INFLUENCE OF CONSTRUCTIVIST PEDAGOGICAL APPROACHES ON IMPLEMENTATION OF GRADE THREE COMPETENCY BASED MATHEMATICS CURRICULUM IN PUBLIC PRIMARY SCHOOLS IN KISUMU CENTRAL SUB-COUNTY, KENYA

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A Research Project Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Education in Curriculum Studies.

UNIVERSITY OF NAIROBI

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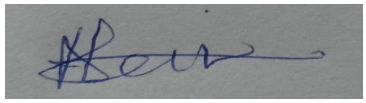
DECLARATION

This research project is my original work and has not been presented for award of a degree in any other university.



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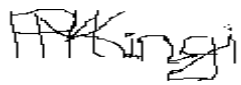

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DEDICATION

I would like to dedicate this project to the following individuals, whose unwavering support and encouragement have been instrumental in my academic journey.

To my children Rune and Caroline and my entire family, who has always believed in me and supported my dreams, I dedicate this project work to you. Your love, understanding, and constant encouragement have been the foundation of my success. Thank you for your patience and for always being there for me.

To my friends and colleagues, thank you for your friendship, camaraderie, and intellectual discussions. Your support and shared experiences have made this academic journey enjoyable and memorable.

To the participants of my study, whose willingness to contribute their time and knowledge made this research possible, I am deeply thankful. Your insights and perspectives have enriched the findings of this thesis and contributed to the advancement of knowledge in this field.

Lastly, I would like to express my heartfelt appreciation to all the teachers, mentors, and researchers whose work has inspired and influenced me throughout my academic career. Your dedication to the pursuit of knowledge has been a constant source of motivation.

This project is dedicated to all of you. Thank you for being a part of my journey and for your unwavering support. Your presence in my life has made all the difference.

ACKNOWLEDGMENT

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To all those who have contributed in ways seen and unseen, I offer my sincere appreciation. Your support has been indispensable, and I am truly grateful for your contributions to the successful completion of this research project.

ABSTRACT

The objective of this study was to examine the impact of constructivist pedagogical methods on the implementation of a competency-based mathematics curriculum for Grade Three in public primary schools located in Kisumu Central Sub-County, Kenya. The objectives of the study were to examine the impact of utilizing constructivist group work as a teaching method on the implementation of the Grade mathematics curriculum, to assess the influence of employing constructivist games as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum, to determine the effects of utilizing constructivist radio as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum, and to establish the influence of utilizing constructivist tablets as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum in public primary schools located in Kisumu Central Sub-county, Kenya. The research was based on the theoretical framework of Lev Vygotsky's Social Constructivist Theory. The research employed a mixed methods approach. The sample size consisted of 168 participants, including 29 head teachers, 29 panel heads, 81 grade three teachers, and 29 PTA members. These individuals were selected from public primary schools located in Kisumu Central Sub-County, Kenya. The sample consisted of 54 respondents who were selected using a stratified simple sampling procedure. The sample for this study comprised of 27 educators teaching grade three mathematics, 9 individuals serving as head teachers, 9 individuals holding the position of panel chairmen, and 9 members of the Parent-Teacher Association (PTA). A questionnaire was distributed to mathematics instructors in the third grade, as well as to head teachers and panel chairs. Interviews were conducted with members of the Parent-Teacher Association (PTA). Descriptive and inferential statistics were generated using SPSS version 22. This study has determined that the utilization of group work, games, radio, and tablets as teaching methods accounts for 81.0% of the variation observed in the implementation of grade three mathematics curriculums. The results of the correlation study indicate a robust positive link between the utilization of the group work teaching technique and the successful implementation of the grade three mathematics curriculum ($r=0.667$; p value$=0.000<0.05$). The utilization of games as an instructional approach exhibits a moderate positive connection, which is both statistically significant and supports the execution of the grade three mathematics curriculum ($r=0.536$, p value$=0.002<0.05$). The teaching technique of radios exhibits a modest positive association, which is statistically significant, with the successful application of the grade three mathematics curriculum ($r=0.404$; p value$=0.000<0.05$). The use of tablets in educational settings exhibits a robust and statistically significant association with the successful execution of grade three mathematics curriculum ($r=0.650$; p value$=0.000<0.05$). The present study revealed that a significant majority of teachers, specifically 89.2%, employed the instructional strategy of group work when teaching grade three mathematics in public primary schools located in Kisumu Central. The utilization of gaming as a pedagogical approach in teaching grade three mathematics is limited to a mere 14.8% of instructors, primarily attributed to the insufficiency of gaming resources inside educational institutions. None of the teachers utilize radio as a teaching tool for mathematics due to its limited capacity to visually represent and effectively convey mathematical concepts. A significant proportion (70.4%) of public primary schools in Kisumu Central possess an ample number of

tablets for the purpose of instructing mathematics, together with reliable internet connectivity. Nevertheless, it has been found that a significant proportion of teachers, specifically 51.9%, lack the necessary abilities and competencies to effectively utilize tablets as a tool for teaching mathematics. Therefore, it is recommended that Mathematics teachers in grade three of public primary schools in Kisumu Central undergo refresher training in order to acquire the necessary skills and competencies to effectively implement constructivist pedagogical approaches in the teaching of mathematics. Additionally, the administration of public primary schools in Kisumu Central should procure an adequate amount of gaming resources and facilities to enable grade three mathematics teachers to utilize the gaming method in their instruction of mathematics. Furthermore, grade three mathematics teachers should receive training in information and communication technology (ICT) to equip them with the skills and competencies needed to integrate the use of tablets in the teaching of grade three mathematics. Lastly, it is advised to incorporate more suitable visual aids and teaching materials in the instruction of mathematics.

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ABBREVIATIONS AND ACRONYMS

CBC	Competency Based Curriculum
GW	Group work
GTCBMC	Grade Three Competency Based Mathematics Curriculum
IRI	Interactive Radio Instruction
KICD	Kenya Institute of Curriculum Development
KNUT	Kenya National Union of Teachers
MG	Mathematical Games
MGs	Mathematical Games'
MDGs	Millennium Development Goals
MOE	Ministry of Education
NACOSTI	National Commission for Science, Technology and Innovation
PTA	Parents Teachers Association
QASO	Quality Assurance and Standard Officer
SPSS	Statistical Package for Social Sciences
T/M	Teaching and learning
T/LM	Teaching and learning materials

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The objective of this study was to examine the impact of constructivist pedagogical methods on the implementation of the Grade Three competency-based mathematics curriculum in public primary schools located in Kisumu Central Sub-County, Kenya. The objectives of the study were to examine the impact of utilizing constructivist group work as a teaching method on the implementation of the Grade mathematics curriculum, to assess the influence of employing constructivist games as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum, to determine the effects of utilizing constructivist radio as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum, and to establish the impact of utilizing constructivist tablets as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum in public primary schools located in Kisumu Central Sub-county, Kenya. The research was based on the theoretical framework of Lev Vygotsky's Social Constructivist Theory. The research employed a mixed methods approach. The study's target group consisted of 168 participants, including 29 head teachers, 29 panel heads, 81 grade three teachers, and 29 PTA members. These individuals were selected from public primary schools located in Kisumu Central Sub-County, Kenya. The sample consisted of 54 participants who were selected using a stratified simple sampling procedure. The participants in this study comprised of 27 educators who teach grade three mathematics, 9 individuals serving as head teachers, 9 panel heads, and 9 members of the Parent-Teacher Association (PTA). A questionnaire was distributed to mathematics instructors in the third grade, as well as to head teachers and panel chairs. Interviews were conducted with members of the Parent-Teacher Association (PTA). Descriptive and inferential statistics were

generated using SPSS version 22. This study determined that the utilization of group work, games, radio, and tablets as teaching methods together explain 81.0% of the variance in the execution of grade three mathematics curriculums. The results of the correlation study indicate a robust positive link between the utilization of group work as a teaching method and the successful implementation of the grade three mathematics curriculum ($r=0.667$; p value=0.000<0.05). The utilization of games as an instructional approach exhibits a moderate positive connection, which is both statistically significant and supports the execution of the grade three mathematics curriculum ($r=0.536$, p value=0.002<0.05). The teaching technique of radios exhibits a statistically significant weak positive connection ($r=0.404$; p value=0.000<0.05) with the application of the grade three mathematics curriculum. The utilization of tablets in educational settings exhibits a robust positive association, which is both statistically significant and noteworthy, with the successful execution of the grade three mathematics curriculum ($r=0.650$; p value=0.000<0.05). The findings of this study indicate that a significant majority, specifically 89.2%, of instructors in public primary schools located in Kisumu Central employ the strategy of group work when instructing students in the subject of mathematics at the third grade level. The utilization of gaming as a teaching tool for grade three mathematics is limited to a mere 14.8% of teachers, primarily attributed to the insufficiency of gaming resources inside educational institutions. None of the teachers utilize radio as a teaching tool for mathematics due to its limited capacity to visually represent and effectively convey mathematical concepts. The findings indicate that a significant proportion (70.4%) of public primary schools in Kisumu Central possess an ample number of tablets for the purpose of instructing mathematics, alongside reliable internet connectivity. Nevertheless, a significant proportion of educators, namely 51.9%, lack the necessary abilities and competencies to effectively utilize tablets as a tool for instructing mathematical concepts. Therefore, it is recommended that Mathematics teachers in grade three at public primary

schools in Kisumu Central undergo refresher training to acquire the necessary skills and competencies for effectively implementing constructivist pedagogical approaches in the teaching of mathematics. Additionally, the administration of public primary schools in Kisumu Central should ensure the procurement of adequate gaming resources and facilities to enable grade three mathematics teachers to utilize the gaming method in their instructional practices. Furthermore, grade three mathematics teachers should receive training in information and communication technology (ICT) to equip them with the skills and competencies needed to integrate the use of tablets in the teaching of grade three mathematics. Lastly, it is advised to incorporate more suitable visual aids and teaching materials in the instruction of mathematics.

1.2 Statement of the Problem

The principles of constructivism are effectively manifested in educational practices that prioritize student-centered learning, foster peer cooperation, and promote cooperative learning. Quality mathematics education is highlighted as a crucial instrument for fostering innovation and facilitating Kenya's transition into a middle-income country. According to recent research conducted by Piper et al. (2016), it is recommended that a diverse range of instructional methods be employed in mathematics education in order to foster the development of procedural fluency and a comprehensive conceptual understanding among students.

Mathematics is the sole topic in Kenya that occupies a central position in the determination of career paths. Upon doing a preliminary examination of the Kenya Certificate of Secondary School 2022 results, it has been seen that over 50% of the students attained grades D and E.

The subpar performance observed in mathematics raises concerns over the fundamental understanding and proficiency of the students in this subject. The fundamental principles are imparted and acquired during the early years of primary school instruction (Russo, 2018). The acceptance of the funding proposal from the Global Partnership for Education by the Ministry of Education, Science and Technology (MOEST) over the period of 2015-2017 resulted in an enhancement of the educational standards, particularly in the field of numeracy. This serves as evidence that mathematics holds significant importance as an academic topic.

The implementation of GTCBMC has various challenges, including a lack of parental support and involvement, issues with the curriculum framework, insufficient human resources, big class sizes, limited ICT skills, minimal public participation, financing constraints, and inadequate teaching and learning materials, among other obstacles. There is a scarcity of research that has quantified the influence of schooling on the adoption of pedagogical strategies in teaching CBC mathematics. The purpose of this study was to examine the impact of constructivist pedagogical methods on the implementation of a competency-based mathematics curriculum for Grade Three students in public primary schools located in Kisumu Central Sub-County.

1.3 The purpose of Study

The objective of this study was to examine the impact of constructivist pedagogical approaches on the implementation of the Grade Three competency-based mathematics curriculum in public primary schools located in Kisumu Central Sub-County, Kenya.

1.4 Research Objectives

i. To find out influence of the constructivist use of group work method of teaching on implementation of Grade Three competency-based mathematics curriculum in public primary schools in Kisumu Central Sub- County, Kenya.
ii. To establish influence of constructivist use of games method of teaching on implementation of Grade Three competency-based mathematics curriculum in public primary schools in Kisumu Central Sub- County, Kenya.
iii. To determine the influence of Constructivist use of radio as a method of teaching on implementation of Grade Three competency-based mathematics curriculum in public primary schools in Kisumu Central Sub- County, Kenya.
iv. To find out the influence of constructivist use of tablet as a method of teaching on implementation of Grade Three competency-based mathematics curriculum in public primary schools in Kisumu Central Sub- County, Kenya.

1.5 Research Hypothesis

The study was guided by the following hypothesis

H_1: Use of group work method of teaching significantly influences implementation of Grade Three mathematics curriculum in public primary schools in Kisumu Central Sub- County.

H_2: Use of games as a method of teaching significantly influences implementation of Grade Three mathematics curriculum in public primary schools in Kisumu Central Sub- County.

H_3: Use of radio method of teaching significantly influences implementation of Grade Three mathematics curriculum in public primary schools in Kisumu Central Sub- County.

H_4: Use of tablet as a method of teaching significantly influences implementation of Grade Three mathematics curriculum in public primary schools in Kisumu Central Sub- County

1.6 Significance of the Study

The study aimed to gather data from head teachers, panel heads, teachers, and a PTA member regarding the implementation of GTCBMC. Its purpose was to provide information to the Ministry of Education, curriculum-planners, curriculum-designers, and teachers regarding the implementation process. Additionally, the study aimed to assist in the planning of content for teachers' training, determine suitable pedagogical approaches, and contribute to the existing body of knowledge.

1.7 Limitations of the Study

Limitations refer to the factors that are outside the researcher's control but have the potential to impact the outcomes of the study (Mugenda & Mugenda, 2013). Certain participants in the study submitted information that was deemed untrustworthy or demonstrated a reluctance to disclose the necessary information. In order to address this concern, the researcher provided the respondents with reassurances on the purpose of the obtained data.

1.8 Delimitations of the Study

Kisumu County encompasses a considerable geographical area and comprises around seven sub-counties. The researcher's focus was limited to Kisumu Central Sub-County due to constraints in both time and funding. The sub-county exhibits a high level of accessibility. The level of standardization in public schools tends to be higher compared to that of private schools. The questionnaires were readily completed by head teachers and teachers. A sample size equivalent to 30% of the entire population was utilized.

1.9 Assumption of the Study

The study was driven by the following assumptions:

I. The participants will offer truthful responses and genuine perspectives.

II. Public elementary schools in the studied locations function within a shared educational setting.

III. The participants are expected to possess a high level of expertise and have a willingness to provide the necessary information.

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1.10 Definitions of Significant Terms

The next subsection presents definitions of essential terms as they are employed within the context of the research.

The term "competency-based mathematics curriculum" pertains to a structured set of instructional materials and activities that students are required to engage with in the context of a mathematical course**.**

Constructivist pedagogical methods pertain to an instructional approach wherein learners actively engage in the process of constructing new knowledge by integrating their past knowledge with new experiences, rather than being passive recipients of information**.**

The utilization of game methods or gaming is an educational approach that involves the participation of individuals in an orchestrated dispute, guided by a set of rules**.**

The group work method refers to the approach by which learners engage in collaborative interaction and develop knowledge while working together in teams to accomplish tasks**.**

The term "implementation" pertains to the process of translating ideas or concepts into practical application or execution**.**

The term "radio" refers to a medium of communication that utilizes electromagnetic waves to transmit and An auditory apparatus capable of facilitating educational experiences and delivering valuable knowledge to a greater quantity of students**.**

A tablet computer is an electronic device utilized in the educational context for the purposes of teaching and learning**.**

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1.11 Organization of the Study

The research was organized into a comprehensive framework consisting of five distinct chapters. The initial chapter encompasses several key components, including an introduction, background information pertaining to the study, a statement outlining the problem being addressed, the purpose of the study, research objectives, research questions, the significance of the study, limitations and delimitations, assumptions made during the study, definitions of significant terms, and an overview of the organization of the subsequent chapters. The second chapter of the study comprised several key components, including an introductory section, a comprehensive assessment of pertinent literature, a concise summary of the material that was evaluated, and the establishment of a conceptual and theoretical framework. The third chapter encompasses the research methodology, which comprises several key components. These components include an introduction to the methodology, the research design employed, the specific location of the study, the target population under investigation, the determination of the sample size and the selection of appropriate sampling techniques. Additionally, the chapter addresses the research instruments utilized, including considerations of instrument validity and reliability. Furthermore, it outlines the procedures employed for data collection, the techniques employed for data analysis, and the ethical considerations taken into account throughout the research process. The fourth chapter of this study shows the results and

conclusions pertaining to the research questions. These findings are based on the data collected from the respondents, in accordance with the study's objectives. Chapter five of this research paper provides a concise overview of the findings, followed by a comprehensive discussion of the results. The chapter concludes with the study's conclusions, which include recommendations based on the findings, as well as suggestions for future research endeavors.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The objective of this study was to examine the impact of constructivist pedagogical approaches on the implementation of the Grade Three competency-based mathematics curriculum in public primary schools located in Kisumu Central Sub-County, Kenya. The present study conducted a comprehensive assessment of literature pertaining to the impact of constructivist pedagogical techniques on the implementation of GTCBMC (Guidelines for Teaching Children with Behavioral and Mental Challenges) in public primary schools. This research involved a thorough examination and analysis of various scholarly sources, including magazines, journals, dissertations, and books.

The literature was categorized into the following sections: the theoretical underpinnings of constructivist pedagogical methods, the impact of utilizing group work as a teaching method, the influence of incorporating games into the teaching process, the effects of utilizing radio as an instructional tool, the impact of using tablets on the implementation of the GTCBMC approach, a concise summary of the literature review, the theoretical framework, and the conceptual framework.

2.2 The concept of constructivist pedagogical approaches

The term "constructivist" has been employed to describe an educational approach wherein learners actively engage in the process of constructing new knowledge by integrating their existing knowledge with new experiences, rather than passively acquiring information. The theory of constructivism posits that in order for learners to internalize information, they must engage in the process of actively constructing knowledge by independently seeking out and

deciphering complex material. The field of CBC mathematics incorporates a range of instructional approaches, such as guided worksheets (GW), manipulative games (MG), radio-based instruction, and tablet-based learning, among others. The researcher examined the impact of several methodologies on the implementation of the Generalized Two-Component Bose-Mesner Algebra Construction (GTCBMC).

