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FACULTY OF SCIENCE EDUCATION

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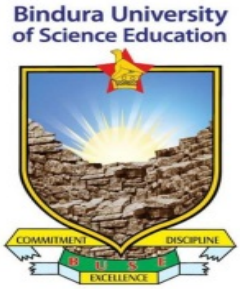

IMPACTS OF E – LEARNING TOOLS IN THE TEACHING AND LEARNING OF MATHEMATICS AT ORDINARY LEVEL

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONORS DEGREE IN MATHEMATICS EDUCATION

JUNE 2024

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Degree Title: Bachelor of Science Honours Degree in Mathematics Education.

Year of completion: 2024

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ACKNOWLEDGEMENTS

First and foremost I would like to thank the Almighty God who provided me wisdom and strength to navigate through the research process. I would also like to extend my gratitude to my dissertation supervisor, Dr. Mangwende who guided me through every detail of the project through reading, editing and polishing the ideas of the write-up. All the credit goes to him for his suggestions and valuable comments on this research; this would not be possible without your support and guidance.

I also thank the administrators of Nyamhunga High Schools for allowing me to carry out the researches at their institutions.

DEDICATION

This study is dedicated to my family who encouraged me through all circumstances to reach beyond the stars I am so thankful. To my late mother, you are the reason I have so much courage to move on when the road gets tough. To my dear friends and colleagues I am thankful for all the encouragement you have given me.

ABSTRACT

The study examined the impacts of e-learning tools in the teaching and learning of Mathematics. The research was carried out at Nyamhunga High School. The researcher used three e-learning tools which included Whatsapp, zoom and google classroom in the teaching and learning of Mathematics on simultaneous equations and graphs of quadratic equations. The researcher concluded that e-learning tools are effective in the teaching and learning of Mathematics. Therefore, teachers need to make use of these e-learning tools to enhance the grasping of concepts on Mathematics thereby improving the national Mathematics pass rate

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CHAPTER 1: INTRODUCTION

1.0 Introduction

For as long as instruction has been delivered, students, teachers and administrators have been integrating e-learning tools in their institutions. This research aims to explore the impacts of E-learning tools in the teaching and learning of Mathematics at Ordinary level.

1.1 Background to the study

In an effort to try and ensure continuous and enhanced teaching and learning the researcher looked at the impact of using e-learning tools as we are living in a technologically advanced world. In addition to that, most learning institutions are making use of e-learning tools to supplement on their face to face lessons. Thus, the researcher explored to see the impacts of e-learning tools in teaching and learning of Mathematics at Ordinary level.

According to Bersin (2004) e-learning takes place through texts, videos, sounds and interactive graphics to improve quality of learning. ICT (Information and communication technology) can provide considerable benefit in supporting learning. By using technology in their learning, the learners can be active learners as they can explore information available in the internet. According to Algahtani (2011), the development of multimedia and information technologies as well as the use of internet as a new technique of teaching has made radical changes in the traditional process of teaching and learning. Thus e-learning is being practiced worldwide and has brought more choices in terms of teaching tools. In Zimbabwe a lot of tertiary institutions are making use of e-learning tools rather than traditional face to face lessons especially those who are on block programs. Also, other private and secondary schools used e-Learning tools like zoom and WhatsApp during the lockdown period.

1.2 Statement of the Problem

Despite the potential benefits of e-learning tools in mathematics education, there is a need to explore their impact at the Ordinary level. While numerous studies have investigated the impacts of e-learning tools in higher education and professional development settings, there is a scarcity of research focusing specifically on their impact in the teaching and learning of

mathematics at the Ordinary level. Therefore, this study aimed to bridge this gap by examining the impact of e-learning tools on students' academic performance, engagement, and attitudes towards mathematics at this level.

1.3 Research Questions

The following research questions guided this study:

1. What are the e-learning tools commonly used in the teaching and learning of mathematics at the Ordinary level?

2. What is the impact of e-learning tools on students' academic performance in mathematics?

3. How does e-learning tools influence students' engagement with mathematics?

4. What are the attitudes of students towards mathematics when e-learning tools are incorporated into instruction?

1.4 Objectives of the Study

The main objectives of this study are as follows:

1. To identify the e-learning tools commonly used in the teaching and learning of mathematics at the Ordinary level.

2. To examine the impact of e-learning tools on students' academic performance in mathematics.

3. To explore how e-learning tools influence students' engagement with mathematics.

4. To investigate the attitudes of students towards mathematics when e-learning tools are incorporated into instruction.

1.5 Assumptions of the study

The study assumes that;

- The gadget manipulation skills of the learner have little effect on virtual learning integration
- The results obtained from the learners are not biased to a certain expected outcome and will reflect true and desired output.
- The study will be completed in the stipulated time frame and does not extend beyond the term where the study is being carried out.
- Familiarisation with virtual learning tools does not take long.

1.6 Significance of the study

The research was of importance as it came up with the relevant e-learning tools and showed their impacts in Mathematics lessons in which some of learners' time was negatively affected by disruptions in the learning process. This study holds several implications for various stakeholders in the field of mathematics education

Firstly, it provided insights into the impacts of e-learning tools in enhancing students' academic performance in mathematics at the Ordinary level. This information can guide educators and policymakers in making informed decisions regarding the integration of e-learning tools into the curriculum. Educators and all other relevant stakeholders can make use of the research findings to find ways in teaching learners through e-learning platforms. This research encouraged parents and other relevant stakeholders to realize the need to purchase electronic gadgets and also enable parents to assist their children at home through e-learning.

Secondly, the study did shed light on how e-learning tools can improve students' engagement with mathematics. By identifying the specific features and functionalities of e-learning tools that promote engagement, educators can design more interactive and stimulating learning experiences for their students. The research can be of importance to various stakeholders and key to decision makers in the education sector. More so, it can raise awareness on the potential

of e-learning tools in the grasping of Mathematical concepts and also a variety of teaching methods can be implemented.

Lastly, understanding students' attitudes towards mathematics when e-learning tools are incorporated can help identify any potential challenges or barriers to their adoption. This knowledge can assist educators in addressing these issues and ensuring that e-learning tools are implemented effectively. The research can give a better understanding on the impacts of e-learning tools and can contribute to academic theory that can benefit learners

1.7 Limitation of the study

This research focused specifically on the impact of e-learning tools in the teaching and learning of mathematics at the Ordinary level. The Ordinary level refers to the secondary school level in the education system. The study was limited to a specific geographical area, and the sample consisted of students and teachers from Nyamhunga High School.

Another limitation of this study was the reliance on self-reported data, which may be subject to response bias. Additionally, the study's findings may not be generalizable to other educational levels or contexts, as the impacts of e-learning tools can vary depending on factors such as students' prior knowledge, socioeconomic background, and access to technology.

In addition, another limitation to the impacts of the project was lack of cooperation from learners and some subject teachers which resulted in inadequate responses.

Also, lack of ICT gadgets, can be a limitation, for example, in the issue of laptops and tablets. They are expensive and not every parent can afford to buy the laptops. Data bundles and network may limit the effectiveness of the project. For this research the researcher used the school WIFI or the Econet private Wi-Fi bundle. Also, power cuts can be a problem however, alternative sources of electricity were used as at the school there is solar system. Time can be a limitation because instead of doing all the topics I selected only two topics because of time.

1.8 Delimitation

The research was carried out at Nyamhunga High School in Kariba District with ordinary level pupils, that is, form 4A6. The class had a total enrollment of fifty learners.

1.9 Definition of key terms

E-learning according to Bersin (2004) is the acquisition of knowledge which takes place through electronic technologies and media.

Teaching as defined by Chiromo (2010) is the engagement with learners to enable their understanding and application of knowledge, concepts and processes.

Learning is a process of acquiring new understanding, knowledge, behaviors, skills and values (Chiromo, 2010).

1.10 Chapters layout

This research had five chapters. Chapter one which looked into the background of the study, statement of the problem, research questions, significance of the study, limitations and delimitations of the study. Chapter 2 is for literature review on related literature on the impacts of e-learning tools in the teaching and learning of Mathematics at ordinary level. Chapter 3 is for research methodology in which the researcher looked at the research design, methods of data collection and types of data and sampling techniques to be used in the study. In addition to chapter 3 is chapter 4 where collected data was presented in tables and graphs, analyzed and discussed. The last chapter was on research summary, conclusions and recommendations.

1.11 Summary

In summary, this chapter has provided an overview of the study on the impact of e-learning tools in the teaching and learning of mathematics at the Ordinary level. The subsequent

chapters will delve deeper into the topic to explore the research questions and provide valuable insights into the integration of e-learning tools in mathematics education.

