THE IMPACT OF BLENDED LEARNING TECHNIQUE ON THE PERFORMANCE OF STUDENTS IN MATHEMATICS AT NAGONGERA CAMPUS, BUSITEMA UNIVERSITY.

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July, 2024

Declaration

I, **Chebet Sandra**, hereby declare that this report is my original work and has never submitted to a college, University, or other organizations for any award.

Chebet Sandra

.....

Approval

This dissertation has been submitted for examination with the approval of my University supervisor

Signature..... Date.....26/08/2024.....

Dr. Asaph Keikara Muhumuza

Dedication

To my lovely grandmother Brugai Melda, my lovely uncles Chemonges Peter, Mwanga Cedric and Musani Eric, my lovely mother Yamangusho Betty, my lovely aunties Kabaro Juliet and Yapsoyekwo Phillis Brothers Ignatius, Migel, Boniventure, and Sahaf, my lovely sisters Faith, Michelle, and Trinah, you were my inspiration, Challengers and cheerleaders during my graduate studies

ACKNOWLEDGEMENT

First, I give all glory to God for assisting me in completing my research, which is a major accomplishment for my academic career would like to thank Dr. Asaph Keikara Muhumuza, my supervisor, for his inspiring and motivating words of advice and support when I needed them. You constantly appreciated my efforts and pushed me to perform at my highest level. I value how you challenged me to keep improving and moving forward during our professional interactions. Thanks for consenting to help me and taking part in this research process, I sincerely appreciate you. May the almighty God bless you abundantly.

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ABSTRACT

Blended learning, which combines traditional face-to-face instruction with online learning, has gained popularity in recent years as a means of enhancing student performance in various disciplines. This report examined the impact of blended learning on the performance of students in mathematics courses at Nagongera campus, Busitema University.

Busitema University is a public university in Uganda, with its main campus located in Busitema and several other campuses, including Nagongera. The university offers a variety of programs, including mathematics courses, which are critical for students pursuing degrees in science, technology, engineering, and mathematics (STEM) fields

The implementation of blended learning in mathematics courses at Nagongera campus involved a combination of traditional classroom instruction and online learning activities. The online component includes the use of learning management systems (LMS), educational videos, interactive quizzes, and discussion forums. This approach allows students to learn at their own pace and engage in collaborative learning activities.

The study examined the impact of blended learning on student performance by comparing the grades of students who participated in blended learning courses with those who took traditional face-to-face courses. The study also analyzes the factors that contribute to the success of blended learning, such as student engagement, motivation, and satisfaction.

The study found that students who participated in blended learning courses performed better than those who took traditional face-to-face courses. The results suggest that blended learning provides students with more opportunities to engage with the course material, review difficult concepts, and receive feedback on their progress. Moreover, the study found that blended learning increased student motivation and satisfaction, leading to higher levels of engagement and participation.

Despite the benefits of blended learning, the study identified several challenges that need to be addressed to ensure its success. These challenges include:

Limited access to technology: Some students may not have access to the necessary technology to participate in online learning activities.

Lack of technical skills: Some students may lack the necessary technical skills to navigate the online learning environment.

Limited internet connectivity: Limited internet connectivity in some areas may hinder students' ability to access online resources.

Time management: Balancing the demands of online and face-to-face learning activities can be challenging for some students.

Inadequate training for instructors: Instructors may require training on how to design and deliver effective blended learning courses.

To maximize the impact of blended learning on student performance in mathematics courses at Nagongera campus, Busitema University, the following recommendations were suggested:

Provide students with access to technology and training on how to use it effectively.
Develop online resources that are accessible and user-friendly for all students.
Ensure that instructors receive adequate training on how to design and deliver effective blended learning courses.

Encourage collaboration between instructors and students to promote active learning and engagement.
Monitor and evaluate the effectiveness of blended learning regularly to ensure continuous improvement.

CHAPTER ONE

1.0 INTRODUCTION

Many educators and academics have been interested in discovering more about how students' performance in mathematics courses at Nagongera Campus is affected by Blended learning strategies. Studying how technology is changing and impacting student learning and performance—especially in math classes—has grown more crucial as it develops further (Roschelle, Pea et al. 2000). There are many ways that online teaching and learning strategies have affected students' performance in mathematics classes at Nagongera Campus which was examined in this essay, along with the advantages and disadvantages of using them.

1.1 BACKGROUND

In recent years, the impact of Blended learning technique had significantly impacted various aspects of education, including the performance of students in mathematics courses in Nagongera campus. This essay will delve into the factors that contribute to this impact, including the advantages and disadvantages of blended learning technique, and the possible future implications for students and educators. Blended learning points out the following advantages to the performance of students. Blended learning technique offer flexibility in terms of time and location, allowing students to learn at their own pace and access course materials from anywhere in the world (Stone, Freeman et al. 2019). This can be particularly beneficial for students in Nagongera Campus who may have difficulty attending in-person classes due to transportation or scheduling conflicts.

Online platforms often provide opportunities for students to engage with their peers and instructors through discussion boards, chat rooms, and videoconferencing tools. This can foster a sense of community and promote collaborative learning (Stone, Freeman et al. 2019). Access to a wide range of resources, including interactive tutorials, video lectures, and additional reading materials, is frequently provided by online mathematics courses. By using these materials, students can enhance their comprehension of difficult mathematical ideas and sharpen their problem-solving abilities.

Since they frequently do away with the need for pricey textbooks and physical infrastructure, blended courses can be more affordable for both students and the university.

DISADVANTAGES OF BLENDED LEARNING TECHNIQUE

The disadvantages of blended learning technique at Nagongera campus can be attributed to several factors that impact the effectiveness of the educational process. These disadvantages include the following.

According to (Ntaga 2022) limited access to technology can hinder the implementation of Blended learning technique at Nagongera campus. Not all students may have access to reliable internet connections or appropriate devices, such as computers or tablets, which are necessary for effective participation in online classes. This lack of access can create disparities in educational opportunities and hinder the ability of some students to fully engage with the curriculum.

Blended learning techniques may lead to reduced social interaction among students and between students and instructors (Jaques and Salmon 2007). In contrast, blended platforms may limit these interactions, potentially leading to feels of isolation and a lack of community within the learning environment.

Students participating in online classes may be more susceptible to distractions in their home environments, such as family responsibilities, household chores, or personal electronic devices(Keser Aschenberger, Radinger et al. 2023). These distractions can detract from their focus and engagement with the course material, ultimately impacting their learning outcomes.

According to (Mwondha 2018) digital divide refers to the gap between those who have access to digital technologies and those who do not. This gap can be influenced by socioeconomic factors, geographic location, or infrastructure limitations. As a result, some students may be disproportionately affected by the shift to blended learning due to disparities in access to technology and internet connectivity.