2.3 Group work (GW)teaching method and implementation

According to Owala (2021), the presence of a significant number of students in a classroom, beyond the government's recommended optimum, presents a notable obstacle to the successful implementation of the Competency-Based Curriculum (CBC). Providing customized attention to learners is a challenging task due to the substantial volume of students, which is a fundamental concern in the context of teaching and learning in a competency-based curriculum. Group work (GW) has been found to be highly advantageous for learners as it effectively optimizes classroom resources and enhances opportunities for learning and achievement. This is mostly attributed to the collaborative nature of GW, which allows youngsters to assist one another in their educational pursuits. The practice of grouping pupils has the potential to foster collaboration among students, enhance their communication abilities, and promote a sense of mutual responsibility and accountability.

Sim et al. (2021) identified several challenges encountered in group work. These challenges include members who excessively depend on others, insufficient contribution to the group, feelings of alienation in the decision-making process, domination of discussions, lack of satisfaction, failure to consider and discuss diverse opinions and ideas, low attendance, and ineffective communication.

2.4 Games as a teaching method and implementation

The active learning method known as Game Mastering (GM) involves the utilization of rules to facilitate player engagement in a manufactured conflict. Play serves as a fundamental foundation for all teaching and learning processes in the domains of mathematics and science. The engagement of students is consistently maintained and invigorated within a competitive learning environment. Russo (2018) highlights the need of incorporating mathematical concepts into the curriculum throughout the early stages of education, specifically in playful and casual settings. Numerical thinking is cultivated through the utilization of games, inquiries, and reading specifically designed for children.

According to Ekonesi and Ekwueme (2011), educators perceive games as a valuable and essential educational method when they possess knowledge about the underlying philosophy, design, and widespread accessibility of games. In order to maintain the involvement and interest of learners, it is important to strike a balance between luck and talent.

In order to accommodate the needs of a wide range of learners, it is recommended that MG incorporates a suitable element of chance, undergoes appropriate modifications to optimize its effectiveness, and provides opportunities for differentiation across various ideas (Russo, 2018). Students who possess strong mathematical abilities often excel in games that rely simply on talent. On the other hand, learners who lack engagement and motivation may struggle to perform well. Additionally, the time required for the learning process in mathematics might be excessive when using traditional teaching methods. Furthermore, the adoption of a competency-based curriculum (CBC) in mathematics is hindered by the insufficient availability of teaching and learning materials, such as books. According to Bragg (2012), the effectiveness of MG in promoting learning retention is comparatively lower when employed in isolation, as opposed to other pedagogical approaches that are both engaging and student-centered, while also incorporating explicit mathematics instruction.

2.5 Use of Radio as a teaching method andimplementation

Radio is considered a valuable tool for educational purposes due to its portability, making it easily accessible to individuals who may have limited reading abilities. Additionally, it enables the implementation of child-centered pedagogical approaches, enhancing the learning experience. Moreover, radio engages users through immersive examples, and it is utilized for behavior change initiatives. Lastly, it aids in the development and refinement of specific pedagogical elements. Educational radio presents a viable and cost-effective solution for disseminating educational content to communities characterized by hard-to-reach learners residing in rural locations. These populations face challenges such as inadequate connectivity, digital literacy, and access to electricity. By leveraging the medium of radio, educational initiatives can be sustained over an extended period, offering an effective means of delivering educational content. According to Elliot and Lashley (2017), the utilization of accessible resources such as local cultural artefacts and teachers has the potential to enhance the learning environment in radio-delivered education.

The utilization of radio as a medium for teaching mathematics encounters several challenges. These challenges include the inability to deliver personalized instruction tailored to individual needs, the reliance on lip-reading to compensate for missed words, the limited ability to provide visual aids that significantly enhance understanding, the difficulty in developing programs suitable for diverse learners simultaneously, the absence of interactivity, the presence of regional instability, uncertain financial circumstances, and the complexity of creating appropriate content and determining the most effective language of instruction for learners (Bates & Bates, 2005).

2.6 Use of tablet computer and implementation

According to Tamim et al. (2015), there is evidence to suggest that tablets and smart mobile devices are among the most recent technical innovations that have been utilized to enhance educational practices. UNESCO has designed an educational tool for pre-service and in-service teacher training in the field of Information Communication Technology (ICT). This tool aims to provide guidance to teachers at all levels of the education system about the effective utilization of ICTs. The instrument referred to as the Competency Framework for Teachers, often known as ICT CFT, was developed by UNESCO in 2018. The utilization of these devices in innovative ways has the potential to enhance educational equity, increase classroom efficiency and productivity, support individualized learning, enable a flexible approach to education, and bridge the gap between formal and informal learning. The effective utilization of tablets is contingent upon several factors, including the presence of dependable high-speed internet access, access to electricity, the seamless integration of information and communication technology (ICT) within the educational setting, the capacity of teachers to implement innovative instructional approaches, the appropriate amalgamation of technology and pedagogy, the cultivation of socially engaged classrooms, and the promotion of interactive and collaborative learning through group work. The utilization of tablets is confronted by various challenges, including a deficiency in information and communication technology (ICT) skills and the incapacity to effectively integrate ICT with the competency-based curriculum (CBC). Additionally, the presence of distracting entertainment elements, inappropriate content, and technical and software complications further contribute to the obstacles faced in the use of tablets.

2.7 Summary of literature review

A survey of relevant literature was conducted in order to examine the various components involved in conceptualizing the impact of constructivist pedagogical approaches on the implementation of the Global Teacher Certification Program for Mathematics and Science

(GTCBMC) in public primary schools. This section examines the meaning of constructivism, the utilization of games, the application of group work, and the incorporation of radio and tablet technologies.

2.8 Theoretical framework

The research was based on the Social Constructivist theory proposed by Lev Vygotsky in 1962. The constructivist theory developed by Lev S. Vygotsky (1978) was influenced by Jean Piaget's cognitive theory (1953). Vygotsky placed significant emphasis on the need of individuals engaging in interactions and mediating language in the process of constructing knowledge. Vygotsky posits that the process of learning is characterized by collaboration and occurs within a social framework, involving interactions between learners and educators. Teachers serve as influential figures who exemplify desirable behavior and values, while also engaging in a dynamic exchange with students through posing inquiries. Lev Vygotsky espouses the use of a bottom-up instructional methodology. Learners are provided with opportunities both within and beyond the confines of the classroom to engage in the acquisition of information and understanding of various ideas. Teachers assume multiple roles in the educational setting, serving as facilitators, guides, and co-learners alongside their students. A multitude of technologies are employed to facilitate the educational setting.

According to the findings of Sim et al. (2021), it has been posited that there exists a distinction between the individual capabilities of a learner and their potential achievements when operating inside a group setting under the guidance of Vygotsky's theoretical framework. According to Piaget (1953), a prominent advocate of constructivist theory, the progression of human intellectual development occurs in a sequential manner, advancing chronologically through many stages. Piaget conducted research on the relationship between age and cognitive abilities in children, specifically focusing on the development of logical reasoning. As a result of his investigations, he proposed a framework consisting of four

distinct phases of cognitive development. The term used to describe this phenomenon is referred to as cognitive development. According to the notion of cognitive development, individuals are required to actively generate their own knowledge rather than passively receiving information in order to achieve rapid comprehension and application. Piaget's assertion posits that children's schemas are built as they progress through four distinct phases of development, facilitated by the cognitive processes of assimilation and accommodation.

2.9 Conceptual framework

The formulation of a comprehensive framework with overarching concepts and principles derived from pertinent areas of study serves as a foundation for organizing and guiding a future discourse, while ensuring the research remains focused and coherent. The utilization of drawings and diagrams to elucidate the interconnection between the independent variable and the dependent variables is referred to as a conceptual framework (Orodho, 2009). The interrelationship is depicted in Figure 2.1. The following text is provided:

The conceptual framework elucidates the impact of many independent variables, namely the utilization of group work method, employment of games method, utilization of radio, and the use of tablets, on the dependent variable, namely the outcome of implementation. The method of MG involves active learning, wherein players are guided by rules while participating in an artificial dispute.Group work (GW) refers to the educational approach in which learners engage in collaborative interaction and develop knowledge while working together in teams to achieve tasks. The radio serves as an auditory tool or apparatus that delivers valuable information and facilitates educational opportunities for individuals seeking to acquire knowledge. Tablets are technological devices utilized in the teaching and learning process. The utilization of each of these variables is contingent upon the execution of CBC.

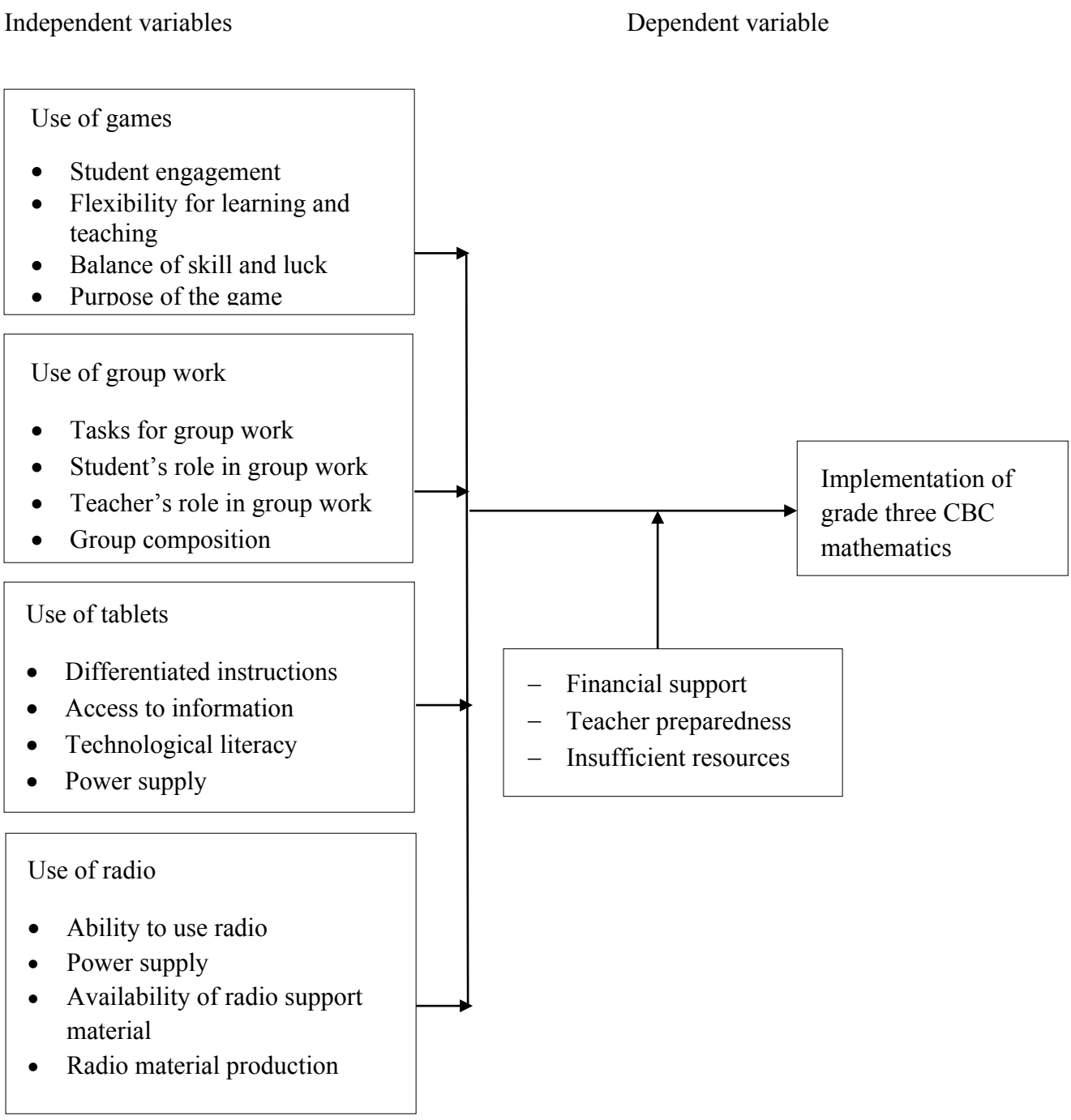

Figure 2.1: Conceptual frameworks on the interplay of study variables

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter focused on the technique employed in conducting the study. The study was divided into several key components, including research design, study location, target population, sample size and sampling techniques, research instruments, instrument validity, instrument reliability, data collection procedures, data processing methodologies, and ethical issues.

3.2 Research design

The research utilized a descriptive survey design in order to assess the present condition of the population in connection to one or more factors and demonstrate the cause-effect link between these variables. Orodho (2009) and Mugenda & Mugenda (2013)

3.3 Location of the study

The research was carried out in public primary schools located in Kisumu Central Sub-County, which is situated inside Kisumu County in the Nyanza region of Kenya. This particular area was chosen due to its accessibility, and it was noted that no prior studies with similar objectives had been undertaken in this sub-county.

3.4 Target population

The target population, as defined by Kothari (2013), refers to the entire group of persons that the researcher intends to study. The research focused on a sample of 29 head teachers/principals (one representative from each school), 29 panel heads (one representative from each school), 81 grade three mathematics teachers, and 29 PTA members (one representative from each school).

3.5 Sample size and sampling techniques

Sampling is a method used to choose a subset of objects or individuals from a larger population in order to ensure that the selected subset accurately represents the characteristics of the entire group. According to Mugenda and Mugenda (2013), a sample size ranging from 10% to 30% is deemed adequate for the purpose of generalizing the findings. A purposive and stratified random sampling strategy was employed to pick 30% of the population. The purposive sample technique was employed with a specific focus on grade three mathematics teachers. The population was divided into three distinct zones, and the sample size was determined as illustrated below.

Table 3.1: Sample Size

Zone	Principal target	Sample 30%	Teachers target	Sample 30%	Panel head target	Sample 30%	PTA members	Sample (30%)
Manyatta	07	3	27	9	07	3	07	3
Central	14	3	27	9	14	3	14	3
Southern	08	3	27	9	08	3	08	3
Total	29	9	81	27	29	9	29	9

3.6 Research Instruments

Researchers employ many research devices to get pertinent data. Questionnaires are a commonly used tool in research and data collection, designed to gather information on individuals' views, opinions, beliefs, and biographical details. The materials were distributed to head teachers, panel heads in mathematics, and teachers of grade three mathematics.

Interview instructions were disseminated to a single member of the Parent-Teacher Association (PTA) from each educational institution. Questionnaires are a valuable tool for maintaining confidentiality and optimizing time efficiency.

3.7 Instrument Validity

Validity refers to the degree to which the conclusions obtained through data analysis accurately and faithfully represent the phenomena being studied. In order to assess their validity and reliability, a pilot study was conducted in three public primary schools, each representing a different zone. These schools were selected based on their similarity to the sampled schools, as outlined by Orodho (2009). A preliminary assessment was conducted in order to ascertain the efficacy of the questionnaires. Kombo and Tromp (2006).

3.8 Instrument Reliability

Reliability refers to the extent to which an instrument consistently produces similar results when administered multiple times to the same respondents (Orodho, 2009). In order to assess and verify the dependability of the instruments, a pilot study was conducted on a consistent group of participants on two separate occasions during a two-week timeframe. The Pearson-product moment correlation calculation was employed to ascertain the reliability coefficient of the scores obtained during both testing periods.

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{[N\sum X^2 - (\sum X)^2] - [N\sum Y^2 - (\sum Y^2)]\}}}$$

Where r=Pearson co-relation co-efficient; X=result from the first test; Y=result from the second test and N=number of observations.

The results of the Pearson correlation analysis indicated a coefficient of 0.78 for the questionnaires completed by teachers, and a coefficient of 0.75 for the questionnaires

completed by head teachers and panel leaders. Hence, the surveys were deemed to possess reliability, given that the correlation coefficient exceeded 0.7.

3.9 Data Collection Procedures

The researcher sought a permit from the National Commission for Science, Technology, and Innovation (NACOSTI) after obtaining a clearance letter from the relevant department. The researcher provided the head teachers of the schools with a Research Authorization letter that had been issued by the county Director of Education's office. Following a preliminary visit to the schools, questionnaires were administered to the head teachers, panel heads of mathematics, and grade three mathematics teachers. Additionally, interview guidelines will be provided to members of the Parent-Teacher Association (PTA).

3.10 Data Analysis Techniques

Data analysis techniques refer to the statistical approaches employed for the purpose of analyzing data in order to facilitate its interpretation. Interview schedules and questionnaires will be utilized to gather data of both qualitative and quantitative nature. The utilization of descriptive analysis enables the researcher to effectively depict the fundamental attributes of the acquired data through the application of percentages, frequencies, standard deviations, and means. In order to facilitate the process of qualitative analysis, the closed-ended questions obtained from the surveys were subjected to coding. The utilization of Statistical Package for Social Sciences (SPSS) version 22 facilitated the generation of charts and tables. The use of inferential analysis facilitated the researcher in discerning the correlation and connection between the pedagogical approaches of group work, games, radio, and tablet usage in the context of implementing the mathematical curriculum for third-grade students.

3.11 Ethical Considerations

The research adhered to the prescribed principles and standards of research ethics. Participants were informed that their personal identifying information, including their names, locations, and responses, would solely be utilized for the purpose of data collection in the study. This provided them with a guarantee of both confidentiality and anonymity.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION, AND DISCUSSION

4.1 Introduction

This chapter provides an overview of the outcomes and discoveries from a study examining the impact of constructivist pedagogical methods on the implementation of a competency-based mathematics curriculum for third-grade students in public primary schools located in Kisumu Central Sub-County, Kenya. The initial section provides an overview of the respondents' general and demographic characteristics. The subsequent part provides an analysis of the impact of the group work teaching style on the implementation of grade three mathematics curriculums. The subsequent part provides an analysis of the impact of the instructional approach employed in educational games on the successful implementation of mathematical curricula for third-grade students. The subsequent part provides an analysis of the impact of the radio teaching method on the execution of grade three mathematics curricula. The fifth element of this study examines the impact of utilizing tablets as an instructional tool on the implementation of grade three mathematics curricula. The final component of this study offers the findings about the implementation of grade three mathematics in public primary schools within Kisumu Central Sub-County. Additionally, a regression analysis is conducted to further analyze the data.