Chapter 2. Literature Review

2.1 Introduction

In this chapter the researcher reviewed literature on definition of e-learning, different e-learning tools that can be used by teachers and learners, the impacts of e-learning tools on students' academic performance in mathematics, how e-learning tools influence students engagements and their attitudes towards mathematics and e-learning tools. Advantages and disadvantages of e-learning tools were also incorporated in each aspect mentioned above and the limitations were also discussed. A variety of literature on e-learning tools was consulted.

2.2 E-learning definition

E-learning is the acquisition of knowledge which takes place through electronic technologies and media (https://www.digitalclassworld.com). Amer, (2002) defines e-learning as the learning utilizing electronic technologies to access education curriculum outside the traditional classroom and it is an interactive system of education. The European Commission (2001) describes e-learning as the use of new multimedia technologies and the internet to increase learning quality. E-learning is a learning program that makes use of an information network such as internet, intranet or extranet whether wholly or in part for course delivery, interaction and or facilitation (Ajaja 2009). Thus e-learning allows for the acquisition of knowledge to learners through the use of electronic media and the internet and also it allows for active participation of the teacher and the learners. Richard and Haya (2009) postulate that the internet has become one of the vital ways to make available resources for research for both learners and teachers to share and acquire information. Thus, the internet plays a crucial role in the teaching and learning.

2.3 E-learning types and tools

There are several ways of classifying the types of e-learning. Khan (2005) divided e-learning into two basic types that is computer based and internet-based e-learning. Amer (2002) states that computer-based learning is the use of full range hardware and software available for the use of

information and communication technology. Thus, computers can be used to manage instruction as well as assist learning. Computers are used for the purpose of storing and retrieving information (Nichols, 2003). Through the use of computers learners and facilitators are able to keep their learning materials in computers which reduces paper work.

Internet based learning according to Almosa (2001) is a further improvement of the computer-based learning as it makes content available with links to related knowledge sources. Examples of internet-based learning include the use of platforms like google classroom, zoom, WhatsApp and many more. Video conferencing and chat rooms can be used as they allow discussions and group work.

According to Amer (2002) e-learning can be employed as an assistant in the traditional classroom or it can be where course material and explanations are shared between traditional learning method and e-learning method in the classroom set up.

E-learning tools are tools that are used to deliver information using information and technology resources such as internet, intranet and multimedia applications (Amer, 2007). Teachers and learners can make use of a variety of e-learning tools in the teaching and learning of Mathematics at ordinary level. These e-learning tools include the use of zoom, google classroom and WhatsApp.

Zoom according to (Fitzpatrick 2012) is a web communication service which can be used in the teaching and learning allowing for teacher to learner interaction. According to Curtis and Lawson (2001) zoom allows for video meetings and has a built-in app that allows students without microphones to participate in the meeting. This shows that through the use of zoom there is learner participation allowing for relaxed and enjoyable lessons. Pedone (2003) states that relaxation makes each lesson more productive and effective. More so, through the use of zoom learners or teachers can record their meetings allowing a meeting to last up to 24 hours with video and audio files recorded (Fitzpatrick, 2012).

In addition, zoom has many best features for example, the ability to allow users to showcase an entire presentation (Curtis & Lawson, 2001). These features enable the teachers to effectively deliver their lessons for the achievement of lesson objectives.

However, for one to be able to use zoom application there is need for a strong internet connection and also the users need to be know how to use this application because without adequate knowledge the users cannot benefit from all the features available on the application.

Another tool that can be used is google classroom which is a great flexible way to ensure that every student gets what they need and can easily delete and create classes (Curtis & Lawson 2001). Through the use of goggle classroom learners can have access to different types of learning materials which can be in the form of PDF, PowerPoint presentation, videos, audios and pictures. These learning material promotes effective learning and reduces paper work on the part of the learner as well as the teacher. However, without having a good device with plenty of storage space it can be difficult to enjoy the benefits of Google classroom unless one stores the materials making use of Google drive which will require internet network for the retrieving of documents every time one wants to use them.

To add on to the above, google classroom allows for effective communication and sharing of information as the user can make announcement. Also this tool speeds up the assignment process and also enhances easy grading according to Pedone (2003) as some of the assignments and quizzes can be marked electronically reducing the teacher's workload. Through the use of google classroom information can be accessed anytime and anywhere (Curtis & Lawson, 2001). With the use of this method learning becomes interesting as learners can learn at their own pace at the time that is convenient to them. However, just like zoom method, Google classroom requires a strong network and technological expertise. When the teacher does not how to upload exercises and quizzes it will be difficult to provide learners with the exercises as well the grading system can be difficult to make use of it.

WhatsApp is another tool that can be used. Whatsappinc (2017) postulates that this method one of the popular instant messaging application and it allows for sending of videos, audios, pictures, documents as well as allowing voice and video calls. With the use of this application learners as well as teachers have access to a variety of learning materials which will enhance effective teaching and learning. As learners download or send information electronically it means less paperwork for them.

According to Bansal and Joshi (2014) WhatsApp is easy to use and it's an interesting way to learn. This method is user friendly as learners and teachers can be able to access information easily and according to Holmes and Gardner (2006), learners' access lesson content unlimited number of times. As learners learn through the use of WhatsApp, they can play the videos and audios over and over again so as to be able to grasp concepts. Also through the use of videos Mathematical concepts demonstration can be seen and played over and over again.

However, the use of WhatsApp in the teaching and learning requires strict monitoring according to Pedone (2003). For effective learning learners need to be monitored by teachers as well as parents as some learners may misuse their gadgets or can be online busy chatting with their friends. Also, WhatsApp may not be conducive enough for learning as messages, video and audio calls from friends can disturb the learners as well as teachers whilst conducting the teaching and learning process.

2.4 Impact of e-learning tools on students ' academic performance

The use of e-learning in the teaching and learning of Mathematics at ordinary level has several positive effects because e-learning is considered among the best teaching and learning methods. Smedley (2010) postulates that e-learning helps to compensate for scarcity of resources including scarcity of man power and apparatus resulting in the improvement of quality of education. This is especially true in teaching and learning of Mathematics whereby in the absence of resources e.g. graph books or equipment like mathematical sets ,the teacher can make use of videos that learners can watch thereby enhancing the grasping of concepts. According to Nichols (2003) e-learning is flexible pertaining on issues of time and place. Thus, through the e-learning platforms, learners can learn in the comfort of their homes at any time. Every learner has the liberty to choose the place and time that suits him or her.

According to Holmes and Gardner (2006), learners can access lesson content at unlimited number of times. This is true as learners can listen to an audio or watch a video on a certain topic over and over again so as to be able to grasp concepts of which this is difficult in a traditional form of learning. In a traditional form of learning once a teacher delivers a lesson he

or she is done and even if you go for consultations the teacher cannot deliver the lesson the same way it was done.

E-learning tools have shown a positive impact on students' performance in various studies. For example, a research paper by Means et al (2009) conducted a meta-analysis of studies on the effectiveness of online learning. They found that students using e-learning tools performed better than those receiving traditional instruction, with an average improvement in student outcomes equivalent to about a percentile point.

Additionally, the flexibility and accessibility of e-learning tools allow students to learn at their own pace and in their preferred environment, leading to increased engagement and motivation. This personalized approach to learning can enhance students' understanding of the material and retention of knowledge.

Furthermore, the interactive nature of many e-learning tools, such as multimedia resources, simulations, and online discussion forums, can promote collaboration among students and critical thinking skills. E-learning tools have the potential to positively impact students' performance by providing personalized learning experiences, enhancing engagement, and fostering collaboration and critical thinking skills.

2.5 How e-learning tools influence students' engagement

E-learning tools have been found to positively influence students' engagement with mathematics by providing interactive and personalized learning experiences. Research by Kyaw and Nyein (2014) investigated the impact of e-learning tools on mathematics education and found that students showed higher levels of engagement and interest in learning when using technology-enabled resources compared to traditional methods.

One of the key ways e-learning tools enhance engagement in mathematics is by providing interactive simulations, visualizations, and real-life examples that help students understand abstract mathematical concepts better. These tools can make learning more engaging and accessible, catering to different learning styles and preferences.

Moreover, e-learning tools allow for adaptive learning experiences, where students can progress at their own pace and receive immediate feedback on their performance. This personalized approach can increase motivation and engagement, as students feel more in control of their learning process.

Additionally, the collaborative features of some e-learning platforms enable students to work together on problem-solving tasks, fostering a sense of community and peer learning. This social interaction can further enhance engagement and deepen understanding of mathematical concepts. E-learning tools positively influence students' engagement with mathematics by providing interactive, personalized, and collaborative learning experiences.