In conclusion, blended learning technique had a significant impact on the performance of students in mathematics courses at Nagongera Campus. While these techniques offer numerous advantages, such as flexibility and access to resources, they also present challenges related to personal interaction, technological barriers, and time management. As technology continues to advance, it is essential for educators and institutions to remain adaptable and committed to providing students with the best possible learning experience, ensuring that all students have the opportunity to succeed in mathematics and other subjects

1.2 PROBLEM STATEMENT

The increasing prevalence of technology and the internet has led to the adoption of blended_learning technique in various educational institutions, including Busitema University. These methods have been designed to cater to the needs of learners in these modern years, offering flexibility and convenience. However, there are concerns about the impact of these online teaching and learning techniques on the performance of students at Nagongera Campus. The study-focuses on the impact of online teaching and learning techniques on the performance of students at Nagongera Campus. This involves examining the effectiveness of these methods in enhancing students' academic achievements, as well as identifying potential challenges that may hinder their performance.

1.3 : RESEARCH OBJECTIVES

This study was guided by the following research objectives.

1.3.1 GENERAL OBJECTIVE OF STUDY

The purpose of this study was to explore the impact of bended learning technique on the performance of students in Nagongera campus.

1.3.2 SPECIFIC OBJECTIVES OF STUDY

1. To analyze the impact of blended learning-techniques on student performance**.**
2. To compare blended learning technique-and traditional teaching methods in terms of student performance.

1.4 RESEARCH QUESTIONS

1. How does Blended learning technique influence the learning outcomes and overall performance of learners in Nagongera campus?
2. What are the differences in student performance between Blended learning technique and traditional teaching methods in Nagongera campus?

1.5 SIGNIFICANCE

The Study will help in the partial fulfillment for the award of a degree of Bachelors of Science and Education. This indicates that the research is a crucial component in meeting the academic requirements for obtaining the specified degree. It demonstrates the academic rigor and commitment required to complete the degree program.

The study will assess how online teaching techniques influence the learning outcomes and overall performance of learners in Nagongera campus. This is significant as it addresses the growing trend of online education and its impact on student learning.

The study will help in identifying the differences in students' performance between online and traditional teaching methods in Nagongera. The comparison provides valuable insights into the effectiveness of different teaching approaches, which can inform decision making processes for educational institutions and educators.

1.6 SCOPE OF THE STUDY.

The scope of study would involve conducting a comprehensive analysis of the impact of Blended learning techniques on the performance of students in mathematics courses at Nagongera campus. Nagongera campus is located in Tororo Township along Tororo-Busolwe road, Tororo district, Uganda. The scope is limited to the current second year and third year mathematics students of Nagongera campus 2021/2022 and 2020/2021entry year respectively.

1.7 OPERATIONAL DEFINITION

Blended learning

Blended is an educational approach that utilizes digital technologies and the internet to deliver educational content remotely.

Performance

Performance refers to the demonstration of skills, abilities, or competencies in a particular area or field in educational context; it can be assessed through examinations, tests, projects, presentations, practical demonstrations and many others

CHAPTER TWO

2.0 LITERATURE REVIEW:

Studies have been conducted to investigate how using blended learning technique affect students' performance in mathematics courses in Nagongera campus (Kaweesi, Kani Olema et al. 2022). A few of these studies are: UK, Malaysia and the USA are among the countries that are incorporating information

and communication technology (ICT) into teaching and learning (Aldrich 2009). This increased students' interest and fascination for mathematics, promoted cooperative learning in Malaysia, enhanced performance in Taiwan, fostered mathematics thinking in United States. The use of blended learning technique was shown to improve students' performance in the study that was conducted in Malaysia when compared to face-to-face interaction (Wright 2017). and the study's findings indicate that this is the case, an ICT application in Kenya was seen as helpful for teaching and learning concepts in abstract mathematical topics like geometry.

Additionally, the adoption of Blended learning technique at Strathmore University had a favorable effect on the academic performance of students (Mukandutiye, Sevilla et al. 2014). The findings in the study show that using blended learning technique enhances students' academic achievement. This is due to the fact that students are in control of their education and that learner-cantered education is becoming increasingly prevalent. According to reports, blended learning in Uganda has the potential to inspire students and enhance the educational experience (Wanami and Kintu 2019). In general, blended learning technique is being used to teach and learn mathematics and sciences, especially in lowresource contexts, has not been thoroughly investigated. Furthermore, research evaluating the use of blended learning in schools in refugee settings is scarce. In recent years, the use of blended learning techniques has become increasingly popular, especially in the field of mathematics education. According to (Maltempi and Malheiros 2010) this literature review aims to analyze the effectiveness of blended learning technique on student performance in mathematics courses at Nagongera campus and compare these methods with traditional teaching approaches. To accomplish this, we will examine relevant research studies and discuss their findings on the impact of blended learning techniques on student performance in mathematics courses.

BLENDED LEARNING TECHNIQUE IN MATHEMATICS EDUCATION

Blended learning technique has been widely adopted in various educational settings, including mathematics courses. These techniques leverage technology to provide students with a flexible and engaging learning experience. Some popular blended learning technique in mathematics education include: Online Learning Management Systems (LMS) - LMS platforms like Moodle, Canvas, and Blackboard provide instructors with tools to create, deliver, and assess online mathematics courses. Interactive Online Textbooks - Digital textbooks, such as those provided by Opens tax, offer interactive elements like embedded videos, animations, and practice problems. Online Tutoring and Homework Help

- Websites like SOS Math and Math way offer instant assistance to students struggling with math problems (Hughes, Carney et al. 2023). Virtual Labs and Simulations - Applications like Geiger and

Demos enable students to explore mathematical concepts through interactive simulations and visualizations (Gupta, Toksha et al. 2021).

Effectiveness of Blended Learning Technique on Student Performance

Several research studies have investigated the impact of online teaching and learning techniques on student performance in mathematics courses. Some key findings from these studies include: A study by the U.S. Department of Education (2010) found that students using blended learning platforms performed better than their peers in traditional face-to-face settings, particularly in mathematics courses. It was revealed that the use of blended learning platforms improved students' problem-solving skills and increased their motivation to learn mathematics. It was showed that the use of online tutoring and homework help services led to improved math performance and increased student engagement. These findings suggest that online teaching and learning techniques can positively impact student performance in mathematics courses.

Comparison of Blended learning and Traditional learning technique

Nagongera campus is a higher education institution in Uganda. The campus offers various programs, including mathematics courses, to its students. In recent, there has been a growing interest in comparing online and traditional teaching techniques at Nagongera campus, particularly in the context of mathematics.

Traditional learning technique at Nagongera campus typically involve face-to-face interactions between instructors and students in a physical classroom setting (Atibuni, Kibanja et al. 2017). In the context of mathematics courses, traditional teaching often includes lectures, problem-solving sessions, and inperson discussions. The use of chalkboards, textbooks, and other physical resources is common in traditional teaching methods (Nwuke and Nwanguma 2024). On the other hand, blended learning techniques at Nagongera campus involve the use of digital platforms and tools to deliver educational content to students. In the context of mathematics courses blended learning may include pre-recorded videos lectures, interactive online modules, virtual problem-solving sessions, and digital resources such as e-books and online data bases.