4.2 General and Demographic Information

This section provides an overview of the findings pertaining to three key aspects: the rate of instrument return, the level of compliance with the Central Board of Curriculum (CBC) among primary schools in Kisumu Central, and the duration of service of instructors in the teaching profession:

4.2.1 Questionnaire Return Rate

Table 4.1 displays the distribution of questionnaires distributed to head teachers, panel heads, and grade three mathematics teachers, in relation to the proportion of questionnaires that were effectively completed and returned for the purpose of analysis. Additionally, the publication includes interviews that were effectively conducted with the members of the Parent-Teacher Association (PTA). All 27 grade three teachers, 9 head teachers, and 9 panel members successfully completed the questionnaires that were distributed to them, as indicated in Table 4.1. In a similar vein, all of the interviews were conducted with members of the Parent-Teacher Association (PTA) in a fruitful manner.

Table 4.1: Questionnaire Return Rate

Respondents	**Administered**	**Returned**	**Return Rate (%)**
Head teachers Questionnaires	9	9	100%
Teachers Questionnaires	27	27	100%
Panel Members Questionnaires	9	9	100%
Interviews with PTA Members	9	9	100%
Total	**54**	**54**	**100%**

Source: Field Data, 2023

According to the data presented in Table 4.1, the questionnaire return rate for all targeted respondents was consistently high, exceeding 100% in all instances. According to Mugenda and Mugenda (2003), a return percentage ranging from 60 to 80 percent is considered "highly satisfactory," while a return rate of 80 percent or higher is deemed "fully satisfactory." The return rate was deemed to be excellent in order to facilitate the provision of the necessary information for data analysis. The increased rate of questionnaire completion can be attributed to the implementation of structured questionnaires. These questionnaires facilitated respondents' ability to easily and efficiently fill them out within a short timeframe. This efficiency was achieved by requiring respondents to select responses that accurately reflected

the constructivist approaches utilized in teaching grade three mathematics in their respective schools. By scheduling appointments in advance with Parent-Teacher Association (PTA) members, the researchers were able to secure access to all of the intended key informants. This facilitated the conduction of interviews on the days specified by the researchers, in accordance with the appointments granted.

4.2.2 CBC Compliance among Teachers in Public Primary School

The degree of conformity with the Competency-Based Curriculum (CBC) inside educational institutions plays a crucial role in assessing the capacity of grade three mathematics instructors to proficiently execute the mathematics curriculum. A substantial degree of adherence suggests that educators possess the capacity to proficiently employ constructivist methodologies in the instruction of third-grade mathematics. Consequently, it was necessary for head teachers and panel heads to ascertain the level of familiarity that teachers in their particular schools possessed with the CBC curriculum, as outlined in Table 4.2:

Table 4.2: Teacher CBC Compliance among Public Primary Schools

Acquaintance with CBC	**Frequency**	**Percentage**
Teachers are well acquainted with the CBC Curriculum	8	44.4%
Teachers are not well acquainted with the CBC Curriculum	10	55.6%
Total	**18**	**100%**

According to the data shown in Table 4.2, a majority of the head teachers and panel heads (55.5%) expressed that the teachers in their schools lacked familiarity with the Competency-Based Curriculum (CBC). Out of the total respondents, a mere 4 individuals, accounting for 44.4% of the sample, expressed that the teachers in their respective schools have a comprehensive understanding of the Competency-Based Curriculum (CBC). This suggests that a significant proportion of instructors in public primary schools in Kisumu Central lack

sufficient familiarity with the Competency-Based Curriculum (CBC). The potential ramifications of this situation may significantly impact the teachers' capacity to successfully execute the program. This observation suggests that a significant proportion of teachers lack the necessary expertise and understanding to successfully administer the Competency-Based Curriculum (CBC). The training of teachers plays a crucial role in equipping them with the necessary skills and abilities needed to successfully administer the Competency-Based Curriculum (CBC). The research undertaken by the Presidential Working Party on Education Reforms (2023) uncovered that despite the provision of induction training programs to a significant number of primary school teachers, their level of preparedness for implementing the Competency-Based Curriculum (CBC) was insufficient due to the rushed nature of the training. Moreover, there exist deficiencies in teachers' ability to effectively implement the Competency-Based Curriculum (CBC), which include challenges related to inadequate digital literacy skills, the adoption of learner-centered pedagogical techniques, and the transition from formative to summative assessments. Consequently, the report put up a recommendation advocating for teachers to partake in refresher training pertaining to the Competency-Based Curriculum (CBC). This measure aims to ensure that teachers possess a thorough understanding and alignment with the curriculum. As a result, it will be mandatory for all teachers to participate in refresher training starting in April 2024. Therefore, the potential lack of familiarity with the Competency-Based Curriculum (CBC), as reported by head teachers and panel heads, could suggest that teachers may not have received sufficient training or that the instruction they received was insufficient. Consequently, educators were requested to specify whether they had received instruction on the CBC curricula as depicted in Table 4.3:

Table 4.3: Grade Three Mathematics Teachers Training on CBC Curriculum

CBC Training	Frequency	Percentage

Never attended training on CBC Curriculum	-	-
Attended training once	2	7.4%
Attended training twice	18	66.7%
Attended training thrice	7	25.9%
Total	**27**	**100%**

According to the data presented in Table 4.3, it can be observed that a majority of teachers in public primary schools in Kisumu Central, namely 18 individuals, accounting for 66.7% of the total, have participated in CBC training on two occasions. In contrast, a smaller proportion of teachers, specifically 7 individuals, representing 25.9% of the total, have received training three times. Additionally, a minority of teachers, specifically 2 individuals, comprising 7.4% of the total, have attended training just once. Despite receiving training on the Competency-Based Curriculum (CBC), a significant proportion of head teachers and panel heads (55.5%) reported that teachers in their respective schools lacked sufficient familiarity with the CBC curriculum (Table 4.2). This observation perhaps suggests that the instruction provided may have been insufficient. Therefore, it can be argued that the training sessions attended by teachers in Kisumu Central on the Competency-Based Curriculum (CBC) were insufficient in providing them with the necessary skills and knowledge to properly administer the curriculum. Consequently, it is imperative for educators to undergo supplementary training in order to augment their proficiency in executing the curriculum.

4.2.3 Grade Three Teachers Experience in Teaching Mathematics

Experienced mathematics educators possess practical expertise and pedagogical strategies that are efficient in imparting numeracy skills to students. As a result, these educators exhibit a higher level of competence, confidence, and preparedness in their ability to effectively

execute the mathematics curriculum. This study aimed to investigate the experiences of grade three mathematics instructors in teaching mathematics, as depicted in Table 4.4:

Table 4.4: Teachers Experience in Teaching Mathematics

Years	Frequency	Percentage
Below 5 years	5	18.5%
6-10 years	11	40.7%
11-20 years	9	33.3%
More than 20 years	2	7.4%
Total	**27**	**100%**

The results shown in Table 4.4 demonstrate that a significant proportion of grade three mathematics instructors possess extensive teaching experience in the field of mathematics. Out of the total sample size, 11 individuals (40.7%) have engaged in the profession of teaching mathematics for a duration ranging from 6 to 10 years. Additionally, 9 individuals (33.3%) have been involved in teaching mathematics for a time spanning from 11 to 20 years. Furthermore, 5 individuals (18.5%) have been teaching mathematics for less than 5 years, while 2 individuals (7.4%) have accumulated experience of more than 20 years in the field of mathematical education. The findings indicate that a significant proportion of primary school teachers in Kisumu Central had practical skills and extensive experience in employing effective pedagogical strategies for teaching mathematics, hence enhancing students' numeracy abilities. The educators have additionally been instructing mathematics since the introduction of the CBC in 2017, thus acquiring expertise in the application of the novel mathematics syllabus. Consequently, this particular encounter has the potential to augment individuals' aptitude in delivering high-quality instructional methods to learners, as well as bolster their proficiency in effectively implementing mathematics curriculum.

4.3 Findings of Objective One

The primary aim of this study was to examine the impact of employing the constructivist approach to group work as a teaching method on the implementation of the Grade Three competency-based mathematics curriculum. The study sought to gather information regarding the utilization of the group work method in teaching mathematics among grade three mathematics teachers. Additionally, head teachers and panel heads were asked to provide insights on whether teachers in their respective schools employed the group work method in teaching mathematics, as well as the ways in which group work contributes to the enhancement of mathematics learning among students. In addition to conducting interviews with members of the Parent-Teacher Association (PTA), a correlation analysis was performed to ascertain the degree to which the group work teaching technique influenced the implementation of the mathematics curriculum. The present study presents its findings in the subsequent parts:

4.3.1 Use of Group Work Teaching Method inGrade Three Mathematics

Table 4.5 teacher's perspective on use of group work in teaching mathematics:

Table4.5: Use of Group Work in teaching Grade Three Mathematics

Statement	SA		A		D		Mean
	N	%	N	%	N	%	
I use group work in teaching mathematics	8	29.6%	16	59.3%	3	11.1%	4.074
Group work enables pupils to learn from each other on how to solve mathematical problems	23	85.2%	4	14.8%	0	0	4.852
Groups enables learners who struggle in learning mathematics to be assisted by learners who are more proficient in mathematics	19	70.4%	8	29.6%	0	0	4.703
Learners develop different perspectives for solving mathematical problems by sharing and exploring ideas from group members	11	40.7%	16	59.3%	0	0	4.407
Group work builds social skills and inculcates teamwork spirit among	25	92.6	0	0	2	7.4%	4.777

learners	
Grand Mean	**4.563**

Interpretation: The scale used for interpretation assigns the range of 4.5-5.0 as indicative of a strong agreement, the range of 3.5-4.4 as indicative of agreement, the range of 2.5-3.4 as indicative of neutrality, the range of 1.5-2.0 as indicative of disagreement, and the range of 1.0-1.4 as indicative of a severe disagreement.

According to the data presented in Table 4.5, a majority of teachers, specifically 16 out of the total sample, accounting for 59.3%, expressed significant agreement on their utilization of group work as a teaching strategy in the context of grade three mathematics. This perspective was endorsed by 8 out of 27 instructors, representing 29.6% of the sample, who acknowledged incorporating group work as a pedagogical approach in their instruction of third-grade mathematics. However, a total of 3 teachers, accounting for 11.1% of the participants, expressed their disagreement with the utilization of group work as a teaching method in the context of mathematics education. The calculated mean of 4.704 indicates a substantial agreement among teachers on their utilization of the group work approach in mathematics instruction. The results of the study indicate that a majority of teachers, specifically 85.2%, strongly agreed that group work facilitates the acquisition of problem-solving skills in mathematics through peer learning. In contrast, a smaller proportion of teachers, specifically 14.8%, agreed with this notion. The calculated mean of 4.852 indicates a substantial consensus among teachers regarding the effectiveness of group work in offering learning opportunities for students to collaboratively solve mathematical problems and learn from one another.

According to the data presented in the Table, it can be observed that a majority of teachers, namely 19 individuals representing 70.4% of the sample, expressed a strong agreement with

the notion that group work facilitates the support of learners who face difficulties in comprehending mathematical concepts by their peers who possess a higher level of proficiency in mathematics. This perspective was endorsed by 8 out of 27 teachers (29.6%) who concurred that group work facilitates the provision of assistance to learners who face difficulties in comprehending mathematical concepts by their peers who possess greater proficiency in mathematics. The obtained mean value of 4.703 indicates a considerable agreement among teachers regarding the provision of assistance to groups facing problems in mathematics by those who possess a higher level of proficiency in the subject. The data presented in the Table indicates that a majority of teachers, specifically 16 out of the total sample (59.3%), agreed that learners acquire diverse perspectives for solving mathematical problems through the process of sharing and exploring ideas within a group. Conversely, a smaller proportion of teachers, specifically 11 out of the total sample (40.7%), strongly agreed with this notion. The obtained mean value of 4.407 suggests that teachers are in agreement on the positive impact of group work on learners' ability to develop diverse problem-solving perspectives in mathematics.

Moreover, a significant majority of teachers, namely 25 individuals representing 92.6% of the total sample, expressed a strong consensus on the positive impact of group work on the development of social skills and the cultivation of a sense of teamwork among students. However, a minority of teachers (2, or 7.4%) expressed disagreement with the notion that group work effectively promotes the development of learners' social skills and team spirit. The obtained mean of 4.777 suggests a broad consensus among teachers on the significant role of group work in fostering learners' social skills and promoting a sense of teamwork. The obtained grand mean of 4.563 suggests a substantial agreement among teachers in public primary schools in Kisumu Central regarding the effectiveness of utilizing the group work method as a means of enhancing mathematics learning.

4.3.2 Head Teachers and Panel Heads Perspective on Use of Group Work in Teaching Mathematics

Table 4.6 head teachers and panel heads perspective on use of group work in teaching mathematics:

Table4.6: Head Teachers and Panel Heads Perspective on Use of Group Work in teaching Mathematics

Statement	SA		A		Mean
	N	%	N	%	
Teachers use group Work Method in teaching mathematics	17	94.4%	1	5.6%	4.940
Group work enables pupils to learn from each other and share ideas on how to solve mathematical problems	16	88.9%	2	11.1%	4.888
Groups enables learners who struggle in learning mathematics to be assisted by learners who are more proficient in mathematics	3	16.7%	15	83.3%	4.166
Learners are able to develop different perspectives for solving mathematical problems by questioning and exploring ideas from group members	8	44.4%	10	55.6%	4.444
Group work builds social skills and inculcates teamwork spirit among learners	12	66.7%	6	33.3%	4.666
Grand Mean					**4.621**

Table 4.6 presented above provides supporting evidence for the findings presented in Table 4.5, which indicated that educators in Kisumu Central employ the utilization of group work as a pedagogical approach for teaching mathematics to third-grade students. According to the data presented in the Table, a majority of head teachers and panel heads, specifically 17 individuals or 94.4%, expressed a strong agreement with the utilization of group work by teachers in their respective schools for the purpose of teaching mathematics. Conversely, a

smaller proportion of respondents, namely 1 individual or 5.6%, just agreed with this practice. The data shown in the table indicates that a majority of head teachers and panel heads, specifically 16 individuals (88.9%), strongly agreed that group work facilitates the learning process for students, allowing them to acquire problem-solving skills in mathematics through interactions with their peers. In contrast, a smaller proportion of respondents, 2 individuals (11.1%), just agreed with the notion that group work enables students to learn from one another.

The data presented in the Table indicates that a majority of head teachers and panel heads (88.3%) agreed that group work facilitates the support of learners who are struggling in mathematics by those who are more proficient in the subject. In contrast, a smaller percentage (16.7%) strongly agreed with the notion that learners who are struggling in mathematics can be assisted by those who are performing well. Out of the total number of head teachers and panel heads surveyed, 10 individuals, accounting for 55.6% of the respondents, expressed agreement with the notion that learners acquire diverse perspectives on solving mathematical problems through the process of sharing and developing ideas within a group setting. In contrast, 8 individuals, constituting 44.4% of the respondents, strongly agreed that groups offer distinct viewpoints for solving mathematical problems.

Moreover, a majority of 12 head teachers and panel heads, accounting for 66.7%, expressed agreement with the notion that group work fosters the development of social skills and promotes a sense of teamwork among learners. In contrast, a smaller proportion of 6 individuals, representing 73.3%, concurred with the idea that group work plays a significant role in enhancing learners' social skills and fostering a spirit of teamwork. The obtained grand mean of 4.621 indicates that head teachers and panel heads in public primary schools in Kisumu Central expressed a strong agreement with the effectiveness of utilizing group work as a teaching strategy to increase the learning of mathematics.

4.3.3 Qualitative Data from Interviews with PTA Members

According to interviews conducted with members of the Parent-Teacher Association (PTA), it was found that the utilization of group work plays a crucial role in the pedagogical approach to mathematics instruction. As stated by a member of the Parent-Teacher Association (PTA), the utilization of group work in educational settings offers learners the chance to engage with their peers, hence cultivating their social and communication proficiencies. In a constructivist educational setting, students engage in the process of learning by actively participating in the exploration of their own ideas, attentively considering diverse perspectives, and cooperatively resolving mathematical issues. The aforementioned social interactions have the potential to augment students' comprehension of mathematical concepts and facilitate the cultivation of crucial interpersonal aptitudes.

Another member of the Parent-Teacher Association (PTA) has made the observation that teachers have the ability to create diverse groups consisting of children with different levels of mathematics proficiency. This practice allows for the facilitation of peer support and cooperative learning among pupils. Educators have the ability to cluster children who demonstrate exceptional aptitude in mathematics alongside those who exhibit subpar performance. This facilitates the provision of assistance to learners who have challenges in mathematics by pairing them with peers who possess greater proficiency in the subject.

Another member of the Parent-Teacher Association (PTA) noted that, in contrast to traditional teaching methods where students passively witness teachers solving mathematics problems, group work fosters active participation and engagement among learners during the learning process. In collaborative group settings, learners engage in constructive activities such as conversations, problem-solving, and idea exchange to develop their mathematical knowledge. This approach is in accordance with the ideas of constructivism, which suggest

that learners engage in active construction of their understanding of mathematical concepts. Another member of the Parent-Teacher Association had similar views, stating that group work provides learners with an opportunity to enhance their mathematical skills by active engagement with their peers, as opposed to the traditional strategy of passively observing the teacher answer problems. The mathematical proficiency of learners is enhanced by the engagement in group work, which affords them the chance to apply their problem-solving skills. Hence, the utilization of a group work approach has the potential to enhance the critical thinking and problem-solving abilities of learners, while also facilitating interactive and efficient learning experiences.

Another member of the Parent-Teacher Association (PTA) has made an observation regarding the benefits of group work in the context of education. This individual highlights that engaging in group work fosters a pleasant and supportive learning environment, wherein students join forces and collaborate to collectively tackle mathematical difficulties. This facilitates learners in cultivating a feeling of inclusion, fostering collaboration skills, and enhancing self-assurance in their mathematics proficiencies. The implementation of a collaborative method in the classroom cultivates a scholastic environment that places importance on cooperation, respect, and the recognition of varied viewpoints. This, in turn, amplifies students' motivation and involvement in the field of mathematics.

4.3.4Influence of Group Work Method of Teaching on Implementation of Grade Three Mathematics Curriculum

A Pearson's correlation analysis was undertaken to examine the impact of group activity on the instruction of third-grade mathematics. The Pearson correlation coefficient is a statistical measure used to assess the strength and significance of the correlation between two variables. A coefficient with a positive sign and a value less than 0.5 indicates a modest positive

association. A coefficient of 0.5 indicates a moderate positive connection, whereas a correlation beyond 0.5 indicates a strong positive correlation. The correlation analysis results are presented in Table 4.7:

Table 4.7: Influence of Group Work Method on Implementation of Grade Three Mathematics Curriculum

		Implementation of Grade Three Mathematics Curriculum	Group work Method of Teaching
Implementation of Grade Three Mathematics Curriculum	Pearson Correlation	1	.667*
	Sig. (2-tailed)		.000
	N	45	45
Group work Method of Teaching	Pearson Correlation	.667*	1
	Sig. (2-tailed)	.000	
	N	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

The coefficient of 0.667 presented in Table 4.6 above signifies a robust positive correlation, which is both statistically significant and indicative of the relationship between the utilization of group work as a teaching method and the successful implementation of grade three mathematics curriculums. The obtained p-value of 0.000 is lower than the predetermined significance level of 0.05. This observation suggests that there is a statistically significant association. Hence, the utilization of the group work teaching technique exerts a substantial impact on the execution of mathematical curriculums for third-grade students.