E-learning accommodates every learner's needs (Khan, 2005). E-learning is suited for everyone as education can be accessed, discussed and shared anytime and everywhere by every learner. Learners or teachers can share information and can have educational discussions in the comfort of their homes at the appropriate time well suited for them.

More so, e-learning offers access to updated content to learners when they want it. Almosa (2002), states that e-learning provide accurate, up to date information relating to mathematics content. Thus, through e-learning both teachers and learners benefit from access to high quality courses, content and learning experiences.

E-learning motivates to interact with others without fear (Smedley 2010). Through e-learning learners feel more comfortable to express themselves as learners will be less anxious in expressing their views and thoughts in public as well as to ask questions.

Almosa (2002) postulates that e-learning is cost effective as there is no need for learners to travel and it offers learning opportunities to a maximum number of lessons with no need for many buildings. Also, through e-learning there is reduced costs as little money if any is required to purchase course materials like textbooks. According to Almosa (2002) e-learning allows for self-pacing for example asynchronous way allows each learner to study according to his or her own pace thus increasing satisfaction and decreasing stress. E-learning makes learning stress free as it can allow learners to pause the lesson and resume from where they left. Also, learners can balance their activities with their study time.

More so, e-learning enhances interactivity resulting in the achievement of objectives in the shortest time with little effort according to Holmes and Gardner (2006). There is quick delivery of lessons as compared to traditional classroom due to quick start of lessons as there is no need for learners to travel to schools for learning. Also, learners can define their own speed of learning instead of following the speed of the whole group.

2.6 Attitudes of students when e-learning tools are incorporated

Students' attitudes towards mathematics have been positively influenced when e-learning tools are incorporated into instruction. Research by Akcaoglu & Lee (2016) explored the impact of technology use on students' attitudes toward mathematics and found that students reported increased interest, motivation, and enjoyment of learning mathematics when using e-learning tools.

One reason for this positive shift in attitude is the interactive nature of e-learning tools, which can make mathematical concepts more engaging and accessible to students. Interactive simulations, games, and multimedia resources can help students visualize and understand abstract concepts, leading to increased interest and enjoyment in learning mathematics.

Furthermore, the personalized nature of e-learning tools allows students to learn at their own pace and receive immediate feedback on their progress. This can boost students' confidence in their mathematical abilities and increase their motivation to learn. Moreover, the collaborative features of e-learning platforms enable students to work together on math tasks, fostering a sense of community and peer support. This social interaction can lead to more positive attitudes towards mathematics, as students feel supported and engaged in their learning.

Incorporating e-learning tools into mathematics instruction can have a positive impact on students' attitudes by increasing interest, motivation, and enjoyment of learning mathematics.

2.7 Limitations of e-learning tools

In spite of the advantages of e-learning in education it also has some disadvantages. E-learning requires a strong inspiration as well as skills so as to be able to use it (Khan, 2002). E-learning need a committed and dedicated person with the ability to use the electronic gadgets. Some

learners instead of making use of the ICT tools to learn they will misuse the tools downloading pornographic materials, films and music. Smedley (2010) argues that where clarity is needed e-learning is less effective than the traditional method of learning. Through face-to-face lessons the learning process is much easier as there is much contact and non-verbal communication can be noted. In addition, it is difficult to make thorough assessments in tests as bad activities like cheating are impossible to control or regulate (Amer, 2007). This is true as it's difficult to measure the grasping of concepts by learners as they will be taking tests whilst at home researching unlike in the traditional class whereby the teacher can monitor learners as they write.

Moreover, according to Smedley (2010) e-learning may led to plagiarism through the ease of copy and paste. This is especially true where learners on assignments they can just copy and paste their responses from other websites. E-learning can also reduce time for socialization for learners (Almosa, 2002). Through e-learning learners' time to meet will be reduced as learners won't be going to school thus limiting socialization.

Furthermore, the use of e-learning methods requires as good power source according to Pedone (2003) for the phones, laptops and tablets need to be charged. Also at times the internet network may be affected with the unavailability of electricity. Also, for one to be able to utilize e-learning methods there is need for the availability of a strong internet network as well as the availability of Wi-Fi or data bundle. According to Young and Norgard (2006) some learners lack resources that are needed for e-learning. Thus some learners do not have gadgets to use as well as internet access.

2.8 Summary

The chapter reviewed literature on the definition of e-learning, types of e-learning tools, advantages and disadvantages of e-learning methods. A variety of sources were used. The research questions were addressed in this chapter and the next chapter will focus on the research design.

Chapter 3 - Research Methodology

3.1 Introduction of chapter

This chapter focused on research methodology showing the research design which the researcher used so as to be able to gather valid and reliable data for the study. Tools of data collection, data collection procedure, and data analysis and research integrity were also discussed in this chapter.

3.2 Research design

Research design according to Creswell (2009) is a plan which give information on how the research should be carried out. This means that a research design acts as a road map on how to conduct the research. In this research the researcher used a mixed method research design that allows the use of qualitative and quantitative methods. Bell and Waters (2014) state that mixed method research design allows an in-depth understanding of the study and also enhances the gathering of relevant detailed data. Thus, through the use of mixed methods there is better comprehension of the problem.

3.3 Sample and sampling procedure

O'Leary (2014) defines a sample as a group of people, objects or items that are taken from a larger population for measurement. The sample enables the researcher to generalize the findings from the research sample to the population as a whole. The study was carried out at Nyamhunga high school with pupils in 4a6. The class had an enrollment of fifty learners. The researcher used of a sample of 50 learners for this study. The sample was divided into two groups through the use of simple random sampling. Small pieces of paper were written numbers which determined the group in which the learners would be during the study. Group number one was for learners who learnt through the use of e-learning tools whilst group two was for learners making use of the traditional classroom method.

Through the use of random sampling technique folded pieces of paper were placed in a hat for learners to pick. Of the 50 pieces, twenty five were labelled one and the other twenty five were

labelled two. Learners who picked papers labelled one were placed in group 1 and those who picked a paper labelled two were automatically placed into group 2.

The researcher also randomly selected simultaneous equations and graphs of quadratic equations from the syllabus which were used for the study so that the researcher can explore on the impacts of e-learning tools in the teaching and learning of Mathematics at ordinary level.

3.4 Methods of data collection

Two methods of data collection were used so as to obtain valid and reliable information. The researcher used questionnaires, tests and observations so as to gather information pertaining to the study. According to Creswell (2009), a questionnaire is a list of questions or items used to gather data from respondents about their attitudes, experiences and opinions. Thus, through the use of questionnaire qualitative and quantitative data is collected. Data was collected on the use of e-learning tools, advantages and disadvantages of e – learning tools in delivering Mathematics content. Closed and open-ended questions were used in questionnaires. Open ended questions provided detailed insight into the phenomenon understudy. Tests were used to assess the achievement of set objectives on the topics covered. Pretest and post tests were used so as to be able to effectively measure the impact of e-learning tools. A pretest is an assessment that is used at the beginning of a course to establish subject knowledge baseline (Bell and Waters, 2014). Pretests together with posttests helped the researcher to know or assess if knowledge was acquired.

3.5 Data collection procedure

The researcher conducted lessons on the selected topics. The learners in group two had face-to-face lessons on the topics whilst those for e-learning tools had their lessons through the use of Google classroom. The objectives to be achieved for the two groups were the same. During face-to-face lessons the teacher observed learners' performance as well as their body language. Tests were administered to learners at the end of each topic to assess on the achievement of lesson objectives.

In addition to the above, the researcher used questionnaires which were distributed to learners under study as well as Nyamhunga High School mathematics teachers. The questionnaires had

questions that allowed the researcher to gather information on the impacts of e-learning in the teaching and learning of Mathematics. After the completion of the questionnaire the researcher collected them and analyzed them so as to be able to present the information.

3.6 Data analysis

The data collected was presented in tables and graphs so that the researcher can analyze the data. The data was analyzed making use of discussions. The researcher analyzed the respondents' response on the questionnaire so as to explore on the impacts of e-learning tools in the teaching and learning of Mathematics at ordinary level. From the learners' performance the researcher was able to analyze which teaching method is effective either e-learning methods or the traditional classroom method. From the two groups the learners that had the highest performance pass rate indicated the method that can produce best results thus showing the impacts of the method.