When comparing the effectiveness of blended and traditional learning technique in mathematics courses at Nagongera campus, several factors need to be considered. These factors include student engagement, learning outcomes, accessibility, flexibility, and the overall learning experience. In traditional teaching, students have direct interaction with instructors and peers during classes(Keaton and Gilbert 2020). This can lead to immediate feedback and a sense of community within the classroom. On the other hand,

blended learning may require proactive engagement from students through discussion forums, virtual office hours, and other digital communication channels.

The assessment of learning outcomes is crucial when comparing blended and traditional learning technique (Yang 2017). However, the structure and delivery of online content play a significant role in determining learning outcomes.

Blended learning can provide greater accessibility to educational resources for students at Nagongera campus (Kaweesi, Kani Olema et al. 2022). It allows for asynchronous learning, which can benefit those who have scheduling conflicts or other responsibilities outside of their studies. Traditional teaching methods may be limited by physical constraints such as classroom capacity and scheduling conflicts.

According to (Khasawneh 2023) One of the key advantages of blended learning is its flexibility. Students can access course materials and lectures at their convenience, which can be particularly beneficial for those with diverse schedules or commitments. Traditional learning methods may not offer the same level of flexibility due to fixed class schedules.

The overall learning experience encompasses various aspects such as interactivity, adaptability to different learning styles, and the integration of technology. Both blended and traditional learning technique can contribute to a positive learning experience when implemented effectively(Kumar, Krishnamurthi et al. 2021).

In conclusion, the comparison between blended and traditional learning technique at Nagongera campus in mathematics courses involves evaluating factors such as student engagement, learning outcomes, accessibility, flexibility and the overall learning experience. Each approach has its unique strengths and challenges, and the effectiveness of either method depends on how well it aligns with the needs and preferences of students at Nagongera campus.

CHAPTER THREE

3.0 TOOLS AND METHODOLOGY.

This chapter explores the research design, source of data, study setting, study variables, data collection techniques, and data collection instruments (Miller and Salkind 2002).

RESEARCH INTRODUCTION

One approach to solving the issue methodically is through research methodology. It might be viewed as a science that studies scientific research methodology. In it, we examine many approaches that a researcher typically takes to analyze his research topic and the reasoning behind the surroundings. The methods and techniques that were employed in this investigation are presented in this chapter.

3.1 RESEARCH DESIGN

This is the arrangement of conditions for collections and analysis of data. This data adopts a descriptive survey design as it deals with people's views and hence relevant to the study area.

It was determined that the case study research design was appropriate for the study given its objectives and nature. The case study research method was described by researchers as an empirical investigation into a current phenomenon within its real-life context, where the boundaries between the phenomenon and context are not immediately apparent, and where multiple sources of evidence are used (Jonassen and Rohrer-Murphy 1999). Therefore, I used a case study to narrow my emphasis on the impact of blended learning technique on performance of students in mathematics courses in Nagongera campus and obtain a comprehensive analysis of the subject from a specific perspective (Swanborn 2010). In terms of offering comprehensive and in-depth explanations of the behavioral issues, it performs better than a quantitative approach, it can also take a lot of time.

3.2 Sources of data

Both primary and secondary sources of data were used to support the study

3.2.1 Primary data

Primary data refers to the data originated by the research for the first time and collected through questionnaires. The information was derived directly from the respondents through these questionnaires.

3.2.2 Secondary data

Secondary data refers to data that has already been collected. Information was collected from acknowledged studies about the study objectives to obtain secondary data. These mostly included online journals and electronic books; library books; research dissertations; learning websites; and through the head of the department of mathematics.

3.3 Study setting

The study was carried out at Nagongera campus, Busitema University, Faculty of Science and Education. The study was limited to students in second-year and third-year mathematics classes of 2021/2022 and 2020//2021 intakes respectively.

3.4 Sampling technique

The sampling process was defined as the process of selecting a sample from a larger population. According to (Usmonov, Turdiyeva et al. 2021), a sample is referred to as a portion of the entire targeted group that accurately reflects the characteristics of the population (Levy and Lemeshow 2013). It might be chosen using non-probability sampling or probability sampling for example in this research a sample of respondents will participate in the study (Pace 2021).

3.5 STUDY VARIABLES

These variables were important in shaping the research design, data collection, and analysis. The following are the key variables that can be used in this research:

Independent variables:

Are those aspects which have an effect on the dependent variables though indirectly? Blended learning was the independent variable in this research, it refers to the method of delivering educational content and instruction through online platforms such as video lectures, online assessments, virtual classrooms and many others (Pukkaew 2013).

Dependent variable:

Performance of students in mathematics courses was the dependent variable in this research. This variable can be measured using various indicators such as test scores, grades and overall academic achievement in mathematics.

3.6 STUDY REGION.

The study was carried out at Nagongera campus Tororo district, which is situated in the eastern part of Uganda. Nagongera campus was chosen for a number of reasons, including the fact that it was more familiar with the researcher, the area was appropriate for the study, Nagongera campus had both public and private students which have varying performance. Therefore, it was anticipated that Nagongera campus can provide all the necessary information for the research.

3.7 Data collection techniques

For this research study, questionnaires were used as a primary data collection tool to gather information about the attitudes, opinions, behaviors, and experiences of the target population. The questionnaires were administered in paper-based and face-to-face formats, with a mix of open- ended and closed-ended questions. The purpose of using questionnaires was to efficiently collect a large amount of data in a structured and standardized way. The researcher carefully designed the questionnaire to ensure the accuracy and reliability of the data collected, while taking into account potential biases such as social desirability bias.

Overall, questionnaires proved to be a valuable research tool for exploring the research questions and providing insights that informed policy and practice.

3.7.1 Data collection tools

The questionnaire was designed to elicit general information from students at Nagongera campus ,Busitema University about their perceptions, knowledge and opinions of blended learning technique (Abadi 2009). The questionnaire consisted of section A, B and C - section A contained three closedended questions to provide the age, gender and region of respondents', B contained ten closed- ended questions about difference between blended learning and traditional learning technique on students' performance in Nagongera campus Busitema; and section C contained two -ended questions about the influence of blended learning on the performance of students in Mathematics courses. The questionnaire contained two open-ended questions and 13 closed-ended questions.

ATTACHED IS THE QUESTIONAIRE

THE IMPACT OF BLENDED LEARNING TECHNIQUE ON THE PERFORMANCE OF STUDENTS IN MATHEMATICS COURSES AT NAGONGERA CAMPUS, BUSITEMA UNIVERSIT

Y

My name is Chebet Sandra, a third-year student at Nagongera Campus, Busitema University conducting a study on the impact of blended learning technique on the performance of students in mathematics courses in Nagongera campus, Busitema University. I am requesting you to spare some of your time to participate in the study by answering the questions below. The information you provide is only for academic research purposes only and will be handled with utmost confidentiality. Thank you for accepting to be part of the study.

