants reported that technology-enhanced instruction improved students’ understanding of shapes concepts

“technology helps learners to visualize and understand shapes concepts better. It’s more effective than traditional teaching methods” (teacher 2)

Theme 3 : increased confidence

Participants reported that technology-enhanced instruction increased learners confidence in learning shapes.

“technology gives students the confidence to try new things and take risks. It’s amazing to see!” (teacher 1)

Theme4: challenges and limitations

Participants reported several challenges and limitations associated with technology-enhanced instruction, including technical issues, lack of access, and teacher training.

“technical issues can be frustrating. Sometimes the technology doesn’t work, and it disrupts the lessons” (teacher 6)

“not all learners have access to technology at home. It’s a challenge to ensure that all students have equal opportunities to learn.” (teacher 9)

Recommendations

Recommendations for teachers

1. teachers should use technology to facilitate student-centered learning, encouraging learners to explore, create and collaborate
2. teachers should use range of technology tools and resources, such as educational apps, games and simulations, to teach shapes in mathematics
3. teachers should provide students with opportunities to practice and apply their knowledge of shapes in mathematics using technology to facilitate this process.

Recommendations for schools and administrators

1. schools and administrators should provide teachers with professional development opportunities to learn about effective ways to integrate technology into their mathematical instruction.
2. Schools and administrators should invest in technology infrastructure and resources, such as devices, software, and internet connectivity, to support technology-integrated instructions.
3. They should also develop policies and guidelines for technology use, ensuring that technology is used in a way that is safe, responsible, and aligned with educational goals.

QUESTIONNAIRES

It is a written series of questions a participant answers (Coutts and Simpson, 2001). This method gathers responses to questions that are essay or agree or neutral or disagree style. It is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents (Jones 2022). However this has disadvantage on that respondents give their own Perspectives.

ANALYSIS FOR QUESTIONNAIRES

STEP1: DATA CLEANING

Check the questionnaire data errors, inconsistencies, and missing values. Clean and prepare the data for analysis.

Step2: Descriptive statistics

Calculate descriptive statistics, such as means, medians, modes, and standard deviations, to summarize the data and identify patterns.

Step3: inferential statistics

Use inferential statistics, such as t-test, ANOVA, and regression analysis, to test hypotheses and make inferences about the population.

Step4: Factor Analysis

Conduct factor analysis to identify underlying factors or dimensions that explain the relationships between variables.

Step5: Reliability and validity

Assess the reliability and validity of the questionnaire data using techniques such as Cronbach's alpha and confirmatory factor analysis.

OUTCOME RESULTS

Demographic Characteristics

The questionnaire data revealed the following characteristics

- the majority of respondents (75%) were between 25-45 years old.
- the sample consisted of 55% female and 45% male respondents.
- the majority of respondents (60%) had 5-10 years of teaching experience.

Technology integration

80% of respondents reported using technology to teach shapes in mathematics

The most commonly used technology tools were educational apps and online games.

Effectiveness of technology

90% of respondents reported that technology had improved student engagement and motivation in learning shapes

-85% reported that technology had improved student understanding of shapes concepts.

-80% of respondents reported that technology had increased student confidence in learning shapes.

Challenges and limitations

The questionnaire data revealed the following results

-60% of respondents reported that technical issues were a major challenge when using technology to teach shapes.

-50% reported that lack of access to technology was a major challenge.

-40% reported that lack of training and support was one of the challenges.

RECOMMENDATIONS

Based on the findings, the following recommendations can be made:

-provide teachers with training and support to effectively integrate technology into their teaching practices.

-ensure that all learners have access to technology, both in and out of the classroom.

-address technical issues and provide technical support to ensure that technology integration is seamless and effective.

3.4 RELIABILITY AND VALIDITY

Reliability refers to the consistency and dependability of the research instrument or tool. In this study, the reliability of the questionnaire and interview protocol will be ensured through the following methods:

Test-Retest Reliability

The questionnaire will be administered to a small pilot group of teachers , and then readministered after a two-week period to assess the consistency of responses.

Inter-Rater Reliability

Two researchers will independently code and analyse the interview data to assess the consistency of themes and patterns that merge.

Cronbach's Alpha

The internal consistency of the questionnaire will be assessed using Cronbach's Alpha, which measures the correlation between items on the questionnaire.

Validity

Validity refers to the extent to which the research instrument or tool measures what it is intended to measure. In this study the validity of the questionnaire and interview protocol will be ensured through the following methods:

Face validity

The questionnaire and interview protocol will be reviewed by experts in the field of mathematics education to ensure that they appear to measure what they are intended to measure.