3.7 Research integrity

The researcher observed research ethical principles and values whilst carrying out the research. Privacy, confidentiality and respect were guaranteed by the researcher by not disclosing gathered information to anyone so that the participants would feel free to participate and air out their views. The researcher also acknowledged the work of other researchers and authors. Valid interpretations and justifiable claims were made based on the research findings that had been collected.

The researcher before data collection asked for permission from the responsible authority that is the school head of Nyamhunga high school to conduct the research. More so, the researcher informed the participants or the sample about the research that was going to be conducted and ask for their cooperation.

3.8 Summary

In this chapter the researcher looked at the research design that was used to carry out the study. The chapter highlighted on the sample that was used as well as the sampling procedures.

More so, methods of data collection and data collection procedure were discussed as well as data analysis and research integrity.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter focused on data presentation, analysis and discussion on the data that was collected during the research. The research questions in chapter one were addressed in this chapter basing on the data that was collected. More so, the findings were also discussed in relation to literature based on this topic.

4.2 Organization and clarity of presentation analysis

Respondent rate

The researcher distributed fifty questionnaires to learners and all the questionnaires were completed and returned. Three questionnaires were distributed to teachers and all of the questionnaires were completed and returned. The researcher was able to observe learners' behavior as he was teaching. More so, learners were given a pretest and two posttests so as to be able to assess the achievement of objectives.

4.3 E-LEARNING TOOLS USED

The researcher took a survey on the tools employed by teachers for online learning and the results are as shown in table 4.1.

Table 4.1 E-learning tools used by teachers

	Google classroom	Zoom	WhatsApp
Teacher A	No	Yes	Yes
Teacher B	No	No	Yes
Teacher C	Yes	Yes	Yes

From Table 4.1, it is evident enough that all the three teachers are making use of e-learning tools whereby WhatsApp is the most used method by all the three teachers. Zoom was being used by two teachers and Google classroom being used by only one teacher. According to

Bansal and Joshi (2014) WhatsApp is one of the popular applications as it is easy to use. Thus, WhatsApp is commonly used because it is easy to use and it allows fast and easy communication. Also the WhatsApp bundles are cheap as compared to zoom and google classroom. WhatsApp Inc., (2017) states that this application allows for sending of videos, audio, photos, documents, video call and voice calls also allows group chatting where members can share data without barriers. Thus, WhatsApp application can be used in the online teaching as it allows sharing of knowledge through the use of audios, videos and notes on word documents and PDF.

From the questionnaires completed by the teachers they stated that WhatsApp is the future of e-learning because it is user friendly as compared to other methods and because it does not require information and technology experts. More so, WhatsApp does not require a strong internet network as compared to zoom and Google classroom. Through the use of WhatsApp, teachers can send learners reading materials, videos, images and audios which can help learners to grasp concepts. Also important to note is the fact that the teachers stated that e-learning tools are effective in the teaching and learning of Mathematics as they can help to cover for shortage of lesson time for Mathematics lessons. Through the use of pictures learners can be able to make use of images, thus enhancing the grasping of concepts and these pictures can save learners' time as they will no longer have the burden to draw diagrams.

However, WhatsApp requires learners who are focused because there isn't much teacher supervision in terms of monitoring whether the learner is utilizing the sent materials. Pedone (2003) states that without learner monitoring e-learning may not be effective. Thus, it is crucial for teachers as well as parents to monitor learners so that teaching and learning can take place effectively.

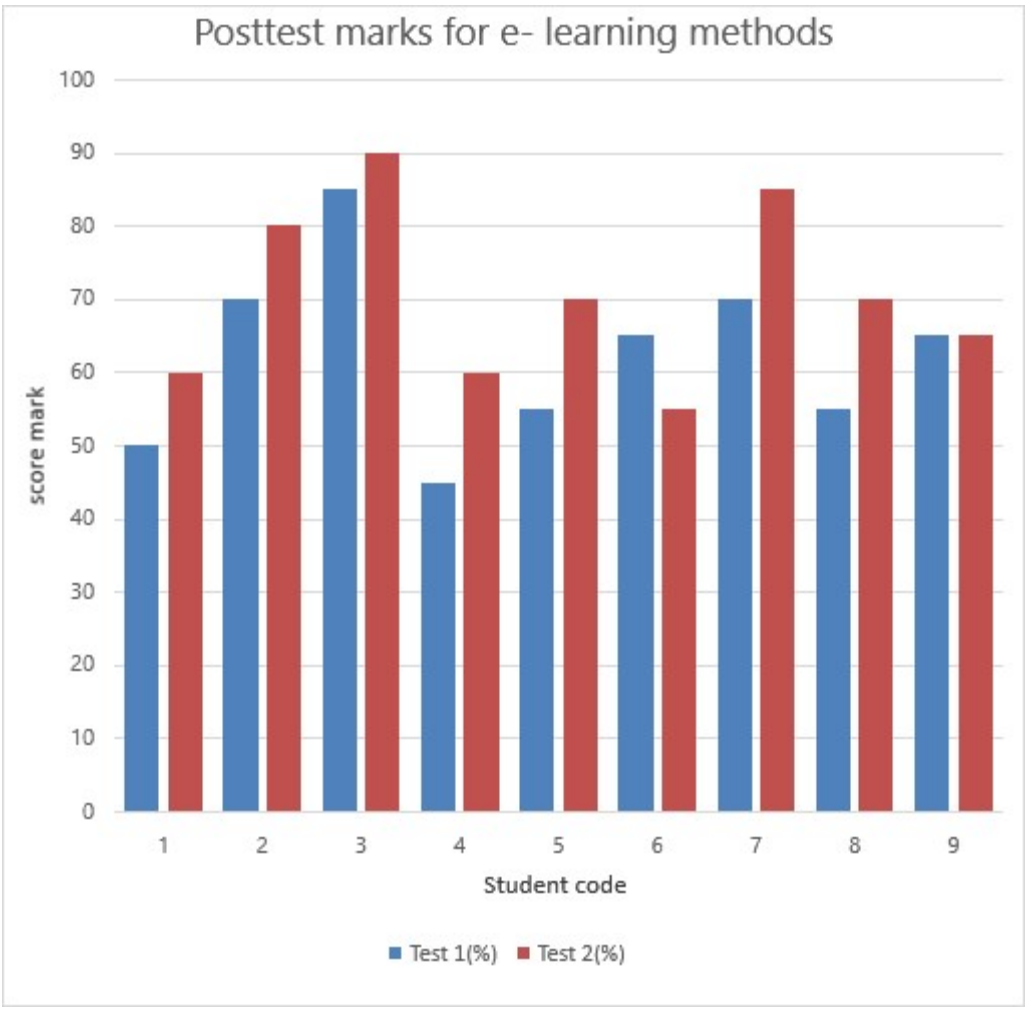
In addition, zoom and google classroom the teachers said that most learners showed less interest in using these platforms citing that they are unfamiliar on using these platforms also that the platform requires a good network strength. According to Curtis and Lawson (2001), some of e-Learning tools are not being utilized by teachers and learners because they lack technological knowledge on how to use them. Also, Khan (2005) states that e-learning requires

strong inspiration as well as skills so as to be able to use it. Thus, through inspiration and skills teachers as well as learners should be able to fully make use of e-learning tools for their benefit.

However, zoom platform is good to use as it enables the teacher to monitor on the learner's participation and involvement in the teaching and learning process. Fitzpatrick (2012), states that zoom has many features including the ability that allows the user to showcase an entire presentation. Thus, through zoom lessons the teacher can be able to properly present the lesson in such a way that learners can be able to grasp concepts.

4.4 IMPACT OF E-LEARNING TOOLS ON THE ACADEMIC PERFORMANCE OF LEARNERS

From the results gathered on the pre-test that was written by all the fifty learners before the e-Learning and face to face lessons on the topics of simultaneous equations and quadratic equations for the study. From the results it was noted that the learners' performance was below average as the highest score was thirty percent and the least percentage was five



percent.

Figure 4.1 Posttest marks for e-learning methods

From Figure 4.1 it can be noted that the learners performed fairly well on answering the test questions. Almost all of the learners managed to score a pass mark except for student with code 4 who got forty-five percent in test one. This may be due to lack of reading or revision of the sent materials. The class average for Test 1 was 63.5% while class average for Test 2 was 71.5%. The highest score from the test results was ninety percent and the least score was forty-five percent. These results show that e-learning teaching tools are effective. From the marks that the learners got in the pre and posttests it can be noted that there was a marked improvement in the learners' performance. This indicates that learners were able to grasp concepts.