SECTION A (Please tick the appropriate boxes when answering the questions)

1. Age of the respondent.

21-29years ☐ 30-39years ☐ 40years and above ☐

2. Gender of respondent.

Male ☐ Female ☐

3. Region of the country.

North ☐ East ☐ Central ☐ West ☐

SECTION B (CIRCLE ◯ THE CORRECT ALTERNATIVE)

1. Which teaching method do you believe has a more significant impact on student performance in mathematics courses at Busitema University - Nagongera campus?

A. Blended learning techniques

B. Traditional teaching methods

2. How often do you use blended learning techniques in teaching mathematics courses atBusitema University - Nagongera campus?

A. Always

B. Often

C. Rarely

D. Never

3. How often do you use traditional teaching methods in teaching mathematics courses at Busitema University - Nagongera campus?

A. Always

B. Often

C. Rarely

D. Never

4. Which of the following blended learning techniques do you find most effective in improving student performance in mathematics courses?

A. Online quizzes and assessments

B. Interactive video lessons

C. Discussion boards and forums

D. Other (please specify)

5. Which of the following traditional teaching methods do you find most effective in improving student performance in mathematics courses?

A. Lectures

B. Tutorials

C. Practical sessions

D. Other (please specify)

6. Do you agree that blended learning techniques can improve student engagement in mathematics courses?

A. Strongly agree

B. Agree

C. Disagree

D. Strongly disagree

7. Do you agree that traditional teaching methods are more effective than blendedlearning techniques in teaching mathematics concepts?

A. Strongly agree

B. Agree

C. Disagree

D. Strongly disagree

8. Do you think that blended learning techniques can cater to different learning styles?

A. Strongly agree

B. Agree

C. Disagree

D. Strongly disagree

9. Do you think that traditional teaching methods can cater to different learning styles?

A. Strongly agree

B. Agree

C. Disagree

D. Strongly disagree

10. Which of the following factors do you think has the most impact on student performance in mathematics courses at Busitema University - Nagongera campus?

A. Teaching method used (blended or traditional)

B. Teacher's expertise

C. Student's effort and dedication

D. Availability of resources

SECTION C

11. Reflect on your experience with blended learning in mathematics courses at Nagongera campus, Busitema University, and discuss how it has influenced your academic performance.

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12. Compare and contrast the benefits and challenges of blended learning with traditional teaching methods specifically in the context of mathematics education at Nagongera campus, Busitema University.

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CHAPTER FOUR

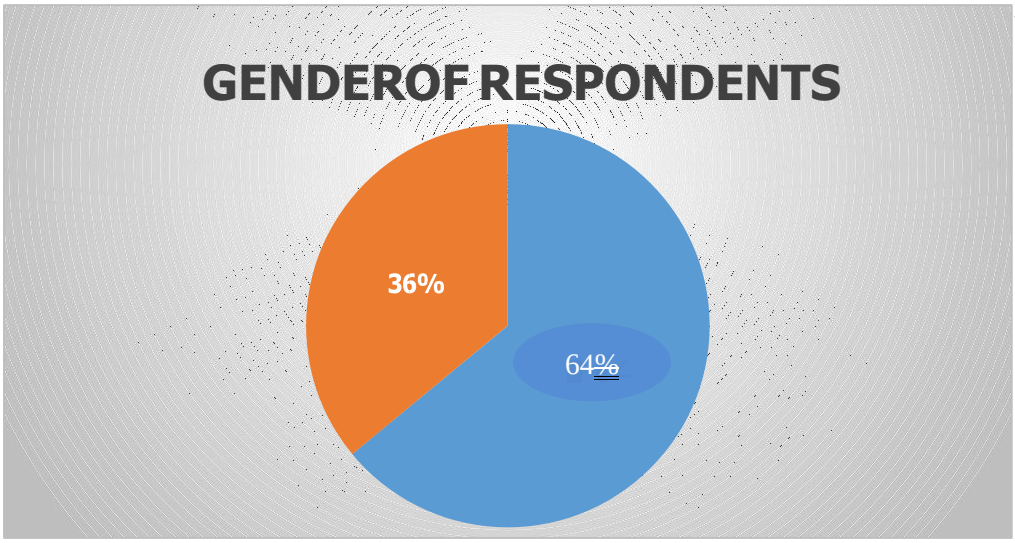
Results and discussion

This chapter presents and discusses the findings of the study

4.1 Findings on the impact of blended learning technique on the performance of students in mathematics courses in Nagongera campus, Busitema university *Table 1Gender of the respondents*

Gender of the respondents	Frequency	Percentage
Male	32	64%
Female	18	36%

Figure 1Representation of Gender of Respondents

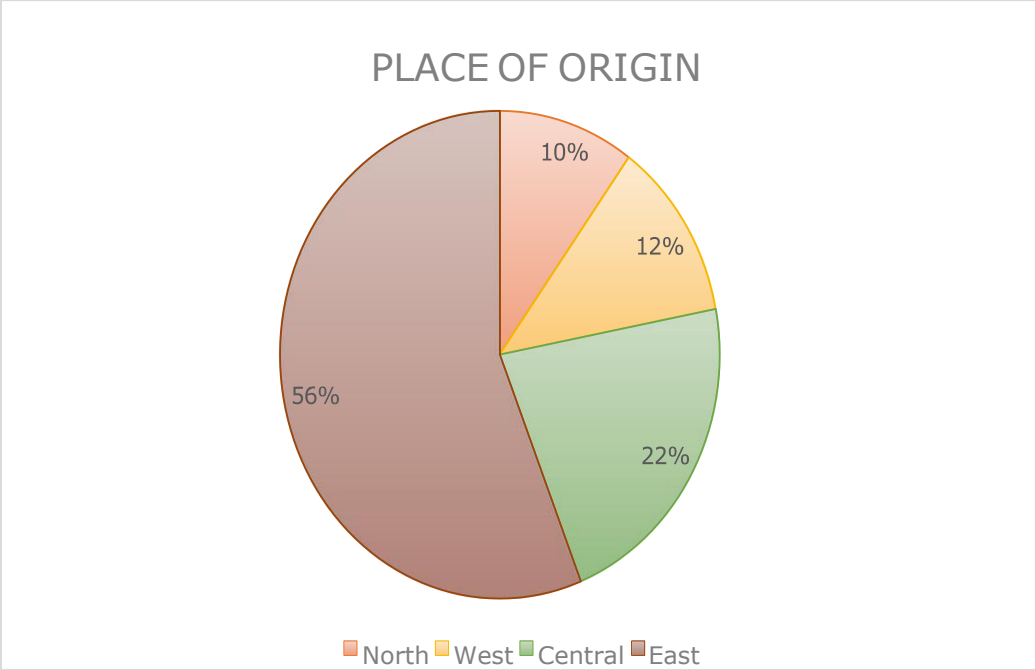


Out of the 50 respondents that participated in the study, majority 32(64%) were males with the minority 18(36%) were females