4.3.5 Discussion of the Findings

The present study revealed that educators in public primary schools within the Kisumu Central region employ the utilization of group work methodology when instructing grade three mathematics. This has facilitated the acquisition of mathematical knowledge.The utilization of group work as a pedagogical approach offers learners the chance to acquire

knowledge from their peers in the realm of mathematical problem-solving. This method also facilitates the provision of assistance to learners who encounter difficulties in comprehending mathematical concepts by their more adept counterparts. Additionally, group work fosters the development of diverse perspectives in tackling mathematical problems through the exchange and exploration of ideas among group members. Moreover, it cultivates learners' social skills and instills a sense of teamwork within the group dynamic.

These findings align with the research conducted by Owala (2021), which highlights the advantages of utilizing group work as a teaching approach. Group work offers learners the opportunity to engage in collaborative learning, fostering achievement through peer assistance. The practice of grouping facilitates collaborative learning, enabling individuals to engage in collective efforts, enhance their communication abilities, and demonstrate mutual responsibility and accountability.

However, Sim et al. (2021) caution that although group work might have advantages for learners, it also possesses intrinsic weaknesses that can significantly hinder the acquisition of mathematical knowledge. Based on their assertions, certain individuals within a collective of learners may exhibit passivity and exhibit a strong dependence on others, resulting in insufficient contributions to the group and hence failing to engage effectively. Furthermore, the integration of learners with low mathematical proficiency into groups consisting of high-performing individuals may result in feelings of alienation. This can occur when discussions and problem-solving activities are predominantly led by the high-performing learners, neglecting to acknowledge and incorporate the ideas put forth by those who struggle in mathematics. This phenomenon has the potential to detrimentally impact the capacity of learners to acquire numeracy abilities.

According to Dekker and Elshout-Mohr (2004), an optimal strategy for facilitating group work involves ensuring that all learners are afforded equal opportunities to engage in the

group activities. Additionally, it is beneficial to form groups that consist of individuals with varying learning abilities and diverse backgrounds. Furthermore, promoting active interactions within the group, where all learners actively participate in resolving mathematical problems, is also crucial for an effective group work environment.

These findings are consistent with the research conducted by Rance-Roney (2010) and Sayedi (2014), which suggest that group work offers learners the chance to complete tasks through collaborative engagement and teamwork, while also enhancing their social and communication skills. This approach enables learners to generate diverse strategies for resolving mathematical issues.

4.4 Findings of Objective Two

The second objective of this study aimed to investigate the impact of utilizing game-based teaching methods on the implementation of the Grade Three mathematics curriculum. Consequently, it was necessary for grade three mathematics educators to specify whether they used games into their instructional practices and to elucidate the ways in which the utilization of games had positively impacted the acquisition of mathematical knowledge. In a similar vein, administrators and department heads were mandated to report if educators within their respective institutions employed gamification as a pedagogical approach in the instruction of mathematics, as well as the resultant impact on students' mathematical comprehension. Interviews were conducted with members of the Parent-Teacher Association (PTA), and a correlation analysis was performed to assess the degree to which the utilization of games impacted the acquisition of mathematical knowledge, as outlined in the subsequent sections:

4.4.1 Use of Games in Teaching Grade Three Mathematics

Table 4.8 presents findings on use of games in teaching grade three mathematics:

Table 4.8: Use of Games in Teaching Grade Three Mathematics

Statement	SA		A		D		
	N	%	N	%	N	%	Mean
I use games method in teaching grade three mathematics.	2	7.4%	2	7.4%	23	85.2%	2.370
Use of games builds up leaners problem solving skills by inculcating ability to strategically think about which moves to make when playing games.	18	66.7%	5	18.5%	4	14.8%	4.370
Games break monotony and boredom of conventional approach of teaching mathematics.	26	96.3%	1	3.7%	0	0	4.963
The fascinating nature of games stimulates active participation of learners in mathematics lessons.	24	88.9%	2	7.4%	1	3.7%	4.814
Use of games in teaching enhances leaners concentration.	23	85.2%	4	14.8%	0	0	4.222
There are sufficient MG resources/facilities for engaging pupils in learning mathematics through use of games.	4	14.8%	0	0	23	85.3%	2.444
Grand Mean							**3.867**

The presence of a grand mean of 3.867 in Table 4.8 suggests that instructors reached a consensus regarding the effectiveness of the MG approach in facilitating the instruction of grade three mathematics. However, a majority of teachers (85.2%) expressed disagreement with the utilization of game-based methods in teaching grade three mathematics, whereas a much smaller proportion of teachers (7.4%) strongly agreed and an equal proportion (7.4%) agreed with the incorporation of game-based methods in their teaching approach for grade three mathematics. The calculated mean of 2.370 indicates that the instructors expressed disagreement over their utilization of game-based instructional methods in teaching grade three mathematics. Hence, a notable percentage of educators in public elementary schools located in Kisumu Central refrain from employing the games approach as a pedagogical tool for teaching mathematics. The lack of sufficient MGs resources, as indicated by 85.3% of teachers who expressed disagreement, can be identified as the primary factor contributing to the inability to effectively engage students in mathematics learning through the utilization of

games. This finding was corroborated by 4 out of 27 instructors, representing 14.8% of the sample, who said that their respective schools lack adequate resources for MGs. The calculated mean value of 2.444 indicates that the instructors expressed a lack of consensus regarding the adequacy of MGs resources and facilities for the purpose of teaching mathematics.

Although the utilization of MGs technique in teaching grade three mathematics is limited, a significant proportion of teachers, specifically 18 individuals (66.7%), expressed a strong agreement, while 5 individuals (18.5%) agreed, that games effectively enhance learners' problem-solving skills by fostering the capacity to strategically analyze and determine optimal moves for successful gameplay. A total of 4 teachers, accounting for 14.8% of the sample, expressed disagreement with the notion that the use of MGs contributes to the development of learners' problem-solving abilities. The obtained mean of 4.370 indicates that teachers generally agreed on the effectiveness of using MGs approach in teaching mathematics for the development of learners' strategic thinking. Moreover, a significant majority of teachers, specifically 26 individuals representing 96.3% of the sample, expressed a strong agreement with the notion that incorporating games into the teaching of mathematics effectively alleviates the monotony and boredom associated with traditional instructional methods. In contrast, only 1 participant, accounting for 3.7% of the respondents, expressed a general agreement with this perspective. The obtained mean value of 4.814 indicates a substantial agreement among teachers regarding the effectiveness of gaming in mitigating monotony and boredom in mathematics classes.

The results presented in Table 4.8 indicate that a majority of teachers, specifically 24 individuals (88.9%), expressed a strong agreement with the stimulating effect of games on the active engagement of learners during mathematics lessons. This perspective was endorsed by 2 out of 27 instructors, constituting 7.4% of the sample, who concurred that the use of MG

fosters active engagement among students during mathematics instruction. However, a small percentage (3.7%) of teachers expressed disagreement with the notion that gamification encourages active participation among learners. Moreover, a significant majority of teachers, namely 23 out of 27 (85.2%), strongly agreed that the utilization of multimedia games (MG) in teaching has a positive impact on learners' concentration. Conversely, a smaller proportion of teachers, specifically 4 out of 27 (14.8%), agreed that the usage of game-based methods boosts learners' concentration. The obtained mean value of 4.222 indicates a consensus among teachers regarding the effectiveness of the MG approach in improving learners' concentration. Therefore, while educators concur that the utilization of educational gaming (MG) can increase the learning of mathematics, the insufficient availability of suitable MG resources has hindered their ability to incorporate gaming methods into mathematics instruction.

4.4.2 Head Teachers and Panel Heads Perspective on Use of Games Teaching Method in Mathematics

Table 4.9presents headteachers and panel heads perspective on use of games teaching methods in mathematics:

Table 4.9: Head Teachers and Panel Heads Perspective on Use of Games Method in teaching Mathematics

Statement	SA		A		SD		Mean
	N	%	N	%	N	%	
Teachers use games method in teaching grade three mathematics	3	16.7%	**0**	**0**	15	83.3%	1.666
Use of games in mathematics builds up learners problem solving skills	7	38.9%	10	55.6%	1	5.6%	4.278
MG breaks monotony and boredom of conventional approach of teaching mathematics	17	94.4%	1	5.6%	0	0	4.944
The fascinating nature of games stimulates	14	77.8%	4	22.2%	0	0	4.778

active participation of learners in mathematics lessons							
Use of games in teaching enhances leaners concentration	8	44.8%	10	55.6%	0	0	4.444
There are sufficient MGs resources/facilities for engaging pupils in learning mathematics through use of games	3	16.7%	0	0	15	83.3%	1.778
Grand Mean							**3.649**

The results shown in Table 4.9 support the assertions made by teachers, as indicated in Table 4.8, that a significant proportion of teachers do not employ the MG approach when instructing grade three mathematics. According to the data shown in the Table, it can be observed that a majority of participants, specifically 15 individuals representing 83.3% of the total, expressed significant disagreement towards the utilization of game-based teaching techniques in grade three mathematics by teachers. In contrast, a smaller proportion of participants, specifically 3 individuals representing 16.7% of the total, consisting of head teachers and panel heads, also expressed strong disagreement towards the usage of game-based teaching methods by teachers in their respective schools. The lack of resources in MGs can be identified as the primary factor, as evidenced by 15 teachers (83.3%) who strongly disagreed with the notion that there are adequate MGs resources and facilities to effectively engage students in mathematics learning through the use of games. In contrast, only 3 teachers (16.7%) reported that their schools possess sufficient MGs resources for teaching mathematics.

However, head teachers and panel heads have suggested that the use of game-based methodologies is crucial in the effective teaching of mathematics. A majority of head teachers and panel heads, specifically 10 individuals representing 55.6% of the sample, concurred that the utilization of games in mathematics education contributes to the development of learners' problem-solving abilities. Additionally, 7 individuals, accounting

for 38.9% of the sample, expressed agreement with the notion that games foster the enhancement of learners' problem-solving capabilities. Only 1 individual, representing a proportion of 5.6%, expressed significant disagreement. Furthermore, a significant majority of head teachers and panel heads, specifically 17 individuals accounting for 94.4%, strongly expressed their agreement with the notion that games serve as a means to alleviate the monotony and boredom associated with traditional methods of teaching mathematics. In addition, one individual, constituting 5.6% of the respondents, also agreed with this perspective. Moreover, a substantial proportion of head teachers and panel heads, specifically 14 individuals representing 77.8%, strongly concurred that the captivating nature of games fosters active engagement among learners during mathematics lessons. Conversely, four individuals, accounting for 22.2% of the respondents, expressed their agreement with the idea that games indeed promote active participation among learners. Moreover, a total of 10 head teachers and panel leaders, accounting for 55.6%, firmly expressed their agreement on the positive impact of incorporating games into teaching on learners' concentration. In contrast, 8 individuals, representing 44.8%, simply agreed with this notion. This suggests that while head teachers and panel heads acknowledge the educational value of incorporating gaming into the teaching of mathematics, the lack of resources for educational gaming has hindered teachers from effectively utilizing this approach in grade three mathematics instruction.

4.4.3 Qualitative Data from Interviews with PTA Members

The findings from interviews conducted with members of the Parent-Teacher Association (PTA) indicate that the utilization of game-based instructional methods has a positive impact on the acquisition of mathematical skills among third-grade students. According to a member of the Parent-Teacher Association (PTA), games provide learners with the chance to actively engage in the process of learning mathematics through hands-on activities that are both

dynamic and captivating. Another member of the PTA had similar views, noting that educational games provide learners with opportunities to apply mathematical principles in practical situations, so strengthening their comprehension and problem-solving abilities. By engaging in practical activities and virtual simulations, students are able to observe the applicability and use of mathematical concepts across diverse contexts. The inclusion of real-world applications of arithmetic can enhance students' comprehension, retention, and proficiency in mathematics.

Another member of the Parent-Teacher Association (PTA) made an observation that games possess the potential to function as a highly effective and engaging instructional tool for teaching mathematics. This is due to the fact that games offer children the opportunity to apply mathematical principles in an interactive and enjoyable manner. Likewise, another member of the Parent-Teacher Association (PTA) asserted that the utilization of games enables learners to explore and experience satisfaction, pleasure, fulfillment, and a sense of competition, all while engaging in the process of acquiring knowledge and skills. The primary objective of this initiative is to mitigate the experience of boredom and cultivate an environment that fosters engaging, intriguing, and inspiring learning and instruction. This approach aims to enhance the acquisition of mathematical knowledge and skills.

One of the members of the Parent-Teacher Association echoed the perspective of instructors that the implementation of the Montessori Method has a positive impact on students' ability to focus in mathematics classes. As to the statement made by the PTA member, educational games have the ability to captivate learners' attention and generate a feeling of enthusiasm and drive. Mathematical games (MG) are effective in capturing attention due to their ability to present mathematical concepts in engaging and exciting manners, in contrast to the conventional technique employed by teachers, when learners passively observe and listen to demonstrations of mathematical concepts on the blackboard.

In a similar vein, another member of the Parent-Teacher Association said that educational games have the potential to stimulate students' enthusiasm for mathematics, especially for those who struggle with traditional instructional methods. The inherent excitement of games can foster learner engagement and passion in the study of mathematics, as it is presented in an enjoyable and relatable manner. This facilitates the development of their cognitive capacity to comprehend and retain mathematical principles that are imparted to them.

4.4.4 Influence of Games Method of Teaching on Implementation of Grade Three Mathematics Curriculum

Pearson's correlation analysis was employed to ascertain the impact of the games-based teaching approach on the implementation of the grade three mathematics curriculum, as depicted in Table 4.10:

Table 4.10: Influence of Games Method of Teaching on Implementation of Grade Three Mathematics Curriculum

		Implementation of grade three mathematic curriculum	Games method of teaching
Implementation of grade three mathematic curriculum	Pearson Correlation	1	.536**
	Sig. (2-tailed)		.002
	N	45	45
Games method of teaching	Pearson Correlation	.536**	1
	Sig. (2-tailed)	.002	
	N	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

According to the findings presented in Table 4.14, there exists a statistically significant and moderate positive association (coefficient = 0.536) between the utilization of games as a teaching method and the successful implementation of grade three mathematics curriculums. The obtained p-value of 0.002 is below the predetermined significance level of 0.05, indicating statistical significance and suggesting a substantial link. Hence, the utilization of game-based instructional methods has a substantial impact on the execution of mathematical curricula for third-grade students.

4.4.5 Discussion of the Findings

The findings of this study indicate that while educators acknowledged the effectiveness of the MG approach for instructing grade three mathematics, a considerable percentage of teachers in public primary schools within Kisumu Central (85.2%) do not employ the utilization of game-based methods in their instructional practices for grade three mathematics. The insufficiency of MGs resources is evident, as stated by 85.3% of teachers who reported that there are appropriate MGs resources and facilities for effectively involving students in mathematics education through the utilization of games. Although there is currently limited implementation of MGs (mathematical games) in grade three mathematics instruction, a significant number of teachers have expressed agreement regarding the benefits of incorporating these games into the curriculum. Specifically, teachers have observed that MGs foster the development of problem-solving skills among learners, encouraging them to think strategically about the moves they make in order to succeed in the game. Additionally, MGs serve as a means to alleviate the monotony and boredom often associated with traditional approaches to teaching mathematics. By introducing MGs into the classroom, learners are actively engaged and participate more actively in their mathematics lessons. Furthermore, the

utilization of MGs in instruction has been found to enhance learners' concentration levels. While it is well acknowledged among educators that the use of educational technology, namely multimedia games (MGs), can promote the learning of mathematics, the restricted availability and quality of MG materials have hindered teachers from effectively incorporating this strategy into their mathematics instruction.

These findings align with those of Russo (2018), who emphasized the need of incorporating mathematical concepts into the curriculum at early stages through the use of playful strategies. These techniques aim to deliver mathematics in a manner that is both enjoyable and engaging, capturing the attention of learners. According to Russo (2018), there is evidence to suggest that the use of multimedia games (MG) can have a positive impact on the development of arithmetic skills in young learners. According to Ebonies and Ekwueme (2011), the MG method is a valuable and essential instructional strategy that educators should employ to effectively teach the mathematics curriculum. This method is known to engage learners and foster their interest in acquiring mathematical knowledge and understanding. The utilization of MG is crucial in maintaining the engagement of learners in the process of acquiring mathematical knowledge, particularly among younger individuals who tend to have limited attention spans.

According to Russo (2018), it has been shown that individuals who demonstrate proficiency in mathematics tend to exert dominance in games by consistently achieving victory. This phenomenon may potentially deter learners who struggle with mathematics from actively participating. As a result, these learners may get distracted and experience a decrease in motivation. Furthermore, it is worth noting that MG's strategy may potentially result in a prolonged duration for the learning process. According to Bragg (2012), the limited availability of gaming facilities and resources poses a constraint on educators' utilization of this instructional approach in mathematics education. Hence, it is crucial for the management

of primary schools in Kisumu Central to prioritize the provision of enough MGs facilities. According to Bragg (2012), the utilization of the gaming method in isolation may prove to be less effective in the instruction of mathematics. In order to optimize the efficacy of mathematics instruction, it is imperative to employ a combination of learner-centered teaching strategies in conjunction with the subject matter.