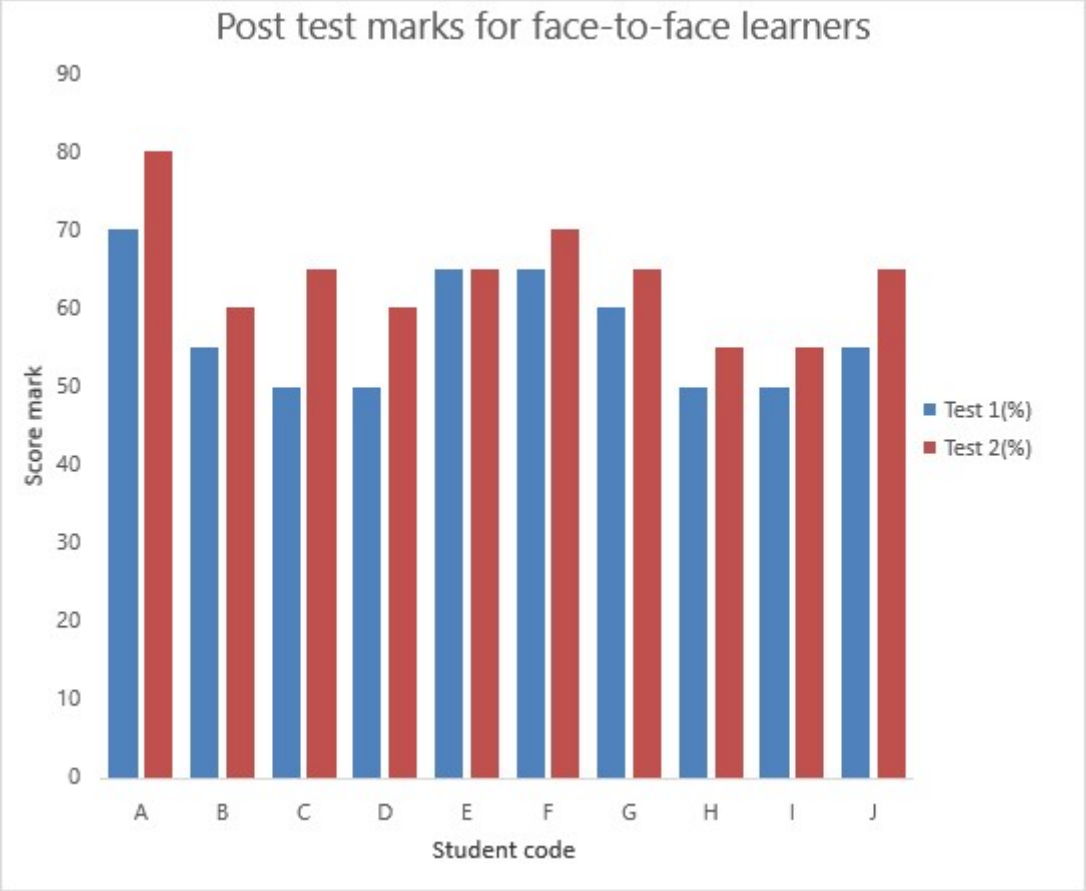


Figure 4.2. Posttest marks on face to face learning method

From Figure 4.2, it can be noted that the learners performed fairly well on answering the test questions. All the learners managed to score fifty percent and above with fifty percent being the least mark and eighty percent being the highest mark. The class average for test one was 57% and the class average for Test two was 64%. For the learners' performance it can be noted that learners performed fairly well compared to their performance in the pretest. This showed that knowledge was added to the learners.

From the class average calculations, it can be noted that learners who made use of e-learning tools did well compared to learners who made use of face-to-face lessons. This may be due to the reasons that those who used e-learning tools had videos and audios which they could play over and over again which made them to easily grasp concepts. As supported by Holmes and Gardner (2006) who argues that through e-learning tools learners have access to lesson content

unlimited number of times. Thus, dedicated learners can go through their learning materials over and over again so as to be able to grasp concepts.

4.5 E-LEARNING TOOLS AND STUDENTS ' ENGAGEMENT IN MATHEMATICS LEARNING

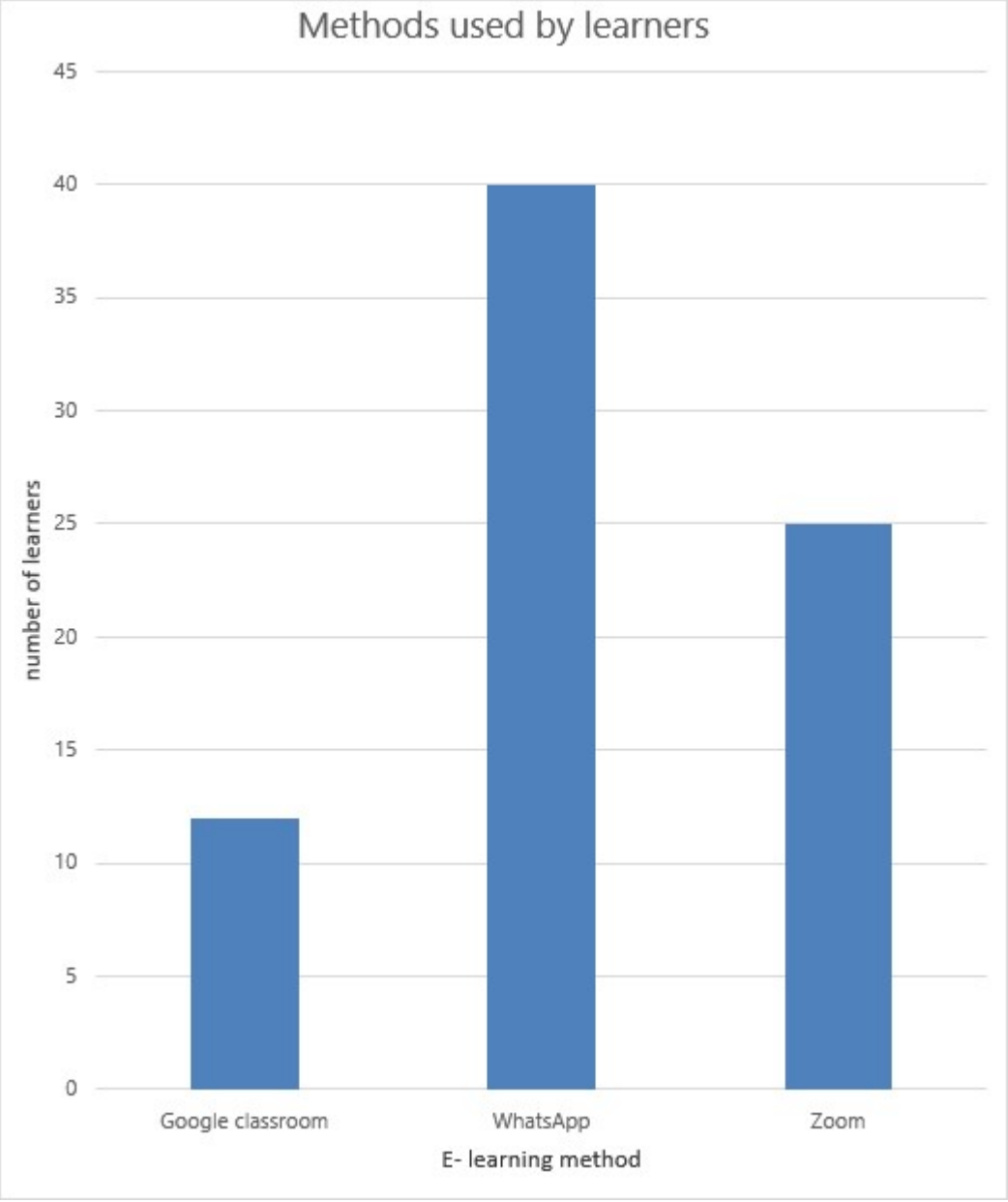


Figure 4.3 E-learning methods used by learners

From the data gathered and presented all the learners have used one or more e-learning tools in their learning experience. The widely used e-learning tool is WhatsApp with forty learners

followed by zoom with twenty-five learners and the least is Google classroom with twelve learners.

From the questionnaires completed by learners the researcher noted that learners enjoyed using online lessons because of a variety of learning materials that they received which include videos, audios, images and PowerPoint notes. More so, some learners noted that through the use of videos and audios they can be able to grasp concepts through playing the audios and videos over and over again. According to Khan (2005), learners through e-learning methods receive a variety of learning materials which suits their different needs. Thus e-learning enables learners to receive information in the form of books, video, audio and pictures from which the learner will benefit enabling him or her to grasp concepts.