Table 2 Region of Respondents

Region of the respondents	**Frequency**	**percentage**
North	5	10%
West	6	12
Central	11	22%
East	28	56%

Figure 2 representation of the region of respondents



Out of the 50 respondents that participated in the study ,28(56%) were from Eastern Uganda, 11(22%) from central, 6 (12%) from western Uganda and 5(10%) from Northern Uganda

4.1.1 The impact of blended learning technique on performance of students in mathematics courses

Table 3 The impact of blended learning technique on the performance of students in mathematics courses

Indicator	A	B	C	D	Percentage
Which teaching method do you believe has a more significant impact on student performance in mathematics courses	60%	40%	0%	0%	100%
I often use blended learning techniques in teaching mathematics courses	68%	20%	12%	0%	100%

I often use traditional teaching methods in teaching mathematics courses	3.3%	13.3%	0%	83.3%	100%
The blended learning technique that l find most effective in improving student performance in mathematics courses is?	15%	31.7%	63.3%	0%	100%
The traditional teaching methods that I find most effective in improving students' performance in mathematics courses is?	60%	30%	10%	0%	100%
I agree that blended learning techniques can improve student engagement in mathematics	11.7%	33.3%	0%	55%	100%
courses					
I agree that traditional teaching methods are more effective than blended learning techniques in teaching mathematics concepts.	46.7%	50%	0%	3.3%	100%
I think that blended learning techniques can cater to different learning styles	15%	31.7%	0%	63.3%	100%
I think that traditional teaching methods can cater to different learning styles	28.3%	11.7%	10%	50%	100%

Majority 30 (60%) of the respondents believe that blended learning has a more significant impact on student performance in mathematics courses and 20 (40%) believe that traditional teaching method has a more significant impact on the student performance in mathematics courses, which implied that most of the respondents believe that blended learning has a very significant impact.

34 (68%) 0f the 50 respondents always use blended learning techniques in mathematics courses ,10 (20%) often use blended learning ,6(12%) rarely use blended learning technique and 0(0%) never used blended learning technique in mathematics courses. Those that use blended learning are more likely to perform better because they had access to information whenever they wanted.

Majority 42 (33%) never used traditional teaching methods in teaching mathematics courses while 17 (33%) always use traditional teaching methods, and 0(0%) rarely use traditional teaching methods.

There were 8 (15%) of the respondents who could find online quizzes and assessments most effective in improving student performance in mathematics courses ,16 (31.7%) of the respondents used interactive video lessons while 32 (63.3%) of the respondents used discussion boards and forums.

Majority (60%) of the respondents strongly agree that blended learning, 30% of the respondent agreed, (30%) disagree while 10% strongly disagree.

There were 28.3% of the respondents strongly agreed that traditional teaching methods can cater to different learning styles,11.7% agreed, 10% disagreed while 50% strongly disagree that traditional learning technique can cater to different learning styles

4.1.2 Respondents views on how blended learning has influenced academic performance positively.

Technology skills development

Enhanced engagement

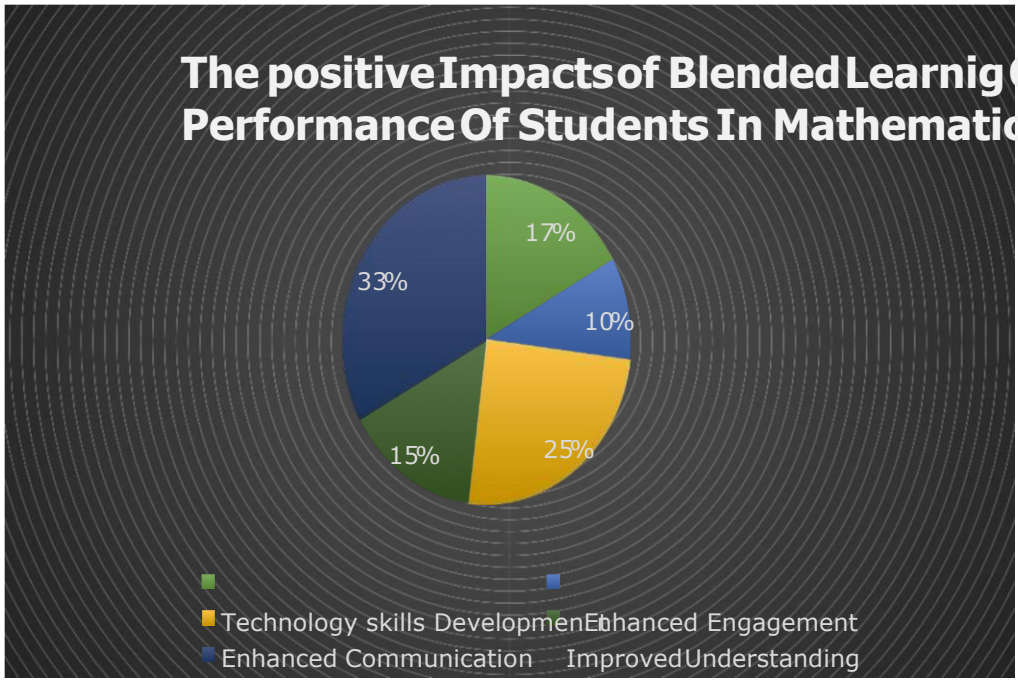
Enhanced communication between instructors and students improved understanding.

Personalized learning.

Table 4 Positive impacts of blended learning

Positive impacts of blended learning	**Frequency**	**Percentages**
Technology skills development	8	17%
Enhanced engagement	6	10%
Enhanced communication between instructors and students	12	25%
Improved understanding	8	15%
Personalized learning	16	33%

Figure 2 Positive Impacts of blended



Out of the 50 respondents that participated in the study,8(17%) said that one of the positive impacts of blended learning is technological skill development,6(10%) wrote that it enhances engagement,12(25%) said it enhances communication between students and instructors, 8(15%) said it improves understanding and 16(33%) said that it improves personalized learning.