4.5 Findings of Objective Three

The primary aim of this study was to assess the impact of utilizing radio as an instructional tool on the successful implementation of grade three mathematics curricula. Consequently, educators were obligated to specify whether they employed radio as a pedagogical tool for instructing third-grade mathematics, as well as to assess the extent to which the utilization of radio had positively impacted the acquisition of mathematical knowledge. The survey sought to ascertain whether head teachers and panel heads had observed the utilization of radio by instructors inside their respective schools. A correlation study was performed to examine the relationship between the usage of radio and the implementation of grade three mathematics, as outlined in the subsequent sections:

4.5.1 Use of Radio in Teaching Grade Three Mathematics

Table 4.11 presents findings on teachers' use of radio in teaching grade three mathematics:

Table 4.11: Use of Radio in Teaching Grade Three Mathematics

Statement	SD		D		A		Mean
	N	%	N	%	N	%	
I use radio for teaching grade three mathematics.	24	88.9%	3	11.1%	0	0	1.111
Radio enhances learning of mathematics.	5	18.5%	22	81.5%	0	0	1.889
The school has radios for teaching.	1	3.7%	24	88.9%	2	7.4%	2.111

Teachers are able to operate the radios for purpose of teaching.	0	0	2	7.4%	25	92.6%	3.852
Radios build learners listening skills.	0	0	3	11.1%	24	88.9%	3.778
Grand Mean							**2.548**

The results presented in Table 4.11 indicate that a majority of teachers, namely 24 individuals (88.9%), expressed significant disagreement with the notion of utilizing radio as a teaching tool for grade three mathematics. Conversely, a smaller proportion of teachers, specifically 3 individuals (11.1%), expressed disagreement with the use of radio for teaching mathematics in general. The calculated mean of 1.111 indicates a considerable disagreement among teachers regarding their utilization of radio as a tool for teaching mathematics. Consequently, it can be inferred that radio is not utilized by any of the educators in public primary schools located in Kisumu Central for the purpose of teaching mathematics. Mathematics is an academic discipline that necessitates the exposition of concepts, primarily through the process of solving mathematical problems. Consequently, it is imperative for learners to have a visual representation of the process of solving mathematical problems in order to grasp fundamental concepts. However, the radio medium predominantly entails a passive listening experience, wherein learners engage in the act of solely listening to the content being broadcasted. Consequently, individuals are unable to mentally comprehend the principles being illustrated, nor can they engage in practical application without visual representation. Hence, this methodology may not be appropriate for instructing mathematics. This elucidates the rationale behind the absence of radio utilization among teachers in public primary schools located in Kisumu Central for the purpose of teaching mathematics.

According to the Table, a majority of teachers, specifically 22 out of the total sample, accounting for 81.5%, expressed disagreement with the notion that radio contributes to the

improvement of mathematics learning. Likewise, a total of 5 individuals, including 18.5% of the sample, expressed significant disagreement with the notion that radio contributes to the improvement of mathematical learning. The obtained mean of 1.889 suggests that there is a lack of consensus among teachers regarding the effectiveness of radio in enhancing the learning of mathematics. Hence, it is evident that the educators in Kisumu Central unanimously hold the belief that the utilization of the radio as a pedagogical approach for teaching mathematics lacks effectiveness. The aforementioned challenge might be ascribed to the absence of visual aids, hence impeding teachers' ability to effectively illustrate mathematical concepts. This resource is primarily designed for third-grade students who have a strong preference for visual learning. Hence, the utilization of radio as a learning tool for mathematics may not be deemed suitable.

A considerable number of schools in Kisumu Central lack radio equipment for the purpose of teaching mathematics, as it is deemed unsuitable for this particular educational context. Only a small proportion, specifically 2 out of 27.4%, of teachers reported that their respective educational institutions possess radio equipment for instructional purposes. The vast majority of instructors, namely 24 out of the total sample, representing 88.9% of respondents, expressed disagreement with the presence of radios at their individual educational institutions for the purpose of teaching mathematics. This assertion was corroborated by a minority of instructors, specifically 1 out of 27 (3.7%), who expressed severe disagreement over the presence of radios at their educational institutions for the purpose of teaching mathematics. Consequently, this led to an average value of 2.111, indicating that instructors expressed disagreement over the use of radios in their schools for the purpose of teaching mathematics. Hence, it can be observed that public primary schools located in the Kisumu Central region lack the necessary provision of radio equipment for the purpose of facilitating mathematics instruction.

Despite the reservations held by educators regarding the suitability of the radio as a tool for teaching mathematics, a considerable percentage of teachers possess the necessary skills to effectively utilize this medium for educational reasons. The results shown in Table 4.11 indicate that a majority of teachers, specifically 25 individuals (92.6%), expressed agreement with possessing the knowledge required to operate a radio for educational purposes. Only 2 individuals, constituting a mere 7.4% of the sample, expressed disagreement with regard to their proficiency in operating a radio. The educators additionally noted that radio has a positive impact on the development of learners' listening abilities, as evidenced by 24 participants (88.9%) who agreed that radio contributes to the improvement of these skills. Only 3 out of 27 teachers (11.1%) expressed disagreement with the notion that radio enhances learners' listening skills. Listening skills play a crucial role in the teaching and learning of mathematics. However, it is important to note that mathematics is a predominantly visual discipline, necessitating educators to visually illustrate concepts in order for learners to comprehend and internalize mathematical principles. Hence, educators teaching grade three mathematics assert that employing radio as a pedagogical tool for teaching mathematics is inadequate, as it solely promotes passive auditory engagement, but mathematics necessitates the visual presentation of concepts.

4.5.2 Head Teachers and Panel Heads Perspective on use of Radio in Teaching Mathematics

The survey sought input from head teachers and panel heads regarding the utilization of radio as an instructional tool for teaching grade three mathematics by teachers within their respective schools. The results presented in Table 4.12 support the findings reported in Table 4.11, which indicated that there is a lack of utilization of radio as a teaching tool for mathematics among instructors in public primary schools located in Kisumu Central.

Table 4.12: Head Teachers and Panel Heads Perspective on Use of Radio in Teaching Mathematics

Statement	SD		D		A		Mean
	N	%	N	%	N	%	
Teachers use radio for teaching grade three mathematics.	15	83.3%	3	16.7%			1.166
Radio enhances learning of mathematics.	8	44.4%	10	55.6%			1.556
The school has radios for teaching.	12	66.7%	6	33.3%			1.333
Teachers are able to operate the radios for purpose of teaching.			2	11.1%	16	88.9%	3.777
Radios build learners listening skills.	4	22.2%			14	77.8%	3.333
Grand Mean							**2.233**

According to the data shown in the Table, it can be observed that a significant majority of head teachers and panel heads, specifically 15 individuals, accounting for 83.3% of the total respondents, expressed severe disagreement with the notion that teachers at their respective schools utilize radio as a means of instructing students in the subject of mathematics. This finding was corroborated by 3 out of 18 (16.7%) head teachers and panel heads who expressed dissent on the utilization of radio as an instructional tool for teaching grade three mathematics in their respective schools. Hence, it was found that none of the head teachers and panel heads at public primary schools located in Kisumu Central region reported the utilization of radio as a teaching tool for grade three mathematics instruction.

Likewise, the school administrators and department heads perceived radio as an inappropriate instructional tool for delivering grade three mathematics education. The results shown in Table 4.12 indicate that a majority of head teachers and panel heads, specifically 10 individuals representing 55.6% of the sample, expressed disagreement with the notion that radio contributes to the improvement of mathematics learning. These perspectives were endorsed by 8 out of 18 (44.4%) head teachers and panel heads who firmly expressed their disagreement about the notion that radio helps the learning of mathematics. Hence, it was concluded by both head teachers and panel heads that the utilization of radio as a teaching medium had a positive impact on the acquisition of mathematical knowledge.

Similar to the findings of a significant proportion of grade three mathematics educators, a majority of head teachers and panel heads expressed that their individual schools lack the presence of radio as a tool for mathematical instruction. The results of the study reveal that a significant majority of head teachers and panel heads, specifically 12 individuals representing 66.7% of the total sample, expressed severe disagreement over the presence of radios at their respective schools for instructional purposes. This assertion was corroborated by 6 out of 18 (33.3%) head teachers and panel heads who expressed dissent on the presence of radio as a tool for teaching mathematics in their respective schools.

The conclusions of this study are supported by the head teachers and panel heads, who concur that instructors possess the necessary skills to effectively utilize radio as a tool for educational objectives. Furthermore, it is believed that radio has the potential to develop learners' listening skills. Based on the results presented in Table 4.12, it can be observed that a majority of head teachers and panel heads, specifically 16 individuals representing 88.9% of the sample, expressed agreement with the ability of

teachers to effectively utilize the radio as a tool for educational objectives. A total of 2 (11.1%) head teachers and panel heads had comparable perspectives, stating that instructors possess the capability to utilize radio as a tool for educational reasons. The findings indicate that a significant proportion of head teachers and panel heads, specifically 77.8%, expressed agreement with the notion that radio contributes to the development of learners' listening skills. Conversely, a smaller percentage of respondents, specifically 22.2%, disagreed with this perspective. In addition to the necessity of listening skills in the teaching of mathematics, it is crucial for educators to employ visualization techniques in order to effectively illustrate mathematical concepts and enhance learners' comprehension of those topics.

4.5.3 Qualitative Data from Interviews with PTA Members

The findings from interviews conducted with members of the Parent-Teacher Association (PTA) indicate a consensus among grade three mathematics teachers, head teachers, and panel heads that radio is not an appropriate instructional tool for teaching mathematics. Based on the perspective of a member of the Parent-Teacher Association (PTA), it is said that radio serves as a more appropriate medium for topics such as English and Kiswahili, as it allows learners to engage with narratives, poems, and other literary resources. Listening is considered to be a fundamental literacy ability in both English and Kiswahili languages. Consequently, the utilization of radio as a teaching tool is deemed more appropriate for topics that need the development of listening abilities, such as language-based disciplines, as opposed to mathematics. These perspectives were expressed by an additional member of the Parent-Teacher Association (PTA) who noted that students also require active engagement with the teacher's verbal explanations of mathematical ideas, as well as visual demonstrations of the material being taught. The utilization of radio as an instructional medium does not

facilitate the achievement of this objective. Therefore, it might be argued that radio may not be a suitable medium for the instruction of mathematics.

According to other members of the Parent-Teacher Association (PTA), it has been noticed that the learning process for young learners, namely those in the third grade, is predominantly visual in nature. Consequently, it is necessary to utilize visual materials or employ audio-visual strategies that effectively illustrate the topics being taught. This facilitates the individual's capacity to retain and comprehend such notions in contrast to the passive listening approach employed in the radio-based instructional method. Therefore, the utilization of the radio as an instructional medium may not be appropriate for the instruction of mathematics, particularly for young learners in the third grade.

Likewise, a PTA member expressed the viewpoint that mathematics is a highly pragmatic discipline wherein students develop numerical proficiencies through the practical application of mathematical problem-solving. Learners exhibit enhanced learning outcomes through the implementation of instructional practices that involve active engagement with the subject matter presented by their educators. This facilitates the acquisition of mathematical problem-solving skills by learners. Achieving this may prove challenging while utilizing the radio, as it primarily entails passive engagement through listening rather than active participation. Therefore, the utilization of radio may not be deemed appropriate for the instruction of mathematical principles.

Based on the perspectives of fellow members of the Parent-Teacher Association (PTA), it has been suggested that employing radio as a medium for instructing mathematics to third-grade students may not be suitable due to their limited attention span. These types of learners necessitate movies that possess compelling qualities, capable of capturing their attention and augmenting their level of focus. Consequently, these learners may lack the ability to fully engage with the auditory content presented over a complete instructional session via radio.

Hence, techniques that employ visual representations are deemed more suitable for acquiring mathematical knowledge in contrast to auditory approaches such as radio-based methods.

4.5.4Influence of Radio Method of teaching on implementation of Grade Three Mathematics Curriculum

Pearson's correlation analysis was employed to assess the impact of the radio teaching technique on the application of the grade three mathematics curriculum, as depicted in Table 4.13:

Table 4.13: Influence of Radio Teaching Method on Implementation of Grade Three Mathematics Curriculum

		Implementation of Grade Three Mathematics Curriculum	Radio Method of Teaching
Implementation of Grade Three Mathematics Curriculum	Pearson Correlation	1	.404*
	Sig. (2-tailed)		.000
	N	45	45
Radio Method of Teaching	Pearson Correlation	.404*	1
	Sig. (2-tailed)	.000	
	N	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

According to the findings presented in Table 4.21, there is a statistically significant and weak positive association between the utilization of the radio as a teaching technique and the successful implementation of grade three mathematics curriculums. This correlation is supported by a coefficient value of 0.404. The obtained p-value of 0.000 is smaller than the predetermined significance level of 0.05, indicating that there is a statistically significant link. Hence, the utilization of radio as a pedagogical tool has a significant impact on the execution of mathematics curricula for third-grade students. The ineffectiveness of using radio as a teaching method for mathematics can be linked to its reliance on auditory content, which lacks the visual elements that are more conducive to the teaching of mathematics.

4.5.4 Discussion of the Findings

The present study revealed that the utilization of radio as a teaching tool for mathematics is absent among teachers in public primary schools located in Kisumu Central. This absence can be attributed to the nature of mathematics as a subject that necessitates the demonstration of concepts, wherein learners benefit from visually observing the process of solving mathematical problems in order to comprehend and internalize the underlying concepts. However, radio mostly entails a passive listening experience in which learners engage in the act of just listening to the content being broadcasted on the radio. Hence, this methodology may not be appropriate for the instruction of mathematics. The prevailing consensus among teachers in Kisumu Central is that the utilization of the radio method is not deemed as an efficacious pedagogical approach for instructing mathematics. A considerable number of schools in Kisumu Central lack radio equipment for the purpose of teaching mathematics, as it is deemed unsuitable for this particular educational context.

Despite the reservations held by educators regarding the suitability of the radio as a tool for teaching mathematics, a considerable number of teachers possess the necessary skills to effectively utilize this medium for educational reasons. Teachers have additionally noted that

the use of radio might effectively improve the listening skills of kids. Listening skills play a crucial role in the teaching and learning of mathematics. However, it is important to note that mathematics is a predominantly visual discipline, necessitating educators to effectively illustrate concepts in order for learners to comprehend and internalize mathematical principles.

The present findings contradict the research conducted by Elliot and Lashley (2017), which shown that radio serves as an effective medium for learning due to its portability, accessibility for individuals with limited reading abilities, and its ability to support child-centered pedagogical approaches. The study conducted by Elliot and Lashley (2017) highlights the benefits of incorporating radio as a teaching tool. However, it is important to note that these advantages may not be directly applicable to the instruction of mathematical concepts. This is because mathematics often necessitates the use of visual aids, which allow teachers to visually demonstrate concepts to learners. Visual aids enable learners to observe, comprehend, and internalize the concepts being explained by the teacher. According to the findings of Elliot and Lashley (2017), the utilization of radio as a teaching method is deemed suitable for educational settings where learners face challenges in terms of accessibility (such as residing in rural areas), limited connectivity, limited digital literacy, and limited access to electricity. However, it is important to note that this particular approach may not be directly applicable to public primary schools located in Kisumu Central, which is an urban center. Moreover, in the initial phases of acquiring mathematical knowledge, third-grade students necessitate visual methodologies that facilitate their comprehension and retention of mathematical concepts by enabling them to mentally image the content being taught.

The results of this study regarding the unsuitability of the radio method for teaching mathematics align with the findings of Bates and Bates (2005). Their research revealed that the radio method of instruction does not effectively deliver personalized learning experiences,

lacks sufficient visualization for learners, and poses challenges in developing appropriate content. Designing mathematical information that can be effectively taught through the radio is a significant challenge for teachers, rendering it a task that is practically hard to accomplish.

4.6 Findings of Objective Four

The primary aim of this study was to investigate the impact of utilizing a constructivist approach with tablet devices as a pedagogical tool on the successful implementation of a competency-based mathematics curriculum for Grade Three students. Consequently, it was necessary for grade three mathematics instructors to specify whether they employed tablets as a tool for teaching mathematics, as well as whether the utilization of tablets had resulted in improved mathematics learning outcomes among grade three students. The study sought to ascertain if teachers in schools utilize tablets as a pedagogical tool for teaching mathematics and the subsequent effects on students' mathematical learning outcomes. In addition to conducting interviews with PTA members, a correlation analysis was performed to ascertain the impact of tablet usage in educational instruction on the execution of grade three mathematics curricula. The aforementioned observations are expounded upon in the subsequent sections:

4.6.1 Use of Tablets in Teaching Grade Three Mathematics

Table 4.13 presents findings on the use of tablets in teaching grade three mathematics:

Table 4.13: Use of Tablets in Teaching Grade Three Mathematics

Statement	SA		A		D		Mean
	N	%	N	%	N	%	
I use tablet computers for teaching grade three mathematics.	15	55.6%	0	0	12	44.4%	3.667
I have the required skills and competencies to use tablets in teaching mathematics.	13	48.1%	0	0	14	51.9%	3.444
Tablets enables teachers to access a wide variety of materials for teaching mathematics from digital libraries, online databases and educational websites.	24	88.9%	3	11.1%	0	0	4.889
Tablets present mathematical concepts in an engaging and captivating manner that captures learner's attention.	26	96.3%	1	3.7%	0	0	4.963
Tablets reduce monotony and boredom of the conventional approach of teaching mathematics.	25	92.6%	2	7.4%	0	0	4.926
There are sufficient tablets for teaching mathematics.	17	63.0%	2	7.4%	8	29.6%	4.037
There is good internet connectivity to facilitate use of tablets in teaching mathematics	13	48.1%	10	37.0%	4	14.8%	4.182
Grand Mean							**4.301**

The grand mean of 4.301, as shown in Table 4.13 above, indicates a substantial agreement among teachers in public primary schools in Kisumu Central on the positive impact of using computer tablets in mathematics instruction on enhancing learning outcomes. According to the data presented in the Table, a majority of teachers, namely 15 out of the whole sample, or 55.6%, expressed a strong agreement with the utilization of tablet computers for the purpose of teaching grade three mathematics. In contrast, a smaller proportion of teachers, specifically 12 out of the total sample, or 44.4%, disagreed with the use of computers for teaching grade three mathematics. The obtained mean value of 3.667 indicates a general consensus among

teachers on their utilization of computer tablets in the instruction of mathematics. Hence, a majority of educators (55.6%) in public primary schools located in Kisumu Central employ computer tablets as instructional tools for the subject of mathematics.

Regarding the proficiency necessary to utilize tablets for the purpose of teaching mathematics, only 13 individuals (48.1%) expressed a high agreement with possessing the requisite skills and competences for employing tablets in this instructional context. Out of the other 14 participants, or 51.9% of the total sample, it was found that they expressed disagreement on their possession of the necessary abilities and competences to effectively utilize tablets for the purpose of teaching mathematics. Hence, it can be deduced that a majority of teachers (51.9%) in public primary schools located in Kisumu Central exhibit a deficiency in the necessary competencies for effectively utilizing tablets as instructional tools in the teaching of mathematics. This may perhaps restrict their capacity to utilize tablets for the purpose of instructing grade three maths.