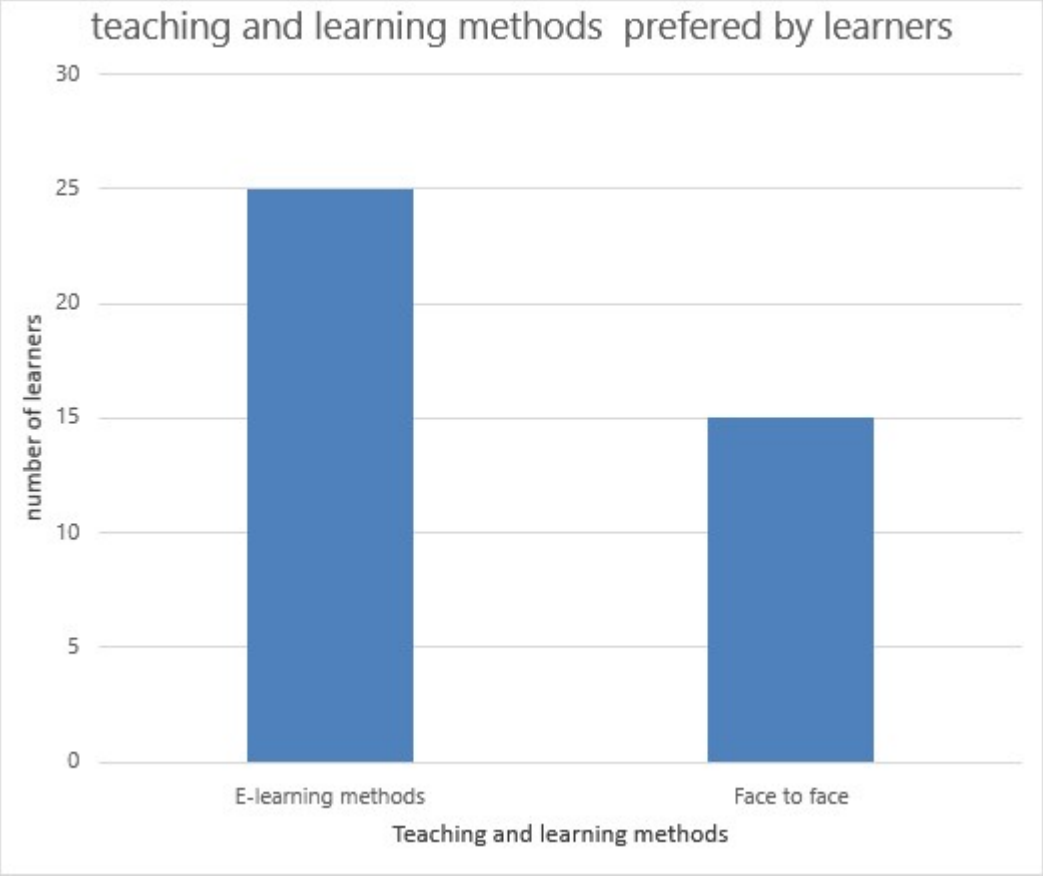


Figure 4.4 Teaching and learning methods preferred by learners

From the information presented in Figure 4.3, twenty-five learners prefer e-learning methods to face to face lessons while fifteen learners prefer face to face lessons to e-learning. From

calculations learners who prefer e-learning lessons constitutes 62, 5% while those who prefer face to face lessons constitute 37, 5%. Learners who prefer e-learning stated that this is an interesting way of learning which is supported by the technological advanced era. More so, e-learning enables learners to learn in the comfort of their homes and they learn through the use of videos, images and audios which can be played over and over again unlike in the class where they find it difficult to continue to ask the same question thrice as some teachers get emotional. Holmes and Gardner (2006) state that through e-learning learners can access lesson content an unlimited number of times. This implies through the use of audios and videos learners can listen and watch as many times as they can. The learners stated that e-learning allows them to learn at any time when it is convenient for them unlike having an afternoon lesson when they are tired which will be difficulty for them to concentrate. This is supported by Almosa (2002) who stated that through e-learning learners' study at their own pace. This implies that learners can learn at their own time through the use of e-learning tools.

Learners who prefer face to face lessons stated that face to face lessons are good as they allow sharing of ideas through group discussions and they also allow learners to ask questions and get clarity on grey areas. According to Almosa (2002) e-learning reduces time for socialization for learners. This is so because through the use of e-learning tools learners will have limited time with their peers as they will be learning in the comfort of their homes. They argued that some of them cannot work on their own as they need teacher's supervision. Moreover, the learners stated that at times internet network will be down or weak making it impossible to be involved in online lessons. The face-to-face learners state that they lack phones that has good storage capacity to store videos and large documents and some of them they do not have phones they make use of their parents or siblings' phones. This is supported by Young and Norgard (2006) who stated that some learners lack resources that are needed for e-learning. Also, Heng and Sol (2020) are of the idea that lack of resources is hindering the effectiveness of online learning. This is especially true in most of the rural areas in Zimbabwe where learners as well as teachers do not have phones and laptops as well as access to internet.

4.6 ATTITUDES OF STUDENTS TOWARDS MATHEMATICS WHEN E-LEARNING TOOLS ARE INCORP0RATED

Less than half of the class used to participate during face to face lessons and their engagement and interest was very low. Learners would indicate an open dislike of mathematics. After the incorporation of e-learning tools, the response on the platforms used was overwhelming. A lot of learners were engaged and participated. They showed great interest and like of the subject all of a sudden. It implies further that their attitude towards Mathematics became pleasant.

Students exposed to e-learning tools developed a positive attitude in the posttest while students in the other group remains neutral. There is a significant difference between the attitudes of the students in Mathematics when exposed to different learning approaches. In this case, the incorporation of e-learning tools yielded positive attitude in the learners towards mathematics.

4.7 Observations

From the face-to-face lessons the researcher conducted, about sixty percent of the learners actively participated during the lesson. However, the majority of the learners were not asking questions instead they were answering the teacher's questions and some of the teacher's questions they were not responding positively. The researcher observed that some learners were shy or afraid to participate during the lesson. According to Smedley (2010), some learners in the traditional classroom do not feel free to ask questions as they will be shy or afraid to participate. Thus, learners at times do not participate during face-to-face lessons as a result of being afraid or being shy of their peers.

On the online lessons conducted the researcher noted that some learners never responded to the teacher's questions may be due to lack of commitment or being shy or being afraid. Pedone (2003), noted that without learner monitoring, e-learning may not be effective. Thus, monitoring of learners by teachers and parents is very important so that e-learning can become effective. On online lessons the researcher observed that learners responded to the teacher's questions on different hours and some learners could respond after a day or never responded.

This was because to lack of connectivity or commitment. The researcher also noted that learners were making use of different gadgets as some learners had laptops, some had tablets and some were making use of their smart phones with different storage capacity.

DISCUSSION

The information gathered by the researcher revealed that there was enough evidence that all the three teachers were employing e-learning tools and WhatsApp happened to be the most used method by all the three teachers. The Zoom platform was being used by two teachers and Google classroom by only one teacher. According to Bansal and Joshi (2014) WhatsApp is one of the popular applications as it is easy to use. This makes it the most commonly used platform because it is easy to use and it allows fast and easy communication. Also the browsing bundles are cheap as compared to other platforms. WhatsApp Inc., (2017) states that this application allows for sending of videos, audio, photos, documents, video call and voice calls also allows group chatting where members can share data without barriers. In this regard this application can be used in the online teaching as it allows sharing of knowledge through the use of audios, videos and notes on word documents and PDF.

However, WhatsApp requires learners who are focused because there isn't much supervision in terms of monitoring whether the learner is utilizing the sent study materials. Pedone (2003) states that without learner monitoring e-learning may not be effective as intended. Therefore it is very crucial for teachers as well as parents to monitor the activities of the learners so that teaching and learning can take place effectively.

Zoom and google classroom were said to be the platforms learners showed less interest in using citing that they were unfamiliar with such platforms. Curtis and Lawson (2001) alluded that some of the e-Learning tools are not being utilized by teachers and learners because they lack technological knowledge on how to use them. Khan (2005) is of the assertion that e-learning requires strong inspiration as well as skills so as to be able to use it. Thus, through inspiration and skills teachers as well as learners should be able to fully make use of e-learning tools for their benefit.

However, zoom is good in the sense that it enables the teacher to monitor the learner's participation and involvement in the teaching and learning process. Fitzpatrick (2012), states that zoom has many features including the ability that allows the user to showcase an entire presentation. Thus, with zoom lessons the teacher can deliver properly a lesson in such a way that learners can be able to grasp concepts.

From the results gathered on the pre-tests written by all the fifty learners before the eLearning and face to face lessons on simultaneous equations and quadratic equations, it was noted that the learners' performance was below average as the highest score was thirty percent and the least percentage was five percent

E-learning enables learners to learn in the comfort of their homes and they learn through the use of videos, images and audios which can be played over and over again unlike in the class where they find it difficult to continue to ask the same question thrice as some teachers get emotional. Holmes and Gardner (2006) state that through e-learning learners can access lesson content an unlimited number of times. The learners stated that e-learning allows them to learn at any time when it is convenient for them unlike having an afternoon lesson when they are tired which will be difficult for them to concentrate and stay focused. Almosa (2002) stated that through e-learning, learners study at their own pace. This means that learners can learn at their own time through the use of e-learning tools.

Learners whose preference was face to face lessons asserted that face to face lessons are good as they encourage and promote sharing of ideas through group discussions and they also allow learners to ask questions and get clarity on grey areas. According to Almosa (2002) e-learning reduces time for socialization for learners. This is so because through the use of e-learning tools learners will have limited time with their peers as they will be learning in the comfort of their homes. They argued that some of them cannot work on their own as they need teacher's supervision. Moreover, the learners stated that at times internet network will be down or weak making it impossible to be involved in online lessons and also lack of resources. This is supported by Young and Norgard (2006) who stated that some learners lack resources that are needed for e-learning. Also, Heng and Sol (2020) are of the idea that lack of resources is

hindering the effectiveness of online learning. This is especially true in most of the rural areas in Zimbabwe where learners as well as teachers do not have laptops as well as access to internet.

4.8 Summary

This chapter focused on the presentation of data through the use of tables, graphs and discussions. In this chapter research questions were answered and the research findings were discussed in relation to literature. The next chapter will focus on the summary and conclusion of the study. Also, the chapter will look at recommendations and areas of further research.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discussed about the study in relation to the research questions. In an effort to assess the implications of the results and make conclusions the discussions were done in relation to the background of the study and literature review. The researcher gave a summary as well as conclusion of the study, recommendations and possible areas of further research.

5.2 Summary of the study

The researcher's area of study was on the impact of e-learning in the teaching and learning of Mathematics at ordinary level. Chapter one of the study looked on the background of the study where the researcher pointed that the need for the research arises as a measure to make for more learning time for the learners. In chapter one, the researcher looked at the statement of the problem and research questions. The research questions also influenced the research objectives. The research questions were what are the e-learning tools commonly used in the teaching and learning of mathematics at the Ordinary level , what is the impact of e-learning tools on students' academic performance in mathematics, how does e-learning tools influence students' engagement with mathematics and what are the attitudes of students towards mathematics when e-learning tools are incorporated into instruction?

In addition, the researcher looked at the significance of the study as coming up with solutions to create more teaching and learning time in Mathematics lessons, also providing relevant stakeholders on the impact of e-learning tools and adding more knowledge to already existing knowledge. The key terms in relation to the topic were defined which are impact, e-learning and teaching and learning. More so, delimitations of the study which was Nyamhunga High School in Kariba District was stated.

Chapter two reviewed literature on what is e-learning and also the various e-learning tools that can be used in schools. Literature was also reviewed on the advantages and disadvantages of these e-learning tools. Various sources were used so as to allow the researcher to analyze on the impact of e-learning to the teaching and learning of Mathematics at ordinary level taking into consideration the findings of other researchers.

In chapter three research methodology of the study was discussed were the researcher used a mixed method approach comprising of the use of both qualitative and quantitative methods which allowed for an in-depth understanding of the study. A sample of fifty learners was used which was divided into two groups through the use of simple random sampling. Data collection methods used were tests, observations and questionnaires. The data collected was presented, analyzed and discussed in chapter four. Data was presented in tables and graphs. From the data that was collected and presented by the teacher, e-learning proved to be effective in the teaching and learning of Mathematics even though there are some disadvantages which need to be addressed.

During the study the researcher had some drawbacks. Some learners did not have browsing bundles for them to make use of e-learning tools so they had to make use of the school WIFI which was a challenge since a lot of protocol had to be followed to be granted access. Also, in some cases the school WIFI had poor internet connectivity and the researcher would hotspot the learners making use of the Econet Ruzivo bundle and ZOL fibroniks wifi. There were also some learners who lacked ICT gadgets so they made use of the school laptops. More so, power cuts were so rampant and frequent such that a solar back up system was required especially to charge the gadgets.

5.3 Conclusion

From the study carried out by the researcher a lot of findings were made which can help various educational stakeholders. A crucial point noted by the researcher is that e-learning tools are very effective in the teaching and learning of Mathematics hence teachers and learners can make use of the e-learning tools for the achievement of educational aims and objectives. In this regard, e-learning allows teachers and learners to practice teaching and learning through the use of phones, tablets and laptops.

From the research it was also noted that there are many ways that can be used by teachers and learners to promote teaching and learning of Mathematics. The e-learning tools that could be used were WhatsApp, zoom and Google classroom. These three methods are good to use because they allow sharing of knowledge in the form of audios, videos, textbooks, PDF and

word documents. Through the use of these e-learning tools learners can pause or play videos and audios over and over again. Furthermore, e-learning tools provides room for less paper work for both teachers and learners. This gives learners ample time to read and revise their work. Through e-learning, learning becomes captivating and interesting as learners can do their assignments and submit them online.

The researcher also noted that through online learning learners have a chance to work in the comfort of their homes. This also positively contributes to quick syllabus coverage as learners can continue learning whilst they will be home during the school holidays and weekends. These e-learning tools are also good as they benefit both the teacher and the learner because they help the teacher to meet their set aims and objectives. E-learning tools allow learners to access diagrams which are useful in the learning of Mathematics as some topics in Mathematics have a lot of diagrams. This will save the learners' time as they will make use of the picture and diagrams rather than drawing for themselves as the majority of the learners struggle with drawing.

However, e-learning is not 100% effective as a result of some factors which were noted by the researcher. E-learning tools are not being fully utilized by the teachers as well all learners as they are not fully knowledgeable on how to make use of the tools. This is so because e-learning requires technological expertise to operate making use of the electronic gadgets. Also, learners and teachers lack proper resources to use that is some do not have laptops and tablets they make use of phones which have less storage capacity. As a result, learners will not have the ability to store large documents as well as large videos. Another important point to take note of is network problems whereby in some parts of Zimbabwe network for internet is a challenge hence it's difficult to have e-learning in some parts of the country. Also, most schools in Zimbabwe they do not have WIFI access. Teachers and learners have to purchase their own WIFI or data bundles. Some learners misuse their gadgets downloading non educational materials therefore strict monitoring is required.

WhatsApp as an e-learning tool at times it's difficult to use for learning as learners or teacher can receive voice and video calls whilst one is having a lesson which can negatively affect one's concentration span.

5.4 Recommendations

Using the data collected and analyzed in this study, the researcher came up with the following recommendations:

- Teachers need to embrace e-learning in the teaching and learning of Mathematics for it has a positive impact as it allows learners to learn through the use of videos, audios, word documents, PowerPoints and PDFs thus allowing learners to grasp concepts as they will be having a variety of learning materials.
- There is need for the employer or school authorities to staff develop teachers on how to use e-learning tools in the teaching and learning such that teachers can fully utilize the e-learning tools for their own benefit as well as for the benefit of the learners.
- Learners should also be trained on how to make use of the e-learning tools especially Zoom and Google classroom so that they can fully benefit enjoying learning in the comfort of their homes, on the go or anywhere and at any time.
- The government need to avail e-learning resources or materials to schools with financially challenged learners. These e-learning resources include laptops, desktops, tablets, WIFI and many more. These resources will go a long way to assist the rural schools and learners to have resources to use so as to enjoy the benefits of e-learning.
- Teachers need to make use of a variety of e-learning tools so as to make learning interesting and motivating. The use of one tool over and over again may become monotonous and also through the use of a variety of tools the shortcomings of another method may be covered through the use of another method.

- Teachers should blend e-learning tools with face-to-face lessons so that learning can continue to take place during holidays and weekends. Also blended methods will enable teachers to make use of the best method depending on the topic that is being taught.
- Parents and teachers need to monitor learners during the use of electronic gadgets as some learners might misuse the gadgets downloading non educational materials for example movies, pornography etc.
- School authorities need to have alternative electrical energy systems in case of power cuts. Alternative electrical sources include making use of the solar system or making use of the generators so that phones, laptops and tablets will not shut down as a result of the absence of electricity.

5.5 Areas for further research

From the study, the researcher noted that there are some areas that need further research and these include:

- What can be done to implement e-learning in all schools country wide?
- What can be done to increase the impact of e-learning tools in the teaching and learning of Mathematics?
- What should be done to make sure all teachers are able to use e-learning tools in every subject area?
- What can be done so that learners cannot misuse their electronic gadgets downloading non educational materials?

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APPENDICES

APPENDIX A

Research instruments (questionnaire)

TOPIC: Exploring on the effectiveness of e-learning tools on teaching and learning of Mathematics at ordinary level.

My name is Mutowo Valentine T. and I am carrying out a research study on impacts of eLearning tools in teaching and learning of Mathematics as part fulfilment of the requirements of the HBScEdMt programme. I am requesting you to respond to the questions by way of ticking in the box adjacent to the question. The information that you volunteer will solely be used for the research study. Please note that you are not obliged to write your name on the questionnaire.

Questionnaire for teachers

1. What is your opinion on teaching mathematics remotely?

……

……

2. Have you ever used any e-learning tools in your teaching of ordinary level learners?

Yes ☐ No

3. If your answer is yes which e-learning tool or tools have you used?

……

……

4. In your own opinion, what are the advantages of the tool used?

……

……

5. In your opinion what are the disadvantages of the e-learning tool used.

……

……

……

6. In your opinion can Mathematics teachers make use of eLearning tools in the teaching and learning?

Yes ☐ No ☐

7) What are your recommendations if any on the use of e-learning tools in the teaching and learning.

……

……

……

APPENDIX B

Questionnaire for learners

TOPIC: Impact of e-learning tools in teaching and learning of Mathematics at ordinary level.

My name is Mutowo Valentine T. and I am carrying out a research study on effectiveness of eLearning tools in teaching and learning of Mathematics as part fulfilment of the requirements of the HBScEdMt programme. I am requesting you to respond to the questions by way of ticking in the box adjacent to the question. The information that you volunteer will solely be used for the research study. Please note that you are not obliged to write your name on the questionnaire.

1. How satisfied are you with the overall e-learning experience?
2.

……

3. Have you ever been taught making use of e-learning tools?
4.

Yes ☐ No ☐

3. If yes which platforms or tools did you make use of?

……

4. To the best of your knowledge, was the lesson effective? Explain your answer.

……

5. If you are given the opportunity to choose between e-learning tools and traditional classroom methods of teaching which method will you choose and explain why you would choose this method.

……

……

……

APPENDIX C

PRE – TEST

1. The following is the table of values for the graph $y = 7 - 5x - x^2$

x	-6	-5	-4	-3	-2	-1	0	1	2
y	1	7	11	a	13	11	b	1	-7

a. find the values of a and b.

b. using a suitable scale, draw the graph of $y = 7 - 5x - x^2$ for $-7 \leq x \leq 2$

c. use your graph to answer the following

i. state the coordinates of the maximum point.

ii. solve the equation $7 - 5x - x^2 = 1$

iii. find the gradient of the curve at the point where $x = 0$

2. Solve the following pair of simultaneous equations.

a. $2x - y = 8$
$3x + y = 17$

b. $4x + 6y = 21$
$7x - 3y = 3$

c. $5x - 19 = 2y$
$3y + 18 = 4x$

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P.O. BOX 128
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APPENDIX D

POST TEST

1.a. The following is an incomplete table of values for the function $y = \frac{3}{x+2}$

x	-6	-5	-4	-3	-2	-1	0	1	2
y	-0,75	-1	-1,5	p	-6	3	1,5	q	0,75

i. calculate the value of p and q

ii. using a suitable scale draw the graph of $y = \frac{3}{x+2}$ for $-6 \leq x \leq 2$

b. using your graph,

i. find the gradient of the curve at the point where $x = 1$

ii. solve the equation $2x + 3 = \frac{3}{x+2}$.

2. Solve the following pairs of simultaneous equations.

a. $2x + 3y = 10$
$2x + y = 2$

b. $12x + 12y = -7$
$4x - 3y = 7$

c. $4a = 1 - 3b$
$4b = -1 - 6a$.

HEADMASTER
NYAMHUNGA HIGH SCHOOL
04 JUN 2024
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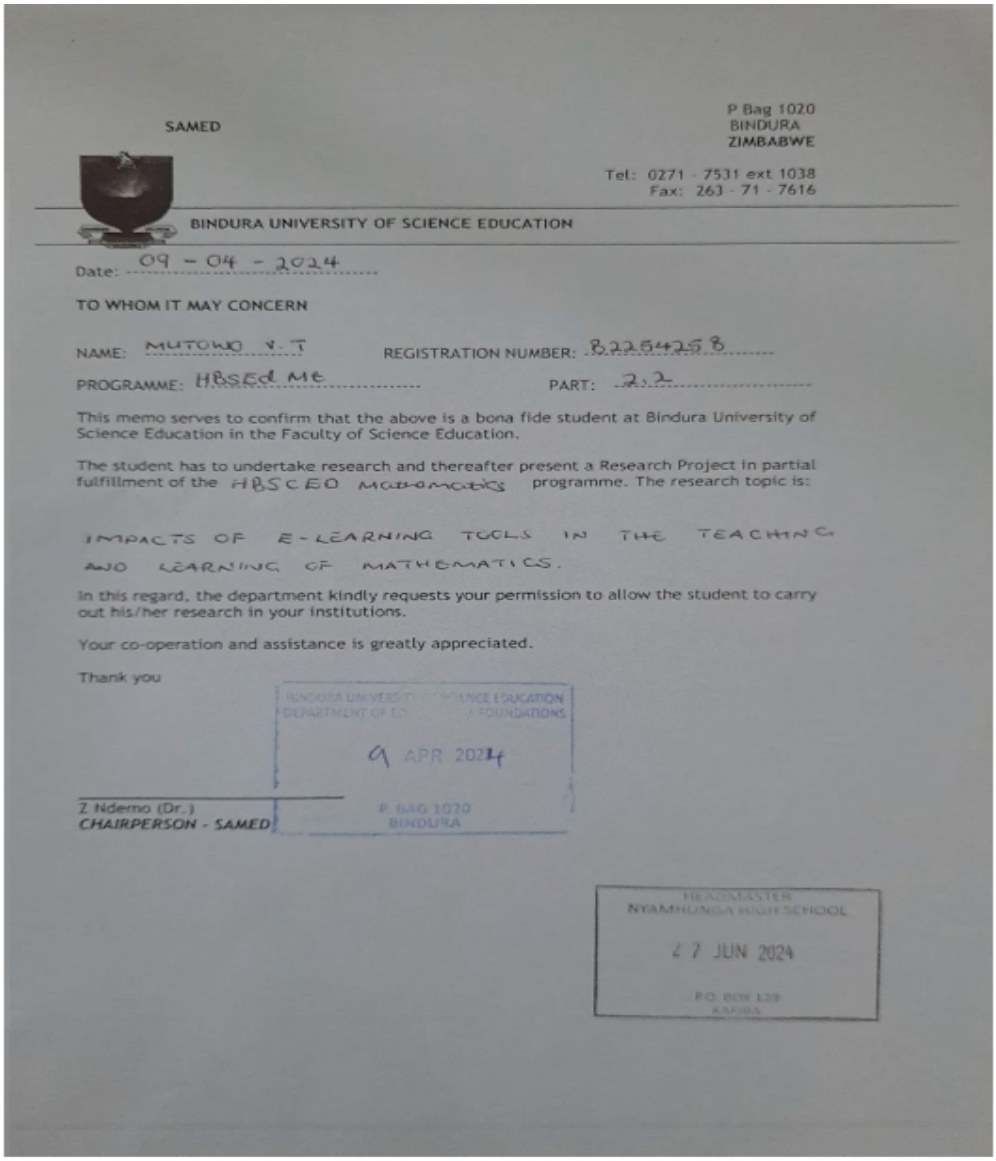
APPENDIX E



SAMED

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ZIMBABWE

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BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 09 - 04 - 2024

TO WHOM IT MAY CONCERN

NAME: MUTOWO V. T REGISTRATION NUMBER: B2254258

PROGRAMME: HBSEd Me 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 HBSCEO Mathematics programme. The research topic is:

IMPACTS OF E-LEARNING TOOLS IN THE TEACHING AND LEARNING OF MATHEMATICS.

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

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF ED... & FOUNDATIONS
9 APR 2024
P. BAG 1020
BINDURA

Z Ndemo (Dr.)
CHAIRPERSON - SAMED

HEADMASTER
NYAMHUNGA HIGH SCHOOL
27 JUN 2024
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