4.1.3 Respondents views on how blended learning has influenced academic performance negatively.

Increased distractions

Lack of personal interaction

Technological barriers

Reduced motivation and accountability

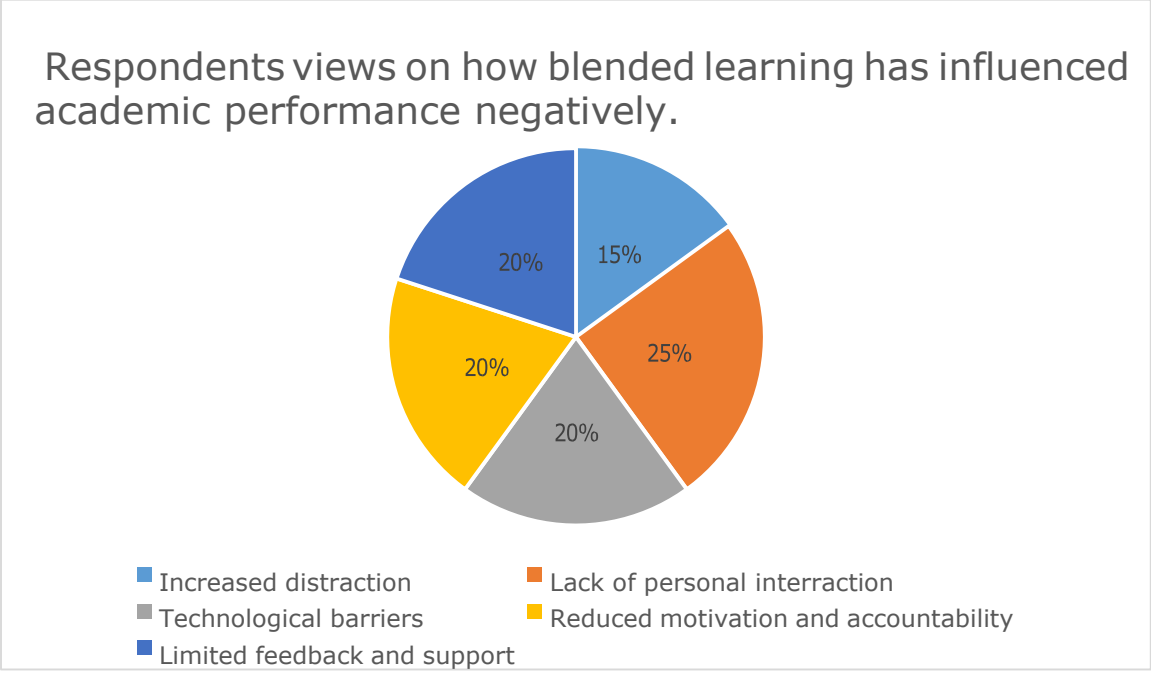
Limited feedback and support

Table 5 Negative impacts of blended learning on the performance of students

Negative impacts of blended learning	**Frequency**	**percentage**
Increased distraction	8	15%
Lack of personal interaction	12	25%
Technological barriers	10	20%

Reduced motivation and accountability	10	20%
Limited feedback and support	10	20%

Figure 3 Representation of negative impacts of blended learning on the performance of students



4.1.4 Respondents comparison and contrast between the benefits and challenges of blended learning with traditional teaching methods in the context of mathematics education.

Blended learning, which combines traditional face-to-face instruction with online learning components, has gained popularity in the field of education (Alammary, Sheard et al. 2014). In the context of mathematics education at Nagongera campus, it is essential to evaluate the benefits and challenges of blended learning compared to traditional teaching methods. This report aims to analyze and compare the advantages and drawbacks of blended learning and traditional teaching in mathematics education at Nagongera campus.

4.1.4.1 Benefits of Blended Learning in Mathematics Education Flexibility:

According to respondents, blended learning offers students the flexibility to access course materials and resources at their own pace and time. This flexibility can be particularly beneficial in mathematics education, where students may require additional time to grasp complex concepts.

Personalized Learning:

According to (Alamri, Watson et al. 2021) Students can receive targeted feedback and support tailored to their individual needs, enhancing their understanding of mathematical concepts.

Increased Engagement:

The integration of multimedia elements, interactive simulations, and online discussions in blended learning can enhance student engagement with mathematical content. This active participation can lead to improved retention and application of mathematical skills.

Access to Resources:

Blended learning provides students with access to a wide range of online resources such as video tutorials, interactive quizzes, and educational websites. These resources can supplement traditional teaching methods and offer additional support for students struggling with specific mathematical topics

4.1.4.2 Respondents views on Challenges of Blended Learning in Mathematics Education

Table 6.students views on the challenges of blended learning in Mathematics education

Challenges of blended learning	**Number of students**	**percentage**
Technological barriers	18	35%
Lecturer training	3	7%
Maintaining student motivation	12	25%
Assessment strategies	17	33%

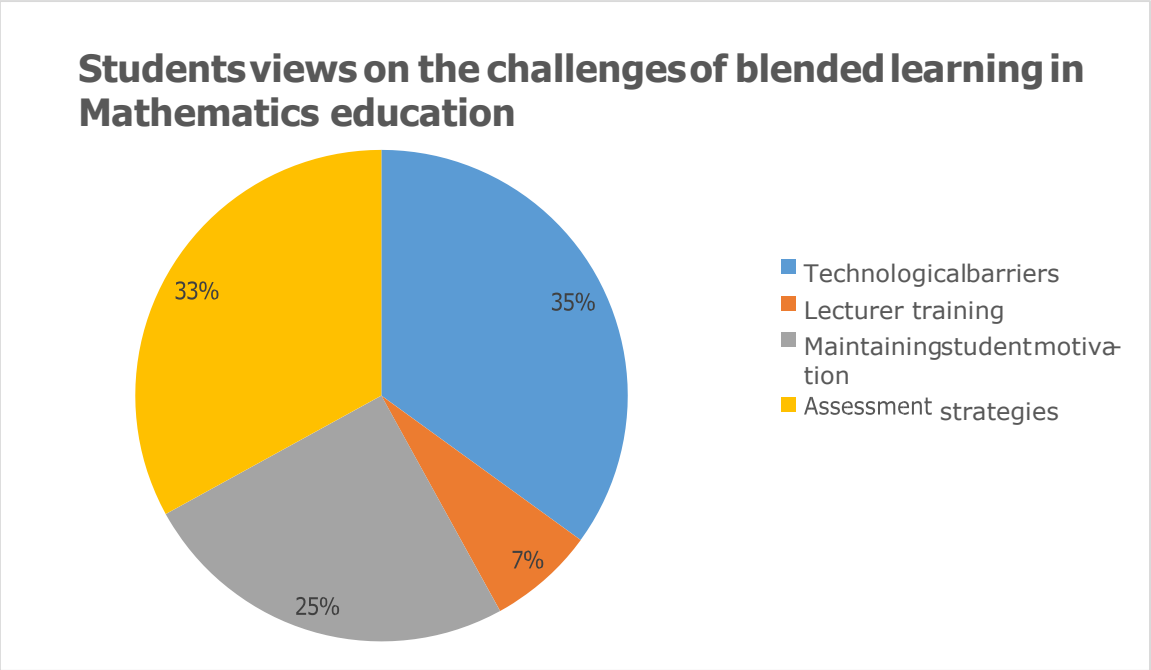


Figure 4.The views of the respondents regarding the challenges of Blended Learning in Mathematics Education summarized in the above graph.

Technological Barriers:

According to the respondents, one of the primary challenges of blended learning is the reliance on technology. In settings where access to reliable internet connectivity or electronic devices is limited, students may face difficulties in fully engaging with online learning materials was cited by 18 students.

Lecturer Training:

3 of the respondents said that implementing blended learning effectively requires Lecturers to be proficient in using educational technologies and online platforms. Without adequate training and support, educators may struggle to integrate online components seamlessly into their mathematics curriculum.