The educators indicated that the utilization of tablets plays a crucial role in the facilitation of mathematics instruction and learning. The results shown in Table 4.13 indicates that a majority of instructors, namely 24 individuals representing 88.9% of the sample, expressed a high agreement with the notion that tablets provide them with the ability to access a diverse range of teaching materials for mathematics instruction. These materials include resources sourced from digital libraries, online databases, and educational websites. This finding was corroborated by a minority of participants (3 individuals, accounting for 11.1% of the total sample), who expressed agreement with the notion that tablets provide teachers with the ability to access a diverse range of instructional resources for teaching grade three mathematics. The obtained mean of 4.889 indicates a substantial consensus among instructors regarding the efficacy of tablets in facilitating access to diverse instructional resources for teaching grade three mathematics. Furthermore, a significant majority of

teachers, namely 26 out of the total sample (representing 96.3% of the participants), expressed high agreement with the notion that tablets effectively deliver mathematical concepts in a manner that is both interesting and fascinating, successfully capturing the attention of learners. This finding was corroborated by a small percentage (3.7%) of educators who concurred that tablets have the potential to boost learners' attention by delivering content in an engaging manner. The obtained mean of 4.963 indicates a substantial agreement among teachers on the positive impact of tablets on mathematics learning. Tablets are believed to increase learning by presenting mathematical topics in an engaging manner that effectively attracts learners' attention. Moreover, a significant majority of teachers, specifically 25 out of 27 (92.6%), expressed high agreement with the ability of tablets to alleviate monotony and boredom associated with traditional methods of teaching mathematics. This perspective was endorsed by 2 out of 27 instructors, constituting 7.4% of the total sample. These teachers expressed agreement with the notion that incorporating tablets into mathematics instruction diminishes feelings of tedium and enhances the overall appeal of the subject. Hence, a notable percentage of educators in public elementary schools from the Kisumu Central region perceive the utilization of tablets as a viable strategy for instructing grade three mathematics.

According to the data presented in Table 4.13, there exists an ample supply of tablets available for the purpose of instructing grade three mathematics. The results presented in Table 4.13 demonstrate that a majority of teachers, specifically 17 individuals representing 63.3% of the sample, expressed a strong agreement about the adequacy of tablets for the purpose of teaching mathematics. This finding was corroborated by a minority of participants, specifically 2 individuals, constituting 7.4% of the total sample, who expressed agreement with the notion that an adequate number of tablets are available for the purpose of teaching grade three mathematics. Only 8 out of 29.6% of teachers expressed disagreement

with the adequacy of tablets for the purpose of teaching mathematics in their respective educational institutions. Hence, a significant proportion of educators in public elementary schools, specifically 70.4%, said that an ample number of tablets are available for the purpose of instructing mathematics. The teachers also expressed that the internet connectivity in the schools was satisfactory, as a majority of 13 instructors (48.1%) strongly agreed that there is reliable internet access to effectively utilize tablets for teaching mathematics. This finding was corroborated by 10 out of 37.0% of instructors who expressed agreement with the notion that internet access in schools was satisfactory. Only 4 out of 27 (14.8%) teachers expressed disagreement with the notion that internet connectivity is beneficial. Hence, a significant proportion of educators in public elementary schools, specifically 23 individuals accounting for 85.1% of the sample, reported that the internet connectivity within their respective educational institutions was satisfactory.

4.6.2 Head Teachers and Panel Heads Perspective on Use of Tablets in Teaching Mathematics

Table 4.14 presents findings on head teachers and panel heads perspective on use of tablets in teaching mathematics

Table 4.14: Head Teachers and Panel Heads Perspective on use of Tablets in Teaching Grade Three Mathematics

Statement	SA		A		D		
	N	%	N	%	N	%	Mean
Teachers use tablet computers for teaching grade three mathematics.	9	50%	0	0	9	50%	3.500
Teachers have the required skills and competencies to use tablets in teaching mathematics.	8	44.4%	0	0	10	55.6%	3.333

Tablets enables teachers to access a wide variety of materials for teaching mathematics from digital libraries, online databases and educational websites.	15	83.3%	3	16.7%	0	0	4.833
Tablets present mathematical concepts in an engaging and captivating manner that captures learner's attention.	17	94.4%	1	5.6%	0	0	4.944
Tablets reduce monotony and boredom of the conventional approach of teaching mathematics.	13	72.2%	5	27.8%	0	0	4.722
There are sufficient tablets for teaching mathematics.	0	0	16	88.9%	2	11.1%	3.778
There is good internet connectivity to facilitate use of tablets in teaching mathematics.	7	38.9%	7	38.9%	4	22.2%	3.944
Grand Mean							**4.151**

The results presented in Table 4.14 support the findings reported in Table 4.13, indicating a consensus among instructors about the utilization of tablets for the instruction of grade three mathematics. The obtained grand mean of 4.151 indicates a consensus between head teachers and panel heads about the utilization of computer tablets by teachers in their respective schools for the purpose of teaching mathematics. Approximately 55.6% of teachers in public primary schools located in Kisumu Central employ tablets as a teaching tool for grade three mathematics. Furthermore, 50% of these teachers, along with panel heads, confirmed that tablets are being utilized by teachers within their respective schools for the purpose of teaching mathematics. However, 50% of head teachers and panel heads expressed disagreement regarding the utilization of tablets by teachers in their individual schools for the purpose of teaching mathematics. Consequently, a significant proportion of head teachers and panel heads at public primary schools located in Kisumu Central have reported that instructors in their respective institutions utilize tablets as an instructional tool for teaching

mathematics. Regarding the proficiency of teachers in utilizing tablets for teaching mathematics, it was found that 10 out of 18 head teachers and panel heads (55.6%) disagreed with the notion that teachers possess the necessary skills and competencies to effectively employ tablets in teaching mathematics. Conversely, 8 out of 18 respondents (44.4%) strongly agreed that teachers in their respective schools possess the requisite skills and competencies to proficiently operate tablets for teaching grade three mathematics.

The majority of head teachers and panel heads also expressed that their individual schools possessed an adequate number of tablets for the purpose of teaching mathematics. The results presented in Table 4.14 indicate that a majority of head teachers and panel heads, specifically 16 individuals (88.9%), expressed agreement with the notion that there are an adequate number of tablets available for teaching mathematics in their respective schools. Conversely, a minority of head teachers and panel heads, consisting of only 2 individuals (11.1%), disagreed with the statement, suggesting that there is an insufficient quantity of tablets for teaching mathematics in their schools. In a similar vein, it was found that 7 out of 38.9% of head teachers and panel heads expressed a strong agreement with the adequacy of internet access in their respective schools, namely in facilitating the utilization of tablets for mathematics instruction by instructors. This finding was corroborated by 7 out of 18 (38.9%) head teachers and panel heads who concurred that there exists robust internet connectivity that effectively supports the integration of tablets in the instructional delivery of mathematics. Only a minority of panel heads and head instructors, specifically 4 individuals representing 22.2% of the total, expressed disagreement over the presence of satisfactory internet access within their respective educational institutions. Hence, a significant number of panel leaders and head educators expressed that their schools possess an ample supply of tablets and reliable internet access, thereby enabling the effective integration of tablets into the instruction and acquisition of mathematical concepts.

The viewpoints of panel heads and head teachers align with regards to the positive impact of tablets on the improvement of mathematics instruction and learning. A significant majority of head teachers and panel heads, namely 15 individuals representing 83.3% of the sample, expressed strong agreement with the notion that tablets provide instructors with the ability to access a diverse range of instructional materials for teaching mathematics. These materials include resources available in digital libraries, online databases, and educational websites. This finding was corroborated by 3 out of 18 (16.7%) head teachers and panel heads, who concurred that the utilization of tablets enables instructors to conveniently access a diverse range of instructional resources for the teaching of grade three mathematics. In a similar vein, it was found that 17 out of 18 panel heads and head teachers expressed a strong agreement about the ability of tablets to effectively communicate mathematical ideas in an engaging and appealing manner, successfully capturing the attention of learners. The aforementioned perspectives were endorsed by 1 out of 18 (5.6%) panel heads and head teachers who concurred that tablets effectively communicate mathematical subject in a manner that engages learners' interest. Moreover, a significant majority of head teachers and panel heads, specifically 13 individuals accounting for 72.2% of the participants, expressed strong agreement with the ability of tablets to alleviate monotony and boredom associated with traditional methods of teaching mathematics. This perspective was endorsed by 5 individuals, accounting for 27.8% of the respondents, who concurred that tablets alleviate boredom and repetition associated with the traditional method of teaching mathematics.

4.6.3 Qualitative Information from Interviews with PTA Members

The findings from interviews conducted with members of the Parent-Teacher Association (PTA) indicate that public primary schools in Kisumu Central are equipped with tablets that are utilized by teachers for instructional purposes. As per the account of a member of the

Parent-Teacher Association (PTA), subsequent to the implementation of the government's initiative to distribute free laptops, students at the lower elementary level are provided with tablets that are utilized by educators for instructional purposes. The PTA member further stated that the schools have obtained contributions from benefactors and collaborators, thereby guaranteeing that educators and students possess sufficient resources and physical structures to incorporate information and communication technology into their instructional practices. This aligns with the government's initiatives to promote the integration of information and communication technology (ICT) in educational practices. One further PTA member noted that the incorporation of Information and Communication Technology (ICT) into the educational process, namely through the utilization of tablets, has become an essential component of instruction. This is evidenced by the fact that instructors are now evaluated on their proficiency in integrating ICT into their teaching practices. The utilization of tablets in educational settings has been encouraged, particularly in public schools. Another member of the Parent-Teacher Association (PTA) underscored the significance of incorporating tablets into the pedagogical approach for teaching mathematics. This individual noted that tablets offer visual representations that augment learners' capacity to comprehend abstract mathematical concepts, as they provide tangible and relatable illustrations. This stimulates the curiosity of students towards the study of mathematics and cultivates a more profound comprehension of mathematical principles. This viewpoint was reinforced by another member of the Parent-Teacher Association (PTA) who noted that the aesthetically pleasing aspect of tablets' material improves children' capacity to retain mathematical concepts. The utilization of tablets in educational settings allows teachers to effectively utilize a range of educational applications, interactive tools, and digital content to augment the learning process and foster student engagement in mathematics classes. This interactive approach promotes active participation among learners, hence enhancing the overall

educational experience. Tablets include interactive functionalities and educational applications that have the potential to augment student involvement and participation in mathematics instruction.

Another member of the Parent-Teacher Association (PTA) also highlighted the noteworthy significance of tablets in the realm of education. This individual noted that teachers who possess the necessary proficiency in operating tablets can effortlessly include these devices into their mathematics courses. By doing so, tablets serve as valuable instruments that aid in the facilitation and improvement of instruction. Educators have the ability to utilize tablets as a means to enhance their instructional approaches and foster student engagement in active learning by accessing educational applications, digital materials, and interactive tools. Through the utilization of tablets in the instructional process of mathematics, educators have the ability to establish a dynamic and captivating learning atmosphere that promotes active involvement from students, enhances their critical thinking abilities, and cultivates their problem-solving capabilities.

Nevertheless, it has been noted by a member of the Parent-Teacher Association (PTA) that the utilization of tablets for instructional purposes in public primary schools within the Kisumu Central region may be hindered due to a deficiency in the requisite skills and knowledge required to effectively operate these devices. In order to optimize the utilization of tablets in mathematics instruction, educators must possess a comprehensive understanding of how to effectively traverse the many capabilities of the tablet, employ educational applications or software, and seamlessly integrate tablet-based activities into their lesson plans. Based on the perspective of the majority of PTA members, it is evident that a significant number of instructors in public primary schools possess insufficient ICT skills necessary for proficiently utilizing tablets as instructional tools. In the absence of adequate preparation, educators may have reluctance or a lack of readiness to integrate tablets in a

proficient manner inside their mathematics instruction. Hence, it is imperative that educators teaching third grade possess the essential abilities and competencies required to optimize the utilization of tablets as a tool for instructing mathematical concepts.

4.6.4Influence the Use of Tablets in teaching on implementation of Grade Three Mathematics Curriculum

Pearson's' Correlationanalysis was used to determine influence ofthe use of tablets in teaching on implementation of grade three mathematic curriculum as shown in Table 4.15:

Table 4.15: Influence of the Use of Tablets in Teaching on Implementation of Grade Three Mathematics Curriculum

		Implementation of Grade Three Mathematics Curriculum	Use of Tablet in Teaching
Implementation of Grade Three Mathematics Curriculum	Pearson Correlation	1	.650*
	Sig. (2-tailed)		.000
	N	45	45
Use of Tablet in Teaching	Pearson Correlation	.650*	1
	Sig. (2-tailed)	.000	
	N	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

According to the findings presented in Table 4.44, there is a robust and statistically significant association between the utilization of tablets in educational instruction and the successful implementation of grade three mathematics curriculums. This is evident from the coefficient value of 0.650. The obtained p-value of 0.000 is lower than the predetermined significance level of 0.05, indicating that there is a statistically significant link. Hence, the

utilization of tablets in the instructional process of mathematics has a substantial impact on the execution of grade three mathematical curricula.

4.6.5 Discussion of the Findings

The incorporation of tablets into mathematics instruction is consistent with the overarching trend of utilizing technology to facilitate educational teaching and learning practices. The present study revealed that a majority of teachers (55.6%) in public primary schools located in Kisumu Central employ computer tablets as a tool for instructing mathematics. However, a slightly higher proportion of teachers (51.9%) in public primary schools within the same region lack the necessary proficiency to effectively operate tablets for teaching mathematics. Consequently, this deficiency hampers their capacity to utilize tablets in the instruction of grade three mathematics. The utilization of tablets plays a crucial role in the pedagogy of mathematics, as they afford educators the ability to access a diverse range of instructional resources for teaching third-grade mathematics. Furthermore, tablets facilitate the presentation of mathematical concepts in a manner that is both captivating and stimulating, effectively capturing the attention of learners. Additionally, tablets serve to mitigate the monotony and tedium associated with traditional methods of teaching mathematics. The findings of this study revealed that a significant proportion of teachers in public primary schools (70.4%) reported that there exists an adequate supply of tablets for the purpose of teaching mathematics. Similarly, a majority of teachers in public primary schools (85.1%)

expressed satisfaction with the quality of internet access within their respective educational institutions.

These findings align with those of Tamim et al. (2015), who demonstrated that the use of technology gadgets, such as tablets, can significantly enhance the learning process. The utilization of these technologies in innovative ways has the potential to promote educational equity, enhance classroom efficiency and productivity, encourage individualized learning, enable flexible learning approaches, and bridge the gap between formal and informal learning. Tamim et al. (2015) have noted that the utilization of tablets in mathematics instruction may face substantial obstacles, such as a deficiency in information and communication technology (ICT) skills and the inability to effectively incorporate ICT into the curriculum (CBC). Educators may encounter constraints in their ability to address technical and software-related challenges. Therefore, it is imperative to offer technological support to educators in order to augment their capacity to integrate the use of tablets in the instruction of mathematics. Moreover, it is possible that learners may experience distractions due to the presence of entertainment elements on the tablet device. Hence, it is imperative for educators to implement measures that restrict access to online entertainment platforms and restrict the tablets to solely educational content.

The assessment of the sufficiency of tablets and reliable internet access in public primary schools in Kisumu. The integration of tablets in mathematics instruction by Central has been found to facilitate the use of this technology. However, it is important to note that a significant proportion of teachers, namely 51.9%, lack the necessary skills and knowledge to effectively operate these tablets. This deficiency among educators may potentially hinder the successful implementation of grade three mathematical curriculums. According to UNESCO (2018), there is a significant emphasis placed on the necessity of providing teachers with both pre-service and in-service training in the field of information and communication technology

(ICT) in order to effectively promote the integration of ICT into educational practices. The effective utilization of tablets in educational settings relies on the teacher's capacity to skillfully incorporate information and communication technology (ICT) into the instructional process, while effectively aligning technological tools with pedagogical principles. The extent to which individuals possess ICT expertise greatly influences this outcome. Hence, it is imperative to ensure that all teachers instructing grade three students receive comprehensive training in order to acquire the necessary skills and competences for effectively utilizing tablet devices.

4.7 Findings on Implementation of Grade Three Mathematics Curriculum

This study also aimed to examine the implementation of grade three mathematics. This study aimed to investigate whether grade three mathematics teachers were adhering to the criteria for implementing the Competency-Based Curriculum (CBC) during mathematics lessons. Additionally, it attempted to assess the numerical abilities obtained by grade three learners and their performance in mathematics. The present study presents the aforementioned findings in the subsequent parts:

4.7.1 Grade Three Mathematics Lessons per Week

The third-grade educators were mandated to report the frequency of their weekly instructional sessions in mathematics. This study revealed that grade three mathematics instructors implemented an average of five mathematics activity lessons each week. This statement adheres to the circular regarding the guidelines for the implementation of the Competency-Based Curriculum (CBC), which was issued by Belio Kipsang, the Permanent Secretary for Education, in 2019. This circular mandates that primary school instructors allocate five mathematics activity classes per week for instruction. Hence, it can be observed that grade three mathematics educators in public primary schools located in Kisumu Central have

demonstrated adherence to the prescribed guidelines pertaining to the execution of the mathematics curriculum.

4.7.2 Learners Acquisition of Numerical Skills

To determine learner's acquisition of numerical lessons teachers were required to indicate if grade three learners had acquiredthe 4 arithmetic operations involving addition, subtraction, multiplication and division. These findings are presented in Table 4.16 below:

Table 4.16: Acquisition of Numeracy Skills by Grade Three Learners

Numeracy Skills	Frequency	Percentage
1. Grade three learners can solve an addition sum and get the correct answer	27	100%
2. Grade three learners can solve a subtraction sum and get the correct answer	26	96.3%
3. Grade three learners can solve a multiplication sum and get the correct answer	15	55.5%
4. Grade three learners can solve a division sum and get the correct answer	14	51.9%

The results presented in Table 4.16 demonstrate that all 27 (100%) grade three teachers surveyed reported that their grade three students are capable of successfully solving addition problems and arriving at the correct answer. Additionally, 26 (96.2%) grade three mathematics teachers indicated that their grade three students possess the ability to solve subtraction problems and obtain the correct answer. However, the learning of numerical abilities among third-grade learners decreases as the complexity of numerical operations increases. A considerable fraction of grade three mathematics instructors report that students in their classrooms possess the ability to successfully solve addition and subtraction problems and arrive at the accurate solution. However, this proportion notably decreases when considering more intricate numerical operations, such as multiplication and division. The

results presented in Table 4.16 demonstrate that a majority of grade three mathematics teachers (55.5%) reported that students in their class are capable of successfully solving multiplication problems and obtaining the accurate solution. In a similar vein, it was found that 14 out of 27 grade three mathematics teachers (51.9%) expressed the belief that learners at this grade level possess the ability to successfully solve division problems and arrive at the accurate solution.