Content validity

The questionnaire and interview protocol will be reviewed to ensure they cover all aspects of the research topic.

Construct validity

The questionnaire and interview will be analysed to ensure that they are related to other measures of teacher attitudes and student learning outcomes.

By using these reliability and validity methods, the study will ensure that the data collected is accurate, reliable, and valid, and the findings are generalizable to the population of interest.

3.5 Ethical issues

Researchers are expected to abide by a moral code of conduct when conducting research (Isaac 2007). The moral code of conduct is referred to as ethical considerations. As a student at Bindura State University, the researcher was given a permission letter from the University to do the research study and was permitted to do the research by the School Head. The researcher did not administer any form of punishment or discomfort to the research participants in order to avoid harming them. Privacy and confidentiality were maintained by not disclosing the names of the participants in this research report.

3.6 Summary

Chapter three looked at the traditional research design on which the practical lessons were done. It also looked at the methods of collecting data used and the sampling procedure used. The methods used were and interviews and questionnaires. The next chapter will be focusing on data presentation, analysis and discussion on research findings.

CHAPTER 4

4.0 Results and Discussion.

4.1 INTRODUCTION

In the ever-evolving landscape of education, the integration of technology has emerged as a pivotal force in enhancing pedagogical practices. This research examines the use of technology in teaching shapes in mathematics at the fifth-grade level. By analyzing data collected from various educational settings, this chapter will present a comprehensive overview of the impact of technological tools on learners' understanding of mathematical shapes. Through the use of tables and statistical analysis, the researcher explored the effectiveness of these tools in fostering student engagement, improving learning outcomes and facilitating differentiated instructions.

4.2 DATA PRESENTATION, ANALYSIS AND DISCUSSIONS/INTERPRETATION

RESEARCH QUESTION 1: Types of Technological gadgets or Devices used by teachers.

Data presentation

DIVICE	FREQUENCY	PERCENTAGE
Interactive whiteboards	20	57%
Laptops/desktops	15	43%
Tablets	10	29%
Smartphones	5	14%

Other	2	6%
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Data analysis

The data shows that the majority of teachers 57% use interactive whiteboards when teaching the topic shapes at grade five level in mathematics. Laptops/desktops are the second most commonly used device 43% followed by tablets 29%, smartphones 14%, and other devices 6%.

Interpretation

The findings suggest that teachers prefer to use boards and laptops when teaching shapes in mathematics. This may be due to the interactive and visual nature of these devices, which can facilitate student engagement and understanding of shapes concepts. The relatively low use of tablets and smartphones may be due to limitations in their functionality or availability in the classroom.

Research Question 2: Challenges faced by teachers when using technology

Data presentation

CHALLENGE	FREQUENCY	PERCENTAGE
Technical issues	25	71%
Lack of Training	18	51%
Limited Resources	15	43%

Student distractions	10	29%
Other	5	14%

DATA ANALYSIS

The data shows that the majority of teachers 71% face technical issues when using technology to teach shapes in mathematics. Lack of training 51% and limited resources 43% are also significant challenges faced by teachers. Students distractions 29% and other challenges 14% are less common.

Discussion/interpretation

The findings suggest that teachers face significant challenges when using technology to teach shapes in mathematics. Technical issues, lack of training, and limited resources are major obstacles that can hinder the effective integration of technology in the classroom. These challenges shows that there is need for schools and education authorities to provide teachers with adequate training, resources, and technical support.

Research question 3: Strategies to improve challenges faced by teachers

Data presentation

Strategy	Frequency	Percentage
Provide training and support	28	80%
Increase resource and funding	22	63%

Improve technical infrastructure	20	57%
Encourage Collaboration and sharing	18	51%
Other	5	14%

Data analysis

The data shows that the majority of teachers 80% believe that providing training and support is the most effective strategy to improve the challenges faced by teachers when using technology to teach shapes in mathematics. Increasing resources and funding 63%, improving technical infrastructure 57%, and encouraging collaboration and sharing 51 are also considered important strategies.

Discussion/interpretation

The findings suggest that teachers believe that providing training and support is crucial to improving the challenges faced by teachers when using technology to teach shapes in mathematics. This highlight that there is need to invest in teacher professional development and provide ongoing support to ensure that teachers are equipped to effectively integrate technology in the classroom.

SUMMARY

This chapter presented the findings of the study, which investigated the effectiveness of technology in teaching shapes in mathematics to grade five students. The results showed that teachers have a positive attitude towards the use of technology, and that technology improves learners learning outcomes in shapes in mathematics. However, teachers face challenges such as technical issues, lack of training, and limited resources. The study have a suggestion to provide teacher training, curriculum development and educational policy.

Chapter 5:

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the final conclusions and recommendations of the study, which investigated the effectiveness of technology in teaching shapes in mathematics to grade five learners. The chapter will summarize the key findings, answers the research questions, and provide recommendations for future research and practice.

5.2 SUMMARY OF THE STUDY

This study aimed to investigate the effectiveness of technology in teaching shapes in mathematics to grade five learners. The study employed a mixed-methods approach, combining both quantitative and qualitative data collection and analysis methods. The study found out that technology has a positive impact on student learning outcomes in shapes in mathematics. The study also identified several challenges faced by teachers when using technology to teach shapes, including technical issues, lack of training, and limited resources. Loveless (2007)

5.3 CONCLUSIONS

Based on the findings of this study, the following conclusions can be drawn:

Conclusion 1: TYPES OF TECHNOLOGY USED BY TEACHERS

Teachers use a variety of technological gadgets or devices when teaching shapes in mathematics to grade five students, including interactive whiteboards, laptops, tablets and smartphones.

Conclusion 2: EFFECTIVENESS OF TECHNOLOGY IN TEACHING SHAPES

Technology has a positive impact on student learning outcomes in shapes in mathematics improving learners understanding, engagement and motivation.

Conclusion 3: CHALLENGES FACED BY TEACHERS

Teachers face several challenges when using technology to teach shapes in mathematics, including technical issues, lack of training and limited resources.

Conclusion 4: STRATEGIES TO IMPROVE CHALLENGES

Providing training and support, increasing resources and funding, improving technical infrastructure, and encouraging collaboration and sharing are effective strategies to improve the challenges faced by teachers when using technology to teach shapes in mathematics.

5.4 RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are made:

Recommendation 1: teacher training and support

Schools and education authorities should provide teachers with adequate training and support to effectively integrate technology into their teaching practices. Implement regular professional development workshops focusing on ICT skills for teachers. This will empower educators to use technology more effectively in their teaching practices (Moyo 2022).

Recommendation 2: resource allocation

Schools and educational authorities should ensure that the technical infrastructure is in place to support the effective use of technology in teaching practices.

Recommendation 3: technical infrastructure

Schools should make sure that the technical infrastructure is in place to support the effective use of technology in teaching practices.

Recommendation 4: collaboration and sharing

Teachers should be encouraged to share their experiences and best practices in using technology to teach shapes in mathematics.

Recommendation 5: future research

Future research should investigate the effectiveness of specific technological tools and resources in teaching shapes in mathematics, as well as the impact of technology on student learning outcomes in other areas of mathematics.

Recommendation 6: community involvement:

Engage the local community and stakeholders in supporting technology initiatives in schools. This could include partnership with tech companies for donations or support in training programs.

References

- Albirini, A.(2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education*, 47, 373-398.
- Begs, T. A. (2000). Influences and barriers to the adoption of instructional technology. Paper presented at the Proceedings of the Mid-South Instructional Technology Conference, Murfreesboro,TN.
- Coutts, N.,Drinkwater, R., & Simpson, M. (2001). Using information communication technology in learning and teaching: A framework for reflection, planning and evaluation in school development. *Teacher Development*, 5(2), 225-239.
- Johnson, L. (2021). The Impact of Technology on Student Engagement. *Journal of Education Technology*, 12(3),45-59
- Jones, R. (2022). Visual Aids and Retention in Mathematics Learning. *International Journal of Mathematics Education*,19(4),233-245
- Mupinga, D. M., Burnett, M.F., & Redmann, D.H. (2005). Examining the purpose of technical education in Zimbabwe's high schools. *International Education Journal*, 6(1),75-83.
- Nziramasaanga, C.T. (1999). Zimbabwe Report of the Presidential Commission of inquiry into Education and Training. Harare: Government printers.
- Loveless, A. (2007). Preparing to teach with ICT: Subject knowledge, didaktik and improvisation. *Curriculum Journal*, 18(4),509-522
- Isaacs,S. (2007). ICT in education in Zimbabwe :Survey of ICT and Education in Africa. Zimbabwe Country Report. Retrieved from [http://:www.infodev.org](http://www.infodev.org)
- Teacher 1(2004), personal interview. Chipale Primary School

Teacher 2 (2004), Personal Interview, Chipale Primary School. Personal Interview,

Teacher 3 (2004), Personal Interview, Chipale Primary School

Teacher 4 (2004), Personal Interview, Chipale Primary School

Teacher 5 (2004), Personal Interview, Chipale Primary School

Teacher 6 (2004), Personal Interview, Chipale Primary School

Teacher 7 (2004), Personal Interview, Chipale Primary School

Teacher 8 (2004), Personal Interview, Chipale Primary School

Teacher 9 (2005), Personal Interview, Chipale Primary School

APPENCICES

APPENDIX A

QUESTIONNAIRE FOR TEACHERS

Ngwenya Mejury Tashama is a student at Bindura University of Science Education, currently studying for an Honours Bachelor of science education in mathematics. She is conducting a research on the following topic “ Investigating the effectiveness of technology in teaching shapes at grade five level.” Your responses will be used for this research only. Thank you in advance.

BACKGROUND INFORMATION

1. What is your teaching experience in grade five the topic of shapes in

mathematics?.....

.....

.....

.....

.....

2. What is the level of comfort with using technology in the

classroom?.....

.....

.....

.....

.....

3. Have you received any training or professional development on using technology to teach

shapes in

mathematics?.....
.....

TECHNOLOGY INTEGRATION

1. How often do you use technology to teach shapes in mathematics at grade five level?.....

2. What types of technology tools or resources do you use to teach shapes in mathematics e.g educational apps, online games, interactive whiteboards?.....
.....

3. How do you typically integrate technology into your mathematics lessons e.g whole-class instruction, small group work or individual activities?.....
.....

EFFECTIVENESS OF TECHNOLOGY

1. To what extent do you agree that technology has improved student engagement and motivation in learning shapes in mathematics ? scale 1-5, where 1 is strongly disagree and 5 is strongly agree.....
.....
.....

2. How effective do you think technology is helping students understand shapes concepts in mathematics? Scale: 1-5, where 1 is not effective at all and 5 is very effective.....
.....
.....

3. To what extent do you agree that technology has increased student confidence in learning shapes in mathematics? Scale : 1-5, where 1 is strongly disagree and 5 is strongly agree.....
.....
.....

CHALLENGES AND LIMITATIONS

1. What are some challenges you face when using technology to teach shapes in mathematics at grade five level? Open-ended

- questions.....

2. How do you address technical issues or problems that arise when using technology in the classroom?.....

3. What support or resources do you need to more effectively integrate technology into your mathematics instruction?.....

ADDITIONAL COMMENTS

- 1.Do you have any additional comments or suggestions about using technology to teach shapes in mathematics at grade five level?.....

Thank you

APPENDIX B: INTERVIEW QUESTIONS FOR TEACHERS

Background Information

1. Can you tell me about your teaching experience and background in Mathematics education?
2. How long have you been teaching grade five mathematics, and what is your experience with technology-integrated instruction?

Technology Integration

1. How do you currently integrate technology into your mathematics instruction, and what tools or resources do you use?
2. What motivated you to start using technology in your mathematics classroom, and what benefits do you think it provides for your students?
3. Can you describe a recent lesson or activity where you used technology to teach shapes in mathematics? What was the objective of the lesson, and how did you assess student learning?

Effectiveness of Technology

1. How do you think technology has impacted student learning and engagement in your mathematics classroom, particularly when it comes to teaching shapes?
2. How do you assess the effectiveness of technology in teaching shapes in mathematics?

CHALLENGES AND LIMITATIONS

1. What challenges or limitations have you faced when using technology into your mathematics instruction, particularly when teaching shapes?
2. How do you help learners without access to technological devices at home?
3. What are the technological challenges you have encountered when using technology to teach shapes in mathematics?

FUTURE DIRECTIONS

1. How can using technology be improved when it comes to teaching shapes?
2. What professional development or support do you think teachers need to effectively integrate technology into their mathematics instruction?
3. Can you suggest any potential areas for future research or investigation related to the use of technology in teaching shapes in mathematics?

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SAMED



BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 04/09/24

TO WHOM IT MAY CONCERN

NAME: MGWENYA MEDURY REGISTRATION NUMBER: B225777B

PROGRAMME: HBSCE D MATHS PART: 2.2

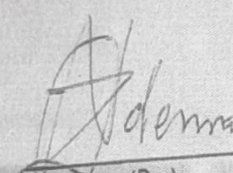
This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

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

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

Your co-operation and assistance is greatly appreciated.

Thank you


Z. Ndemo (Dr.)
CHAIRPERSON - SAMED