Maintaining Student Motivation

12 respondents reported that in a blended learning environment, maintaining student motivation and accountability can be challenging. Without regular face-to-face interactions with teachers, some students may struggle to stay motivated and focused on their mathematical studies

Assessment Strategies

According to 17 respondents, designing effective assessment strategies that align with both online and traditional teaching components can be complex. Ensuring that assessments accurately measure student understanding and progress in mathematics is crucial for the success of blended learning initiatives.

4.1.4.3 Comparison and Contrast

Blended learning offers a unique combination of flexibility, personalized learning, increased engagement, and access to resources in mathematics education at Nagongera campus(Keaton and Gilbert 2020). However, it also presents challenges such as technological barriers, teacher training requirements, student motivation issues, and assessment strategy complexities when compared to traditional teaching method.

In conclusion, blending learning with traditional teaching methods in mathematics education at Nagongera campus can provide significant benefits such as enhanced flexibility, personalized learning experiences, increased engagement, and access to diverse resources. However, addressing challenges related to technology access, teacher training, student motivation, and assessment strategies is essential for successful implementation.

5.0 Discussion of Data Findings

According to Olszewski-Kubilius and Clarenbach (2012), blended learning methods demonstrate superior effectiveness in enhancing academic achievement compared to traditional approaches. One key advantage lies in the flexibility afforded to students, allowing them to progress at their own pace without the constraints of synchronized learning environments. In traditional teacher-led settings, students may struggle to keep up if they miss critical information due to distractions. Conversely, in blended learning environments where each student has access to individual computers and learning resources, interruptions are minimized, enabling uninterrupted learning.

Moreover, the availability of digital resources empowers students to revisit learning materials as needed and engage in repetitive exercises to deepen their understanding. The integration of online assessments with immediate feedback further contributes to improved learning outcomes by providing timely insights into areas needing reinforcement.

Overall, these findings highlight how blended learning methodologies can effectively optimize the learning experience by leveraging technology to personalize and enhance educational outcomes.

This structure provides a clear and concise overview of the advantages of blended learning supported by the referenced study. It ensures that the main points are articulated effectively for your audience. The

results of this study showed that the blended learning method was more effective than traditional methods in terms of improving attitude toward mathematics. This corresponds to the findings in previous studies that have found positive results from the blended learning method in terms of attitude toward mathematics. The results indicated that the attitudes of the experimental group were significantly positively changed, whereas the control group failed to show a similar result. Similarly, the results showed students in the experimental group experienced a more positive attitude toward mathematics, more enjoyment of mathematics, and more motivation to do mathematics than students in the control group. This model facilitates mathematics learning through a virtual online classroom. It is helpful for facilitating students to present their opinions. Moreover, it improves the interaction among peers, and between students and teachers. Students benefit from group discussions and collaborative learning.

No significant gender difference was found in the post-test results for achievement in mathematics. After the experiment, the mean of the groups slightly increased, but the mean differences between the two groups were not significant. This corresponds to previous studies which found that achievement in mathematics does not differ significantly between males and females. The reason behind may be asynchronous environments afford thoughtful discussions in the convenience of one's home at any time. This would dramatically open up opportunities for students to not only contact teachers, but to pull ideas and questions from other class members. A "forum" would be common ground where anyone could join in and offer up thoughts; it would allow peer interaction that might otherwise be awkward and difficult, especially if students do not know each other well. (Bringslid 2002) mentioned that the improvement of understanding mathematics by using interactive and personalized documents on the web could reverse bad trends. Thus, males and females could utilize equal opportunities provided by technology-based instruction; blended learning and online learning, and function effectively in learning mathematics.

Another variable that has been shown to influence achievement is the ability. The post-test results of the attitude toward mathematics showed a significant difference between students at different levels of ability (high ability, medium ability, and low ability). After the experiment, high-ability students had significantly more positive attitudes of important others toward mathematics, and they scored significantly higher than medium-ability.

This result is consistent with the findings of (Renzulli 2003), which may be because high-ability students thrive in a dynamic teaching environment, and they are more likely to speculate and get the right idea. Therefore, there is a more positive attitude toward blended learning compared to traditional in-class teaching methods, which tend to be one-way transmissions. Several authors have concluded that a

significant difference exists in achievement in mathematics between students with different abilities. However, this study did not find that the blended learning method had an impact on interest. The fact that no significant interaction on students' achievement tests and attitude toward mathematics between the gender and different abilities. This corresponded to previous studies in their performances on the achievement test and attitude toward mathematics did not differ significantly.

The majority of the students believed that the blended learning approach helped them with their learning (89%), and consequently had a positive impact (74%) on their learning outcomes. They also believed that web-based learning supplemented in-class learning (80%), and that online quizzes (90%) were an effective way to receive feedback and facilitate reflection. Therefore, online tests are also popular with students as an aid to learning and revision. Regular formative and summative testing with instant feedback are useful tools to improve student engagement and drive student learning.

Moreover, students actively used Internet resources, rather than passively accepting information from teachers, to acquire knowledge and learn mathematical concepts. During the course, teachers aided the students, increased their involvement, and assisted them in completing tasks. This process enhanced student learning of mathematical concepts, cultivated their abilities to solve related problems, and enabled the students to contemplate and organize mathematical problems. Interactions between the teachers and students, and between the students, have been neglected in traditional instruction, resulting in inefficiencies in courses. After this process, students expressed that they became interested in the activities and their attitudes toward mathematics improved (Midgley, Feldlaufer et al. 1989).

CHAPTER FIVE: Conclusion and recommendations

In this chapter, a summary of what has been done in the study is given. Directions and some guiding questions for further research are also suggested.

5.1 Conclusion

The study examined the impact of blended learning technique on the performance of students in mathematics in Nagongera campus, Busitema University in Uganda. The study employed 50 respondents. Students' impacts were both positive and negative and the positive impacts included exposure to a variety of things like tutorials, the negative impacts included Limited access to technology

The study found out that majority of students are more interested in course-related reading and course materials features of blended learning. Also, students perceive course materials to provide high benefits on performance. Interesting students are not interested in collaborating with colleges and discussing with lecturers on blended learning platforms. The study further showed that performance expectancy and facilitating conditions influenced adoption of blended learning in Nagongera campus, Busitema University, while perceived ease of use and social influence did not have any influence on adoption. Gender did not play any moderating effect on impact of blended learning on the performance of students in mathematics in Nagongera campus, Busitema University.

5.2 Recommendations

5.2.1 Professional Development for Educators

Provide training and professional development opportunities for teachers at Nagongera campus to familiarize them with blended learning techniques, tools, and strategies specific to mathematics instruction. This will ensure that educators are equipped to design and deliver effective blended learning experiences that cater to the diverse needs of students.

5.2.2 Technology Integration*:*

Invest in appropriate technology infrastructure and resources to support blended learning initiatives.

Ensure access to devices, reliable internet connectivity, and relevant software applications that facilitate interactive online activities, virtual simulations, and collaborative learning experiences in mathematics courses.

5.2.3 Curriculum Design:

Collaborate with educators to redesign mathematics curricula at Nagongera campus to incorporate blended learning components seamlessly. Align learning objectives, assessments, and activities to leverage both face-to-face instruction and online resources effectively, promoting deeper understanding and engagement with mathematical concepts.

5.2.4 Student Support Services:

Establish support mechanisms for students engaging in blended learning environments. Offer guidance on time management, study skills, digital literacy, and access to tutoring or academic assistance to address any challenges students may encounter while navigating the blended learning model.

5.2.5 Continuous Evaluation and Improvement:

Implement a system for ongoing evaluation of the impact of blended learning on student performance in mathematics courses at Nagongera campus. Collect feedback from students, teachers, and other stakeholders to identify strengths, areas for improvement, and best practices that can inform future iterations of the blended learning approach.

By incorporating these recommendations into the implementation of blended learning techniques at Nagongera campus, educational stakeholders can create a supportive environment that enhances students' mathematical attitudes and academic achievement through innovative instructional practices.

REFERENCES

Aldrich, C. (2009). Learning online with games, simulations, and virtual worlds: Strategies for online instruction, John Wiley & Sons.

*Jonassen, D. H. and L. Rohrer-Murphy (1999). "Activity theory as a framework for designing constructivist learning environments." Educational technology research and development **47**(1): 61-79.*

*Maltempi, M. V. and A. P. d. S. Malheiros (2010). "Online distance mathematics education in Brazil: research, practice and policy." ZDM **42**: 291-303.*

Ntaga, E. (2022). "Utilization of library resources and services at Busitema university."

*Pukkaew, C. (2013). "Assessment of the effectiveness of internet-based distance learning through the VClass e-Education platform." International Review of Research in Open and Distributed Learning **14**(4): 255-276.*

Roschelle, J. M., et al. (2000). "Changing how and what children learn in school with computer-based technologies." The future of children: 76-101.

*Stone, C., et al. (2019). "Equal or equitable? The role of flexibility within online education." Australian and International Journal of Rural Education **29**(2): 26-40.*

Swanborn, P. (2010). "Case study research: What, why and how?" Case study research: 1-192.

Van Dijk, J. A. (2017). "Digital divide: Impact of access." The international encyclopedia of media effects: 1-11.

Kaweesi, M., et al. (2022). "Stakeholders' Perspectives on Transformative Teaching and Learning in the Face of COVID-19: A Case of Busitema University-Faculty of Science and Education."

Jaques, D. and G. Salmon (2007). Learning in groups: A handbook for face-to-face and online environments, Routledge.

Miller, D. C. and N. J. Salkind (2002). Handbook of research design and social measurement, Sage.

Mwondha, P. (2018). "Towards Bridging the'Gender Digital Divide'in Uganda: A Study of University to Work Transition Patterns among ICT graduates."

Ntaga, E. (2022). "Utilization of library resources and services at Busitema university."

Wanami, S. and D. Kintu (2019). "Students 'perceptions about a distance learning programme: A case of the open, distance and E-learning programme at Kyambogo University, Uganda."
*Wright, B. M. (2017). "BLENDED LEARNING: STUDENT PERCEPTION OF FACE-TO-FACE AND ONLINE EFL LESSONS." Indonesian journal of applied linguistics **7**(1).*

Atibuni, D. Z., et al. (2017). "Challenges and strategies of research engagement among Master of Education students in Uganda."

Kaweesi, M., et al. (2022). "Stakeholders' Perspectives on Transformative Teaching and Learning in the Face of COVID-19: A Case of Busitema University-Faculty of Science and Education."

*Yang, D. (2017). "Instructional strategies and course design for teaching statistics online: perspectives from online students." International journal of STEM education **4**: 1-15.*
*Abadi, D. J. (2009). "Data management in the cloud: Limitations and opportunities." IEEE Data Eng. Bull. **32**(1): 3-12.*

*Alammary, A., et al. (2014). "Blended learning in higher education: Three different design approaches." Australasian Journal of Educational Technology **30**(4).*

*Alamri, H. A., et al. (2021). "Learning technology models that support personalization within blended learning environments in higher education." TechTrends **65**(1): 62-78.*

*Asante, K. O. (2012). "Secondary students' attitudes towards mathematics." IFE Psychologia: An International Journal **20**(1): 121-133.*

*Bringslid, O. (2002). "Mathematical e-learning using interactive mathematics on the Web." European journal of engineering education **27**(3): 249-255.*

*Gupta, P., et al. (2021). Virtual Experimentation: An Advanced Tool for Educational Technology. Technology and Tools in Engineering Education, CRC Press**:** 1-27.*

*Hughes, G., et al. (2023). "Building Mathematics Professional Development With an Explicit Attention to Concepts and Student Opportunities to Struggle Framework." Mathematics Teacher Educator **11**(2): 93-116.*

*Keaton, W. and A. Gilbert (2020). "Successful online learning: What does learner interaction with peers, instructors and parents look like?" Journal of Online Learning Research **6**(2): 129-154.*

*Keser Aschenberger, F., et al. (2023). "Physical home learning environments for digitally-supported learning in academic continuing education during COVID-19 pandemic." Learning Environments Research **26**(1): 97-128.*

Khasawneh, M. A. S. (2023). "Exploring the Benefits and Challenges of Blended Learning Models in Higher Education." Onomázein(62 (2023): December): 81-91.
*Kumar, A., et al. (2021). "Blended learning tools and practices: A comprehensive analysis." Ieee Access **9**: 85151-85197.*

Levy, P. S. and S. Lemeshow (2013). Sampling of populations: methods and applications, John Wiley & Sons.

Midgley, C., et al. (1989). "Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school." Child development: 981-992.

Mukandutiye, D., et al. (2014). Adoption of e-assessment in Strathmore University. 2014 IST-Africa Conference Proceedings, IEEE.

Nwuke, T. J. and T. K. Nwanguma (2024). "Provision and Utilization of Physical Resources for Effective Teaching and Learning Effectiveness in Public Universities in Rivers State."

Olszewski-Kubilius, P. and J. Clarenbach (2012). "Unlocking Emergent Talent: Supporting High Achievement of Low-Income, High Ability Students." National Association for Gifted Children (NJ1).

*Pace, D. S. (2021). "Probability and non-probability sampling-an entry point for undergraduate researchers." International Journal of Quantitative and Qualitative Research Methods **9**(2): 1-15.*

*Renzulli, J. S. (2003). "A Rising Tide Lifts All Ships: Applying Gifted Education Know-How to the Development of High Potential in All Students'." The International Journal of Creativity & Problem Solving **13**(1): 83-110.*

Usmonov, M., et al. (2021). "SAMPLE POWER. SELECTION METHODS (SAMPLE ORGANIZATION METHODS)."