4.7.3 Grade Three Learners Performance in Mathematics

The performance of grade three learners inmathematicsis an indication of the level of learner's acquisition of numeracy skills in mathematics. Good performance implies that learners have acquired numeracy skills which are an indication of effective implementation of Mathematics curriculum. Grade three mathematics teachers were therefore required to indicate the average performance of grade three learners in Mathematics as presented in Table 4.17:

Table 4.17: Grade Three Learners Performance in Mathematics

Performance	Frequency	Percent
Excellent	-	-
Good	7	25.9%
Average	12	44.4%
Poor	8	29.6%
Very Poor	-	-
Total	**27**	**100%**

The results presented in Table 4.17 reveal that 12 out of the total number of grade three mathematics teachers, accounting for 44.4%, reported that the performance of grade three learners in Mathematics can be classified as average. Additionally, 8 teachers, representing 29.6% of the sample, indicated that the performance of grade three learners in Mathematics is

below average. Furthermore, 7 teachers, constituting 25.9% of the participants, reported that the performance of grade three learners in Mathematics is good. There was no indication from any of the teachers that the performance of grade three pupils was either very poor or great. According to the findings, a majority of grade three learners in public primary schools in Kisumu Central demonstrate below average performance in Mathematics, with less than half achieving an average level of proficiency. Additionally, approximately a quarter of grade three learners exhibit a good level of performance in Mathematics, while less than a third of learners fall below the average performance threshold.

4.8 Regression Analysis

Regression analysis was employed to ascertain the degree to which constructivist pedagogical approaches impact the implementation of the Grade Three mathematics curriculum, as well as to determine the significance of the correlation between constructivist pedagogical approaches and the implementation of said curriculum. The remaining sections of this paper present the findings of the analysis:

4.8.1 Model Summary

The model summary quantifies the extent to which the regression line explains the variability in the dependent variable. The present study employed a statistical model to ascertain the extent to which the regression line accounted for the diversity seen in the implementation of grade three mathematics curriculums. The results are presented in Table 4.18:

Table 4.18: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.900[a]	.810	.776	.42598

a. Predictors: (Constant), Group Work Method of Teaching, Games Method of Teaching, Radio Method of Teaching, Use of Tablets in Teaching.

The findings from the research presented in Table 4.18 demonstrate that the R Square value is 0.810, while the adjusted R-square value is 0.776. The R-squared value represents the proportion of variability in the implementation of grade three mathematics curriculums that may be accounted for by constructivist pedagogical approaches. This suggests that the utilization of Group Work Method of Teaching, Games Method of Teaching, Radio Method of Teaching, and Use of Tablets in teaching together explain 81.0% of the variability observed in the implementation of grade three mathematics curriculums. The remaining 19% is attributed to additional variables that were not subject to investigation in the present study.

4.8.2 Analysis of Variance (ANOVA)

ANOVA was used to determine the significance of the influence of constructivist pedagogical approaches on implementation of grade three mathematics curriculums as shown in Table 4.19:

Table 4.19: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.050	4	4.262	23.489	.000[b]
	Residual	3.992	41	.181		
	Total	**21.042**	**45**			

a. Dependent Variable: Implementation of Grade Three Mathematics Curriculum

b. Predictors: (Constant), Group Work Method of Teaching, Games Method of Teaching, Radio Method of Teaching, Use of Tablets in Teaching.

Results of analysis in Table 4.19 indicate that the significance of the regression model=0.000. The significance of the regression model is less than the significance level of 0.05. Therefore, the influence of constructivist pedagogical approaches on implementation of grade three mathematics curriculums is statistically significant. Hence, constructivist pedagogical approaches have a significant effect on implementation of grade three mathematics curriculums.

4.8.3 Coefficient of Correlation

Co-efficient of correlation was used to determine the extent to which constructivist pedagogical approachesinfluence implementation of grade three mathematics curriculums As shown in Table 4.20:

Table 4.20: Coefficients of Correlations

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	6.200	3.126		3.983	.000
	Group Work Method of Teaching	.670	.546	-.016	3.122	.000
	Games Method of Teaching	. 605	.438	.670	5.528	.000
	Radio Method of Teaching	. 420	.757	.140	2.798	.000
	Use of Tablets in Teaching	.457	.445	.482	3.277	.003

a. Dependent Variable: Implementation of Grade Three Mathematics Curriculum

The equation presented herein is obtained from Table 4.20.

The equation can be expressed as Y = 6.200 + 0.670X1 + 0.605X2 + 0.420X3 + 0.457X4 + e, where Y represents the dependent variable, X1, X2, X3

The equation presented above demonstrates that the constant term represents the consistent application of constructivist pedagogical methods in the teaching of third-grade mathematics, resulting in an outcome of 6.200. The utilization of the group work technique in mathematics instruction exhibits a positive relationship with the implementation of grade three mathematics, as evidenced by a 0.670 unit rise for each unit increase in its usage. The obtained p-value of 0.000 is statistically significant at the 0.05 level. Hence, the utilization of group work as a pedagogical approach demonstrates a statistically significant impact on the successful execution of the grade three mathematics curriculum.

The utilization of a unit-based instructional approach in teaching mathematics to third-grade students results in a 0.605 unit increase in implementation. The obtained p-value of 0.000 is statistically significant at the 0.05 level. Hence, the utilization of game-based instructional approaches demonstrates a statistically significant impact on the execution of mathematical curriculums for third-grade students.

The implementation of grade three mathematics increases by 0.420 units with each unit increase in the radio method of teaching. The obtained p-value of 0.000 is statistically significant at the conventional alpha level of 0.05. Hence, the utilization of radio as a pedagogical approach exhibits a statistically significant impact on the successful execution of grade three mathematical curricula.

The utilization of tablets for instructional purposes in mathematics education exhibits a positive correlation with the implementation of grade three mathematics, with each unit increase in tablet usage resulting in a corresponding rise of 0.457 units in the implementation of grade three mathematics. The obtained p-value of 0.000 is statistically significant at the

0.05 level. Hence, the use of tablets in the instruction of mathematics has been found to have a statistically significant impact on the execution of grade three mathematical curricula.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a concise overview and analysis of the research findings in relation to the study's objectives. It includes the conclusions taken from the findings, policy recommendations, and suggestions for further research.

5.2 Summary of the Findings

The findings are summarized in accordance with the research objectives:

5.2.1 Influence of Group Work Method of Teaching on Implementation of Grade Three Mathematics Curriculums

The present study has successfully demonstrated a robust and statistically significant association between the utilization of group work as a pedagogical approach and the effective implementation of grade three mathematics curricula. This relationship is evidenced by a coefficient of 0.667. The obtained p-value of 0.000 is lower than the predetermined significance level of 0.05. This observation suggests that there is a statistically significant association. Hence, the utilization of group work as a pedagogical approach has a substantial impact on the execution of mathematical curricula for third-grade students. The utilization of group work as a teaching approach in mathematics instruction exhibits a positive correlation with the implementation of grade three mathematics, with each unit increase in the use of group work resulting in a corresponding increase of 0.670 units in implementation. The obtained p-value of 0.000 is statistically significant at the 0.05 level. Hence, the utilization of group work as a pedagogical approach demonstrates a statistically significant impact on the successful execution of grade three mathematics curricula.

The present study revealed that a significant majority of teachers, specifically 89.2%, employed the pedagogical strategy of group work in their instructional practices for teaching grade three mathematics within the context of public primary schools in Kisumu Central. The utilization of the group work method in teaching mathematics has been found to enhance the learning process. According to a survey, a significant majority of 85.2% of respondents

acknowledged that group work facilitates the acquisition of mathematical problem-solving skills through peer learning. Additionally, 70.4% of teachers reported that group work allows struggling learners to receive assistance from their more proficient peers in mathematics. Moreover, 59.3% of teachers agreed that group work fosters the development of diverse perspectives in approaching mathematical problems, as learners share and explore ideas within their groups. In contrast, 40.7% of teachers strongly agreed with this notion. Moreover, a significant majority of teachers (92.6%) expressed strong agreement with the positive impact of group work on the development of social skills and the cultivation of a sense of teamwork among students.

5.2.2 Influence of Games Method of Teaching on Implementation of Grade Three Mathematics Curriculums

The present study has successfully demonstrated that the utilization of game-based teaching methods exhibits a moderate positive correlation, which is both statistically significant and supported by empirical evidence, with the effective implementation of grade three mathematics curriculums. This association is quantified by a coefficient value of 0.536. The obtained p-value of 0.002 is smaller than the predetermined significance level of 0.05, indicating that there is a statistically significant link. Hence, the utilization of game-based instructional methods has a substantial impact on the execution of mathematical curricula for third-grade students. The utilization of the games approach of teaching in grade three mathematics results in a 0.605 unit increase in implementation. The obtained p-value of 0.000 is statistically significant at the 0.05 level. Hence, the utilization of games as an instructional approach exhibits a statistically significant impact on the execution of grade three mathematics curricula.

The present study revealed that a significant majority of instructors (85.2%) in public primary schools located in Kisumu Central do not employ the utilization of game-based instructional methods when teaching mathematics to grade three students. Only 14.8% of educators employ game-based instructional methods while teaching mathematics to third-grade students. The lack of sufficient resources for engaging students in mathematics learning through the use of games has been identified as a contributing factor, as indicated by 85.3% of teachers who expressed disagreement with the availability of suitable resources and facilities for this purpose within the MGs context. Despite the limited implementation of the MG method in the instruction of grade three mathematics, a significant majority of teachers (85.2%) expressed that games effectively foster the development of problem-solving skills among learners. Furthermore, an overwhelming majority of teachers (96.3%) strongly agreed that games serve as a means to alleviate the monotony and boredom associated with traditional approaches to teaching mathematics. Additionally, an equally high percentage of teachers (96.3%) strongly agreed that the captivating nature of games stimulates active engagement and participation among learners during mathematics lessons. Lastly, a substantial proportion of teachers (85.2%) strongly agreed that the incorporation of games in instruction enhances learners' ability to concentrate on the subject matter. Therefore, while educators concur that the utilization of educational gaming (MG) increases the acquisition of mathematical knowledge, the scarcity of suitable resources for MGs has hindered their widespread implementation in mathematics instruction.

5.2.3 Influence of Radio Method of Teaching on Implementation of Grade Three Mathematics Curriculums

The present study has successfully demonstrated that the utilization of radio as a teaching technique exhibits a modest yet statistically significant positive association with the

successful implementation of grade three mathematics curriculums. This correlation is substantiated by a coefficient value of 0.404. The obtained p-value of 0.000 is lower than the predetermined significance level of 0.05, indicating that there is a statistically significant link. Hence, the utilization of radio as a pedagogical tool has a significant impact on the execution of grade three mathematical curricula. The implementation of grade three mathematics increases by 0.420 units with each unit increase in the radio method of teaching. The obtained p-value of 0.000 is statistically significant at the conventional significance level of 0.05. Hence, the utilization of radio as a pedagogical approach demonstrates a statistically significant impact on the execution of grade three mathematical curricula.

The findings of this study indicate that radio is not utilized by any of the instructors in public primary schools in Kisumu Central for the purpose of teaching mathematics. A significant majority of teachers, specifically 81.5%, expressed the belief that radio does not contribute to the improvement of mathematics learning. The aforementioned challenge might be ascribed to the absence of visual aids, hence impeding teachers' ability to effectively illustrate mathematical concepts. This resource is primarily designed for third-grade students who have a strong preference for visual learning. Hence, the utilization of radio as a learning tool for mathematics may not be deemed suitable. The absence of radio as a teaching tool for mathematics in public primary schools within the Kisumu Central region is attributed to its perceived inadequacy for this purpose. Despite the reservations held by educators regarding the suitability of the radio as a tool for teaching mathematics, a significant majority of teachers, specifically 92.6%, expressed confidence in their ability to effectively utilize radios for educational purposes. Furthermore, a substantial proportion of teachers, amounting to 88.9%, acknowledged the potential of radio in enhancing learners' listening abilities.

5.2.4 Influence of use of Tablet inTeaching on Implementation of Grade Three Mathematics Curriculum

The present study has successfully demonstrated a robust and statistically significant association between the utilization of tablets in educational instruction and the effective implementation of grade three mathematics curricula. This relationship is evidenced by a coefficient of 0.650. The obtained p-value of 0.000 is lower than the predetermined significance level of 0.05, indicating that there is a statistically significant link. Hence, the utilization of tablets in the instructional process of mathematics has a substantial impact on the execution of grade three mathematical curricula. The utilization of tablets in mathematics instruction exhibits a positive correlation with the implementation of grade three mathematics, with each unit increase in tablet usage resulting in a corresponding rise of 0.457 units in implementation. The obtained p-value of 0.000 is statistically significant at the 0.05 level. Hence, the use of tablets in the instructional process of mathematics has been found to have a statistically significant impact on the successful execution of grade three mathematical curricula.

The findings of this study indicate that a majority of teachers (55.6%) in public primary schools located in Kisumu Central utilize computer tablets as a tool for teaching mathematics. However, it is noteworthy that only 48.1% of these teachers possess the necessary skills and competencies to effectively employ tablets in the instruction of mathematics. Conversely, a significant proportion of teachers (51.9%) lack the requisite skills and competencies to proficiently operate tablets for the purpose of teaching mathematics. This may potentially restrict their capacity to utilize tablets as a pedagogical tool for teaching third-grade maths. Moreover, a significant majority of teachers (88.9%) expressed strong agreement regarding the capability of tablets to provide access to a diverse range of teaching materials for mathematics, including digital libraries, online databases, and educational websites.

Additionally, an overwhelming majority of teachers (96.3%) strongly agreed that tablets effectively present mathematical concepts in a manner that is both engaging and captivating, successfully capturing the attention of learners. Furthermore, a substantial proportion of teachers (92.6%) strongly agreed that tablets have the potential to alleviate the monotony and boredom associated with traditional methods of teaching mathematics. The findings of the study revealed that a significant proportion of teachers in public primary schools, specifically 70.4%, expressed that there exists an adequate supply of tablets for the purpose of teaching mathematics. Additionally, a substantial majority of teachers in public primary schools, amounting to 85.1%, reported that the internet connectivity within their respective educational institutions was deemed satisfactory.

5.2.5 Implementation of Grade Three Mathematics Curriculum among Public Primary Schools in Kisumu Central

The findings of this study indicate that mathematics instructors in grade three at public primary schools in Kisumu Central adhere to the rules outlined in the circular for the implementation of the Competency-Based Curriculum (CBC). Specifically, these teachers conduct an average of five mathematical lessons each week. According to grade three mathematics teachers, the majority of learners in their classes possess the ability to successfully solve addition problems. Additionally, a significant proportion of grade three mathematics teachers, namely 96.2%, said that grade three learners are capable of correctly solving subtraction problems. Nevertheless, the magnitude of this figure decreases considerably in the context of intricate arithmetic operations, such as multiplication and division. According to the survey, 55.5% of grade three mathematics teachers reported that students in their mathematics class possess the ability to successfully solve multiplication problems and arrive at the accurate solution. In a similar vein, it was found that 51.9% of

grade three mathematics teachers said that students in their mathematics class at the third-grade level possess the ability to successfully solve division problems and arrive at the accurate solution.

Moreover, it is noteworthy that a mere 44.4% of grade three students enrolled in public primary schools in Kisumu Central exhibit an average level of proficiency in the subject of Mathematics. Additionally, a quarter of these students (25.9%) demonstrate a commendable performance in Mathematics, while less than a third (29.6%) exhibit below-average proficiency in the subject. All of the grade three learners demonstrated average performance in mathematics, with no students performing significantly below or beyond expectations.

5.3 Conclusions of the Study

The present study provides evidence supporting the notion that the utilization of constructivist educational approaches yields favorable outcomes and holds aesthetic significance when applied to the implementation of mathematics curriculums at the third-grade level. Nevertheless, a significant proportion of grade three mathematics educators in public primary schools located in Kisumu Central exhibit a lack of proficiency in the Competency-Based Curriculum (CBC).

A considerable percentage of educators in the public primary schools of Kisumu Central employ the strategy of group work when teaching mathematics to third-grade students. This approach facilitates peer learning, allowing pupils to acquire problem-solving techniques from one another. Moreover, it provides assistance to learners who encounter difficulties in comprehending mathematical concepts by leveraging the expertise of their more proficient peers. Additionally, group work fosters the development of diverse perspectives in tackling

mathematical problems, while simultaneously nurturing social skills and instilling a sense of teamwork among the students.

Despite the fact that the MG method of teaching effectively cultivates learners' problem-solving skills, alleviates the monotony and tedium associated with conventional approaches to teaching mathematics, promotes active engagement among learners during mathematics lessons, and enhances learner concentration, its utilization in teaching grade three mathematics remains limited. This is primarily attributed to the insufficient availability of MG resources within schools.

The absence of visual aids and the limited utilization of radio as an instructional tool for teaching mathematics is observed in public elementary schools located in Kisumu Central.

The majority of public primary schools in Kisumu Central possess an ample number of tablets for the purpose of teaching mathematics, as well as reliable internet connectivity. The utilization of this technology has provided educators with the ability to access a diverse range of resources for instructing mathematical topics. Furthermore, it allows for the presentation of these concepts in a manner that is both exciting and stimulating, thereby capturing the attention of learners. Additionally, it serves to alleviate the monotony and tedium associated with traditional methods of teaching mathematics. Nevertheless, a significant proportion of educators lack the necessary skills and abilities to effectively utilize tablet devices for the purpose of instructing mathematics. The utilization of tablets for mathematics instruction among teachers in public primary schools in Kisumu Central is currently restricted, with slightly over 50% of teachers employing this technology.

5.4 Recommendations of the Study

This study recommends that:

1. Grade three Mathematics teachers in public primary schools in Kisumu Central undertake refresher training in line with recommendations of the Presidential Working Party on Education Reforms to acquire skills and competencies required to effectively implement the CBC curriculum and apply constructivist pedagogical approaches in teaching mathematics.
2. The administration of public primary schools in Kisumu Central procure sufficient MGs resources/facilities to enable grade three mathematics teachers to use the MG method in teaching mathematics.
3. Grade three mathematics teachers undertake training in basics of information and communication technology to enable them acquire the skills and competencies required to integrate use of tables in teaching grade three mathematics.
4. Grade three mathematics teachers incorporatemore appropriate visual aid and teaching materials in teaching mathematics as mathematics requires teachers to demonstrate mathematical concepts to learners.

5.5 Suggestions for Further Research

1. This study is based on the perspective of teachers, head teachers and panel heads; hence there is need for a study to examine influence of constructivist pedagogical approaches from the learner's perspective.
2. This study only examined implementation of mathematics curriculum, hence there is need a similar study to examine influence of constructivist pedagogical approaches on implementation of other subjects such as English and Kiswahili.
3. There is need to undertake a study to assess/examine effects of implementing constructivist pedagogical approaches on performance of learners in mathematics to determine if constructivist pedagogical approaches enhance performance of learners.

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APPENDICES

Appendix I: Introduction Letter

Meir Awandu,

University of Nairobi,

P. O. Box 30197- 00100,

Nairobi.

……../..…. /2023

The head teacher,

…….. Primary School.

Dear Sir/Madam,

RE: REQUEST TO CARRY OUT RESEARCH

I am a Masters Student undertaking a research titled: **influence of constructivist pedagogical methods on implementation of grade three Competency Based Mathematics' Curriculum in public primary schools in Kisumu Central Sub-County.** I request for permission to do research in your institution. The information so provided for this research will be handled with outmost confidentiality.

Thank you,

Yours faithfully.

Appendix II: Questionnaire for Head Teacher/Panel Head

I am a Masters Student undertaking a research titled: **Influence of constructivist pedagogical methods on implementation of grade three Competency Based Mathematics' Curriculum in public primary schools in Kisumu Central Sub-County.**

SECTION A: DEMOGRAPHIC INFORMATION OF RESPONDENTS

i. What percentage of teachers in your school is CBC compliant? 0-33% [ ] 34-66%[ ] 67-100%[ ]

ii. Indicate to which extent you agree to the following statements whereby; 5-Strongly Agree (SA) 4-Agree (A) 3-Undecided (UD) 2-Disagree (D) 1-Strongly Disagree (SD)

SECTION B	**Group work**	**5 (SA)**	**4 (A)**	**3 (UD)**	**2 (D)**	**1 (SD)**
i)	Teachers use group work in teaching mathematics					
ii)	Group work enables pupils to learn from each other and share ideas on how to solve mathematical problems					
iii)	Groups enables learners who struggle in learning mathematics to be assisted by learners who are more proficient in mathematics					
iv)	Learners are able to develop different perspectives for solving mathematical problems by questioning and exploring ideas from group members					

vi)	Group work builds social skills and inculcates teamwork spirit among learners					
SECTION C	**Use of games**					
vii)	Teachers use games method in teaching grade three mathematics					
viii)	Use of games in mathematics builds up leaners strategic thinking by enabling them to strategically think about which moves to make to succeed in playing games.					
ix)	Games breaks monotony and boredom of conventional approach of teaching mathematics					
x)	The fascinating nature of games stimulates active participation of learners in mathematics lessons					
	Use of games in teaching enhances leaners concentration					
xi)	There are sufficient gaming resources/facilities for engaging pupils in learning mathematics through use of games					
SECTION D	**Use of radio**					
xv)	Teachers use radio for teaching					

	grade three mathematics					
xvi)	Radio enhances learning of mathematics					
xix)	The school has radios for teaching					
xx)	Teachers are able to operate the radios for purpose of teaching					
xxii)	Radios builds learners listening skills					
SECTION E	**Tablet computers**					
xxiii)	Teachers use of tablet computers for teaching grade three mathematics					
	Teachers have the required skills and competencies to use tablets in teaching mathematics					
	Tablets enables teachers to access a wide variety of materials for teaching mathematics from digital libraries, online databases and educational websites					
xxiv)	Tablets present mathematical concepts in an engaging and captivating manner that captures learners attention					
xxv)	Tablets reduce monotony and boredom of the conventional					

	approach of teaching mathematics					
xxvi)	There are sufficient tablets for teaching mathematics					
xxvii)	There is good internet connectivity to facilitate use of tablets in teaching mathematics					

Appendix III: Questionnaire for Grade Three Mathematics Teachers

I am a Masters Student undertaking a research titled: **Influence of constructivist pedagogical methods on implementation of grade three Competency Based Mathematics' Curriculum in public primary schools in Kisumu Central Sub-County.**

SECTION A: DEMOGRAPHIC INFORMATION OF RESPONDENTs

i. Length of service in teaching. 0-5 [ ] 6-10 [ ] 11-15 [ ] 20+ [ ]

ii. a) Have you attended any CBC training? Yes [ ] No [ ] Not Sure [ ]

b) If yes, then how many times. Once [ ] Twice [ ] More than thrice [ ]

c) If not, give reasons…….

Indicate to which extent you agree with the following statements whereby; 5-Strongly Agree (SA) 4-Agree (A) 3-Undecided (UD) 2-Disagree (D) 1-Strongly Disagree (SD)

SECTION B	**Group work**	**5 (SA)**	**4 (A)**	**3 (UD)**	**2 (D)**	**1 (SD)**
i)	I use group work in teaching mathematics					
ii)	Group work enables pupils to learn from each other and share ideas on how to solve mathematical problems					
iii)	Groups enables learners who struggle in learning mathematics to be assisted by learners who are more proficient in mathematics					
iv)	Learners are able to develop different perspectives for solving mathematical problems by questioning and exploring ideas from group members					
vi)	Group work builds social skills and					

	inculcates teamwork spirit among learners					
SECTION C	**Use of games**					
vii)	I use games method in teaching grade three mathematics					
viii)	Use of games in mathematics builds up leaners strategic thinking by enabling them to strategically think about which moves to make to succeed in playing games.					
ix)	Games breaks monotony and boredom of conventional approach of teaching mathematics					
x)	The fascinating nature of games stimulates active participation of learners in mathematics lessons					
	Use of games in teaching enhances leaners concentration					
xi)	There are sufficient gaming resources/facilities for engaging pupils in learning mathematics through use of games					
SECTION D	**Use of radio**					
xv)	I use radio for teaching grade three mathematics					

xvi)	Radio enhances learning of mathematics					
xix)	The school has radios for teaching					
xx)	Teachers are able to operate the radios for purpose of teaching					
xxii)	Radios builds learners listening skills					
SECTION E	**Tablet computers**					
xxiii)	I use tablet computers for teaching grade three mathematics					
	I have the required skills and competencies to use tablets in teaching mathematics					
	Tablets enables teachers to access a wide variety of materials for teaching mathematics from digital libraries, online databases and educational websites					
xxiv)	Tablets present mathematical concepts in an engaging and captivating manner that captures learners attention					
xxv)	Tablets reduce monotony and boredom of the conventional approach of teaching mathematics					

xxvi)	There are sufficient tablets for teaching mathematics					
xxvii)	There is good internet connectivity to facilitate use of tablets in teaching mathematics					

SECTION F: IMPLEMENTATION OF GRADE THREE MATHEMATICS

1. How many mathematical lessons do you teach per week?

……..

2. Indicate if grade three learners in your class are able to undertake the following numerical operations

Numerical Skills	**Tick**
5. Grade three learners can solve an addition sum and get the correct answer	
6. Grade three learners can solve a subtraction sum and get the correct answer	
7. Grade three learners can solve a multiplication sum and get the correct answer	
8. Grade three learners can solve a division sum and get the correct answer	

3. How is the performance of the grade three learners in mathematics?

Excellent [ ]
Good [ ]
Average [ ]
Poor [ ]
Very Poor [ ]

Appendix IV: Interview Guide for PTA Member

This interview guide collect information for research work on **influence of constructivist pedagogical approaches on implementation of grade three Competency Based Mathematics' Curriculum in public primary schools in Kisumu Central Sub-County.**

Kindly answer the questions below.

1. a. Gender: Male [ ] Female [ ]

b. Please comment on teachers' use of group work in teaching grade three mathematics. (Probe)

c. Comment on use of group work to teach mathematics. (Probe)

d. Give your opinion on the use of group work in improving the learning. (Probe)

e. Comment on the use of group work in relation to social development. (Probe)

2. a. Give your opinion on the teachers' use of games in teaching grade three mathematics. (Probe)

b. Comment on varying the games used to teach mathematics. (Probe)

c. Give your opinion on the use of games in relation to improving learning. (Probe)

d. Please comment on the choice of games to teach mathematics. (Probe)

3. a. Please comment on teachers' use of radio in teaching grade three mathematics. (Probe)

b. Remark on the frequency of the use of radio in teaching. (Probe)

c. Comment on the adequacy in the use of radios in teaching. (Probe)

d. Please comment on the listening skills and use of radio. (Probe)

4. a. Give your opinion on teachers' use of tablet computer in teaching grade three mathematics. (Probe)

b. Comment on the adequacy of tablets computers in teaching. (Probe)

c. Give your opinion on the impact of limited network on use of tablet computers. (Probe)

d. Comment on the availability of tablet computers in the learning institutions. (Probe)

5. What is your opinion about the new curriculum? (Probe)

6. Have you been informed about your role as a parent or guardian in CBC? (Probe)

7. What is your opinion on the carry home assignment by your child? (Probe)

8. Give your suggestion on how to assist a child with the carry home assignments? (Probe)

9. Please comment on CBC implementation? (Probe)

Appendix V:Letter of Authorization

UNIVERSITY OF NAIROBI

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY &CURRICULUM STUDIES

P.O. BOX 30197,

OR P.O. BOX 92 -00902,

KIKUYU.

dept-edpcs@uonbi.ac.ke

22/03/ 2023

OUR REF: UON/FED/EMPCS/1/18

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: MEIR AWANDU – REG NO. E55/8167/2017

This is to confirm that Meir Awandu is a Master of Education student in the Department of Educational Management Policy and Curriculum Studies of the University of Nairobi. She is currently working on her research proposal entitled **"Influence of Constructivist Pedagogical Approaches on Implementation of Grade Three Competency Based Mathematics Curriculum in Public Primary Schools in Kisumu Central Sub – County, Kenya".**

Her area of specialization is Curriculum Studies

Any assistance accorded to her will be highly appreciated

Yours Sincerely

SUSAN CHEPKONGA, PHD

CHAIRMAN

DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY AND CURRICULUM STUDIES

Dept Of Ed. Mngmt. Policy & Curriculum Studies
Chairman
P.O BOX 92 - 00902
Faculty Of Education

sg/ SCY

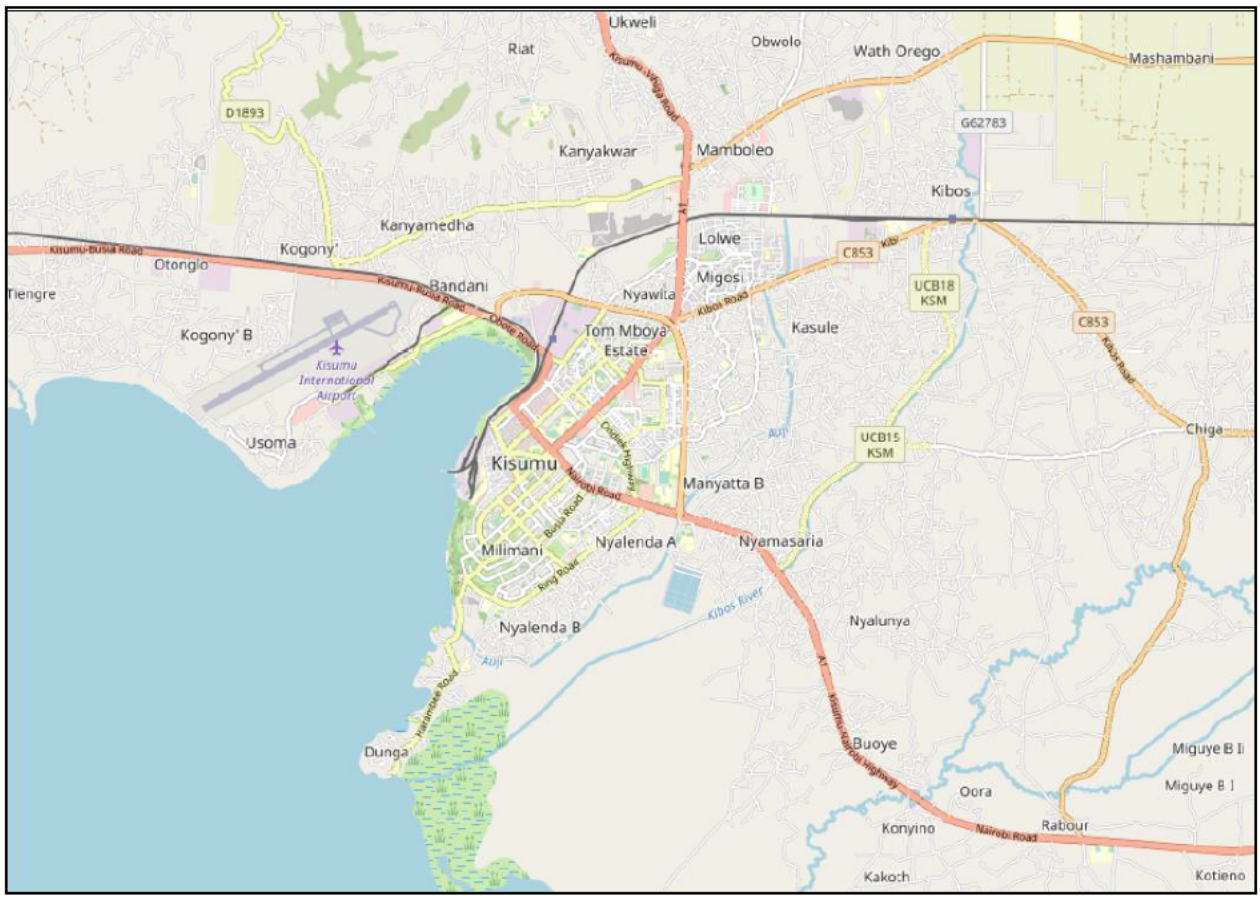
Appendix VI: List of public primary schools in Kisumu Central Sub-County

List of public primary schools in Kisumu Central Sub-County

1. St. Vitalis Nanga
2. Dunga
3. Joel Omino
4. Pandpieri
5. Victoria
6. Xaverian
7. Central
8. Arya
9. Lake
10. M. M. Shah
11. Highway
12. St. Pauls Kanyakwar
13. St. Mary's Kibuye Girls
14. Kisumu Union
15. Kibuye mixed
16. Kudho
17. Kaloleni Muslim
18. Shauri Moyo
19. Mathew Ondiek
20. Manyatta Arab
21. Kosawo
22. Migosi
23. Kondele
24. Ezra Gumbe
25. Obinju Kanyakwar
26. Magadi
27. Manyatta
28. Arina
29. Joyland Special school

Source. MOE Kisumu Central Sub-County Office

Appendix VII:Kisumu Central Sub-County



Appendix VIII: Recommendation

UNIVERSITY OF NAIROBI

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY &CURRICULUM STUDIES

P.O. BOX 30197,

OR P.O. BOX 92 -00902,

dept-edpcs@uonbi.ac.ke KIKUYU.

22/03/ 2023

OUR REF: UON/FED/EMPCS/1/18

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: MEIR AWANDU – REG NO. E55/8167/2017

This is to confirm that Meir Awandu is a Master of Education student in the Department of Educational Management Policy and Curriculum Studies of the University of Nairobi. She is currently working on her research proposal entitled **"Influence of Constructivist Pedagogical Approaches on Implementation of Grade Three Competency Based Mathematics Curriculum in Public Primary Schools in Kisumu Central Sub – County, Kenya".**

Her area of specialization is Curriculum Studies

Any assistance accorded to her will be highly appreciated

Yours Sincerely

SUSAN CHEPKONGA, PHD

CHAIRMAN

DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY AND CURRICULUM STUDIES

Dept Of Ed. Mngmt. Policy & Curriculum Studies
Chairman
P.O BOX 92 - 00902
Faculty Of Education

SCY/sg

Appendix X: Research Permit

MINISTRY OF EDUCATION
Department of Early Learning and Basic Education

Telegrams:
Telephone: Kisumu
Email: deokisumucentral@yahoo.com
When replying please quote:

SUB COUNTY EDUCATION OFFICE
KISUMU CENTRAL
P.O. Box 1914 - 40100
KISUMU

12th April, 2023

REF:KSM/C/MISC5/VOL.I /127

The Headteacher

Joel Omino Primary School

Pandpieri Primary

St. Vitalis Nanga Primary

MM Shah Primary

Lake Primary

Arya Primary

Migosi Primary

Kosawo Primary

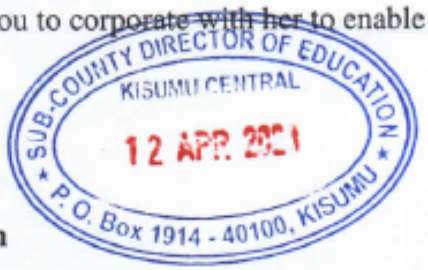
Manyatta Primary

RE: REQUEST TO CONDUCT RESEARCH ON INFLUENCE OF CONSTRUCTIVIST PEDAGOLOGICAL APPROACHES ON IMPLEMENTATION OF GRADE THREE COMPETENCY BASED MATHEMATICS CURRICULUM IN PUBLIC PRIMARY SCHOOLS IN KISUMU CENTRAL SUB COUNTY

The above subject refers.

The bearer of this letter has been granted authority to carry out a learning assessment in schools within Kisumu Central from 13th April,2023 to 4th May,2023

The purpose of this letter is to ask you to corporate with her to enable her accomplish their mission.



Ang'iela Charles
Sub County Director of Education
Kisumu Central

Appendix XI: Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 982502

Date of Issue: 05/April/2023

RESEARCH LICENSE

This is to Certify that Ms.. Meir Awandu of University of Nairobi, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: INFLUENCE OF CONSTRUCTIVIST PEDAGOGICAL APPROACHES ON IMPLEMENTATION OF GRADE THREE COMPETENCY BASED MATHEMATICS CURRICULUM IN PUBLIC PRIMARY SCHOOLS IN KISUMU CENTRAL SUB-COUNTY, KENYA for the period ending : 05/April/2024.

License No: NACOSTI/P/23/24831

982502

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions