PEER TUTORING STRATEGY AND ITS INFLUENCE ON LEARNERS' ACHIEVEMENT IN MATHEMATICS IN PUBLIC SECONDARY SCHOOLS KIAMBU COUNTY, KENYA

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTERS OF EDUCATION (MATHEMATICS EDUCATION) IN THE DEPARTMENT OF EDUCATION, COMMUNICATION AND TECHNOLOGY, SCHOOL OF EDUCATION AND LIFE LONG LEARNING, KENYATTA UNIVERSITY

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DECLARATION

I confirm that this thesis is my original work and has not been submitted to any degree award in any other University. This thesis has been complemented by referenced sources duly acknowledged. References are cited using the current APA and in accordance with anti-plagiarism regulations. No part of this thesis should be reproduced or photocopied without prior permission of the author and Kenyatta University.

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DEDICATION

This thesis is dedicated to my loving Family; my parents Mr Nteziryayo Desire and Mrs Mukampazimaka Elina. To my siblings, Mr Hagenimana Dominique, Mr Abimana Fulgence, Mrs Ingabire Rachel, Mr Niyongira Eric and Mr Ishimwe Benjamin. Thank you for always having my back, lifting my spirits and reminding me that i never had to go through it alone.

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ABBREVIATIONS AND ACRONYMS

APE	Adapted Physical Education
ASD	Autism Spectrum Disorder
CG	Control Group
CWPT	Class Wide Peer Tutoring
EBD	Emotional Behavioral Disorders
EG	Experimental Group
ESN	Extensive Support Needs
IDD	Intellectual and Developmental Disabilities
KCSE	Kenya Certificate of Secondary Examination
KNEC	Kenya National Examination Council
MSBI	Modified Schema Based Instruction
NACOSTI	National Commission of Science Technology and Innovation
NCTM	National Council of Teachers of Mathematics
NRC	National Research Council
PALS	Peer-Assisted Learning Strategy
PMII	Peer Mediated Instruction and Intervention
RPT	Reciprocal Peer Tutoring
SPSS	Statistical Package for the Social Science
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organization
USA	United States America
ZPD	Zone of Proximal Development

ABSTRACT

Report on achievement in Mathematics at the Secondary school level in Kenya indicates that achievement has been below the expected standard. The results of the Kenya Certificate of Secondary Examination (KCSE) for the period 2017 to 2022 revealed that the national average score in Mathematics has been below 40 percent. Research evidence indicates that teaching strategies used by Mathematics teachers do not give room for learners to develop intuition, critical thinking, and creative ability. There is evidence that the use of learner-centered methods, such as peer tutoring strategy as a teaching strategy could lead to better achievement in Mathematics. The purpose of the study was to investigate the use of peer tutoring strategy and its influence on learners' achievement in Mathematics in secondary schools in Kiambu County, Kenya. The objectives of the study were : (a) establish different types of peer tutoring used in teaching and learning Mathematics; (b) determine the extent to which Mathematics teachers use peer tutoring in teaching and learning; (c) establish the difference in Mathematics achievement between learners who learned using peer tutoring and those who learned without using peer tutoring; (d) establish the difference in Mathematics achievement when using peer tutoring by gender among secondary school students. The study was guided by the Social Constructivist theory developed by Levy Vygotsky in 1978. The study adopted convergent parallel mixed method with quasi-experimental research design. The target population was 14 public secondary schools, 34 heads of departments, 67 Mathematics teachers, and 1062 Form II students. A stratified random sampling was used to form a sample of four (4) public secondary schools, 160 Form II students was selected to form a sample using simple random sampling, 20 Mathematics teachers was selected to form a sample using a purposive sampling technique, 10 heads of departments was selected to form a sample using conveniently sampling. Data was collected using teachers' questionnaires, learners' questionnaires, in-depth interview schedules for heads of departments, Mathematics achievement tests, and classroom observation schedule. A pilot study was conducted in two (2) public secondary schools. A reliability coefficients of 0.78 and 0.886 for pretest and post-test respectively was obtained. The instruments were validated using content validity, criterion validity, construct validity, as well as face validity. Quantitative data from Mathematics achievement tests and questionnaires was analyzed using the independent samples t-test, paired samples t-test and interpreted using statistical package of social sciences (SPSS version. 27). Qualitative data from the interview schedule and observation schedule was analyzed into themes and interpreted based on research objectives. The finding indicated that peer tutoring was effective strategy across age, academic levels, grade levels, ability levels and skills levels. Therefore, peer tutoring strategy demonstrated greater effectiveness and contributed to heightened Mathematics achievement compared to traditional teaching methods. The study revealed a statistically remarkable disparity in achievement in Mathematics between the experimental group and the control group ($p=0.00<0.05$ at 2-tailed level of significance). The study also found no remarkable disparity in Mathematics achievement between male and female respondents. Peer tutoring strategy could be used to close the gender gap in Form II learners' achievement in Mathematics. The study recommends that peer tutoring should have incorporated in Mathematics curriculum.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter describes the background of the study, statement of the problem, research objectives, research questions and hypothesis, significance, limitations, and delimitations, assumption, theoretical and conceptual frameworks, and operational definition of terms.

1.2 Background of the study

Mathematics encompasses the study of numbers, quantity and space (Isack, 2015). It is a fundamental field that empowers learners and prepares them for a successful future, as highlighted by Belbase et al. (2022). A strong foundation in Mathematics is crucial for learners' academic achievement as it enhances their problem-solving skills, critical thinking abilities, and logical reasoning capabilities, as emphasized by (Celik & Ozdemir, 2020). Mathematical skills are further honed through the school Mathematics curriculum (Adamu, 2020). Research evidence shows that courses of study such as engineering, computer science, finance, and data analysis, rely heavily on Mathematical concepts and principles. A deep understanding of Mathematics increases their professional success and provides learners with the computational proficiency needed to perform well in these fields (Onoshapokaiye, 2023).

Abdul-Raheen et al. (2017) have indicated that the teaching and learning process entails the exchange of knowledge between learners and teachers. In 2015, the United Nations Educational Scientific and Cultural Organization (UNESCO) highlighted the importance of teachers coordinating the teaching and learning process to ensure quality education in the classroom. This indicates that teachers should have content suitable for learners' abilities and possess the necessary skills to address diverse needs in an inclusive environment to effectively manage the learning process Ali et al. (2015). In 2001, the National Research Council (NRC) revealed that utilizing learner centered methods as an effective teaching strategies play fundamental roles in shaping learners' academic achievement in Mathematics. One potential learner-centered method for addressing Mathematics achievement is the peer tutoring strategy, a systematic, peer-mediated teaching strategy (Asaf & Zahoor, 2017).

Teaching using peer tutoring has been widely documented across all stages of education and in all the subjects of the curriculum. Its academic benefits have been broadly acknowledged in Mathematics as reported by Alegre-Ansuategui et al. (2017). Different peer tutoring methods have been explored. One of them is the same-age peer tutoring technique, where teachers pair proficient learners with less skilled learners who are within one or two years of age (Wang & Murota, 2016) and Zhang et al.(2017). Another one is cross age peer tutoring in which older learners from a higher academic level provide guidance and support to their younger peers (Tenhovirta et al.,2022). In reciprocal peer tutoring (RPT), the teachers pair two or more learners who take turns acting as both tutor and tutee during the session, with each participant having time in each role. Peer assisted learning strategy (PALS) involves teachers pairing learners in need of additional instruction with peers who can provide support

Vickrey et al. (2015) and (Zingaro & Porter, 2014). There is also Class wide peer tutoring strategy(CWPT) where teachers divide the entire class into groups of three to six learners with varying ability levels Sayer et al. (2016).

Bellen and Jomoc, (2017) revealed that peer tutoring strategy is more effective for learners in grades 1-3, minority learners, school-wide prevention programme, urban settings, low socioeconomic areas, and learners-controlled tutoring sessions. In peer tutoring sessions. In peer tutoring sessions, tutors have the opportunity to support the success of their peers, derive meaning and fulfillment from learning to maintain credibility and effectiveness in sharing knowledge while the tutees have the chance to comprehend, clarify and deepen their understanding of the lessons (Tan & Gevera, 2020). The research study conducted in Latin America. (Gracia, 2020) established the influence of peer tutoring programmes on middle school learners' Mathematics achievement. The study utilized a randomized controlled trial in which learners were appointed to either the control group or experimental group. The experimental group had higher gains in Mathematics test scores and the organized peer tutoring strategy structure supported concentrated learning, improved collaboration among peers, resulting in a much deeper comprehension of Mathematical concepts. It was evident that learners in the organized peer group expressed higher confidence, had a positive attitude towards Mathematics and enhanced problem solving skills.

Chong et al., (2020) has demonstrated peer tutoring as a successful method for enhancing performance in Mathematics. Utilizing peer tutoring as a teaching strategy can alleviate pressure on teachers tasked with instructing large and varied learner’s population, it not only improves social relationships but also improves students'

academic achievement (Wolfe, 2018). An important facet of peer tutoring is that the learner instructor's power dynamic is not present. Gu and Gu, (2019) have demonstrated peer tutoring as kind of communication where the exchange of information between peers goes beyond purely academic domain. Learners work hard not to give away but discover the solutions themselves. Thus, peer tutoring, including numerous tasks, is a broadly accepted practice in their education worldwide. These tasks involve scenarios like peer-assisted study sessions, peers facilitating group study sessions, or engaging in one-on-one peer support within contexts or peer-learning programs (Andreanoff, 2016) and (Giles & Ody, 2015).

Peer tutoring serves as the primary objective of conventional teaching and learning of ‘No Child Left Behind'. Peer tutoring is a learner-centered method that encourages inclusiveness while empowering learners to learn from one another Cockeril, et al., (2018). In Mathematics, there still exists important diversity in learners' skill levels, with researchers accrediting this distinction to components like classroom size and basic Mathematical knowledge (Shi, 2019). In Ghana, the learners demographic enrolled in secondary schools is highly diverse encompassing a wide spread of features such as preparedness, age, capabilities, abilities, interests, and socioeconomic background. Applying teacher-centered methods like the talk and chalk approach has yielded poor results due to widespread class sizes Fisher et al. (2020).

In Uganda, Mathematics teachers used cross-age peer tutoring, and group work to handle large classes with more than 70 students in the management of the classroom Nakabugo et al. (2007). Teachers expected to teach large classes employed peer tutoring which places the responsibility of teaching in the hands of well-prepared and

knowledgeable students whom the teachers had trained. Peer tutoring equally enables slow and quick learners to develop important qualities like self-discipline, sharing, and self-esteem. Educationalists have established through experiences and studies that peer tutoring is a successful technique for providing support to students in achieving their educational goals Bozzi et al. (2021). Peer tutoring supports teachers in the formulation of groups of students with excellent connection, which is acquired from errands of activities, guide, and tutee, where the two (2) slower learners have a common goal and acquire curricular limit through a relationship established by educator, as reported in Arthur et al. (2022).

In Kenya, according to the research study conducted in the Nyeri sub-County, Kenya. (Kibuthu,2016) has indicated that learners are motivated to achieve success in Mathematics using peer tutoring. Utilizing peer tutoring benefits both proficient and struggling learners Orland-Barak and Wang, (2021). It empowers adept learners to attain mastery over course concepts, enabling them articulate their ideas with confidence. Concurrently, learners facing challenges witness improvement and advancement in their achievement enhancing their grasp of lesson content (Jalal, 2021). This approach adeptly addresses both the social and academic facets of education, forging an environment that fosters comfortable and effective interactions for both teaching and learning endeavors. Further, the researchers such as Asempapa et al. (2021) observed that learners who participate in peer teaching exhibit enhanced achievement in examinations, particularly in tasks that necessitate reasoning and critical thinking capacities.

In developed countries such as Kenya, the importance of concern about students' competence in Mathematics cannot be overstated. This is because creating professionals in the areas of medicine, engineering, and accounting requires good scores in the Mathematics. A report on the achievement of students in the past five years in Kenya Certificate of Secondary Examination (KCSE) indicated that more than 70% of students scored grades D+ and below, and less than 15% of students scored quality grades of B- and above. This poor achievement in Mathematics has been a concern in Ruiru sub-county of Kiambu County which posts satisfactory results in other subjects. Performance analysis in Mathematics in the years 2017 to 2022 showed several learners in public secondary schools received a mean score of Mathematics which is below 50% (Ministry of education, Kiambu County, 2024).

Table 1.1 Mean Scores in KCSE Mathematics in Kiambu County,2017-2022

Sub-county	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
1. Kikuyu	5.0342	4.6969	5.183	4.722	4.863	4.119
2. THIKA WEST	2.926190476	3.026	5.022	4.539	4.513	3.596
***3.* JUJA**	2.138	2.954	4.210	3.796	3.833	3.339
***4.* KIAMBU**	3.145	3.632	3.700	3.945	3.879	2.976
***5.* LIMURU**	2.758216667	2.457526316	3.763	3.105	3.494	2.901
***6.* RUIRU**	2.286753036	2.203465667	2.838	2.562	2.523	2.367
***7.* KABETE**	2.722	2.629	3.566	3.331	3.245	2.237
***8.* NDEIYA**	0.000	0.000	0.000	1.974	2.139	2.101
***9.* GITHUNGURI**	2.391368421	2.516736842	3.228	2.659	2.658	2.042
10. LARI	2.003465909	2.097336762	2.652	2.375	2.520	2.038
11. GATUNDU SOUTH	2.910	2.909	2.959	2.524	2.494	1.922
12. GATUNDU NORTH	2.912	2.964	2.912	2.530	2.758	1.897
13. KIAMBAA	2.469	1.923	2.350	2.242	2.222	1.795
14. GITHURAI	0.000	0.000	0.000	1.461	1.461	1.345
15. THIKA EAST	1.684875	2.004666667	2.246	1.681	1.972	1.328
Mean	2.494	3.183	3.094	3.498	3.338	3.362

Source: (County Director of Education, Kiambu County,2024)

According to data in Table 1.1. Between 2017 and 2022, the average mean Mathematics score for applicants transferring into secondary education in Kiambu County was 3.7938. This indicates that for five (5) years in a row, there was decline in the mean Mathematics score. In year 2017 the mean score was 2.494 where as in 2022 the mean score was 3.362. Specifically, in Ruiru sub-county, Mathematics achievement in public schools has been below average mean as indicated in Table 1.1. Between 2017 and 2022, the average mean Mathematics score for applicants transferring into secondary education in Ruiru sub-county was 2.955. This indicates that for five (5) consecutive years, the average score was D- which is below the C＋ average that is used as the minimum for admission to university.

1.3 Statement of The Problem

Achievement in Mathematics in Kenya continues to be below expectations despite various research efforts to remedy the situation. Efforts have been made to counter the problem of poor achievement in Mathematics in secondary schools but no significant improvement has been recorded (KNEC, 2022). Numerous research efforts have been focused on identifying factors that constrain the learning of Mathematics. The use of teacher- centered rather than learner- centered methods of teaching as well as low motivation of learners have been highlighted as some of the problems affecting learners' achievement in Mathematics.

The teaching strategies applied by majority of Mathematics teachers do not accord the learners opportunities to develop their creative ability, critical thinking, imagination, and intuition. As a result, Mathematics teachers are continually searching for varied approaches to use so as to attain the stated Mathematics educational objectives. Research has shown that teaching Mathematics using peer tutoring could result in

better achievement. This is because peer tutoring enhances the personal abilities of various learners compared to traditional methods of teaching. The study was investigating the use of peer tutoring strategy and its influence on learners' achievement in Mathematics in secondary schools, in Kiambu County Kenya.

1.3.1 Purpose of The Study

The purpose of the study was to investigate the use of peer tutoring strategy and its influence on learners' achievement in Mathematics in secondary schools in Kiambu County, Kenya.

1.3.2 Objectives of the Study

i. Establish different types of peer tutoring strategies used in teaching and learning Mathematics

ii. Determine the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning

iii. Establish the difference in Mathematics achievement between learners who learned using peer tutoring strategy and those who learned without using peer tutoring

iv. Establish the difference in Mathematics achievement when using peer tutoring by gender among secondary school students

1.3.3 Research Questions

The study intended to answer the following study questions

i. What are the types of peer tutoring used by Mathematics teachers in teaching and learning?

ii. To what extent do Mathematics teachers use peer tutoring in teaching and learning?

1.3.4 Hypotheses

The following null hypotheses were tested for the study

H01: There is no statistically significant difference in Mathematics achievement between learners who learned using peer tutoring and those who learned without using peer tutoring

H02: There is no statistically significant gender difference in Mathematics achievement among students after learning using peer tutoring

1.4 Significance of The Study

The teacher would benefit from peer tutoring by improving how they present the lessons more appropriately, thereby making learners more interested in participating actively in Mathematics. Therefore, this would help in inculcating better collaborative learning habits in Mathematics for the learners to strengthen their academic achievement through direct participation in peer tutoring.

Students would benefit from peer tutoring by improving the whole process of enhancing learning, and personal cognitive abilities, improving learners' academic achievement, and developing confidence in Mathematics through their direct involvement. Peer tutoring would help students struggling to understand Mathematics by inspiring them with awareness to determine and evaluate their capability and their competence.

The Ministry of Education would benefit from the study by coming up with numerous ways of improving peer tutoring strategies in secondary schools. Therefore, the study results would produce piratical information on the accessible actualities in different

facts and mutually widespread circumstances of the linkage between peer teaching strategy and learners' academic performance in Mathematics.

1.5 Limitations and Delimitations

The study's limitations are constraints outside of the researcher's control and are inherent to the study that could affect the generalization of the findings while on other hand delimitations are further limitations actively put into place by the researcher in order to control for factors that might affect the results (Miles & Scott, 2017).

1.5.1 Limitations of The Study

The first limitation that was anticipated during the study was that sometimes teachers shared the teaching tips and guidelines but learners were not expected to become expert educators. Therefore, the tutors were not able to support the tutees properly because of the lack of experience. The Second limitation, was the pairing of learners was backfire because of their hesitancy and feeling inferior when the tutees were taught by their own classmates. Tutees did not put in required effort because of lack of keenness. This created tensions between the tutor and tutee. The third limitation was transparency that lead to segregation among the learners in classroom discussion. There was time where tutees tended to depend a lot on their peers to guide them even for easy topics. Fourthly, the sample of the study was so small which was not true representative of the entire population of secondary schools in Ruiru sub-county. A more representative sample with Form II students from different geographical location would have reinforced the finding of the study.

1.5.2 Delimitations of The Study

The result of the study was restricted to public secondary schools in the Ruiru sub-County, Kiambu County, and did not consider other sub-Counties in the County.

However, different places within Kenya might encounter poor academic achievement in Mathematics. Therefore, the study was used to give an accurate picture of the entire country. Private schools were not included in the study which encounters other aspects that are disparate as public schools. Also, other levels of education such as primary schools was not taking part in the study and they might experience different causes of poor academic achievement in Mathematics due to the various characteristics of secondary schools. Numerous strategies could be used to teach secondary school students yet the study was only focused on peer tutoring in Form II classes. The study was carried out in public secondary schools in Ruiru sub-County, Kiambu County, Kenya and no other sub-County or County in Kenya.

1.6 Assumptions of The Study

i. The study assumed that peer tutoring was employed by Mathematics teachers to teach secondary school students
ii. The study assumed that there was a positive relationship between peer tutoring in teaching Mathematics and students' academic achievement
iii. The study assumed that all respondents would provide accurate and honest responses to the research instruments
iv. The study assumed that implementation of peer tutoring yields a significant influence of gender on achievement of students in Mathematics.

1.7 Theoretical Framework

The research study was guided by Social Constructivist developed by (Vygotsky, 1978). Vygotsky asserted that the process of learning comes from social interaction within a language and a cultural context as the most important tool. Learners' access is gained through tutors who are contributing to facilitate the teaching activity; while the

purpose of learning activities is to realistically and practically overcome problems in authentic settings. For peer tutoring, this setting refers to the realistic setting of humankind, so that learners are to be involved in one job activity instead of following didactic explanations on abstract concepts. The argument is that learners are able to approach unfamiliar problems and provide the exact solutions based on their particular culture. Peer tutoring concept is in line with the aspects of Social Constructivist theory. It is in developing social negotiation between tutors and their peers in which the knowledge construction is achieved through communication and dialogue in groups.

(Vygotsky, 1978) further classified the learners into three (3) categories on the basis of individual differences. According to him, one group of learners represents those who may easily comprehend the teachers and do not need any further assistance. Such learners are grouped in the Zone of Proximal Development. The Second group, (Vygosky, 1987) recommended peer tutoring, home tuition, and group discussion because it is beneficial for both tutor and tutee (Daniels, 2016). The cognition of the tutor is developed by preparation of lesson and responding to the tutees' questions while the learning of the tutees is developed in the shape of providing opportunities for free discussions and asking questions. The third group of students are those who are incapable to understand something even with the provision of external help. These learners are classified in the Zone of no Development (Mehra & Mondal, 2005).

(Vygotsky, 1978) also stressed upon the significance of culture, social interaction and historical background in their significant role in developing the intellectual abilities (Blake & Pope, 2008). The Zone of Proximal Development manifests the level of

learning abilities in which the learners need Scaffolding, which may be provided by an experienced colleague or a teacher. ZPD is integral to peer tutoring, with tutoring interactions occurring as tutor-tutee collaborations. For scaffolding to improve learning, tutors must deliberately link new information to already known information (Valkmburg & Dzuback, 2009). According to Wood et al., (1978), there are six (6) key scaffolding elements: (a) recruitment - gathering learner interest in the task's requirements; (b) reduction in the degree of freedom -simplifying the task; (c) direction maintenance - keeping the learner on a particular objective; (d) marking critical features - confirming/ checking; (e) frustration control - managing the learners' emotional state; (f) demonstration - task based solution. (Vygotsky, 1987) proclaims when learners are engaged with colleagues better in intellectual abilities within the Zone of Proximal Development, they may easily internalize the concepts as compare to learning through instruction passively Shabani et.al.(2010). That is the reason that Vygotsky supported peer tutoring as useful approach for tutees as well as well as tutors.

1.8 Conceptual Framework

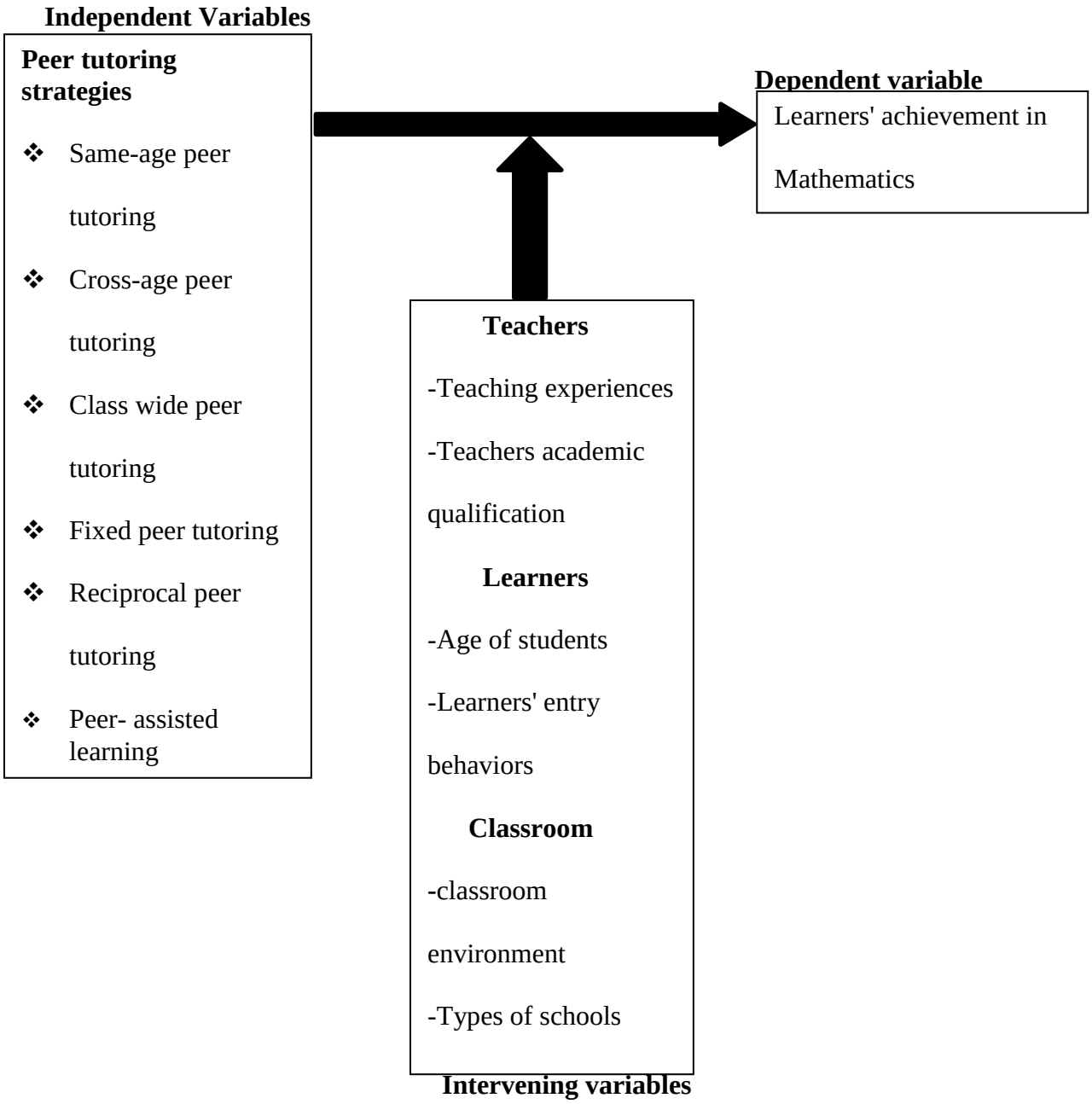

Figure 1.1 Conceptual Framework

Source: Researcher

Figure 1.1 Conceptual framework of peer tutoring strategy and its influence on learners' achievement in Mathematics

The researcher was conceptualized different variables including independent variables such as peer tutoring teaching strategies and dependent variables which was learners' achievement in Mathematics as well as intervening variables such as classroom environment, teaching experiences, students' entry behaviors, teachers' academic qualification and age of students.

1.9 Operational Definition of Terms

Peer tutoring: is a teaching strategy that involves students' partnerships, combining slower students with quick students

Peer Tutee: a person who is given advice or taught by the tutor

Peer Tutor: a person who assists in certain subject areas or skills

Academic achievement: the extent to which a learner or teacher has achieved their short-term or long-term academic goals

Teaching strategy: refers to the techniques, methods, processes, or procedures that a teacher uses during instruction

Zone of Proximal Development: is describe as the current or actual level of development of the learners and the next level attainable through the use of mediating semiotic and environment tools and capable adult or peer facilitation.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews related literature based on the objectives of the study, A) Establish different types of peer tutoring used in teaching and learning Mathematics B) Determine the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning, C) Establish the difference in Mathematics achievement between learners who learned using peer tutoring strategy and those who learned without using peer tutoring, D) Establish the difference in Mathematics achievement when using peer tutoring by gender among secondary schools students.

2.2 Concept of Peer Tutoring

Peer tutoring is defined as an instructional strategy where students cooperate in groups Cross et al. (2020). It involves the learners taking the duties of teaching fellow learners, either of the same or separate age, involving face-to-face interaction or with one mentor guiding the learning of two (2) or three (3) learners (Cornelius & Sandmel, 2018). As a pedagogical strategy, peer tutoring has been defined as a way to encourage collaboration between learners, which has led to its increasing acceptance and recognition within educational institutions. Furthermore, Peer tutoring has been identified as an effective learning engaging interaction and dialogue among individuals Abdelkarim and Abuiyada, (2016). Just as important, Peer tutoring has been defined as a way of interaction among a skillful learner, who has recently or excelled successfully in the subject and another learner facing difficulty in a similar subject (Lam, 2019).

2.3 Historical background of peer tutoring

The practice of peer tutoring can be traced back as far as the ancient Greeks, and research studies continue to show findings of academic, behavioural and social benefits to both the tutor and tutee (Bonner et al., 2013; Hattie, 2017). The Bell-Lancaster system of peer tutoring was developed and named for two (2) British educators such as Andrew Bell and Joseph Lancaster as reported by Fuchs et al., (1997). Even though in 1817 over 100,000 children in England and Wales participated in this tutoring system, by middle of the 19th century interest in peer tutoring decreased. In the United States, peer tutoring in the 19th and early 20th centuries within a one room school house was common. However, peer tutoring was not rediscovered on large scale until the late 1960s when American educators became concerned about underachievement among many poor and minority learners. By 1970, according to Gerber and Kauffman, some types of after school tutoring program had been implemented in more than 200 school districts within the Philadelphia, Pennsylvania and Newark, New Jersey areas as a result of their Youth Teaching Youth tutoring programmes.

2.4 Factors affecting the effectiveness of peer tutoring programmes

A study by (Keerthirathne, 2021) indicate that any successful peer tutoring required; the tutors to have received training and familiar with the peer teaching procedure; strong rewards in place, focusing on positive reinforcement; give learners enough time to respond as they go through the learning scenario on their own; use group strategies; when needed, the facilitator should use scaffolding to highlight the value of active learning; explain how to provide feedback. Just as important, Topping and Lindsay (2020) indicated that for any peer tutoring sessions to be successfully, there is a need to meet certain requirements. The requirements include proper training and

oversight for peer tutors, a comprehensive understanding of the aims and objectives of the peer tutoring, and an emphasis on fostering positive connections between tutors and the tutees. It was also noted that peer can be ineffective or detrimental when unmet requirements exist. For instance, if peer tutors are not adequately trained or supervised, they may inadvertently reinforce misconceptions or provide incorrect information.

According to the research study conducted by Titik Setyowati et al., (2020) indicated that effective tutor selection methods should include tutor selection, tutor candidate exam, agency referrals and special offers. Tutors serve as innovators and motivators. Junior tutors, also known as a peer tutors are graduate, postgraduate, or graduate assistants with outstanding academic records, facilitates first year learners and support those who are struggling over the course of several years (Da Re, 2013).

2.5 Types of Peer Tutoring Strategy

2.5.1 Same-age and Cross-age Peer Tutoring

Two (2) types of peer tutoring have been identified based on participants' age, same-age and cross-age peer tutoring. In same-age peer tutoring, participants are of the same age while in cross-age peer tutoring, participants are of different age Topping et al. (2017). Same-age peer tutoring is a type of tutoring where learners belong to the same grade level as reported by Alegre et al. (2020) while on other hand cross-age peer tutoring consists of tutors from higher learning to help tutees belonging to lower learning, according to Dada et al., (2023). The implementation of same-age peer tutoring is easy as compared to cross-age tutoring as it is only conducted in one

classroom. Moeyaert et al., (2021) have demonstrated that peer tutoring is usually more successful for learners in the same academic year.

Researchers such as Greene et al. (2018) revealed that tutors who were older than tutees tended to have higher achievement skills, and better attributes than tutors who were of the same age as tutees. Just as important, special education teachers have also found that older learners with disabilities struggling academically can benefit from tutoring or reading to younger learners (Mauer et al.,2024), such cross age peer tutoring can positively affect the motivation and skill level of the tutors as well as providing them with increased self-concept and role as instructional leader.

Cross age tutoring can occur in a classroom environment or during and after school program (Burton, 2021). The most recent systematic review on cross age tutoring for the general education was conducted by Schenderovich et al., (2016). The study analyzed cross age tutoring in Kindergarten and elementary school settings and summarized the effects of cross age tutoring delivered by nonprofessional tutors such as old classmates and adult community volunteers. The review highlighted the significance of this approach in improving literacy and numeracy, primarily relying on randomized controlled trials to ensure robust evaluation of educational outcomes. The research findings revealed modest but positive effects on tutees' reading comprehension and decoding skills for tutoring in reading but found no significant effect in Mathematics outcomes. They also found that highly structured reading programmes were of more beneficial than those that were loosely structured.

A study by Sands et al., (2019) was conducted on an Adapted Physical education (APE) classroom, where both cross-age and same-aged peer mentors were present. The research findings indicated that when trained peer tutors were present in the classroom, the five (5) learners in the APE classroom exhibited an increase in on task behaviors, and all learners agreed that the classroom was a positive experience. The research findings also reported that four (4) out of five (5) learners in the APE classroom said that they would like to be in another classroom with peer mentors. Peer mentors reported that they would have preferred to switch mentees rather than being consistency paired with the same one, but also said, ‘‘ It was a great experience ’’ and ‘‘ It was awesome! ’’.

Focusing on learners with emotional and behavioral disorders, Bowman-Perrott et al., (2014) demonstrated that cross age tutoring offers moderate to large academic benefits across various subjects for these learners. In similar vein, a study conducted by Toulia et al.,(2023) revealed that when Mathematics teachers used peer tutoring in classroom with learners with intellectual disabilities, both teachers and learners reported a positive impact. The study was conducted in Greece and sampled six (6) elementary general education Mathematics teachers who received training on same-age peer tutoring. The study focused on the impacts of peer of peer tutoring with 11 learners who received special education services. After two (2) week check-in, Mathematics teachers reported that the learners benefited socially and were excited to work together. Mathematics teachers also reported that using same-age peer tutoring strategy decreased disruptive behaviors and increased engagement in learning as well.

The gap between ages is basic in the process as tutees learn more with other tutors Hänze et al. (2018). Even though previous studies have indicated that differences exist between same-age and cross-age peer tutoring, there is no supporting document that suggests that one type is more effective than the other (Leung, 2019a). In essence, the researchers such as Morris et al. (2016) indicated that the age difference guarantees the best outcome and they suggest an age difference of two (2) to four (4) years between tutors and tutees. This helps to eliminate a perceived power imbalance because, if the tutor is considerably older he or she can intimidate tutees and impede their ability to learn (Muhoro & Kang'ethe, 2014). In addition, Topping et al. (2004) demonstrate that using elder tutors guarantees the success of the experience and they suggest an age gap of a minimum of two years between tutors and tutees. Research studies have indicated that tutees improved mostly when old tutors assist them and the dominance of cross-age over same-age peer tutoring has yet to be proved (Scruggs & Osguthorpe,1986) and (Hartup, 1976). Therefore, much uncertainty still exists about these two types of peer tutoring.

2.5.2 Peer assisted learning strategy

Peer-assisted learning strategies (PALS) is type of peer tutoring that allows the teachers putting together learners who require further directions or assistance from a peer who can assist Fuchs et al. (2000). Students are usually paired with other students who have similar abilities or who are at the same level. Sinclair et. al., (2019) defined PALS as a '' supplemental reading intervention that utilizes peer coaching and motivational elements to improve learner's engagement ''. PALS requires teachers to give a discourse to individual learner needs. Teachers observe the students, and provide individual remedial courses (Blueprints for Healthy Youth Development,

2019). PALS is not new and neither is the focus on collaboration as cited (Bone, 2015).

PALS has been described as " the skills development and knowledge through working support amid status equals or matched companions" Carr et al. (2016). There are often changes according to the subject or skills and they are more flexible in the formation of groups. Typically, all students receive an opportunity to perform as tutor or tutee at a particular time. PALS might be initiated informally owing to the minimal existence of a comfort zone between teachers and learners, especially when the teachers dominate the class and does not allow any teamwork as reported by Utha et al.(2019)

PALS session was shown to increase statistics self-efficacy which in turn supported achievement outcomes Spedding, J et al. (2017). PALS is more effective on the students' learning and incorporate several important features. First, all learners in class are paired. Second learners are trained to use specific prompts, corrections and feedback. Third, PALS incorporates frequent verbal interactions between tutors increasing learner’s opportunities to respond (Fuchs & Fuchs, 2006). Fourth, roles are reciprocal so that both learners in pair serve as tutor and tutee during each session and fifth, PALS consists of a set of structured activities and learners are trained to implement them independently (Castelym, 2018). Moreover, studies by (Topping, 2020) suggests that peer-assisted learning strategy promotes a positive learning environment, boosts confidence in Mathematical abilities, and encourages learners to explain and justify their reasoning. This collaborative approach to learning Mathematics can lead to higher teacher assessment and academic achievement levels as it emphasizes cooperative learning and peer interactions. Despite this, very few

studies have established the effective use of peer assisted learning strategy in teaching and learning Mathematics.

A research study conducted by Duah et al.,(2014) investigated the use of PALS in undergraduate Mathematics courses. The study employed both qualitative and quantitative methods. The qualitative analysis of interviews indicated that PALS raised learner's involvement in second year undergraduate Mathematics. In addition, they found a positive correlation between number of PALS sessions attended and final grade in the Vector Spaces module, controlling for prior achievement in Linear Algebra and Lecture attendance. The researchers replicated these findings in a subsequent study of PALS in the Complex Variables module, again findings a positive correlation between number of PALS sessions attended and final grade in that module. However, the mechanism for this effect was unclear, it is possible that the extra study time in the module content during PALS sessions, rather than the peer assisted learning strategy (PALS) itself, could have been responsible for higher final grades.

2.5.3 Class wide peer tutoring strategy

Class-wide Peer Tutoring (CWPT) involves direct rehearsal, well-structured procedures, a highly competitive team, and the posting of scores, according to Maheady et al.,(2001). It is carried out in a manner that encourages positive learner relationships by using peer tutoring and partner pairing. In CWPT, students were prepared to teach peers who are more competent to present a weekly set of information where they can give direct feedback for correct and incorrect responses (Mkpanang, 2016). Every child in the classroom is directly engaged in the process of learning with CWPT, which enables them to learn fundamental skills in a funny and

organized manner Kamps et al. (1994). CWPT combines instructional components that involve systematic content coverage, partner pairing, continuous testing, team competition, direct error corrections, and point testing Ali, Anwer et al. (2015). The whole class gets involved in organized peer tutoring tasks two or more times each week for approximately 30 minutes (Harper & Maheady, 2007). Typically, CWPT is created to effectively teach a specific set of information to young children with a wide range of skill levels (Kapil &Malini, 2018).

Class wide peer tutoring(CWPT) was created by University of Kansas researchers and teachers in the early 1980s as a way of providing help to learners with learning disabilities or learners from minority or disadvantaged backgrounds who were struggling academically (Arreaga-Mayer, 1998). Typically, CWPT was initially designed for at risk elementary learners in reading and Mathematics, but has generalized to higher grade levels (Ayvazo & Aljadeff, 2014; Buzhardt et al.,2007). In a research study conducted by (Ayvazo & Aljadeff, 2015) using Class wide peer tutoring (CWPT) at an inner city charter school in the USA. The study sampled 71 special educational and social needs learners in physical education classes. During this study 41 third grade learners and 30 eighth grade learners received two (2) to three (3) hours per week. The study concluded that this evidence based instructional strategy held the following multiple benefits for student learning: a) high opportunities to respond; b) development of fundamental social skills; and c) performance improvement subsequent to immediate feedback.

A study conducted by Arakere and Mainess, (2023) for the purpose to determine the comprehension of idioms using Class wide peer tutoring (CWPT) in middle school

learners with specific learning disorders(SLD). The learners were randomly paired and remained paired throughout the study and a special education teachers facilitated CWPT in their English class for 20 minutes, four (4) days a week, lasting four (4) weeks. The data was collected on learners with an individualized education plan and diagnosed with SLD. The research findings revealed that there was a significant improvement in idiom comprehension scores between the sixth (6^{th}) and eighth (8^{th}) graders in the class. While these scores are statistically significant, they are not clinically significant. CWPT improved idiom comprehension in middle school learners with a special learning disability.

2.5.4 Reciprocal and Fixed peer tutoring strategy

Thurston and Topping, (2007) define two (2) types of peer tutoring taking into account the duties performed by tutoring session participants, such as fixed and reciprocal peer tutoring. In the fixed peer tutoring strategy, there exists an interaction between students, one group frequently acts as a tutor and the other as a tutee while in reciprocal peer tutoring, the learners exchange duties, performing part of the time as a tutor and the other time as a tutee. Components including frequency of the tutoring, participants' age, duration, and experimental research design play significant roles in the outcomes of fixed and reciprocal experiences Bowman-Perrott et al. (2016).

During the process of teaching, students sustain their respective duties, tutors always perform as tutors and tutees usually perform as tutees in fixed peer tutoring while on the other hand, duties are switched during reciprocal peer tutoring experiences (Martin-Beltran, Chan & Guzman, 2018). De Backer et al. (2016) and Bailey et al. (2018) revealed that the implementation of reciprocal peer tutoring demands a

moderate level of knowledge and experts in the learners' academic and communication skills.

A research study conducted by De Backer et al. (2015) indicated that reciprocal peer tutoring is more effective than fixed peer tutoring. This is because tutees' self-awareness could be affected by ongoing support received from their tutors, making themselves feel inferior or useless to their peers. It has been observed that performing permanently as tutors may be harmful for them as feelings of dependency and inferiority may arise if the tutoring implementation is too long in most studies, however fixed peer tutoring was adopted by researchers, in which learners were selected to be tutors based on their academic performance or other skills with aim of increasing the possibility of the success of the programme. The result is that reciprocal peer tutoring inadequately addressed (Alshareef, 2020).

There are scholars who believe reciprocal peer tutoring is superior to the fixed peer tutoring because it provides equal opportunity for all learners to learn by teaching (Cheng & Ku, 2009). There are no meta-analyses or previous literature that have been widely recommended for the superiority in educational terms of one type over the other. The evidence for this relationship remains inconclusive

2.6 Extent use of Peer Tutoring in Teaching and Learning Mathematics

In a research study conducted in middle schools of Northeast England (Wang, 2018), the objective was to establish teachers' perceptions and experiences regarding the influence of peer tutoring programmes in supporting middle school learners in Mathematics learning. This qualitative study utilized semi-structured interviews with Mathematics teachers who implemented peer tutoring programmes. Thematic analysis

indicated that teachers perceived peer tutoring as a valuable instructional strategy promoting learner engagement, collaboration, and peer learning. Teachers reported positive outcomes such as improved academic achievement, increased learners' confidence and supportive classroom environment. Further, teachers highlighted the benefits of peer tutoring in fostering a growth mindset, encouraging independent learning, and building learners' problem solving skills. However, the study by (Wang, 2018) utilized semi structured interview for Mathematics teachers while the present study utilized in depth interview for HoDs.

A study by Ley Davis et al., (2022) was conducted in Southeastern United States to determine the effects of modified schema-based instruction(MSBI) paired with peer delivered instruction on teaching Mathematical word problem solving to learners with extensive support needs (ESN) in special education. The study also determines if they could generalize these skills. The study employed a single case design with multiple probes across four (4) peer tutors. The intervention had three (3) phases; change increase, change decrease and change mixed. The data was collected based on the total number of task analyses completed correctly and problems solved correctly. The research findings revealed that all four (4) learners scored 100% on their word problem solving questions during their maintenance phase, which consisted of four (4) to six (6) sessions each time. They found that using MSBI with peer delivered instruction had a moderate to significant effect. The learners were also able to generalize the skills they learned each time with an unfamiliar person.

In a research study conducted in Spain, Ansuategui and Miravet, (2017) used a sample of grade two (2) learners of Castellon de la Plana. The study was guided by

self-concept theory and same age as peer tutoring approach type. The study used both qualitative and quantitative research methodology. The findings indicated that learners successfully complete assignments faster and gain better understanding, learners explain the problem to a friend as well as remove feelings of embarrassment, learners demonstrate positive behaviors and cognitive competences throughout the programme. The study by Ansuategui and Miravet, (2017) used a sample of grade two (2) learners while the present study used a sample of Form II learners

A research study was conducted in Vietnam (Nguyen, 2023), to establish the influence of peer tutoring programmes on middle school learners' confidence levels and attitudes towards Mathematics. The study utilized mixed methods, quantitative surveys measuring learners' self-confidence and attitudes towards Mathematics. Learners reported feeling more comfortable asking questions, seeking help and engaging in Mathematical discussions with peers.

The learners also expressed greater enthusiasm for learning Mathematics and a sense of accomplishment when they successfully explained concepts to their peers. The study's recommendation was to integrate peer tutoring programmes to enhance learners' confidence levels and foster a positive attitude towards Mathematics learning. The study underscores the significance of peer interactions in promoting collaborative learning experiences and building learners' self-efficacy in Mathematics.

The benefits of incorporating peer tutoring in educational systems are multidimensional. For instance, Thurston et al., (2021) conducted a research study to determine the influence of Reciprocal peer tutoring (RPT) in Mathematics in 20

elementary schools in three (3) different districts of Scotland, UK. The research findings revealed that learners' academic achievement in Mathematics was significantly boosted with a medium effect size of 0.43. Similarly, (Cofer, 2020) used quantitative methods to examine how tutors perceive the tutor experience. The research findings indicated that a large number of participants (tutors and tutees) have benefited from the experience not only in academic achievement but also in skills sets. It was observed that the longer the learners served as peer tutors, the greater the perception of the gains in learning.

A study by Travers and Carter, (2022) reviewed 66 studies on the effects and benefits of peer mentors. The study focused on 10 different areas that impacts the peer mentors. These areas included social impacts, changes in views, future intentions, academic impact, increased knowledge about disabilities, development of personal qualities, skill development, changes in self-perception, enjoyment, and general benefits. The study focused on learners who have intellectual and developmental disabilities (IDD). The study consisted of two (2) surveys, which included Likert-type scales and open ended questions. The results indicated that a total of 56.7% of research on peer mentoring found that peer mentors experienced benefits in social impacts. The social impact benefits included forming or maintaining friendships and having more opportunities to create new friendships with peers who have disabilities. The researchers also found that 51.5% of the studies refereed to changes in views towards people with disabilities.

In the research study conducted in Indonesia, Putranto and Marsigit, (2018a) used a sample of junior high school year seven (7) slower learners from inclusive classes.

The researchers adopted Realistic Mathematics Education approach and same age peer tutoring approach. Quantitative research methodology was used to determine the influence use of peer tutoring for some aspects of social and cognitive skills. The finding revealed that inclusive classes students have overall development. However, the study by Putranto and Marsigit, (2018a) adopted Realistic Mathematics approach while the present study adopted mixed method approach.

In the research study conducted in two rural Chinese secondary schools, Song et al. (2018) discovered that peer-assisted learning did not raise the tutees' Mathematics results. Rather, it increased their level of learning tension. Tutor experiences positive changes while tutee experience negative changes. Tutor has higher Mathematics achievement while tutees have no significant increment.

The research study conducted by Anditiasari et.al. (2023) also found that peer tutoring improves learners' comprehension and learning outcomes, especially when learners cooperate in small groups and participate in cooperative learning and peer teaching. The study by Song et al. (2018) was conducted in two rural Chinese secondary while the present study was conducted in Four (4) public secondary schools in Kenya.

A meta-analysis was conducted by (Geoffrey, 2017) in USA. The objective was to identify the effectiveness of peer tutoring strategy on learners Mathematics achievement as well as promoting learning by enhancing the level of higher order cognitive task among collaborative groups engaged on Mathematical task. The researcher employed Vygotsky's Sociocultural theory and its Zone of Proximal Development. Quasi experimental research design was adopted. The research

instruments used included questionnaires, semi structured interview, observation schedule, document analysis, researcher's diary entries, reflective journals. The research finding indicated that learner' higher level thinking skills were improved after the implementation of the collaborative meta cognitive community, learners preferred to work in groups during the knowledge construction process. Vygotsky's ZPD model helped teachers to focus on individual learners rather than thinking about learners as a homogeneous group.

A study by Gilley et al., (2023) was conducted in Southeastern United States at a high school to examine the effects of peer delivered on Mathematical word problems, focusing specifically on multiplicative word problems alongside other important skills, such as self-determination, Mathematical discourse and reasoning. The study adopted a mixed methods single case research design, where data were collected during the baseline, intervention, and maintenance phases. Generalization was tested every three (3) sessions. Peer tutees was selected based on learners having Mathematics difficulties, take an alternative state assessment, be in 9^{th} through 12^{th} grade, and miss fewer than two (2) school days per month. Five (5) learners qualified and became peer tutees based on these set criteria. On other hand, peer tutors were selected based on their current enrollment status in a peer tutoring programmes at their school and spending 80% of their day in a general education classroom. Based on criteria, only four (4) met the qualification.

During the baseline and intervention phases, the learners completed a Mathematics worksheet on the computer, which include a multiplication word problems featuring a task analysis, a word problem, and a schematic diagram. The schematic diagram was

not included during the generalization and maintenance phases. The peer tutors would then give the learners the worksheet. if they did not attempt to start within five (5) seconds, the peer tutors would use the system with the fewest prompts. If the peer tutees made a mistake, they would help correct their errors. The results indicated that all five (5) peer tutees increased their ability to solve word problems, and four (4) out of the five (5) maintained this ability during the maintenance phase. The study also found that using analysis paired with peer delivered instruction had a moderate to large effect size, and peer tutees were able to solve more word problems during the intervention than in their baseline data.

In a research study conducted in Pakistan, Nawaz and Rehman, (2017) used a sample of 200 high school students in Haripur district. The researchers used same age peer tutoring approach and Constructivism theory to determine the influence use same age peer tutoring on student's achievement in Mathematics and for some aspect of social and cognitive skills. Quantitative research methodology was also adopted. The findings revealed that learners understand their level in processing knowledge and there was an increase of learners' academic achievement in Mathematics.

Meta-analysis research was conducted on the influence use of peer teaching across 26 single-case research experiments. Bowman-Perrot et al. (2013) employed a population of 938 students in grades one (1) through 12. The research findings indicated that peer tutoring was successfully implemented regardless of grade level or disability status. They further argued that peer tutoring assists learners in understanding the concepts in the curriculum. The study by Nawaz and Rehman, (2017) used a sample of 200 high school student. The present study used a sample of 160 secondary students.

In a research study undertaken by Stewart a Thomas (2010) for the purpose to improve learners' procedural and conceptual understanding as well as thinking in linear algebra through peer tutoring strategy that better identify some of the difficulties they experienced. The study used social and individual learning theory. The research instrumental used included classroom voting through multiple choice questions and true/false questions, in depth interviews, ethnography, observations, pre and post quiz, examinations grades as well as questionnaires. The research findings indicated that learners have learned new strategy which is peer tutoring strategy and have been able to model and evaluate a situation that was challenging, interesting and real in linear algebra classroom. Moreover, there was difficulties concerning learner understanding in the procedural approach rather than a conceptual one, and an apparent lack of representational versatility.

A study conducted in Indonesia by Putranto and Marsigit, (2018b) used a sample of 31 slower learners in grade five (5) junior high school from three (3) different inclusive classes. The study used same age tutoring approach and Realistic Mathematics Education approach. Quantitative research methodology was adopted to determine the influence of peer tutoring for some aspects of social and cognitive skills. The findings indicated that there was a development in problem solving skills abilities, Mathematics attitudes, Mathematics literacy and conceptual understanding.

A meta-analysis was performed by Alegre-Ansuategui et al. (2018) from early childhood to secondary school in Mathematics subject. The purpose was to examine the influence of peer tutoring in Mathematics. When evaluating the academic achievement variable, the research findings indicated 88% positive effect sizes and

the final analysis indicated that peer tutoring programs conducted during school hours were more effective than those implemented outside of school.

In another research study conducted by Bowman-perrott et.al. (2023) demonstrated that peer tutoring has a positive impact on academic and behavioral outcomes for adolescents who have emotional and behavioral Disorders(EBD) or are at risk for developing it. The investigation by Alegre-Ansuategui et al. (2018) was conducted from early childhood to secondary while the recent study was conducted in public secondary schools.

A study by Awinoouko (2018) was conducted to explore the impacts the peer instruction in improving learners' perceptions on their problem solving abilities in Mathematics in Bungoma County, Kenya. The study selected 300 participants including learners from boys' schools, girls' schools, and co-educational schools, selected through proportionate sampling technique. The study was guided by observation learning theory by (Bandura, 1977). The study adopted an Ex Post Facto research design. The study also collected data using questionnaires and both descriptive and inferential statistics were applied in the analysis of data. The findings indicated that majority of the learners felt more confident in their ability to solve Mathematics problems after receiving peer instruction. Based on these findings, the study recommends incorporating peer instruction into teaching strategies to support learners develop better problem solving skills in Mathematics.

In a research study conducted by Hanze et al. (2018) employing tutees from students in the third (3^{rd}) grade at an elementary school and tutors from students in the eighth

(8th) grade at a secondary school. The findings indicated that tutees demonstrated greater active behavior as well as higher competence, autonomy, and intrinsic motivation, meanwhile, tutors showed greater knowledge-building rather than knowledge-telling behavior.

A study by Fuchs et al. (2019) have frequently documented that peer tutoring can be useful and helpful to any type of student, even learner with disabilities to improve their academic performance in Mathematics. The study by Hanze et al. (2018) was conducted in the third (3) grade at an elementary school while the present study was conducted in Form II secondary school students.

In a research study conducted in middles schools of USA, (Smith, 2019) took a qualitative approach to delve into peer dynamics and learner's engagement during peer tutoring sessions. Data collection involved classroom observations, learner interviews, and teacher's reflections, followed by thematic analysis to identify patterns and themes. The finding indicated peer tutoring fostered active engagement, collaborative problem- solving, and positive relationship. The study also revealed that peer tutoring promoted a sense of responsibility among learners, as they took ownership of their learning and supported each other in mastering Mathematical concepts.

A study by Ullah et al., (2020) was conducted to investigate the effects of peer tutoring on the academic achievements of both tutors and tutees at the secondary level. The study focused on the cognitive domain's key levels (knowledge, comprehension and application). The study sampled data from 40 respondents using a purposefully

sampling technique. The study took place at ANSI school Mardan. The researchers applied the pretest post-test equivalent group design. The research findings indicated that respondents of the experimental group achieved better score at knowledge and application levels of the cognitive domain. Experimental group were not better in the comprehension level on the posttest in compare to the high achievers of the control group. It was concluded that the academic achievement of the tutors as well as the tutees was significantly affected by peer tutoring.

A study by Krisi and Nagar, (2023) conducted a qualitative study on the benefits of special needs learners at a college where college learners mentored their peers with special needs. The mentees were second and third year college learners who attended the center at their college, which supported learners with disabilities. There were seventeen mentors, including six (6) males and 11 females. The purpose of the study was to determine whether being a mentor could serve as a therapeutic tool for learners with special needs helping boost their self-esteem and confidence.

The study identified three (3) themes in semi structured interviews with the mentors. These three (3) themes were self-esteem, empowerment, and self-efficacy. The learners reported increased self-esteem and were more accountable, responsible and satisfied in their personal and professional lives. When learners reported on self-efficacy, they changed their perception of themselves. Some learners reported that they no longer view themselves as needing help and feel an increased sense of responsibility, which enabled them to help others. Learners reported that mentoring ‘‘ taught [them] how to be more patient, tolerant of others, and to listen to others' needs, wishes and opinions’’. The last theme was empowerment; learners felt internal and

external empowerment. Learners reported an increase in internal empowerment, feeling that they have matured and can make a difference in other people's lives and their own lives. The study also reported increases in external empowerment, where learners felt important and confident, and could use their strengths to better themselves and others.

A Study by Wanubey et al., (2021) conducted in nine (9) schools in Indonesia and specifically in the regency of East Sumba, the research findings indicated that that peer tutoring has a significant influence not only on the development of pure academic skills, but also and more importantly on the formation and character change of learners and indirectly of the teachers, who becomes more capable and flexible in organizing and managing inclusive learning in a more functional way.

A study by Watts et al., (2019) was conducted for purpose to examine the learners with emotional behavioral disorders as cross age tutors. The study findings revealed mixed academic outcomes across content areas. Reading effects ranged from -0.3 to 0.86 for tutees and 0.28 to 0.94 for tutors, whereas basic Mathematics was 0.68 for tutees and 1.0 for tutors, but only included one study. The study by Wanubey et al. (2021) used a sample of nine (9) schools in Indonesia. The present study used a sample of four (4) secondary schools in Kenya.

In a research study was conducted by (Ghanie, 2020) to compare the influence of peer tutoring and faculty tutoring on academic performance and its benefit on first-year university Mathematics students. The research findings discovered that no remarkable change occurred in the Mathematics mean scores and interest or zeal of learners

taught Mathematics using the faculty tutoring method and those taught using the peer tutoring strategy.

A study by Muhammad et al. (2020) was undertaken to determine the use of peer tutoring strategy as an approach to enhance academic achievement in Mathematics. The research findings indicated that peer tutors can help low level learners understand and build on the content already implemented in traditional classroom setting through in depth explanation of the concepts and using the relevant communication skills. An empirical study conducted by Moliner and Alegre, (2020) found that same-age peer tutoring among reciprocal peer tutoring had a remarkable positive influence on the learners' Mathematics self-confidence.

In Pakistan, (Khan, 2021) conducted a research study for purpose to examine the influence of peer tutoring programs for learners with varying levels of Mathematics achievement in middle school. Through a randomized research design. Learners were grouped based on the initial Mathematics achievement levels, and peer tutoring session were tailored to meet the needs of each group. The finding indicated that peer tutoring was beneficial for learners across all achievement levels. With notable improvements observed in both high achieving and struggling learners. In addition, peer tutoring provided personalized support, targeted interventions, and opportunities for peer collaboration, leading to enhanced learning outcomes. Learners in peer tutoring exhibited increased motivation, engagement, and confidence in their Mathematical abilities.

A study by Fridaus et al., (2021) was conducted to investigate the effect use of peer tutor methods and self-efficacy on Mathematics learning outcomes with the aims to identify the implementation of a peer tutor method and self-efficacy towards the students' Mathematics learning outcomes. The research findings revealed that: learning method (external factor) and self-efficacy (internal factor) influence the students' learning outcomes; students taught with the peer-tutor method have better learning outcomes score compared to those taught with lecture method; there is an interaction between learning method and self-efficacy towards students' learning method results in better learning outcomes compared to lecture method; for students with high self-efficacy, peer tutor method results in better learning outcomes compared to lecture method; for students with low self-efficacy, the leaning outcomes of students taught with peer tutor method and lecture method are similar; in sciences subjects such as Mathematics, peer tutor method is recommended due to its capability of increasing the students' learning motivation, creativity and self-efficacy.

A study by Watts and MckKenna, (2021) indicated that when Emotional Behavior Disorders (EBD) learners tutored younger learners, they could often help them with skills they were currently working on, thereby giving them practice in the subject or area as well. The research findings revealed that learners had improved in Mathematics, reading, writing and overall test scores. In similar vein, (Mahoney, 2019) Broke down peer mediated instruction and intervention (PMII) into six (6) steps for learners with Autism Spectrum Disorder(ASD). The first step is to identify the learners' needs, and the second step is to form a group. Typically, the teacher’s pairs one learner with a disability with two or three learners without a disability who get along and have a relationship with the learner with disability. The third step would be

to train the peer mentors in PMII. This includes defining target behaviors, providing feedback, modeling target behaviors, and prompting engagement in tasks.

The study explains that you need to structure the environment for success, i.e., seating learners together and having a structured activity. The teacher will also check in with the groups to ensure understanding and monitor their progress. The study suggested that when learners with ASD are set up for success with structured tasks and peer mentors, they will likely benefits from these supports.

Mathematics classrooms in South Africa are very crowded. Such classrooms tend teachers to control classroom discussions, while students have insufficient time to interact openly or with other students. Ntow and Adler, (2019) indicated that peer tutors either in similar grade levels or in the case of this study at a higher grade level can assist students with one-on-one attention who are facing challenges in understanding Mathematics which was not always possible in a crowded classroom.

In the same related study conducted by Tracey et al. (2007) in South Africa described the experiences of students engaged in a cross-cultural peer teaching initiative between a township school in Port Elizabeth and a privileged private school. The purpose was to investigate the possible benefits of cross-cultural peer tutoring in certain parts of the new Mathematics curriculum. The research findings indicated that there is understanding of Mathematics topics dealt with during peer teaching sessions and both groups attained from the peer tutoring relationship.

Peer tutoring has been found effective not only in enhancing academic achievement but also in addressing off-task behaviors among learners. A study by Almas et al., (2020) was conducted to determine the effect peer instruction (PI) method on first course Mathematics education learners' academic achievement and attitudes. The implementation was carried out seven (7) weeks with 60 respondents in an introduction to Mathematics analysis lesson in Suleyman Demarel University in Kazakhstan. The research findings revealed a significant positive effect on learners' achievement in introductory Mathematics analysis. Most respondents strongly agreed that peer instruction (PI) positively impacted their peers' understanding by making learning more engaging and interactive, creating a conductive classroom atmosphere and enhancing learners' overall learning experience.

A research study was conducted by Okilwa and Shelby, (2010) in Nigeria on the impacts of peer teaching on the learner's academic achievement with disabilities in Grades 6 through 12. The purpose was to examine the effectiveness of peer tutoring for special education learners in both special and general education settings. The research findings discovered that peer tutoring which was implemented across different fields of study such as science, language, arts, social studies, and Mathematics indicated positive academic effects. Further, when the students are engaged in an activity, they have a greater consciousness of the topics being taught. By involving with Peer tutors, students could be motivated to be constantly careful of the activity and in exchange are frequently encouraged to proceed with the activity Kim et al. (2015).

A study by Batool et al., (2021) was conducted to examine the effect of peer tutoring on the Mathematics achievement of slow learners. The research findings indicated that exposure to peer tutoring significantly improved the Mathematical achievement of slow learners. In addition, the students demonstrated increased cooperation with their peers and their confidence level was uplifted to a larger extent. During the peer tutoring sessions, it was observed that the slow learners learned more quickly than the traditional method of teaching. The environment fostered by peer tutoring encouraged students to ask questions freely without hesitation, a behavior they were less likely to exhibit with their teachers. The findings of these studies revealed that the transformative potential of peer tutoring. Not only does it serve as catalyst for improved academic achievement, but it also empowers educators by providing an effective strategy to address the learning challenges faced by slow learners in Mathematics.

In Botswana, limited studies were conducted on peer tutoring strategy. For example, Mangope et al., (2014) conducted a research study at the University of Botswana, investigating teachers trainers' perceptions of peer tutoring strategy. Most respondents underscored the significance of peer tutoring strategy, advocating for incorporation into the curriculum before teaching practice. The study revealed a prevailing emphasis on cooperation over competition, a finding with direct relevance to the current research. This emphasis has the potential to shape recommendations for an improved peer tutoring scheme specifically tailored for learners enrolled in foundation Mathematics courses.

In another related research study conducted by Mangope,(2017), the study focus shifted to inclusive education strategies employed special education teachers in

Botswana. While the primary focus was on inclusive education, the study provided valuable insights into the utilization of peer tutoring and group work by teachers. These insights contribute to a broader understanding of peer tutoring as a strategic approach to support students in achieving success in Mathematics especially during supplementary examination and regular classroom instruction.

In South Africa, a research study was conducted by (Campbell, 2019) using a sample of secondary school students to explore the impacts of peer tutoring for some aspects of social and cognitive skills in Mathematics. The study adopted Constructivist theory. The study also used same age peer tutoring approach and study design as a research methodology. The findings indicated that the social aspect give high motivation to the tutee where the tutee shows interest in discussions with the tutor face to face, learners' cognitive can built through assignments completed with the tutor.

A study by Etsu and Manko (2019) was conducted in Niger state to determine the influence use peer teaching on students’ academic achievement in Mathematics. The finding indicated that peer teaching is highly effective in improving the academic interest, zeal, and success of less competent students in high school geometry than the chalk-and-talk methods of teaching.

Despite extensive research demonstrating the extent use of peer tutoring in Mathematics subject, gaps remain in understanding its benefits compared to other conventional methods and its significance on improving learners' attitudes and reducing math anxiety toward learning mathematics. Addressing these gaps will provide a comprehensive understanding of peer tutoring's advantages in Mathematics

education. Based on the well-established benefits of peer tutoring, peer tutoring aims to increase learners' self-confidence and efficacy in their Mathematical ability (Gan & Hong,2020). Peer tutoring fosters learners autonomy, team work, participation, contributing to positive social and personal outcomes such as communication skills Tenenbaum et al.(2020). Furthermore the perceived benefits of peer tutoring among secondary schools students encompass social support, attitude , trust and overall well being. Martinot et al.(2022) and (Sarosa & Setyowati, 2022) emphasized the significance of peer support and collaborative interactions in enhancing school engagement and e-Learning participation during the Covid-19 pandemic.

2.7 Peer tutoring strategy and academic achievement in Mathematics

In a research study conducted in United Kingdom(UK), Thurston et. al. (2020) used a sample of 487 students aged ten (10) to 12 from 20 elementary schools in three (3) different districts. Same age peer tutoring approach type was used as well as Social dependency theory. Quantitative research methodology was adopted. The purpose of the study was to establish the influence use of peer tutoring on students academic achievement in Mathematics and some aspects of social and cognitive skills. The findings indicated that learners' Mathematics achievement increased and there was no significant effect towards social and cognitive skills stated.

A study by Deshler et al. (2019) was conducted in the United State of America (USA) to investigate the influence use of same-age peer tutoring strategy on learners' academic achievement in Mathematics and for some aspects of social skills. The study used a sample for developmental Mathematics students. The study employed a mixed-method research design. The findings indicated that learners show higher achievement levels and learners' persistence increased slightly learners are more

committed to completing their studies. The study by Deshler et al. (2019) used a sample for developmental Mathematics students while the recent study used a sample for Form II students .

In Australia, a research study was conducted by (Johnston, 2021) for second-year undergraduate learners in numerical methods in applied Mathematics courses. The objective of the study was to establish the effect use of same-age tutoring on learners' academic performance in Mathematics. A quantitative research method was used. The findings indicated that same-age tutoring increases learners' understanding of the content of lessons learned, improving students' language skills and self-confidence is increasing. The study by (Johnston, 2021) used a sample of second-year undergraduate learners in numerical methods in applied Mathematics course while the recent study used a sample of Form II learners in secondary schools

In a research study was conducted in Turkey by (Yaman, 2019) to determine the effect use of a same-age peer tutoring strategy on learners' academic achievement in Mathematics. The study used a sample of eight (8) out of 50 first-year engineering students. The study applied Sociocultural and Constructivism theory and quantitative research methodology. The findings indicated that on academic achievement, there was no significant effect but there was an interaction among learners provide positive impacts towards learners' achievements. The study by (Yaman, 2019) used a sample of first engineering students in Turkey while the present study used a sample of Form II students in Kenya.

In a research study conducted in Spain, Moliner and Alegre, (2020b) used a sample of 420 learners in grades seven (7) and nine (9) from 12 to 15 years. The objective of the study was to examine the influence use of same-age tutoring strategy on learners' academic achievement in Mathematics. The study applied self-concept theory and quantitative research methodology. The findings indicated that most students had a positive effect on the implementation of peer tutoring and were able to reduce anxiety over Mathematics subjects, effective interaction in peer tutoring benefits tutors and tutee. The study by Moliner and Alegre, (2020b) was conducted in Spain for grades seven (7) and nine (9) from 12 to 15 years while the recent study was conducted in Kenya for Form II students from 16 to 18 years

In a research study conducted in Philippines, Berso and Lorente (2020) used a sample of five (5) classes of grade nine (9) students of Bantanyan National Secondary School, Tobacco City. The purpose of the study was to determine the influence use of same-age tutoring on learners' academic achievement in quadratic equation topics. The study used descriptive and comparative research design. The findings indicated that the level of achievement in quadratic equation topics increased for both tutor and tutee, tutors comfortable asking questions and understanding the learning better. The study Berso and Lorente (2020) used a sample of five (5) classes of grade nine (9) students while the recent study used a sample of four(4) public secondary schools.

A study by Rosdianwinata et al. (2019) was conducted in Indonesia to determine the influence use of the same-age peer tutoring strategy on students academic achievement in Mathematics. The study used a sample of secondary school learners aged between 18 to 21 years and a quantitative research methodology was adopted.

The results indicated that learners' academic achievement in understanding Mathematics through peer tutoring is better than the students who learn on their own, peer tutoring trains learners to collaborate, build and maintain communication with tutors to gain improvement in learning.

Another study conducted in Indonesia, (Baidu, 2017) used a sample of grade five (5) learners of Sekolah Rendah Pertama Kujang school. The objective of the study was to determine the influence use of same-age tutoring on learners' academic performance in Mathematics. The study applied constructivist theory and qualitative research methodology. The findings indicated that learners find that through peer tutoring, it is easy to understand the concept and able to complete the task given by the teacher, learners dare to ask questions and actively engage in discussions. The study by (Baidu, 2017) used a sample of grade five (5) learners in Indonesia while the present study used a sample of Form II learners in Kenya

In Taiwan, Chu et al.(2017) used a sample of grade three (3) students in primary schools in Taiwan to determine the influence use of cross-age peer tutoring on learners' achievement in Mathematics. The study applied cognitive load theory and quantitative research methodology. The findings indicated that cross-age improves the level of learners' academic achievement and there was an increase of cognitive load of learners where learners also show a caring attitude as the role of tutor and tutee. The investigation by Chu et al.(2017) was conducted in primary schools in Taiwan while the present study was conducted in secondary schools in Kenya.

In United Kingdom (UK), the research study was conducted by (Johnson, 2018) to explore into the impacts of peer tutoring programs on middle school learners' Mathematics achievement. The study used a quasi experimental research design. The study compared a group of learners receiving peer tutoring with a control group. Pre and Post intervention assessments were used to measure changes in academic achievement. The finding indicated significant improvements in Mathematics test scores among learners who participated in peer tutoring sessions. Students demonstrated enhanced problem- solving skills and a deeper understanding of Mathematical concepts compared to their peers in the control group. Further, learners in the peer tutoring group reported higher levels of motivation and engagement in Mathematics.

A study was conducted by Elizabeth et al.(2016) in the secondary education department to determine the abilities of learners in Mathematics. The study used a sample of 12 schools from a random sampling technique. The purpose of the study was to investigate the influence of peer tutoring among slower learners in Mathematics. The study selected the target population from students, heads of departments, and Mathematics teachers. A descriptive research design was adopted and a static procedure was used in data analysis. The findings indicated good results of the study and heads of department established that peer tutoring become a useful method in the academic well-being of students.

A research study conducted by (Anderson, 2022) in United State of America(USA). The purpose of the study was to explored the sustained influence of peer tutoring interventions over time in middle school. The study employed a randomized

controlled trial design. Learners were assigned to either peer tutoring group or a control group. Academic achievement was examined a multiple intervals throughout the academic year. The finding indicated that learners who participated in peer tutoring maintained higher Mathematics test scores and grades compared to the control group. The long-time influence included improved problem-solving abilities and increased confidence in Mathematical tasks. Learners in the peer tutoring group demonstrated greater perseverance and resilience in tackling challenging Mathematical problems. The study by (Anderson, 2022) employed a randomized controlled trial design while the recent study employed a quasi experimental research design.

In a research study conducted by Roy and Verma (2020) to investigate the effect of peer assisted learning strategy (PALS), a peer mediated instructional method in solving Mathematical word problems by standard IV students in general classroom. The findings indicated that the peer assisted learning strategy (PALS) significantly improved students' scores compared to the control group in solving Mathematical word problems, suggesting that peer assisted learning is beneficial for solving Mathematical word problems.

A Study by Ycong et al.,(2021) used a quasi experimental design to examine the effects of peer tutoring to the learning outcomes in exponential expressions of grade eight (8) students. The research findings indicated that peer tutoring strategy significantly improved the learning outcomes of students in the experimental group. It is recommended that peer tutoring strategy may be used by Mathematics teachers to improve their students' performance in the subject matter.

The research study was conducted by (Kiburis, 2012) using a peer-assisted learning strategy (PALS) with some modification in grade seven (7) learners of formal education in the Mathematics subject. The study indicated that the implementation of the PALS Mathematics program for learners decreased their pretest scores in Mathematics compared to post-test scores. PALS provided an opportunity to interact with all learners to go through Mathematics problems. PALS Mathematics provided additional support to learners with multiple learning abilities. Further,

In a research study conducted by Zeneli et al. (2018) in the United Kingdom(UK) to investigate the effects of cross-age peer tutoring on learners' academic achievement in Mathematics. The study employed a population of 550 students aged between nine (9) to 19 years old. The study applied Social Dependency theory and quantitative research methodology. The findings indicated that academic achievement increased but not significantly.

A research study was conducted by Robert and Spangenberg, (2020) for grade twelve (12) learners in private schools in South Africa(SA). The purpose was to investigate the influence use of cross-age peer tutoring on learners' academic achievement in Mathematics. The study utilized Qualitative research methodology. The findings indicated that there was an increased level of student motivation through tutorials conducted during tutoring and tutors' understanding of the role of encouraging tutees to be responsible for the assignments. The tutees' self-confidence in Mathematics subject also increased.

A study by (Vassay,2010) was conducted to investigate the effect use of peer tutoring on learners' academic achievement in two phases. Phase 1 was to measure the achievement of learners in college algebra, while phase two was to find out the influence of peer tutoring in more advanced foundations of learners in integers, numbers, decimals, and fractions. A quasi-experimental research design including a pretest and post-test test was adopted. Data collected was analyzed using the t-test. The research findings indicated that experimental group performed better as compared to control group.

In Kenya, a research study was conducted by (Kibuthu, 2016) to investigate the effect of peer teaching on the academic achievement of learners with disabilities in standard four in Nyeri sub-County, Kenya. A descriptive research design was adopted for the study and Standard-four students and all Teachers of Mathematics were used as the target population of the study. Two sets of questionnaires, interview schedules, and observation checklists were used as research instruments. The research findings discovered that the tasks that peers mostly committed to included peer tutors demonstrating to the tutee as an activity while the process of learning was highly achieved. The students seek guidance from the teachers and ask each question, concentrating on the activity. Mathematics teachers were trained appropriately and well-equipped to include peer tutoring in their classes. Moreover, the study by (Kibuthu, 2016) was conducted in Nyeri sub-county, Kenya while the present study was conducted in Ruiru sub county, Kenya.

2.8 Peer tutoring and gender on achievement in Mathematics

A prominent issue within Mathematics education is the establishment of a teaching and learning environment that ensures equal opportunities for male and female

learners in mastering Mathematics(Mensah & Nabie,2021). Addressing gender related disparities in Mathematics achievement is crucial concern for Mathematics educators and policymakers. Substantial empirical evidence from sources like Awofala and Lawani,(2020) supports the assertion that utilizing learner-centered methods like peer tutoring in classroom settling resulted in comparable achievement levels for both male and female students. The prevalence of male dominance in Mathematics and other STEM disciplines remains noteworthy.

A study by Sallah et al.,(2023) sample elementary schools students in Philippines for purpose to examine the influence use of peer tutoring strategy in term of gender difference. The findings indicated that learners exposed to the peer tutoring instructional approach achieved higher scores and exhibited notably superior achievement compared to those who experienced the traditional talk and chalk teaching method. Moreover, it is also concluded that there is no influence of gender on Mathematics. This suggest that peer tutoring is a gender friendly teaching method that benefits both male and female learners performed equally in achievement in Mathematics. These findings align with research studies by Longjohn and Osila(2022), Abuda and Jaromay (2021), who all found no significant gender based differences in outcomes related to peer tutoring. Similarly, Candelaria (2023), Danga (2022) also found out that there is an increased interest in Mathematics with no significant gender-based differences in outcomes.

In a research study conducted in Taiwan by (Che & Chu ,2020) for the purpose to analyze the relevance of peer relationships, learning, motivation and learning effectiveness. The study adopted a mixed approach by distributing questionnaires,

analyzing them and reviewing the literature on the subject. The study sample consisted of learners groups of both male and female. The study's findings indicated that there is positive influence of peer tutoring in three areas: social relationships among peers, learning motivation, and learning influence. The results also indicated statistically differences in the interest in peer's attributes to the gender variable and in favor of female learners. Contrast, in a research study conducted by Johnson and Kasmer,(2018) identified statistically significant difference favoring male respondents in terms of Mathematics achievement using peer tutoring.

In a research study conducted by Asaf et al. (2017) at high schools on the effectiveness of peer tutoring in Mathematics. The study employed a population of 200 students divided into two (2) separate schools. The students were grouped into two (2) categories; control group and experiment group. A pretest and post-test were conducted as per the designed study then a peer tutoring session was taken. A research hypothesis was tested: H0:whether there is significant gender disparity in performance of boys and girls who expose to peer treatment After the completion of the peer tutoring strategy. The changes in the performance of Mathematics learners were evaluated. The findings of the research showed that girls performed better as compared to boys. Girls indicated better scores after being exposed to peer tutoring than boys in the experimental group. Moreover, the study by Asaf et al. (2017) employed a target population of 200 students while the present study employed a target population of 1062 students.

The study was conducted in the Tai local government area of Rivers State, (Nebo,2012) to examine the influence use of peer tutoring on learners' academic

achievement in Mathematics in terms of gender differences. Quasi-experimental research design was adopted using intact classes. The researcher used a population of 260 SS1 students. Three schools were sampled using a simple random sampling technique. Data gathering instruments used involved structured questions tagged, Mathematics achievement test. Research instruments were validated by two experts in the subject area. The data analysis procedure involves the use of descriptive statistics such as mean as well as ANCOVA to test null hypotheses. The research findings indicated that the mean of post-test scores of boys in the experimental group increased as compared to a control group of female pretest mean scores. Further,(Buzbee-Little,2015) acknowledge that girls develop better verbal skills than boys, while boys are better at Mathematical skills.

The research study was conducted in Ekiti state in Nigeria by (Thomas,2007) to examine the effect of reciprocal peer tutoring on learner's academic achievement. It further determines academic achievement in terms of gender difference using competitive and conventional strategies. A quasi-experimental research design was adopted using two experimental groups and one control group. The sample was drawn from one hundred and seven (107) students from three public secondary schools. The study used a multistage sampling technique as sampling technique. Data gathering instruments used included the Mathematics achievement test. The study used content, face validity, and criterion relative to validate the research instrument. The finding indicated that the reciprocal peer tutoring strategy proved to be more successful than the conventional method in improving learners' academic performance in Mathematics. There were no remarkable disparity on gender differences in the three

groups. Again, the finding indicated that there were no interactive gender differences in student achievement exposed to reciprocal peer tutoring.

In education district II of Lagos State, Okunuga et al. (2020) and Agu and Samuel, (2018) conducted a research study using a population of 210 senior secondary schools. The study adopted a quasi-experimental. The researcher selected six (6) schools using a stratified random sampling technique. The study utilized a Mathematics achievement test as its primary data collection tool. The learning approach was divided into two categories: traditional method and experimental group, with gender considered at two levels. The results of the research indicated that there were no significant differences in Mathematics academic performance between male and female students in senior secondary school.

2.9 Summary of Review of Related Literature

Objective	**Key Citation**	**Contribution**	**Key Gap**
Objective (1)	(Blueprints for Healthy Youth Development,2019)	Mathematics teachers identify slower learners and provide a remedial sessions in peer tutoring activities	Despite this, very few studies has established the effective use of peer assisted learning strategy in learning Mathematics
Objective (2)	Ntow and Adler,(2019)	Peer tutors assist students with one on one attention who are facing challenges in understanding Mathematics	This research study was conducted in South Africa, while the present study was conducted in Kenya.

Objective (3)	Kibuthu,(2016)	Students seek guidance from the teachers and ask each question, concentrating on the activity	This research study used a descriptive research design while the present study used Quasi-experimental research design
Objective (4)	Okunuga et al. (2020)	The finding indicated that there were no significant changes in Mathematics academic achievement between male and female exposed on peer tutoring activities	This research study used a target population of 210 secondary schools students in Lagos state Nigeria while the present study used 1062 form two students in Ruiru Sub-County, Kiambu County Kenya.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the research design, study locale, target population, sampling technique, sample size determination, research instruments, piloting of research instruments, data collection methods, data analysis, and ethical considerations.

3.2 Research Design

The research adopted a convergent parallel mixed method approach. This approach involves the combination of both qualitative and quantitative research methods to obtain the triangulated results. Combining data from both sources enhances the overall comprehension beyond the insights that quantitative or qualitative findings can offer individually. As per (Maxwell,2016), this method was the best choice as it allowed the researcher to answer the research questions (1) and (2) with greater certainty and wider implications in the conclusion to get a complete picture of the issue being explored and to validate a set of findings with another. At first, two (2) types of data sets are collected concurrently and secondly, they are analyzed independently using quantitative and qualitative analytical approaches (Schoonenboom & Johnson, 2017; Creswell & Plan Clark,2018). To collect quantitative data from study respondents, both open and closed ended questionnaire were used. This study on other hand collected qualitative data from observation schedule and interview schedule for head of departments (HoDs). The integration of convergent design was done into two (2) phases, sharing results of qualitative research followed by quantitative research and vice versa.

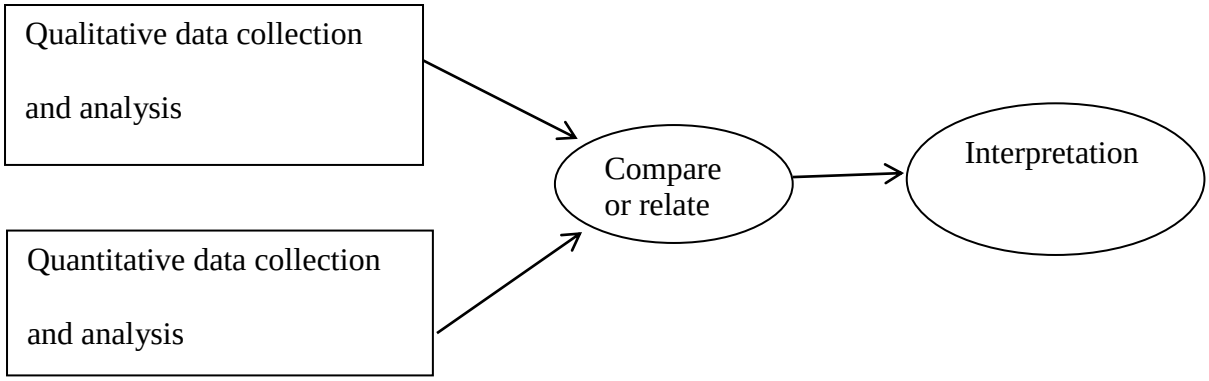

Figure 3.1 convergent parallel design

(adopted from Creswell & Plato Clark ,2018)

Figure 3.1 shows convergent parallel design. Whether the findings from these two distinct data sets align or differ. The researcher explained the results by collecting more data, re-examining the results or explaining the quality of data set. In all, this design was used to answers research questions (1) and (2).

This study's quantitative design was quasi-experimental. The study employed the pretest, posttest quasi experimental design. Due to the inability to assign randomly to treatment groups, a non-equivalent control group design was implemented. Therefore, a quasi-experimental design was used to test hypotheses three (3) and four (4) of the study. The study utilized the entire classes because certain classroom conditions did not allow for extensive alterations as recommended by Achor and Ejibo,(2018). Peer tutoring strategies and traditional strategies were the independent variables, while learners' achievement in Mathematics was the dependent variable. The research design included a pretest for all groups, followed by a post-test administered to both the experimental and control groups before any intervention. The study comprised an experimental group that received peer tutoring and a control group assigned to a traditional teaching approach

. The design was diagrammatically represented in Table 3.1 below;

Table 3.1 Non equivalent pretest post test (control group) Design

Grouping	**Pre treatment test**	**Research Condition**	**Post-test**
EG	**O_1**	**X_1**	**O_2**
CG	**O_1**	–	**O_2**

Where:

EG — Experimental group

CG — Control group

O_1 – Pre treatment test

O_2 – Post test (for all the groups)

X_1 – Research treatment

— No treatment (traditional strategy)

3.3 Study Locale

The study took place in the Ruiru sub-county of Kiambu County Kenya. It was a town situated in Kiambu county, formerly part of the central province of Kenya, covering an area of 2,449.5 square kilometers. It was roughly 0.5 kilometers from Kenyatta University's Main Campus. Ruiru's total human population stood at 238,858 with fast population growth owing to a shortage of subsidized housing in Nairobi since 2009. It was well-served by shopping malls and banks. Ruiru sub-county involves a combination of both urban and rural areas. It was also an industrial area, with super foam, Devki steel mills, and Spinners & Spinners Garment factory. Public secondary schools increased due to the vast population expansion. The selection of Ruiru sub-County, in Kiambu County was made because this area has consistently

shown low academic performance in Mathematics based on the data presented in Table 1.1 of the study's background.

3.4 Target Population

The target population consists of any group of learners who share a specific quality that is important to the researcher (Orodho, 2012). The target population included all Form II learners in selected public secondary schools in Ruiru sub-County, as well as Mathematics teachers and Heads of Departments (HoDs). Those in Form I was not sampled from the study because learners spent limited time in school since enrollment in their academic achievement had only two (2) terms. Learners in Form III were feeling nervous about transitioning to the National class while those in Form IV were busy preparing for KCSE. The learners enrolled in Form II were more probable to encounter a particular peer tutoring strategy settling than those in Form I, III, and IV.

There are total of 24 secondary schools in the sub county, with 10 being private schools and 14 being public schools. The target population included 1062 Form two (2) students from the 14 public secondary schools within the county, 67 Mathematics teachers in the Ruiru sub-county, and 34 HoDs (Ruiru sub-county,2024)

Table 3.2 Population for The Study

Category	**Population(n)**
Public Secondary schools	14
Mathematics Teachers	67
Form two (2) students	1062
HoDs	34

3.5 Sampling Technique and Sample Size

A sample is a limited portion of a statistical population, used to gather initial information about the overall population's characteristics (Kothari, 2004). (Mugenda, 2011) has put forward that a study should consider a large sample size where resources and time help remove sampling errors that respond from a small sample. The challenge with a limited sample size is that it may not fully capture the genuine attributes of the entire population to a satisfactory degree. According to Gall and Borg, (2003), a sample of 10% -30% is acceptable. Four (4) secondary schools representing 30% of the sample size for the study (2 mixed schools and 2 single schools) was selected using a stratified random sampling technique. One hundred and sixty(160) Form II learners representing 15% of the sample size for the study was selected using a simple random sampling technique. Twenty (20) Mathematics teachers representing 30% of the sample size for the study was selected using purposive sampling technique. Ten (10) HoDs representing 30% of the sample size for the study was selected using a convenient sampling technique.

Table 3.3 Sampling Technique and Sample Size

Category	**Population (N)**	**Sample (N)**	**Percentage**
Public secondary schools	14	4	30%
Mathematics teachers	67	20	30%
Form two (2) students	1062	160	15%
HoDs	34	10	30%

3.6 Research Instruments

The research instruments were intended to remove any potential bias from the researcher (Robert, 2013). Four (4) research instruments were employed to collect data from participants: (a) questionnaires for Mathematics teachers and learners; (b) an interview schedule for Heads of Departments (HoDs); (c) Mathematics achievement test (MAT), and (d) observation schedule.

3.6.1 Questionnaires

Ordho, J. (2012) indicates that a questionnaire typically exhibits good reliability as it enables the collection of data from a wide range of representatives and samples areas. Two pairs of questionnaires was developed; one questionnaire for students and the other questionnaire for Mathematics teachers. Both open and closed ended questionnaires were used to simplify the data collection process for collecting both qualitative and quantitative data. The questionnaire helped the researcher address research questions from both Mathematics teachers and learners, presenting various possible solutions as recommended by (Creswell,2014). The researcher utilized a questionnaire to investigate the use of the peer tutoring strategy with groups of learners and teachers.

The questionnaires for both learners and Mathematics teachers was sub-divided into five segments labeled A, B, C, D, and E. Segment A consisted of demographic information items. Segment B was used to collect information on different types of peer tutoring used by Mathematics teachers in secondary schools. Segment C was used to solicit information on the perception use of peer tutoring as a teaching strategy. Segment D was used to solicit information on peer tutoring activities used in teaching and perceived benefits of use peer tutoring. Segment E was used to collect

information on how peer tutoring strategy affects learners' academic achievement in Mathematics in secondary schools of Ruiru sub-County, Kiambu County Kenya.

3.6.2 Interview Schedule

The interview schedule can be used by the researchers if they want to collect information about something such as a person's emotions, feelings, and experiences (Denscombe, 2010). The researcher used in-depth interview guide for HoDs to collect information on the use of peer tutoring strategy for the Mathematics teachers. In depth interview is an effective qualitative method for getting participants to talk about their personal feelings, opinions, and experiences. It is also an opportunity to gain insight into how participants interpret and order the world (Zaharia et al., 2008). Therefore, the researcher prepared several questions based on the peer tutoring strategy employed in teaching Mathematics, how it affects learners' academic achievement, what influences the choice of Mathematics teachers in employing peer tutoring in the classroom, and possible measures that should be put into place to improve the use of peer tutoring in teaching and learning at secondary schools of Ruiru sub-County, Kiambu County Kenya.

3.6.3 Mathematics Achievement Test

The researcher used a Mathematics achievement test to gather primary data on the learners' Mathematics performance. The MAT was collected from the Mathematics syllabus in the Form II classes covering different areas like numbers and operation, measurement, algebra, and geometry. The test was consisted of 10 open questions for both pretest and post-test.

3.6.4 Observation Schedule

Robson (2002) clarifies that observation gives a rude awakening since what individuals do contrasts with the state they do. In this study, an observation schedule was employed to collect information from Mathematics teachers during live Mathematics lessons.

3.7 Pilot Study

Piloting was done to confirm if all items in the questionnaires are well articulated and indicate a similar meaning for all respondents and it is essential as it helps guarantee the precision of the research tools utilized in both qualitative and quantitative data collection procedures (Rinjit, 2020). A trail run of instruments is a useful step to prepare a researcher to move to the field. It increases significantly the credibility of the research findings.

A pilot study was carried out in two public secondary schools in Ruiru sub-County, Kiambu County, Kenya. Two (2) sets of questionnaires were piloted in two public secondary schools that share similar characterizations with the schools selected for the study but were not included in actual research sample. The questionnaires was administered to fifty (50) learners from the two public schools and ten (10) Mathematics teachers. In the pilot schools, four (4) heads of departments (HoDs) were interviewed using the instrument before it was ultimately employed for data collection. The instruments were returned to verify spelling errors, typing mistakes, unclear questions, format arrangement, and the suitability of items. After the assessment and evaluation, the research tools were reviewed and adjusted accordingly.

3.7.1 Validity

Validity refers to the significance and precision of inferences drawn from research findings as outlined by (Mugenda &Mugenda, 2014). The researcher employed content validity, criterion validity, construct validity, and face validity in evaluating the research instruments. The inclusion of two (2) supervisors helped in the construction of research instruments and assist with the review of related literature required for the study. Content validity involves a review of related literature and follow-ups with assessment by panels and expert judges (Taherdoost, 2016). Two (2) supervisors collaborated to test the relevance of items in the research instruments. The process of using expert judgment for content validity requires the researcher to work with a specialist for validation purposes.

Criterion validity involves using assessment to evaluate how subjects behave under specific conditions (Mugenda, 2012). Criterion validity is divided into two different types and it was tested in the study. Those include predictive validity and concurrent validity. Concurrent validity has been defined as an association between the measure of the problem and the results at the equivalent time while predictive validity involves the capability to anticipate events or outcomes that were expected to occur (Selvam, 2017). Criterion validity was tested by distributing the research instruments to two secondary schools and examining the data obtained to determine if it met the necessary criteria.

3.7.2 Reliability

Reliability is the measure of how consistently a research instrument provides data or consistent responses across repeated trials (Ordho, 2012). The greater the consistency in the results produced by the instrument across repeated trials, the more reliable it is.

Two public secondary schools were chosen for the pilot study to test the reliability of the quantitative research instruments. The researcher utilized a test-retest statistical approach to test the reliability of the Mathematics achievement test, while internal consistency reliability was applied to test the reliability of the questionnaires. The learners' questionnaires were administered to a group of fifty (50) secondary students, while the Mathematics teachers questionnaires were independently tested on ten(10) Mathematics teachers to calculate the correlation coefficient for each instrument. The results were analyzed using Cronbach's alpha formula in SPSS. (Singh, 2017) suggest that a Cronbach's alpha value of 0.7 is typically considered acceptable for reliability. A pretest correlation coefficient of 0.78 and a post-test correlation coefficient of 0.86 were recorded, indicating that the instruments were reliable for the study

3.8 Data Collection Methods

The researcher first requested a letter of introduction from the graduate school at Kenyatta university. Following that, permission was acquired from the National Council for Science, Technology and Innovation (NACOSTI) to collect data. Approval was then requested from Kiambu Education Office to conduct research in Ruiru sub-County. Afterward , the researcher visited the public secondary schools, arranged meetings with the principals, and conducted the research at the agreed upon times. This method was implemented to prevent surprise school visit without prior notice, ensuring clear communication of the visit's objectives.

All learners and Mathematics teachers from the chosen schools were individually handed the questionnaires and given sufficient time to complete them. The completed questionnaires were collected. Furthermore, for the in-depth interview sessions, the researcher arranged meetings with the Heads of Departments (HoDs) and conducted

interviews. Detailed notes were taken, and the data obtained during the interview sessions were properly documented.

A pretest was administered for learners in Form II. Then each class was taught using various instructional methods for two (2) weeks. Two (2) classes in Form II was used as treatment groups (taught using peer tutoring) while the other two classes in Form II was used as control groups (taught using conventional methods that consider lecture method and classroom activities). The lessons covered different areas in Mathematics including Numbers and operations, Measurements, Algebra, and Geometry.

The whole classes received training on the procedures of peer tutoring before introducing it into the classroom. During the pretest phase, the entire class was instructed on the various steps of peer tutoring and the roles of both tutors and tutees. After the students demonstrated mastery of the tutoring process, the teachers initiated the treatment post-test phase. Throughout the process, the teachers educated the learners on Mathematics topics. Subsequently, the teachers assigned tutors as the main educators for the tutees. The tutors delivered content that had already been taught by the teachers, providing explanations with illustrations from the Mathematics curriculum.

The session lasted approximately 40 minutes, after which the tutees switched roles to reinforce their learning or recall what they had been taught by the tutors. Following this, all learners were given a set of questions related to the lesson topics they had covered. After completing the questions, they exchanged papers and graded each other's work. This process was repeated for the next topic within a specific area.

Following a two (2) week period, learners in both classes were given a post-test to assess their comprehension of the subject matter.

3.9 Data Analysis

The research utilized both qualitative and quantitative methodologies. As described by Matula et al. (2018), data analysis included organizing, summarizing, and examining the feedback collected from participants in textual form (qualitative data) or in numerical form (quantitative data) to draw conclusions. The quantitative data analysis process involved coding, data validation, and inputting the data into the statistical package for the social sciences (SPSS version.27). Quantitative data underwent analysis in SPSS utilizing descriptive statistics like means, percentages, and frequencies. The analysis involved presenting the data through bar graphs, pie charts, and frequencies tables.

The quantitative data gathered from closed ended questions were analyzed through descriptive statistics, specifically focusing on frequencies and percentages to address research objectives (1) and (2). The qualitative data obtained from combination of open ended questions, interview schedule, and observations schedule were analyzed using conceptual content analysis, chosen as the most suitable method for analysis. As per (Creswell, 2008), conceptual content analysis is a methodology utilized for drawing conclusions by systematically and impartially recognizing unique aspects of messages and employing consistent methods to identify patterns. In this research study, the data from transcriptions and field notes were structured and readied for analysis. After the data review, the researcher coded information to establish themes and overarching interpretations, which were then presented in the form of impactful

quotes. Valuable insights were obtained through the use of both direct quotations and narrative quotations.

The pretest and post test assessments were administered before and after the intervention to determine if there were any noticeable improvements in Mathematics achievements among Form II learners. The research examined quantitative data from Mathematics achievement (pre and post tests) through inferential statistics , including independent samples t-tests and paired sample t-tests, to address research objectives (3) three and (4) four. The researcher employed the t-test to evaluate the mean difference between learners in the experimental group(peer tutoring) and the control group (conventional methods) concerning the Mathematics achievement tests. The t-test was utilized to assess statistically significant differences in the Mathematics achievement tests between Form II learners in the experimental group and the control group. The study compared the average scores of both groups. The paired samples t-test was utilized to compare the average score improvement for both the experimental group (EG) and control group (CG) across male and female respondents. Table 3.4 below summarizes the process of data analysis.

Table 3.4 Matrix Showing Data Analysis Process

Objectives	**Instrument**	**Types of data**	**statistics**
Establish different types of peer tutoring strategies used in teaching and learning Mathematics	Questionnaire, interview schedule	Qualitative and Quantitative data	Descriptive statistics (Frequencies and percentages)
Determine the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning	Questionnaire, interview schedule, and observation schedule	Qualitative and quantitative data	Descriptive statistics (Frequencies and Percentages)
Establish the difference in Mathematics achievement between learners who learned using peer tutoring strategy and those learned without using pee tutoring	Pretest and post test	Quantitative data	Inferential statistics (Independent samples t-test and paired samples t-test)
Establish the difference in Mathematics achievement when using peer tutoring by gender among secondary schools students	Pretest and post test	Quantitative data	Inferential statistics (Independent samples t-test and paired samples t-test)

3.10 Ethical Considerations

All professionals have strict guidelines that govern their professional work (Kothari,2003). The key ethical issue includes informed consent, honesty, and confidentiality. Before running data collection, the research proposal was presented to multiple review bodies. The research document sought to represent to institutional review board within Kenyatta University to ethical adherence considerations. Thereafter, the document sought to be presented to the Kenya government agency National Commission for Science, Technology, and Innovation (NACOSTI) for permission to conduct the research within Kenya, during research instrument administration and data collection, verbal request and to some extent written letters were given various individuals and organization to be allowed to undertake the study.

The informed consent for the respondents was established for the research instrument before starting the research, and the participants were adhere to be respected and their privacy was highly be respected. To achieve participants' privacy and confidentiality, all types of questionnaires was filled in anonymously and even before the respondents seek to embark on filling the questionnaires. The individual was acknowledged that he or she has to read the informed consent and append his/her signature. All these requirements was written together with informed consent attached to the research instrument. The researcher adheres to the requirement of conducting research

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter represents the data, analysis, interpretation and discussions. The quantitative data was analyzed using descriptive statistics followed by inferential statistics such as independent sample t-test and a paired sample t-test to test the null hypotheses. This chapter also contains qualitative data obtained from open ended questions, interviews schedule and observation schedule to answer the research objectives one (1) and two (2). In particular, the study findings were discussed in the related literature reviewed. The objectives of the study were to:

a) establish different types of peer tutoring strategies used in teaching and learning Mathematics;
b) determine the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning;
c) establish the difference in Mathematics achievement between learners who learned using peer tutoring strategy and those who learned without using peer tutoring;
d) establish the difference in Mathematics achievement when using peer tutoring by gender among secondary schools students;

The study investigated the following research questions:

i. What are the types of peer tutoring used in teaching and learning Mathematics ?
ii. To what extent do Mathematics teachers use peer tutoring in teaching and learning ?

This study also tested the following null hypotheses :

$H0_1$: There is no statistically significant difference in Mathematics achievement between learners who learned using peer tutoring and those who learned without using peer tutoring.

$H0_2$: There is no statistically significant gender difference in Mathematics achievement among learners after using peer tutoring.

4.2 Demographic Information of Respondents

4.2.1 Demographic Data of The Learners

The study involved 160 Form II students selected from four (4) secondary schools. Data collected from learners was gender and age. Table 4.1 indicates the demographic data for the EG and CG concerning Form II students' gender at the secondary school level respectively.

Table 4.1 Distribution of learners by Gender

	Experimental group(EG)		Control group(CG)	
Gender	N	Percent	N	Percent
Male	40	50.0	50	62.5
Female	40	50.0	30	37.5
Total	80	100.0	80	100.0

Table 4.1 indicates that in the experimental group,50％of the respondents were male and 50％ were female and the control group consisted of 62.5 ％ of respondents were male and 37.5％ were female.

Table 4.2 Distribution of learners by Age

	N	%
Below 16	**65**	**40.6%**
Between 16 and 18	**80**	**50.0%**
Above 18	**15**	**9.4%**

Table 4.2 shows that 50 % of learners were aged between 16 and 18 years, 40.6% of learners was aged below 16 years and 9.4% was aged above 18 years . This shows that Form II learners were evenly distributed on the basis of age from 16 years to 18 years and above. The age difference of two (2) to four (4) years between students was consistent with the research finding from a study conducted by Morris et al.(2016) in which the research finding revealed that an age difference of two (2) to four (4) years between tutors and tutees guarantees the best outcome of peer tutoring session.

4.2.3 Demographic Data of The Teachers

This part presents demographic data gathered from 20 Mathematics teachers. The information enabled the researcher to establish their gender, age, professional qualification and teaching experience.

Table 4.3 Gender of Teachers

Male	**Female**
13	7
65.00%	35.00%

Table 4.3 above shows gender distribution of Mathematics teachers from the sampled population shows that. They were 65.0% of male while 35.0% were female. This shows that the study locale has more male teachers than female teachers.

The researcher was also interested into ages of teachers. The information is represented in Table 4.4

Table 4.4 Age Bracket of Teachers

25-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs
5	10	4	1
25.00%	50.00%	20.00%	5.00%

Table 4.4 above indicate age bracket of Mathematics teachers. According to the table, 50 % of Mathematics teachers were within age bracket of 31 and 40 years, 25% were within 25 and 30 years, 20 ％were within in 41 and 50 years, 5.00% were above 51 and 60 years. This shows that Mathematics teachers at the study locale had sufficient experience in teaching considering that those that were between 51-60 years. Again, having age balance can bring valuable insights, skills and qualities to the teaching of Mathematics, enriching the learning experience for learners.

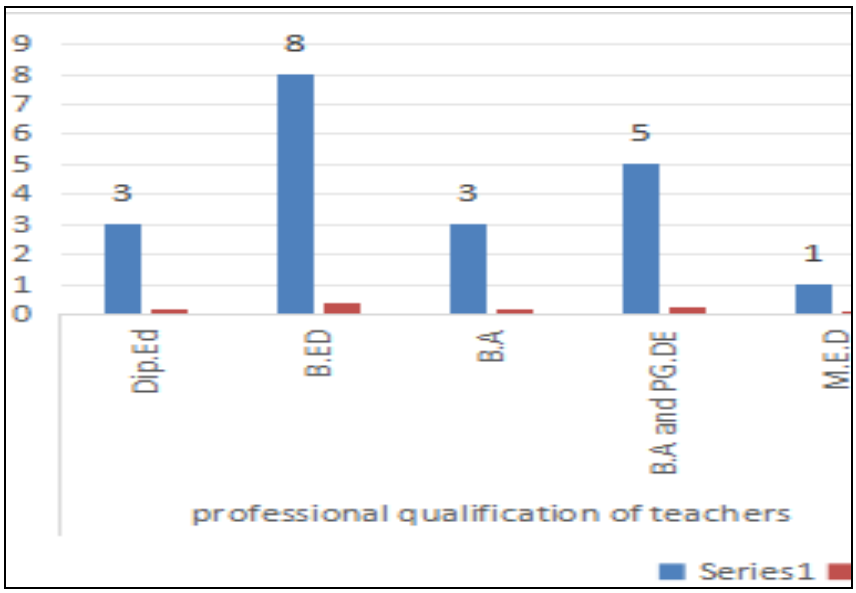

Figure 4.1 Professional Qualification of Teachers

Regarding professional qualification as it is indicated in figure 4.1 above, three (3) Mathematics teachers in the study locale were approved diploma in education, eight (8) bachelor in education, three (3) bachelor of arts,humanities and social sciences, five (5) bachelor of arts, humanities and social sciences and post graduate diploma in education,one (1) masters in education. This finding indicate that Mathematics teachers in the study locale were more knowledgeable and this can helps Mathematics teachers understanding how to adapt peer tutoring strategy to meet the needs of diverse learners.

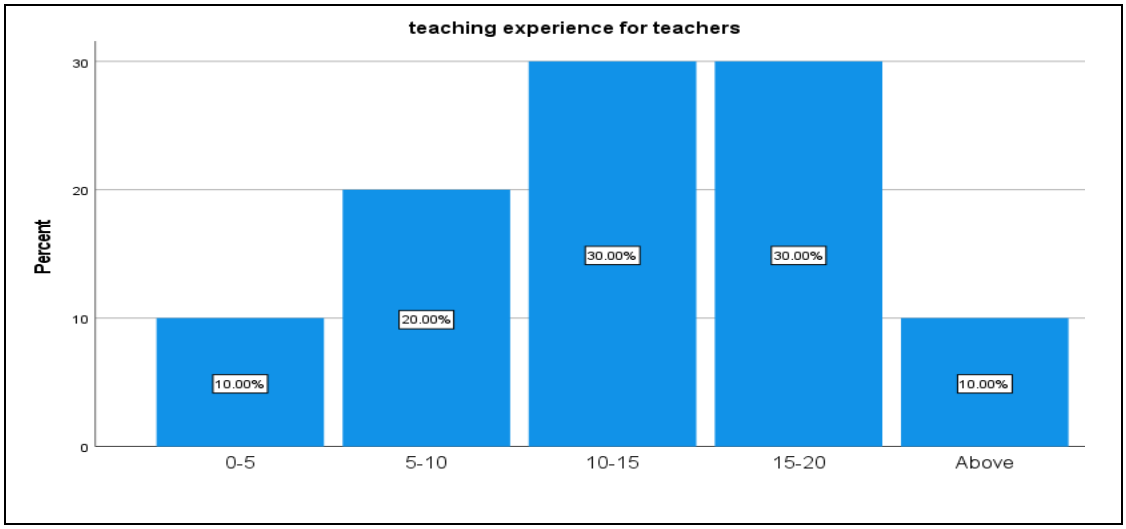

Figure 4.2 Distribution Of Teaching Experience For Mathematics Teachers

Regarding teaching experience as indicated in the figure 4.2 above. The Mathematics teachers in the study locale, as recorded by 30% had teaching experience within 10 and 15; 30 % are within 15 and 20. The figure further indicated that 20 % Mathematics teachers had teaching experiences within 5 and 10 years and 10 % are above 20 years. The long teaching experience allow Mathematics teachers to deepen their understanding of how students learn Mathematics, identify common misconceptions and develop effective instructional strategies in Mathematics classroom.

4.3 Peer tutoring strategy used in teaching and learning Mathematics

The first objective was to establish different types of peer tutoring strategies used in teaching and learning Mathematics. This study collected data using a questionnaires for both teachers and students, in depth interviews schedule for HoDs. The finding was interpreted using descriptive statistics such as percentages .

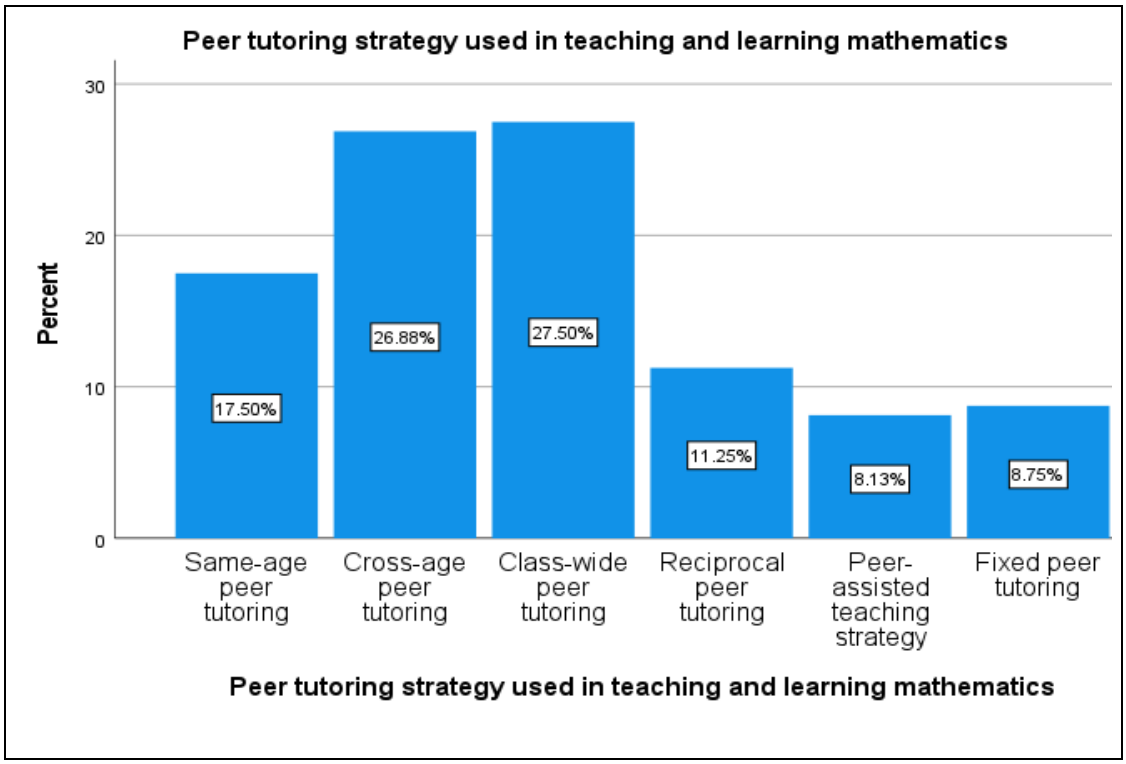

Figure 4.3 Peer tutoring strategy used in teaching and learning Mathematics

Figure 4.3 above shows that CWPT was the most common strategy used in teaching and learning Mathematics as reported by the majority (27.50%) of Form II students. This research findings was supported by Kamps et.al (1994), whose findings indicated that using class wide peer tutoring strategy give equal opportunity of every students in classroom in directly engagement in the process of learning with CWPT, which enable them to learn fundamental skills in funny and organized manner. Similarly, This findings corroborate by Ali,Anwer et.al.(2015) whose research study described CWPT as strategy which involves combination of instructional components

includes systematic content coverage, partner pairing, continuous testing, team competition,direct error corrections and point testing .

A look at Figure 4.3 , Cross age peer tutoring was also mostly frequently used to some extent as reported by 26.88％ for Form II students followed by same age peer tutoring strategy as reported by 17.50％. The current research findings align with those of Hänze et al. (2018), whose research highlighted the disparity between same-age and cross age interactions in Mathematics learning, indicating that tutees benefit more from tutors of different ages. Similarly,the recent study's findings corroborate with that of Morris et al. (2016) whose research emphasized that an age gap of two (2) to four (4) years between tutors and tutees leads to optimal outcomes. As contrast, the researchers such as Greene et.al (2018) also indicated that tutors who were older than tutees tended to have higher achievement skills, and better attributes than tutors who were of the same age as tutees .

It was found that Peer-assisted learning strategy (PALS) was rarely used as reported by 8.13％. In contrast, educational researcher, for instance (Blueprints for Healthy youth development,2019) demonstrated that this strategy play a pivot role in learning Mathematics as the teachers observe the slower learners and provide individual remedial sessions.

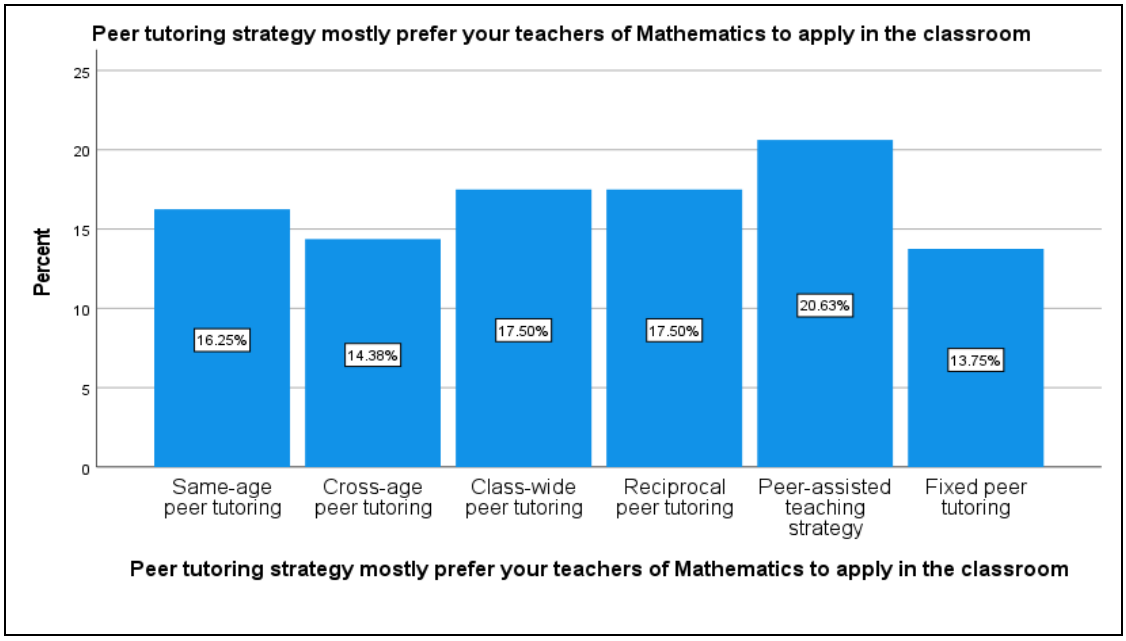

Figure 4.4 Peer tutoring strategy mostly preferred by Form II students to be employed by Mathematics teachers.

The finding in figure 4.4 show that 20.63% Form II students preferred Peer assisted teaching strategy (PALS) to be employed by Mathematics teachers in classroom. The use of Peer assisted teaching was also reported to develop skills and knowledge of students through working support amid status equals or matched companions Carr et al.(2016). A look at Figure 4.4, both class wide peer tutoring(CWPT) and reciprocal peer tutoring (RPT) as reported by 17.50 % of respondents was also the most preferred by Form II students to be employed by Mathematics teachers in classroom. This finding was also in the line of researchers (Harper &Maheady, 2007) whose research demonstrated that CWPT allow the entire class to be involved in organized peer tutoring tasks two or more times each week for around 30 minutes and it is created to effectively teaching as specific set of information to young children with a wide range of skills levels.

Reciprocal peer tutoring(RPT) strategy was mostly preferred by students because this strategy is more effective as compared to fixed peer tutoring. This is because tutees' self awareness could be effected by ongoing support received from their tutors, making themselves feel inferior or useless to their peers as reported by De Backer et.al(2015). In contrast to this finding, the researchers such as Bailley et al.(2018) indicated that the implementation of reciprocal peer tutoring demands a moderate level of knowledge and experts in the learners' academic and communication skills.

On the quantitative results realized through open ended questionnaires by Form II students. Majority students gave justification why they preferred the selection of Class wide peer tutoring and Reciprocal peer tutoring strategy to be employed by Mathematics teachers. However each responded differently regarding the types of peer tutoring strategy that facilitate him/her in term of academic achievement in mathematics. Here is what four respondents said;

".....the reason why i prefer class wide peer tutoring is because it enhance my communication and problem solving skills in term of discussion some Mathematical concepts to my fellow student. Again this help me to better articulate my thought and ideas in Mathematics subject…."(*respondent A)*

"…. I prefer class wide peer tutoring to be employed by Mathematics teacher because class wide peer tutoring helps me to build relationship with my classmates,create a supportive network that enhance my motivation,confidence and commitment to learn Mathematics… " (*respondent B)*

"*…. I prefer reciprocal peer tutoring strategy as it help me to take my own responsibility in term of discussing some Mathematical concept to my peer and receiving feedback. Again this strategy help me to actively process*

information ,leading to better comprehension and retention of Mathematical formulas and principles…."(respondent C)

"….i prefer reciprocal peer tutoring strategy as it help me to get an opportunity to clarify my own misconceptions, deepen the understanding of Mathematical concepts and strong problem solving skills….."(respondent D)

This implies that class wide peer tutoring(CWPT) and reciprocal peer tutoring (RPT) were not fully utilized by Mathematics teachers to give best results in mathematics based on academic achievement. Even though reciprocal peer tutoring strategy was not fully utilized, it is challenging to implement reciprocal peer tutoring strategy in classroom because, there may be instances where one student is significantly more knowledgeable in certain Mathematics concepts than their peer and this can lead to unequal exchange of information. Without proper teachers guidance monitoring ,there is a risk that students may provide inaccurate or incomplete information during tutoring sessions. This can lead to misconceptions or error being reinforced, ultimately hindering academic achievement in Mathematics. Just as important, the recent study's finding coincides with that of (Duran & Monereo, 2005) and De Backer et .al (2016) whose researches indicated that under implementation of peer tutoring, fixed peer tutoring is frequently the most advanced as compared to reciprocal peer tutoring. This is because reciprocal peer tutoring demands a moderate level of knowledge and experts in the learners' academic and communication skills.

The finding also reported that Form II students prefer same age peer tutoring (16.25%) over cross age peer tutoring strategy (14.38%). A gain this finding is in the line of the researchers Moeyaert et al.(2021) who research study indicated that implementation of same age peer tutoring is easy as compared to cross age peer tutoring strategy as it

is only conducted in one classroom and it is usually more successful for learners from the same academic year.

Mathematics teachers were further asked to demonstrate peer tutoring strategy mostly frequently applied in classroom. Figure 4.6 summarizes the finding

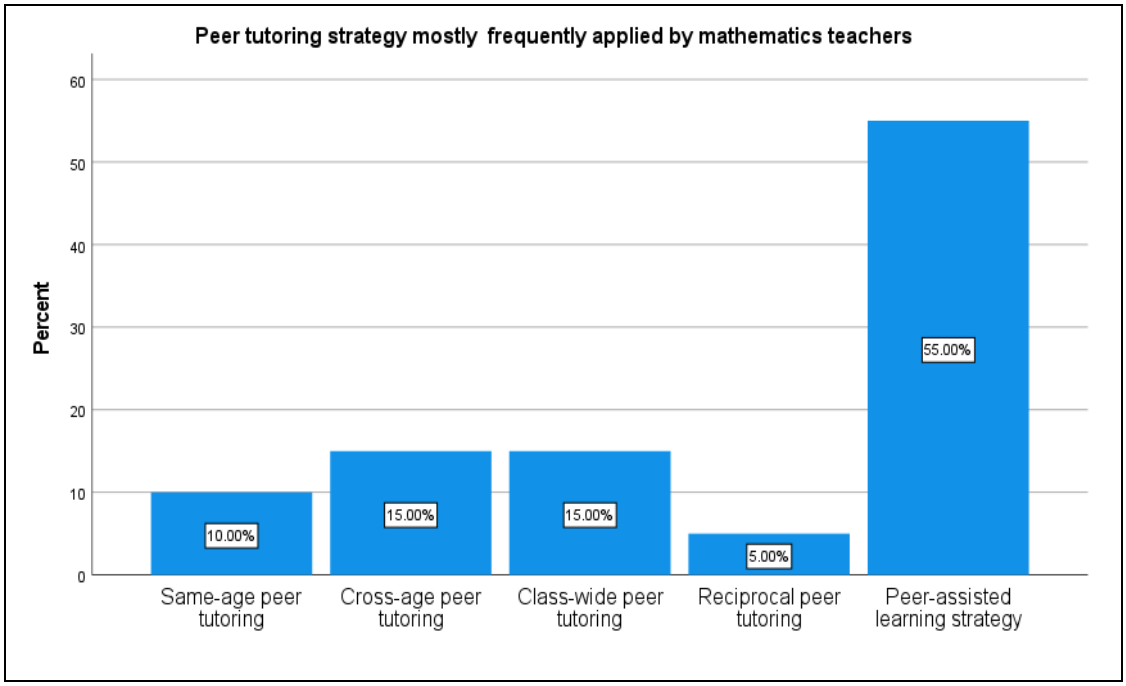

Figure 4.5 Peer tutoring strategy mostly frequently applied by Mathematics teachers

The finding from figure 4.5 indicated that (55.00%) agreed to greater extent that peer assisted learning strategy (PALS) was the most frequently peer tutoring strategy employed by Mathematics teachers in classroom. According to educational research conducted by Fuchs et al.(2000) has indicated that using peer assisted learning strategy allow teachers to identify slowly learners who require assistance from a peer who can assist. Teachers can use peer assisted learning strategy to assess learners understanding, identify misconceptions and provide targeted feedback, leading to more effective formative assessment practices.

Indeed for data triangulation purposes. The researcher interviewed head teachers to probe the responses obtained from the qualitative data. Majority head teachers reported that peer assisted learning strategy was the mostly frequently employed by Mathematics teachers but consequently resulted to multiple challenges to implement this strategy in large classroom size. Here is what the head teachers responded;

" .....In my classroom, majority Mathematics teachers employed peer assisted learning strategy but it bring a lot of challenges under its implementation in large classroom size as it require additional time and resources for planning , coordination and assessment which can be challenging for teachers with limited time availability….."(*interviewee A*)

" *…..in my school, Mathematics teachers prefer to employ peer assisted learning strategy but it brings so many challenges to monitor and evaluate learners progress during peer assisted learning sessions, requiring proactive strategies to assess students engagement , understanding and collaboration……"(interviewee B)*

" …….it brings multiple challenges to implement peer assisted learning strategy in my classroom as it requires to consider different factors such as learning styles, personality, learning abilities and academic abilities to create successful pairs….."(interviewee C)

In connection of above report, the present study's finding concur with that of (Topping, 2020) whose research findings indicated that peer-assisted learning strategy boost confidence in Mathematical abilities, promotes a positive learning environment,and encourages learners to explain and justify their reasoning. Just as important, the recent study's findings supported by the research study conducted by Duah et al.,(2014) for the purpose to investigate the sue of PALS in undergraduate Mathematics courses, using both qualitative and quantitative methods. The research

findings indicated that PALS raised learners involvement in second year undergraduate Mathematics. In addition, they research findings indicated a positive correlation between number of PALS sessions attended and final grade in the Vector Spaces module, controlling for prior achievement in linear algebra and lecture attendance.

4.4 Extent Use of Peer Tutoring Strategy in Teaching and Learning Mathematics

In objective two (2), the study sought to determine extent to which Mathematics teachers use peer tutoring strategy in teaching and learning. To establish this objective of the study,the researcher collected data from both teachers and learners using Teachers' questionnaire, Learners' questionnaire, in-depth interview schedule for HoDs and observation schedule. Collected data was analyzed using descriptive statistics such as means and percentages and was interpreted using SPSS version.27.

Table 4.5 Learners' perception towards the use of peer tutoring in learning Mathematics

Statements	SA(%)	A(%)	MA(%)	D(%)	SD(%)	Mean	Std.Dev	Decision
1. Peer tutoring is a practical activity used to maintain my academic achievement in Mathematics	81 (50.6)	50 (31.3)	22 (13.8)	5 (3.1)	2 (1.3)	1.73	0.902	Low perception
2. There is an improvement in understanding of Mathematical concepts through peer tutoring	62 (38.8)	51 (31.9)	33 (20.6)	10 (6.3)	4 (2.5)	2.02	1.037	High perception
3. A more positive attitude towards Mathematics is developed due to peer tutoring	55 (34.4)	59 (36.9)	32 (20.0)	10 (6.3)	4 (2.5)	2.06	1.011	High perception
4. Mathematics is theoretical and complex to be taught by peer	52 (32.5)	57 (35.6)	37 (23.1)	8 (5.0)	6 (3.8)	2.12	1.042	High perception
5. Using peer tutoring allows me to exchange ideas which can help me to have a deeper understanding of Mathematics subject	56 (35.0)	48 (30.0)	43 (26.9)	6 (3.8)	7 (4.4)	2.13	1.074	High perception

6. Confidence in understanding and solving Mathematical problem is improved with use of peer tutoring	55 (34.4)	55 (34.4)	43 (26.9)	5 (3.1)	2 (1.3)	2.03	0.925	High perception
7. Peer tutoring helped me to complete my homework and assignments in Mathematics	55 (34.4)	62 (38.8)	32 (20.0)	6 (3.8)	5 (3.1)	2.03	0.990	High perception
8. Seeking help from peer when struggling with Mathematics is comfortable	49 (30.6)	59 (36.9)	36 (22.5)	11 (6.9)	5 (3.1)	2.15	1.035	High perception
9. Mathematics is found interesting when discussed in peer tutoring sessions	58 (36.3)	56 (35.0)	33 (20.6)	9 (5.6)	4 (2.5)	2.03	1.012	High perception
10. Enjoyment in collaborating with peers to solve Mathematical problems is experienced	65 (40.6)	53 (33.1)	27 (16.9)	8 (5.0)	7 (4.4)	1.99	1.084	Low perception

Notes *N*= 160, SA = Strongly agree; A= Agree; MA= Moderate agree; D= Disagree; SD= Strongly disagree; Decision= Weighted mean=20.029÷10= 2.0029.

Results from Table 4.5 indicate that more than 40 % respondents agreed to some extent (strongly agree) that enjoyment in collaborating with peers to solve Mathematical problems is experienced and peer tutoring is a practical activity used to maintain their academic achievement in Mathematics. The present study finding corroborate with that of Ansuategui and Miravet, (2017) who conducted a research study in Spain. The findings indicated that learners successfully complete assignments faster and gain better understanding, learners dare to explain the problem to a friends as well as remove of embarrassment, learners demonstrate positive behaviors and cognitive competence throughout the program. Just as important, the present study's finding corroborate with that of (Smith, 2019). The results indicated that peer tutoring encouraged a sense of accountability among students, leading them to take ownership of their learning and offer each other support in understanding Mathematical concepts. Similarly, the present study's findings corroborate with the study conducted by Muhammad et al. (2020) who undertaken a research study on the use of peer tutoring strategy as an approach to enhance academic achievement in Mathematics. This research findings suggested that peers tutors can assist struggling learners in comprehending and expanding upon the material covered in traditional classroom settings by offering in depth explanations of concepts and employing effective communication skills.

A look at Table 4.5 indicates that the majority of respondents (more than 35%) agreed to some extent (strongly agree) that there is an improvement in understanding of Mathematical concepts through peer tutoring, and Mathematics is found interesting when discussed in peer tutoring sessions. Again, more than 36% of participants agreed that a more positive attitude towards Mathematics is developed due to peer

tutoring, peer tutoring help them to complete their homework and assignments in Mathematics, seeking help from peer when struggling with Mathematics is comfortable. The present study's finding corroborate with that of Fuchs et al. (2019) who has frequently documented that peer tutoring can be useful and helpful to any type of students, even learners are with learning's difficult to improve their academic performance in Mathematics.

In contrast, Table4.5 shows that forty three representing 26.9％of the respondents (moderate agree) that using peer tutoring allow them to exchange ideas which can help them to have a deeper understanding of Mathematics, confidence in understanding and solving Mathematical problem is improved with use of peer tutoring. Only six (6) representing 3.8％ of respondents strongly disagree that Mathematics is theoretical and complex to be taught by their peer. The recent study's findings concur with that of Putranto and Marsigit, (2018b) conducted in Indonesia. The researchers used a sample of 31 slower learners in grade five (5) junior high school from inclusive classes and Realistic Mathematics Education approach. The findings indicated that there was a development in problem solving skills abilities, Mathematics attitudes, Mathematics literacy and conceptual understanding.

The study also assessed the perceived benefits of using peer tutoring strategy in learning Mathematics for Form II students. All 160 respondents in Form II classes responded to an open ended question. The findings were gathered and analyzed by creating categories, coding and entering the coded information into computer to run descriptive statistics. The resulted of data finding are represented in Table 4.6 below.

Table 4.6 Learners' perceived benefits of peer tutoring strategy in learning Mathematics

Statements	1(%)	2(%)	3(%)	4(%)	5(%)	Mean	Std. deviation	Decision
1. Perceived benefits of peer tutoring on problem solving skills in Mathematics	59 (36.9)	48 (30.0)	23 (14.4)	14 (8.8)	16 (10.0)	2.25	1.308	**Low perception**
2. Perceived benefits of peer tutoring on critical thinking skills in Mathematics	45 (28.1)	36 (22.5)	51 (31.9)	12 (7.5)	16 (10.0)	2.49	1.254	**High perception**
3. Perceived benefits of peer tutoring on social and cognitive skills in Mathematics	60 (37.5)	50 (31.3)	26 (16.3)	24 (15)		2.09	1.066	**Low perception**
4. Perceived benefits of peer tutoring on communication skills in Mathematics	40 (25.0)	47 (29.4)	41 (25.6)	12 (7.5)	20 (12.5)	2.53	1.288	**High perception**
5. Perceived benefits of peer tutoring on academic skills in Mathematics	38 (23.8)	72 (45.0)	24 (15.0)	15 (9.4)	11 (6.9)	2.31	1.138	**Low perception**

Note *N= 160,* 1=Always; 2=Often; 3=Sometimes;4= Rarely; 5= Never; Decision= Weighted mean= 11.67÷5= 2.334

Results from the Table 4.6 indicated that more than 35%of the respondents confirmed that they always perceived benefits of peer tutoring strategy on problem solving skills and on social and cognitive skills in Mathematics. The present study's findings corroborate with that of (Geoffrey, 2017) who undertaken a research study in USA.

The research findings indicated that learners' critical thinking abilities were enhanced when they participated in a collaborative meta cognitive community. Learners expressed a preference for working in groups while constructing knowledge. Similarly,the present study' findings coincided with that of (Gan & Hong, 2020) whose research well established benefits of peer tutoring as it increase learners' self confidence and efficacy in their Mathematical ability. Just as an important, the present study's findings are in the line of research study conducted by (Cofer, 2020) for the purpose to examine how tutors perceive the tutor experience. The research findings indicated that a large number of participants (tutors and tutees) have benefited from the experience not only in academic achievement but also in skills sets. The longer the learners served as peer tutors, the greater the perception of gains in learning.

A look at Table 4.6 indicated that seventy two representing 45％ of respondents confirmed that they often perceived benefits of peer tutoring on academic skills in Mathematics. The present study's finding contradicted with that of (Ghanie, 2020) whose research was conducted to compare the influence of peer tutoring and its benefit on first year university Mathematics students. The findings discovered that no remarkable change occurred in the mean scores and interest or zeal of learners taught using peer tutoring.

Again fifty one representing 31.9％ of respondents confirmed that they sometimes perceived benefits of peer tutoring on critical thinking skills in Mathematics. In contrast, Table 4.6 shows that twenty representing 12.5％of the respondents confirmed that they never perceived benefits of peer tutoring on communication skills in Mathematics. The recent study's finding negated with that of (Khan, 2021) who

conducted a research study in Pakistan for the purpose to examine the influence of peer tutoring programs for learners with varying levels of Mathematics achievement in middle school. The research findings showed significant enhancements in both high performing and struggling learners. Students participating in peer tutoring showed boosted confidence, motivation , and involvement in their Mathematical skills. Furthermore, peer tutoring proved advantages for learners at various levels of academic achievement

Similarly, this study assessed all 20 Mathematics teachers in the perceptions towards use of peer tutoring strategy in lesson delivery in Mathematics. Their perceptions were gathered using open ended question and were analyzed by creating categories and entering the coded information into SPSS version.27 to run descriptive statistics. The results are presented in Table 4.7 below.

Table 4.7 Teachers' perception towards the use peer tutoring strategy

Statements	SA(%)	A(%)	MA(%)	D(%)	SD(%)	Mean	Std. deviation	decision
1. I choose the peer tutoring strategy among others instructional strategy	9 (45.0)	5 (25.0)	2 (10.0)	2 (10.0)	2 (10.0)	2.15	1.387	Low perception
2. I find it very difficult to use some peer tutoring strategies in Mathematics classroom lesson	2 (10.0)	3 (15.0)	7 (35.0)	3 (15.0)	5 (25.0)	3.30	1.302	High perception
3. Peer tutoring improve my experience in lesson planning and presentation skills	11 (55.0)	4 (20.0)	2 (10.0)	2 (10.0)	1 (5.0)	1.90	1.252	Low perception
4. The nature of Mathematics topic affects the choice of peer tutoring	8 (40.0)	8 (40.0)	1 (5.0)	1 (5.0)	2 (10.0)	2.05	1.276	Low perception
5. learners' entry behavior affects the choice of peer tutoring	9 (45.0)	4 (20.0)	3 (15.0)	2 (10.0)	2 (10.0)	2.20	1.399	Low perception
6. My choice of peer tutoring is well determined by the prescribed school curriculum	5 (25.0)	3 (15.0)	2 (10.0)	6 (30.0)	4 (20.0)	3.05	1.538	High perception
7. I consider students' ages and choose peer tutoring	11 (55.0)	3 (15.0)	2 (10.0)	2 (10.0)	2 (10.0)	2.05	1.432	Low perception
8. The classroom environment plays a primary role in the choice of peer tutoring	8 (40.0)	6 (30.0)	2 (10.0)	2 (10.0)	2 (10.0)	2.20	1.361	Low perception
9. Peer teaching experience has been challenging and exciting in Mathematics subject	13 (65.0)	6 (30.0)	1 (5.0)			1.40	0.598	Low perception
10. Peer tutoring strategy is a good instructional approach to teach Mathematics subject	12 (60.0)	2 (10.0)	4 (20.0)	1 (5.0)	1 (5.0)	1.85	1.226	Low perception

Note *N*= 20; SA= Strongly Agree; A= Agree; MA= Moderate Agree; D= Disagree; SD= Strongly Disagree; Decision= weighted mean=22.15÷10=2.215

The findings of the study from Table 4.7 revealed that more than 40% of the respondents agreed to some extent (Strong agree) that they chosen peer tutoring

strategy among others instructional strategy, peer teaching experience has been challenging and exciting in Mathematics, learners' entry behavior affects the choice of peer tutoring, they consider students' age and choose peer tutoring, peer tutoring strategy is a good instructional approach to teach Mathematics, and peer tutoring improve their teaching experience in lesson planning and presentation skills. The present study's findings concur with that of Ntow and Adler, (2019) who conducted a research study in South Africa for the Mathematics teachers who tend to control classroom discussions while learners have insufficient time to interact openly or with other students. The findings indicated that peer tutors either in similar grades levels or in case of this study at a higher grade level can assist learners with one-on-one attention who are facing challenges in understanding Mathematics which was not always possible in crowded classroom. Just as important, the present study's findings corroborate with that of Mangope et al.,(2014) conducted at University of Botswana. The objective of the study was to determine teachers' trainers perceptions of peer tutoring strategy. Majority of the teachers underscored the significance of peer tutoring strategy, advocating for incorporation into the curriculum before teaching practice.

A look at Table 4.7 indicate that 25％of Mathematics teachers agreed that the nature of Mathematics topic affects the choice of peer tutoring, classroom environment plays a primary role in the choice of peer tutoring. This finding was supported by (Wang, 2018) who conducted a research study in UK. This research study involved conducting semi-structured interviews with Mathematics teachers who had implemented peer tutoring programs. Thematic analysis revealed that teachers viewed peer tutoring as a beneficial instructional approach that fosters learner engagement

and collaboration. Teachers reported positive effects, including enhanced learner confidence, a supportive classroom atmosphere, and improved academic performance. Furthermore, the recent study's finding are consistent with that of Etsu and Manko, (2019) whose study indicated that peer tutoring is highly effective in improving the academic interest ,zeal and success of less competent students in high school geometry than the chalk and talk methods of teaching. Similarly, the recent study's finding concur with that of Algre-Ansuategui et al. (2018) who performed a meta-analysis from early childhood to secondary school in Mathematics. Based on their research finding ,the final analysis indicated that peer tutoring programs conducted during school hours were more effective than those implemented outside of school.

In contrast, Table 4.7 shows that seven (7) representing 35.0% of the respondents moderate agree that using peer tutoring strategy is somehow difficult. Again six(6) representing 30% disagree that the choice of peer tutoring is well prescribed school curriculum. This finding was supported by Song et al.(2018) who conducted a research study in two rural Chinese secondary schools. The findings discovered that peer assisted learning (PALS) did not raise the tutees' Mathematics results, rather , it increased their level of learning tension, tutor experiences positive changes while tutee experiences negative changes. Just as important, the present study's findings are in the line of the research study conducted by (Mangope, 2017). The objective of the study was to provide valuable insights into utilization of peer tutoring and group work by teachers. The findings revealed that, these insights contribute to a broader understanding of peer tutoring strategy as a strategic approach to support learners in achieving success in Mathematics especially during supplementary examination and regular classroom instruction.

Mathematics teachers were further asked to explain peer tutoring activities employed in teaching. Summarizes of finding were analyzed into the following themes using open and closed ended questions for Teachers and interview schedule for head of department (HoDs).

Table 4.8 How often do you monitor the progress and effectiveness of peer tutoring activities for both proficient learners and slower learners?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	always	4	20.0	20.0	20.0
	Often	9	45.0	45.0	65.0
	Sometimes	3	15.0	15.0	80.0
	Rarely	2	10.0	10.0	90.0
	Never	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Results from Table 4.8 indicated that nine(9) Mathematics teachers representing 45% confirmed that the often monitor the progress and effectiveness of peer tutoring activities for both proficient learners and slower learners. Four (4) Mathematics teachers representing 20% confirmed that the always monitor the progress and effectiveness of peer tutoring activities for both proficient learners and slower learners

Indeed for data triangulation purposes, the head teachers were interviewed to probe respondents to get more information towards the effectiveness of peer tutoring activities for both proficient and slower learners. The interview with the respondents was based on the following themes.

a. What peer tutoring activities have you introduced in your Mathematics classroom to support students learning?
b. What specific roles and responsibilities do you assign to students during peer tutoring activities in Mathematics?
c. How do you group students for peer tutoring sessions in Mathematics?

Here is what 4 head teachers responded ;

"*…..in my school,I used pair and share where the proficient students paired with slower students to work on Mathematics problems together. Therefore this allow the proficient student to explain concepts to the slower learners , reinforcing their understanding….*"(*interviewee D)*

"*……..in my classroom, I allow proficient students to lead mini lessons on a specific Mathematics topic for their peers. This empowers students to take on a teaching role and helps slower learners grasps concepts from a peer's perspective….*"*(interviewee E)*

"*…….in my school, I divided a Mathematics topic into sections and assign each section to a group of students. After studying their section, students come together to teach their peers. This promotes collaboration and ensures all students contributes to the learning process….*"(*interviewee F)*

"*…...in my classroom, I used peer assessment by encouraging students to provide feedback to their peers on Mathematics assignments. This promotes a supportive learning environment and allow students to learn from each other's strength…….*" *(interviewee G)*

In connection with above reports, the present study's finding concur with that of Hanze et al. (2018) who conducted a research study by employing tutees from students in the third grade at an elementary school and tutors from students in the

eighth grade at a secondary school. The research found that tutees demonstrated greater behavior as well as higher competence, autonomy and intrinsic motivation, meanwhile; tutors showed greater knowledge-building rather than knowledge-telling behavior. Similarly, the recent study's finding concur with of Stewart and Thomas, (2010). The purpose of the study was to improve learners' procedural and conceptual understanding as well as thinking in linear algebra through peer tutoring strategy. The researchers used true/false questions, in depth interviews and classroom voting through multiple questions. The finding indicated that students have been able to model and evaluate a situations that was challenging, interesting and real in linear algebra classroom

Table 4.9 When selecting tutors for peer tutoring activities, what criteria do you consider to identify proficiency levels of students in Mathematics?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High academic grades	6	30.0	30.0	30.0
	Strong conceptual understanding	10	50.0	50.0	80.0
	Effective communication skills	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Table 4.9 above, the result indicated that the ten (10) Mathematics teachers representing 50 %confirmed that strong conceptual understanding was considered to identify proficiency levels of students in Mathematics. Again six(6) of Mathematics teachers representing 30 %mentioned that high academic grades was considered to identify proficiency levels of students in Mathematics. In contrast to the Table 4.9;

four (4) Mathematics teachers representing 20 % mentioned that effective communication skills was considered as criteria to identify proficiency levels of students in Mathematics.

In connection of above reports, the recent study's findings concur with that of (Nguyen, 2023) who conducted research study in Vietnam. The research findings indicated that learners expressed greater a sense of accomplishments and enthusiasm for learning Mathematics when they successfully explained concepts to their peers. Learners seeking help and feeling more comfortable asking questions, engaging in Mathematical discussions with peers. Just as important, the present study's concur with that of (Campbell, 2019) who conducted a research study in South Africa. The findings indicated that the Social aspect give high motivation to the tutee where the tutee shows interest in discussions with the tutor face to face, learners' cognitive can built through assignments completed with the tutor.

Table 4.10 How do you pair slower students as tutee with proficient students as tutors in peer tutoring activities ?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Randomly paired	2	10.0	10.0	10.0
	Teachers assigned pairs based on academic performance	12	60.0	60.0	70.0
	Students self selected pairs	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

The finding from Table 4.10 indicated that twelves Mathematics teachers as reported by 60 % confirmed that teachers assigned pairs based on academic performance. Again six Mathematics teachers representing 30 % mentioned that students self selected pairs in peer tutoring activities.

Indeed for data triangulation responses, the head teachers were interviewed to know how Mathematics paired slower students as tutee with proficient students as tutors in peer tutoring activities. The interview schedule was based on the following themes;

a. Which types of peer tutoring strategy does teachers implement to support slower students as tutee during peer tutoring sessions?
b. How do you encourage collaboration and communication among students during peer tutoring sessions in Mathematics?

C. How do you assess the effectiveness of peer tutoring activities on students achievement in Mathematics?

Here is what 4 head teachers responded;

"*…….in my school, Mathematics teachers preferred to implement peer assisted learning strategy to support slower learners which build more confidence in their Mathematics abilities and feeling more comfortable asking questions and seeking help when needed……."(interviewee H)*

"…….in this school, Mathematics administer pre and post assessment to measure the progress of slower learners in Mathematics before and after participating in peer tutoring activities…."(interviewee I)

"…….in Form II classes, Mathematics teachers preferred to use students performance data by analyzing students' performance data, such as quiz scores ,homework,

assignments and classroom participation to gauge the impacts of peer tutoring on slower learners achievement especially in area of algebra…"(interviewee J)

"…….in this school, Mathematics teachers incorporate visual aids, manipulative and hands on activities in Mathematics lessons to support communication and collaboration especially for slower learners. These tools help them to make abstract concepts more concrete and facilitate discussion and problem solving especially in area of geometry….."(interviewee K)

In connection of above report, the recent study's finding concur with that of Moliner and Alegre, (2020) who conducted an empirical research study. The findings indicated that same-age peer tutoring among reciprocal peer tutoring had a remarkable positive influence on the learners' Mathematics self confidence. Similarly, in the research study conducted by Okilwa and Shelby,(2010) in Nigeria on the impacts of peer teaching on the learner's academic achievement with disabilities in grades 6 through 12. The purpose of the study was to examine the effectiveness of peer tutoring for special education learners in both special and general education settings. The researcher discovered that peer tutoring which was implemented across different fields of the study such as science, language , arts ,social studies and Mathematics indicated positive academic effects.

Table 4.11 How often do you ensure that peer tutoring activities are inclusive and beneficial for all students, regardless of their proficiency levels in Mathematics?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always	3	15.0	15.0	15.0
	Often	6	30.0	30.0	45.0
	Sometimes	8	40.0	40.0	85.0
	Rarely	2	10.0	10.0	95.0
	Never	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

The finding from Table 4.11 indicated that eight(8) Mathematics teachers as reported by 40% confirmed that the sometimes ensure that peer tutoring activities are inclusive and beneficial for all students, regardless of their proficiency levels in Mathematics. A look at Table 4.11 six(6) Mathematics teachers representing 30% confirmed that the often ensure that peer tutoring activities are inclusive and beneficial for all students , regardless of their proficiency levels in Mathematics.

Indeed for data triangulation purposes, the study interviewed head teachers to probe respondents to get more details and deep understanding of respondents' view towards the inclusive of peer tutoring activities and how it benefits for all students regardless of their proficiency levels in Mathematics. The interview schedule was based on the following themes;

a. Have you noticed any improvement in students understanding and performance in Mathematics as result of implementing peer tutoring strategy?

b. In your opinion, what are the key benefits of using peer tutoring strategy in Mathematics?

c. What challenges have you encountered while implementing peer tutoring activities in Mathematics and how have you addressed them?

Here is what two (2) head teachers responded;

".....in this school, Mathematics teachers to ensure that all Form II students are actively engaged and benefiting from the peer tutoring activities. They offered support , guidance and resources as needed to help students overcoming challenges and succeed in their mathematics learning …."(interviewee L)

".……in this school, Mathematics teachers create a supportive and inclusive environment where all students feel valued and respected . emphasizing the significance of teamwork, empathy and understanding in peer tutoring activities to foster a positive learning atmosphere…."(interviewee M)

".……..in this school. Mathematics teachers clearly outline roles and expectations for both tutor and tutee in the peer tutoring activities ,communicating the goals of the sessions and emphasize the importance of supporting of one another and working together to strengthen mathematics skills….."(interviewee N)

In connection of above report, in today's classroom. It is common to find learners who tend to be quiet and lack of confidence necessary to speak up and share their ideas or concerns with the entire classroom during discussion time. The present study's finding concur with that of Putranto and Marsigit (2018a) conducted in Indonesia using a sample of junior high school year seven (7) slower learners from inclusive classes. The finding revealed that inclusive classes have overall development. Similarly in the research conducted by Bowman-Perrot et.al.(2023) demonstrated that peer tutoring

has beneficial effects on the behavior and academic performance of adolescents with emotional and behavioral disorders (EBD) or those at risk of developing them.

Moreover, using observation schedule, the study collected data on effect of peer tutoring in Mathematics classroom. The results are illustrated in Table 4.12

Table 4.12 Form Two Students Classroom Observation Schedule feedback(N=10)

Aspects	**Great extent**	**Average extent**	**Little extent**	**No effect**
1. Peer tutor/peer tutee socialization	15%	65%	15%	5%
2. Motivation to the pair	95%	5	0	0
3. Effect on teachers' reward system	0	0	10%	90%
4. Effect of types of peer tutoring	75%	15%	10%	0
5. Effect on learners' performance in Mathematics	85%	15%	0	0
6. Effect of teaching and learning resources	10%	65%	15%	10%
7. Effect on time management	15%	65%	10%	10%

A look at Table 4.12 indicates that there is great extent more than 70% of motivation to the pair, effect of types of peer tutoring, effect on learners' performance in Mathematics. Again,there is average extent (65 %) of peer tutor/peer tutee socialization, effect of teaching and learning resources and effect on time management. As contrast , Table4.12 indicates that there is no effect (about 90%) on teachers' rewards system. This finding is good and it shows that the majority of Form II students (70%) can use peer tutoring strategy to some extent to brings positive effect to tutors and tutees. The role of tutor in teaching other peers is a responsibility which is not easy to perform. It requires skills that should be honed from the

beginning as well as guidance form the teachers. Just as important this finding are consistent in the research study conducted by Wanubey et al., (2021) in nine (9) schools in Indonesia. The findings indicated that peer tutoring is more importantly on character change of learners and indirectly of the teachers who becomes more capable and flexible in organizing and inclusive learning in a more functional way.

4.5 Peer Tutoring and Achievement in Mathematics Between EG and CG

This chapter tested the null hypothesis: H01: There is no statistically significant difference in Mathematics achievement between learners who learned using peer tutoring and those who are learned without using peer tutoring. In response to objective three (3), this investigation sought to compare the scores of student's achievement in Mathematics tests. The study randomly places the respondents into the EG and CG. Respondents in the EG were introduced into the step involve in implementation of peer tutoring while their colleagues in the CG learned Mathematics using conventional method such as lecture method, discussion method and demonstration method.

The study collected the data using Mathematics achievement test. The data collected from the Form II students' pretest Mathematics syllabus before learning Mathematics with peer tutoring were recorded as scores. The data statistics for this study have been indicated in Table 4.13 below

Table 4.13 Results of independent samples t-test on the pretest for both groups

	Pretest	N	Mean	Std. Deviation	Std. Error Mean
Scores	EG	80	41.88	3.551	.397
	CG	80	40.17	3.306	.370

Table 4.13 shows that EG obtained a mean score of 41.88 while the CG obtained a mean score of 40.17 before the intervention. The mean difference between the two groups was 1.71. We can realize that there appears to be difference but without the hypothesis test, we can't say if the difference is caused by sampling error or if it's real (statistically significant). The second table holds the finding of the statistical comparison.

Table 4.14 Results of independent samples t-test on the pretest for both groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Scores	Equal variances assumed	.001	.971	3.145	158	.002	1.706	.542	.635	2.778
	Equal variances not assumed			3.145	157.201	.002	1.706	.542	.635	2.778

According to the above results in Table 4.14, the Levene's test was not statistically significant, the test value of (F= 0.01) and (*P*= 0.971). We accept the null hypothesis and assume the variances are equal. However because the probability value (p-value) was 0.971 in equal variance assumed(*P>0.05)* revealing that there was no remarkable disparity in the mean score of the two groups(EG and CG) before the intervention. The result of the study indicated that Form two students in both experimental group (Peer tutoring strategy) and Control group (conventional method) were similar in abilities before the treatment was administered. (M=41.88; SD=3.551) on EG and

those learned Mathematics without peer tutoring strategy (M=40.17, SD= 3.306); [t (158) =3.145, P= 0.002<0.05] at 2 tailed level of significance

The results of this investigation are in the line of the research study conducted by Zeneli et al. (2018) in United Kingdom. The objective of their study was to investigate the influence use of cross age peer tutoring on learners' academic achievement in Mathematics. The findings indicated that on academic achievement was not significant for both groups. Similarly, the present study's findings corroborate with that of (Yaman, 2019) who conducted a research study in Turkey for the purpose to determine the effect of use of same age peer tutoring on learners' academic achievement in Mathematics. He applied sociocultural and constructivism theory. The finding indicated that on academic achievement, there was no significant effect.

The Table 4.15 shows the results of the independent samples t test on the post test of both groups.

Table 4.15 Output of the independent samples t-test on the post test for both groups

	Post test	N	Mean	Std. Deviation	Std. Error Mean
Scores	EG	80	43.09	5.229	.585
	CG	80	37.31	4.482	.501

Table 4.15 indicates that the EG obtained an average mean score of 43.09 while the CG obtained an average mean score of 37.31. The mean difference between the two groups was 5.78 in favor of the EG. As we realize that there appears to be a difference between two (2) groups but without the hypothesis test , researcher cannot say if the difference is caused by sampling error or if its is real (statistically

significant). The second Table 4.16 below indicates the finding of the statistical comparison between two groups.

Table 4.16 The output of the independent samples t-test on the post test for both groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Scores	Equal variances assumed	1.168	.281	7.500	158	.000	5.775	.770	4.254	7.296
	Equal variances not assumed			7.500	154.388	.000	5.775	.770	4.254	7.296

Table 4.16 indicates that the probability value was small($P< 0.05$) in equal variances not assumed revealing that there is statistically difference in the average means scores of both groups. The findings of this study established that the Form II students using peer tutoring strategy performed better in Mathematics than their colleagues who learned Mathematics using convectional method. This teaching strategy might helped form two students in Ruiru sub-county in the EG to understand Mathematics better than the counterparts in the CG. The findings of the research study has established that there is statistically difference in Mathematics achievement test between Form II students who were taught Mathematics with peer tutoring strategy(M=43.09, SD= 5.229) and those were taught Mathematics without the peer tutoring strategy(M =

37.31, SD= 4.482); [t(158) = 7.500 , p-value = .000 < .05] at the 2 tailed level of significance.

In connection of the above results, peer tutoring strategy might played a significance role by providing personalized support to the students, addressing individual learning needs and grasps difficult encountered in areas of Algebra and Geometry. Similarly, the present study's findings supported by (Kiburis,2012) who conducted a research study using a peer assisted learning strategy(PALS) with some modification in grade 7 learners of formal education in Mathematics subject. The findings indicated that the implementation of the PALS Mathematics decreased their pretest scores in the Mathematics compared to post-test scores. PALS provided an opportunity to interact with all learners to go through Mathematics problems. PALS provided additional support to learners with multiple learning abilities. Again the results of the present study are consistent with those of Rosdianwinata et al.(2019) who conducted a research study in Indonesia on the impacts use of the same age peer tutoring. The study use a sample of secondary school students aged between 18 to 21 years and a quantitative research methodology. The results indicated that learners' academic achievement in understanding Mathematics through peer tutoring is better than the learners who learn on their own. Similarly, the recent study's finding was in the line of research study conducted in middle school in UK by (Johnson, 2018). The research revealed that learners who engaged in peer tutoring experienced notable enhancements in their Mathematics scores. Furthermore, these learners improved their problem solving skills and displayed a more profound comprehension of Mathematical concepts when compared to their peers in the control group.

Furthermore, the present study concur with those of (Kibuthu,2016; Baidu, 2017; Vassay, 2010; Thurston et al., 2020; Johnston, 2021; Deshler et al.,2019; Chu et al.,2017; Elizabeth et al.,2016; Moliner & Alegre,2020; Robert & Spangenberg,2020; Roy and Verma, 2020; Ycong et al.,2021;). These studies observed a statistically difference between means score of students using peer tutoring and those students learn Mathematics without using peer tutoring. Learners using peer tutoring find that through pee tutoring. It is easy to understand the Mathematical concepts and able to complete the task given by the teachers. As a result , Learners shows a positive effects on implementation of peer tutoring and were able to reduce anxiety over Mathematics subject.

Moreover, the present study determined which of the two groups gained more in learning Mathematics using peer tutoring strategy and conventional method. This was done by using the paired samples t-test to analyze the data as presented in Table 4.17

Table 4.17 Results of The Paired Sample t Test

		Mean difference	Std. Deviation	t-value	Sig.(2 tailed)
Pair 1	**Post-test-Pretest for (EG)**	**1.994**	**6.652**	**3.791**	**.000**
Pair 2	**Post-test-Pretest for (CG)**	**-.156**	**7.007**	**-.282**	**.778**

The study carried out a paired samples T-test to compare the test given before intervention and the test given after intervention scores for the EG and CG as indicated in Table 4.16. The finding in table 4.16 indicates a mean difference of 1.994 between post-test score and pretest score in experimental group and the test before intervention of Form II students in the EG as compared to -0.156 for the CG. The test

statistic of the EG was 3.791 and the probability value was small(*P<0.05)* indicates that there statistically difference between the post test and pretest among Form two students in the EG achievement in Mathematics. On the other hand , the CG obtained obtained a t-value of -.282 and the p-value was 0.778 (P> 0.05) indicating that the was not statistically difference between post test and pretest before intervention. This research finding indicates that there was an improvement in mean scores of both EG and CG. The research finding indicate that respondents in both groups gained from the use of peer tutoring. However students in EG outperformed than those students in CG.

In connection of the above report, the present study's are consistent in the research study conducted in USA by (Anderson, 2022). The findings indicated that Learners in the peer tutoring group exhibited increased determination and resilience when faced with difficult Mathematical problems. These learners also maintained higher grades and scores in Mathematics compared to those in the control group.

This study tested the null hypothesis: H01: There is no statistically significant difference in Mathematics achievement between learners who learned using peer tutoring and those who learned without using peer tutoring. The post-test was used to collect data, which was then investigated using the independent samples t-test. The research finding indicated that there was statistically difference between in students academic achievement in Mathematics between respondents in the EG and those in CG. This finding indicates that peer tutoring had a positive effect on students academic achievement. Just as important the present study's finding corroborate with those of Berso and Lorente,(2020) who conducted a research study in Philippines. The

objective of the study was to determine the influence use of same age peer tutoring strategy on learners' academic achievement in Quadratic equation topics. The findings indicated that the level of achievement in Quadratic equation topics increased for both tutor and tutee.

4.6 Peer tutoring and gender achievement in Mathematics

The four objective of the study was to see if there any gender disparity in Mathematics achievement among Form II students in Ruiru sub-County Kiambu County after learning with peer tutoring strategy. The study established a null hypothesis a proceed: H0: There is no statistically significant gender different in Mathematics achievement among students after learning using peer tutoring strategy. The study used the Mathematics achievement test to collect data. The collected data in EG was analyzed using independent samples t-test. The independent samples t-test was used to obverse if there was any mean difference between genders in the group and the paired samples t-test was used to obverse how much mean scores gain each group had. The findings are presented in Table 4.18.

Table 4.18 Results of independent samples t-test on the EG concerning gender difference

	gender	N	Mean	Mean difference	Std. Deviation	t-value	Sig.(2 tailed)
Pretest for experimental group(EG)	Male	40	40.33	2.700	4.227	3.004	.004
	Female	40	37.63	2.700	3.801	3.004	.004
Post test for experimental group(EG)	Male	40	42.93	.850	3.533	1.016	.313
	Female	40	42.08	.850	3.938	1.016	.313

Table 4.18 above was established using independent samples t-test to see whether there was difference between male and female Form II students' pretest average mean

scores for the experimental group(EG). A look at Table4.18 indicates that the average mean score for male was 40.33 while the female counterpart obtained average mean score of 37.63. The average mean different between the two groups was 2.700 in favor of the male amidst a test statistic(t-value) of 3.004. The probability value(p-value) was small ($p<0.05$) meaning that the different in the average mean scores of male and female Form II students was significant. The finding of this research study indicated that the male respondents in the EG performed better in Mathematics than their female students in the same groups before the treatment was administered. The male respondents performed better in EG than the female counterpart in the same group. The independent sample t-test found a statistically significant difference in Mathematics achievement between male Form II students ($M= 40.33, SD=4.227$) and female form two students($M=37.63, SD=3.801$); [$t(78)= 3.004, P=0.004<0.05$] at the 2-tailed significant level on the pretest.

Furthermore, Table 4.18 indicated that the male Form II students obtained an average mean scores of 42.93 while the female form two students obtained 42.08 mean score after learning Mathematics using peer tutoring strategy. The mean difference between the two groups was 0.850 in favor the male form two students amidst a t-value of 1.016. The Probability value was high($P>0.05$) indicating that the variation in the average mean score of both groups was not significant. The finding of the present study reveal that the male respondents in the EG performed better in Mathematics using peer tutoring strategy as compared to their female respondents in the same group. Therefore the disparity in Mathematics achievement between male and female respondents during the post-test was not statistically significant. The finding of this study indicates that there was an increase in mean scores of both male and female

respondents after the treatment was administered. The results revealed that Form II students achieved from learning Mathematics using peer tutoring strategy regardless of gender. This teaching strategy is effective of reducing the gap between students' gender achievement in Mathematics.

Moreover the study investigated the two groups to assess which groups (male and female) gain a greater mean score difference than the other after learning using the peer tutoring strategy. The study utilized a paired sample t-test to compare the test scores before intervention and the test scores after intervention for Form II students in the EG. The finding are presented in table 4.19 below

Table 4.19 Gender mean gained difference

Group		Mean Difference	Std. Deviation	t-value	df	Sig.(2-tailed)
Pair 1	Post-test for the experimental male-Pretest for the experimental (Male)	2.125	2.794	4.811	39	.000
Pair 2	Post-test for the experimental male-Pretest for the experimental (Female)	3.625	2.686	8.535	39	.000

Table 4.19 above indicates that the mean score difference between the test given after intervention and the test given before intervention of male in EG was 2.125 while the female counterpart received mean difference which is equal to 3.625. The study reported a t-value of 4.811 for male group and the probability reported was small($P<0.05$) indicating that the mean gained differences between the test given after and test given before intervention mean scores were statistically significant among the male students in the EG achievement in Mathematics. On the hand the female received a t-value of 8.535 and the p-value was small($p<0.05$) revealing that the mean

gained difference the test given after intervention and the test given before intervention mean scores was statistically significant among female students in the same EG. The finding indicates that there was an upgrade in Mathematics achievement mean scores of both male and female Form II students after learning Mathematics with the peer tutoring strategy. The result of this study indicates that gender has no effect on students learning using peer tutoring strategy.

Furthermore, a look at Table 4.19 indicates that the female students in the EG obtained a big mean of 3.625 in Mathematics achievement as compared to their male counterparts' mean disparity of 2.125 in the EG. Therefore by making comparison in the t-value for both male and female as indicates in table 4.19. The test statistic for male (4.811) is smaller than of the female (8.535). This implies that the female gained more mean scores than the male after learning Mathematics using peer tutoring strategy. The female performed better than their counterpart in the post test. Based on the finding of the paired samples t test, both male and female gained from leaning using peer tutoring strategy but the female gained more as compared to their male counterparts. This indicates that peer tutoring is an effective learner-centered method which can be used to close the gender gap in Mathematics achievement for Form II students in Ruiru sub-County Kiambu County.

Moreover the study investigated the hypothesis H0: There is no statistically significant gender different in Mathematics achievement among students after using learning using peer tutoring. Data was collected using the post-test and interpreted using independent samples t test. The finding from the independent samples t test revealed that there is no statistically gender different in Mathematics among Form II

students after learning using peer tutoring strategy. The present study's corroborate with that of Okunuga et al.(2020) who conducted a research study in education district II of Lagos state. The findings of the study indicated that there were no remarkable changes in Mathematics academic achievement between senior secondary school male and female students after using peer tutoring strategy. Similarly, the recent study finding concur with that of (Thomas,2007) who conducted a research study in Ekiti state in Nigeria. The objective of the study was to examine the effect of reciprocal peer tutoring on learner's academic achievement. It further determines academic achievement in terms of gender difference using competitive and conventional strategies. The finding indicated that there was no significant difference on gender differences in the three groups. This implies that gender does not effect students learning of Mathematics when they are given equal opportunity.

In contrast, in the research study conducted by Asaf et al.(2017) at high schools for the purpose to investigate the effect of peer tutoring on students achievement in Mathematics. Their research study employed a population of the study of 200 students divided into separate schools. The students were grouped into two categories; control group and experimental group. A pretest and post-test were conducted as per the designed study then a peer tutoring session was taken. The findings revealed that girls performed better as compared to boys and indicated better scores after being exposed to peer tutoring than boys in the experimental group. Just as important, in the study conducted by Johnson and Kasmer, (2018) identified statistically significant difference favoring male respondents in term of Mathematics achievement.

As a result, this investigation revealed no statistically remarkable gender different in Mathematics achievement between Males Form II students(M=42.983, SD=3.533)

and Female form two students(M=42.08, SD=3.933);[t(78)=1.016,P=0.313>0.05] at the 2 tailed significant level after learners were taught Mathematics using peer tutoring strategy

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter details a summary of the study, conclusions, recommendations for policy making, and recommendation for further study. This study sought to investigate the use of peer tutoring strategy and its influence on learners' achievement in secondary schools in Ruiru sub-County Kiambu County Kenya. The study revealed that peer tutoring was more effective teaching strategy and beneficial to the Form II students in Ruiru sub-County Kiambu County Kenya.

5.2 Summary of the finding of the Study

The study establish different types of peer tutoring used in teaching and learning Mathematics. The study determines the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning. The study establishes the difference in Mathematics achievement between learners who learned using peer tutoring strategy and those who learned without using peer tutoring. The study establishes the difference in Mathematics achievement when using peer tutoring by gender among students. The results were summarized and grounded on the research objectives discussed below.

5.2.1 Types of peer tutoring used in teaching and learning Mathematics

The study sought to establish different types of peer tutoring used in teaching and learning mathematics in secondary schools students in Ruiru sub-County, Kiambu County Kenya. Feedback from students questionnaires indicates that class wide peer

tutoring (27.50%) was the most common peer tutoring used in teaching and learning followed by cross age, same age,reciprocal peer tutoring, peer assisted learning strategy and final fixed peer tutoring. Class wide peer strategy involves combination of instructional components includes systematic content coverage, partner pairing ,continuous testing and team competition. The form two students also mostly preferred peer assisted teaching strategy as reported by 20.63% to be employed by teachers. Further, the Mathematics teachers indicated that peer assisted learning strategy was the mostly frequently applied in classroom. This strategy was effective as it enable teachers to identify slowly learners and provide a remedial sessions.

5.2.2 Extent use of peer tutoring strategy in teaching and learning Mathematics

The study sought to determine the extent to which Mathematics teachers use peer tutoring strategy in teaching and learning. Finding from the questionnaires revealed that peer tutoring strategy was used to great extent in teaching and learning Mathematics. The majority Form II students more than 40% agreed to some extent (strongly agree) that peer tutoring strategy is a practical activity used to maintain their academic achievement in Mathematics and enjoyment in collaborating with peers to solve mathematical words problems is experienced. Again, the majority students more than 35%agreed to some extent (strongly agree) that there always perceived benefits on problem solving skills, social and cognitive skills in Mathematics. Feedback from the closed ended questionnaires revealed that mathematics teachers agreed to great extent more than 40 % that they chosen peer tutoring strategy among others instructional strategy, peer teaching experience has been changing and exciting in Mathematics, learners' entry behaviors affects the choice of peer tutoring and peer tutoring improve their teaching experience in lesson planning and presentation skills.

Further feedback from in depth interview schedule, for HoDs confirmed that peer tutoring activities are well implemented to support both slower learners and proficient learners in tutoring sessions.

5.2.3 Peer tutoring and achievement in Mathematics between EG and CG

This investigation sought to see if there was any significant different in Mathematics achievement between students who learned Mathematics using peer tutoring strategy and their colleagues who learned Mathematics using conventional methods. Form II students were given pretest and post-test to see if there was a remarkable change in their achievement in Mathematics.

The findings of the independent samples t-test on the pretest indicate that there is no statistically significant change in Mathematics achievement between Form II students who learned Mathematics using peer tutoring and those who learned it using conventional method. However on other hand, the post-test indicated a statistically significance change in Mathematics achievement between those students exposed to EG (M= 43.09, SD=5.229) and those in CG (M= 37.31, SD=4.482);[t(158)= 7.500; P-value=0.00<0.05) at 2 tailed level of significance.

Moreover, the paired samples t-test indicated that both groups gained from peer tutoring, but students in the EG gained more than their counterpart in the CG. Concerning the result of this investigations , there is sufficient empirical evidence to reject the concern that there is no statistically significance change in Mathematics achievement between students in the EG and those in the CG.

5.2.4 Peer tutoring and gender achievement in Mathematics

This study sought to establish if there any gender disparity in Mathematics achievement among Form II students after learning using peer tutoring. Pretest and post-test were given to both groups to observe if there was a gender different in their achievement in Mathematics. This investigation used the independent samples t-test and paired samples t-test.

The data analysis of independent samples t-test on the pretest observed a statistically disparity in learners gender achievement in Mathematics, favoring male Form II students in pretest. On other hand the independent samples t-test observed no statistically significance difference in learners' gender achievement in Mathematics on the post-test. Moreover the paired samples t-test indicated that both male and female gained from learning using peer tutoring strategy but the females gained more(mean score of 3.625) as compared to their male counterparts(mean score of 2.125).

Concerning the outcome of this research, there is no statistically remarkable disparity in Mathematics achievement between male Form II students((M=42.983, SD=3.533) and Female Form II students(M=42.08, SD=3.933);[t(78)=1.016,P=0.313>0.05] at the 2 tailed significant level after learners were taught Mathematics using peer tutoring strategy

5.3 Conclusions

This study recognized four majors conclusions which are as follows:

First, concerning on the results of this investigation. It is reasonable to conclude that peer tutoring is a more effective teaching strategy across age, academic levels, grade levels, ability levels and skills mastered.

Second, the analysis of the respondents' questionnaires ,interview schedules and observation checklist indicated that peer tutoring was used to great extent in process of teaching and learning Mathematics. Therefore, peer tutoring strategy approach enhanced comprehension of Mathematical concepts and encouraged students to take ownership of their learning, leading to the development of effective study habits. The learners receive an opportunity to share their ideas and creativity can also be induced through peer tutoring strategy.

Third, the results of this investigation's independents samples t-test indicated that there was a statistically difference in Mathematics achievement test between learners in EG and their colleagues placed in CG. Thus, peer tutoring strategy demonstrated greater effectiveness and contributed to heightened Mathematics achievement compared to traditional teaching methods.

Fourth, both male and female Form II students gained from learning Mathematics with peer tutoring strategy. But female Form II students gained more(mean score 3.625) than their counterpart male(mean score 2.125). Considering the results of this investigation's independent samples t-test , there was enough empirical evidence to confirm that peer tutoring could be used to close the gender gap in Form II students' achievement in Mathematics in Ruiru Sub-County Kiambu County.

5.4 Recommendations

Concerning on the finding of this investigation, the researcher made recommendations for policymakers and recommendations for further studies. The recommendations was summarized below.

5.4.1 Policy Recommendations

This research study made the following recommendations:

I. Incorporating peer tutoring into the Mathematics curriculum is recommended.

Ii. Mathematics teachers overseeing these tutoring sessions implement a reward system to encourage learners to stay focused and actively participate.

iii. It is advisable to include peer tutoring strategy in the teaching of Mathematics in regular classes and other science subjects.

iv. Conducting seminars and workshops to train Mathematics teachers on implementing peer tutoring would be beneficial

5.4.2 Recommendations For Further Research

Concerning the finding of this research, the study recommended further research as follows:

i. Further research are needed to study the challenges encountered under implementation of peer assisted learning strategy in Mathematics classroom

ii. Future researchers are needed to expand the study's scope into a large sample of of special student with intellectual disabilities and physical disabilities in different county in Kenya.

iii. Further research are needed to conduct new studies on identifying relevant variables that affect the results of the learners' academic achievement in Mathematics with regard to peer tutoring strategies from different county in Kenya

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APPENDICES

Appendix A: Questionnaire for Learners

I am a postgraduate student at Kenyatta University conducting a research study on the use of peer tutoring strategy on learners' academic achievement in Mathematics in secondary schools of Ruiru sub-county, Kiambu County, Kenya.

Your contribution to this research study will be completely deliberate. If you are prepared to take part in this study, please kindly read the questionnaire and provide your answer as much as possible you can. Your answer will be used in strict confidence and will only be applied to this research study. Kindly do not mention your name on the questionnaire.

Thanks for your attention and working together in this important endeavor

Sincerely

IYAMUREMYE REGIS

Segment A: Demographic Information

1. Gender

a. Male [ ] b. Female [ ]

2. Age

a. Below 16 [ ] b. Between 16-18[ ] c. Above 18 [ ]

3. **School type**

a. Boys school [ ] b. Girls school [ ] c. Mixed school [ ]

Segment B: Peer tutoring strategies used in teaching and learning Mathematics

1. From the list below which peer tutoring strategy is mostly applied in your school. Choose one

a. Same-age peer tutoring [ ]

b. Cross-age peer tutoring [ ]

c. Class-wide peer tutoring[ ]

d. Reciprocal peer tutoring[ ]

e. Peer-assisted leaching strategy [ ]

f. Fixed peer tutoring[ ]

g. Other (specify)

…….……

……

2. From the list in question (1) which one do you prefer your teachers of Mathematics to apply in the classroom?

..……

……..

3. Give the justifications why you prefer the selection you made in (2) for teaching Mathematics

..……

…….

Section C: Learners' perception towards use of peer tutoring in Mathematics subject

To what extent do you agree with the learners' perception towards peer tutoring strategy in Mathematics subject

Statements	**Strongly agree**	**Agree**	**Moderate agree**	**Disagree**	**Strongly disagree**
1. Peer tutoring is a practical activity used to maintain my academic achievement in Mathematics					

2. There is an improvement in understanding of Mathematical concepts through peer tutoring					
3. A more positive attitude towards Mathematics is developed due to peer tutoring					
4. Mathematics is theoretical and complex to be taught by my peer					
5. Using peer tutoring allows me to exchange ideas which can help me to have a deeper understanding of Mathematics subject					
6. Confidence in understanding and solving Mathematical problem is improved with use of peer tutoring					
7. Peer tutoring helped me to complete my homework and assignments in Mathematics					
8. Seeking help from peer when struggling with Mathematics is comfortable					
9. Mathematics is found interesting when discussed in peer tutoring sessions					

10. Enjoyment in collaborating with peers to solve Mathematical problems is experienced					

Segment D: Learners' Perceived Benefits Of Peer Tutoring Strategy In Mathematics Subject

Statements	**Always**	**often**	**sometimes**	**rarely**	**never**
1. perceived benefits of peer tutoring on problem solving skills in Mathematics					
2. perceived benefits of peer tutoring on critical thinking skills in Mathematics					
3. perceived benefits of peer tutoring on social and cognitive skills in Mathematics					
4. perceived benefits of peer tutoring on communication skills in mathematics					
5. perceived benefits of peer tutoring on academic skills in Mathematics					

Segment E: Peer tutoring and learners' Mathematics achievement

1. In which way does peer tutoring strategy affect your achievement in Mathematics

……

……

Appendix B: Questionnaire for Mathematics Teachers

I am a postgraduate student at Kenyatta University conducting research on the use of peer tutoring strategy on learners' academic achievement in Mathematics in secondary schools of Ruiru sub-county, Kiambu County, Kenya.

Your contribution to this research study will be completely deliberate. If you are prepared to take part in this study, please kindly read the questionnaire and provide your answer as much as possible you can. Your answer will be used in strict confidence and will only be applied to this research study. Kindly do not mention your name on the questionnaire.

Thanks for your attention and working together in this important endeavor

Sincerely

IYAMUREMYE REGIS

Segment A: Demographic Information

1. Gender

a. Male [ ] b. Female [ ]

2. Age of the teacher

a. 25-30 [ ] b. 31-40 [ ] c. 41-50 [ ] d. 51-60 [ ]

3. **For how long have you taught Mathematics**

a. 0-5 [ ] b. 5-10 [ ] c. 10-15 [ ] c. 15-20[ ] d. Above [ ]

4. Indicate your professional qualification

a. P1 [ ] b. Dip.Ed [ ] c. B.ED [ ] d. B.A [ ] e. B.A and PG.DE [ ] f. M.E.D [ ] g. Other (states)

Segment B: Peer tutoring strategies used in teaching Mathematics

1. From the list below, which peer teaching strategy do you apply in the Mathematics classroom? Choose one

a. Same-age peer tutoring [ ]

b. Cross-age peer tutoring [ ]

c. Class-wide peer tutoring [ ]

d. Reciprocal peer tutoring [ ]

e. Fixed peer tutoring [ ]

f. Peer-assisted learning strategy [ ]

g. Other (specify)

2. From the list in question (1) which one do you prefer in the Mathematics classroom

..……

……

3, Give the justifications why you prefer the selection you made in (2) for teaching Mathematics.

..……

……

Segment C: Teachers' perception towards use of peer tutoring strategy

To what extent do you agree with the teachers' perception towards use of peer tutoring strategy in Mathematics classroom

Statements	**Strongly agree**	**Agree**	**Moderate agree**	**Disagree**	**Strongly disagree**
1. I choose the peer tutoring strategy among others instructional strategy					
2. I find it very difficult to use some peer tutoring strategies in Mathematics classroom lesson					
3. Peer tutoring improve my experience in lesson planning and presentation skills					
4. The nature of Mathematics topic affects the choice of peer tutoring					

5. learners' entry behavior affects the choice of peer tutoring					
6. My choice of peer tutoring is well determined by the prescribed school curriculum					
7. I consider students' ages and choose peer tutoring					
8. The classroom environment plays a primary role in the choice of peer tutoring					
9. Peer teaching experience has been challenging and exciting in Mathematics subject					
10. Peer tutoring strategy is a good instructional approach to teach Mathematics subject					

Segment D: **Peer tutoring activities in teaching Mathematics**

1. How often do you monitor the progress and effectiveness of peer tutoring activities for both proficient learners and slower learners

Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]

2. When selecting tutors for peer tutoring activities, what criteria do you consider to identify proficiency levels in Mathematics?

i. High academic grades [ ]

ii. Strong conceptual understanding [ ]

iii. Effective communication skills [ ]

3. How do you pair slower students as tutees with proficient students as tutors in peer tutoring activities ?

i. Randomly paired [ ]

ii. Teachers assigned pairs based on academic performance [ ]

iii. Students self selected pairs[ ]

4. How often do you ensure that peer tutoring activities are inclusive and beneficial for all students, regardless of their proficiency levels in Mathematics?

Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never[ ]

Segment E: Peer tutoring strategy and students' Mathematics achievement

1. In which ways do peer tutoring strategies affect learners' achievement in Mathematics in your classroom?

…..……

…….

Appendix C: Interview Schedule for Head Teachers

1. Which types of peer tutoring strategy mostly frequently employed by Mathematics teachers in your school?

2. What peer tutoring activities have you introduced in your Mathematics classroom to support students learning?

3. What specific roles and responsibilities do you assign to students during peer tutoring activities in Mathematics?

4. How do you group students for peer tutoring sessions in Mathematics?

5. What types peer tutoring do you provide to support slower students as tutee during peer tutoring sessions?

6. How do you assess the effectiveness of peer tutoring activities on students achievement in Mathematics?

7. Have you noticed any improvement in students understanding and performance in Mathematics as a result of implementing peer tutoring strategy?

8. How do you encourage collaboration and communication among students during peer tutoring sessions in Mathematics?

9. What challenges have you encountered while implementing peer tutoring activities in mathematics and how have you addressed them?

10. In your opinion , what are the key benefits of using peer tutoring strategy in Mathematics ?

Appendix D: Mathematics Achievement Test (MAT)

I. Pretest / 50 Marks

1. Determine the equation of line passing along the points A(1,3) and B(2,8)

2. Solve for x in the equation

$$\left(\frac{1}{16}\right)^{x-\frac{3}{4}} = 32$$

3. Find the gradient of the line whose equation is 3y-6x+7=0

4. Solve for X in the equation $16^{x^2} = 8^{4x-3}$

5. Simplify $2^x \times 5^{2x} \div 2^{-x}$

6. Determine the gradient and y-intercept of the line whose equation is 4x-3y-9=0

7. Determine the value of x in this equation $49^{(x+1)} + 7^{(2x)}$=350

8. Find the equation of a line that passes through (3, -5) and is perpendicular to a line whose equation is 4x − 5y − 6 = 0

9. Solve for x

$9^{2x} \div 3^{2x} = 2187$

10. A line which joins the point A(3,K) and B(-2,5) is parallel to another line whose equation is 5y+2x=10. find the value of K

II. post-test / 50 marks

1. Given that $p = 4$, $q = 3$ and $S = 5$, find the value of

$\frac{p+q^2-S}{S}$

2. In the following equation, determine the value of n

$\left(\frac{1}{27^n} \times (81)^{-1}\right)$= 243

3. A straight line through the point A(2,1) and B(4,m) is perpendicular to the line whose equation is 3y=5-2x. Determine the value of m

4. Determine the equation of the perpendicular to the line $x + 3$y= 4 and passes through point (2,1)

5. Determine the equation of line whose X-intercepts is -3 and Y-intercepts is 5

6. Solve the simultaneous equation by elimination method

$$y + x = 7$$

$$3x + y = 15$$

7. Simplify $\frac{\sin 90° \cos 45°}{\sin 45°}$

8. Solve for x in the equation : $32^{(x-3)} \times 8^{(x+4)} = 64 \div 2^x$

9. Two years ago,Jane was twice as old as John. If the sum of their ages 5 years from now will be 44 years. Calculate their present ages.

10. A line T, which passes through the point (-3,-5) and (3,-6) and is perpendicular to a line at the point (-2,-2)

a) Find the equation of line T in the form ax＋by＋c where a, b and c are constants

b) Given that another line Q is parallel to T and passes through (1,-3), find x and y intercept of Q

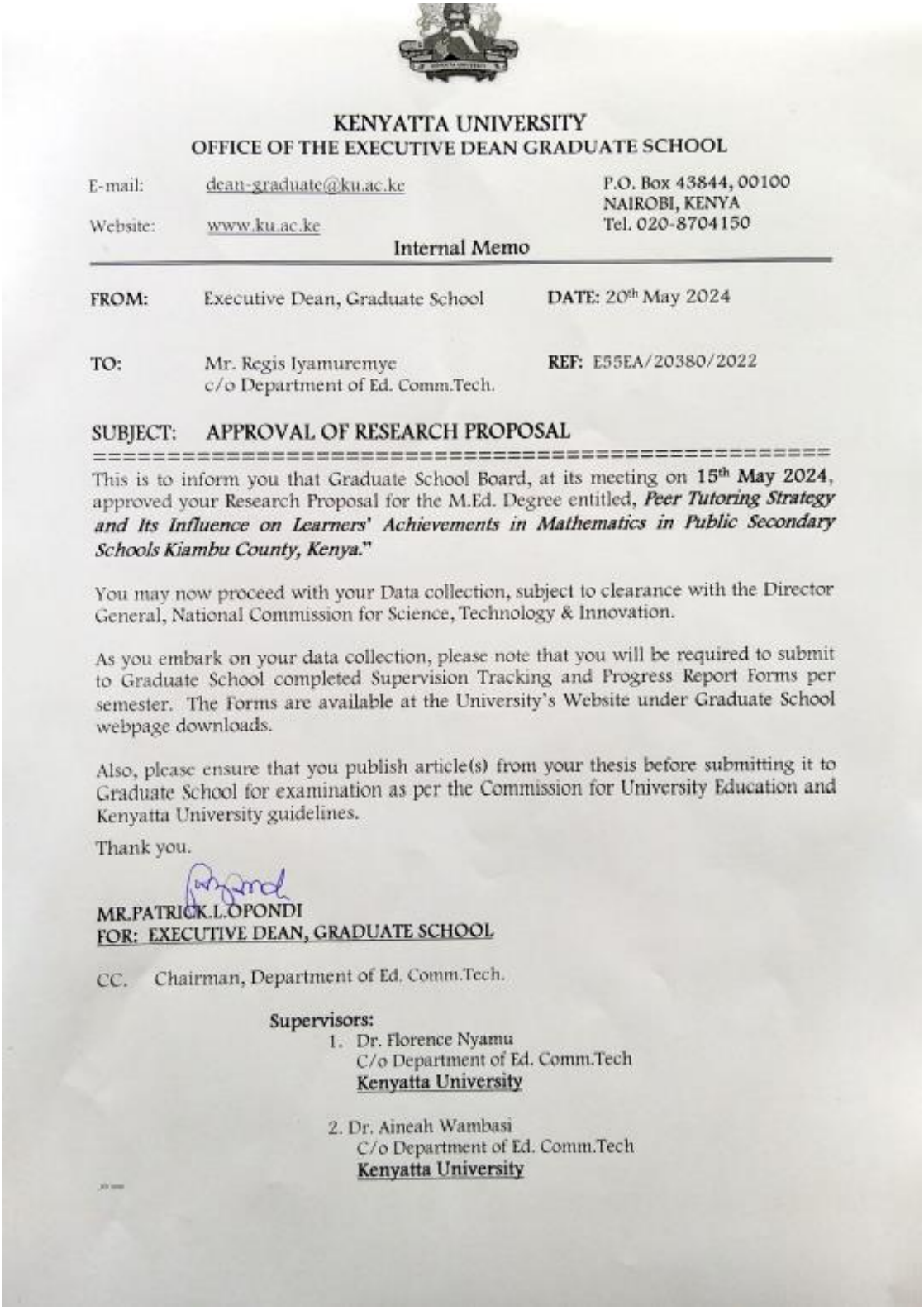
c) Find the points on intersection of L and Q

Appendix E: Observation schedule

Section A: Effect of Peer Tutoring In The Mathematics Classroom

Aspects	Great extent	Average extent	Little extent	No effect
1. Peer tutor/peer tutee Socialization				
2. Motivation to the pair				
3. Effect of teachers' reward system				
4. Effect of types of peer tutoring				
5. Effect on learners' performance in Mathematics				
6. Effect of teaching and learning resources				
7. Effect on time management				

Appendix F: Approval of Research Proposal



KENYATTA UNIVERSITY
OFFICE OF THE EXECUTIVE DEAN GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Executive Dean, Graduate School **DATE:** 20th May 2024

TO: Mr. Regis Iyamuremye
c/o Department of Ed. Comm.Tech. **REF:** E55EA/20380/2022

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on **15th May 2024**, approved your Research Proposal for the M.Ed. Degree entitled, ***Peer Tutoring Strategy and Its Influence on Learners' Achievements in Mathematics in Public Secondary Schools Kiambu County, Kenya.***"

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your thesis before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

MR.PATRICK.L.OPONDI
FOR: EXECUTIVE DEAN, GRADUATE SCHOOL

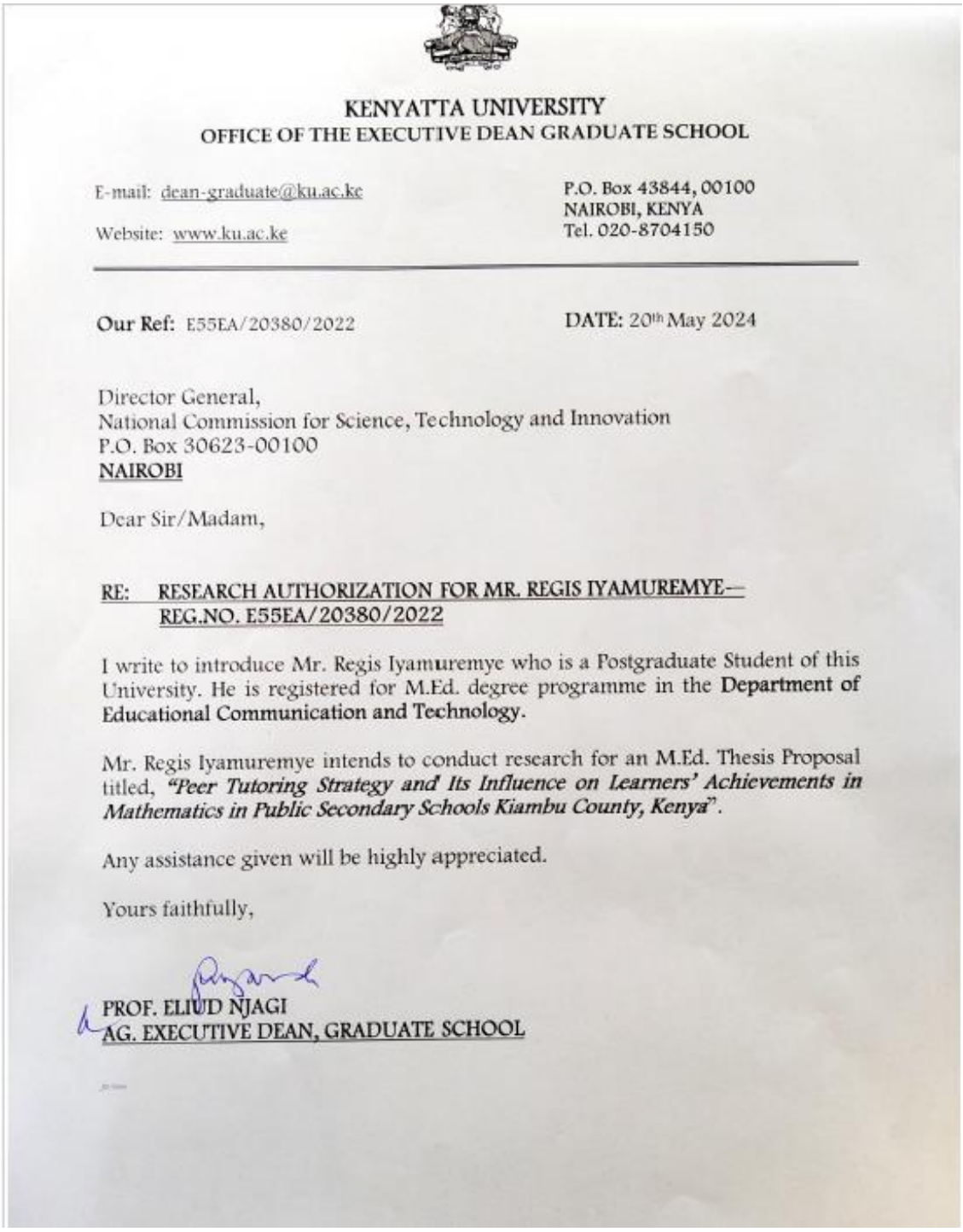
CC. Chairman, Department of Ed. Comm.Tech.

Supervisors:

1. Dr. Florence Nyamu
   C/o Department of Ed. Comm.Tech
   Kenyatta University

2. Dr. Aineah Wambasi
   C/o Department of Ed. Comm.Tech
   Kenyatta University

Appendix G: Research Authorization



KENYATTA UNIVERSITY
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E-mail: dean-graduate@ku.ac.ke
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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: E55EA/20380/2022

DATE: 20th May 2024

Director General,
National Commission for Science, Technology and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. REGIS IYAMUREMYE—
REG.NO. E55EA/20380/2022

I write to introduce Mr. Regis Iyamuremye who is a Postgraduate Student of this University. He is registered for M.Ed. degree programme in the **Department of Educational Communication and Technology.**

Mr. Regis Iyamuremye intends to conduct research for an M.Ed. Thesis Proposal titled, ***"Peer Tutoring Strategy and Its Influence on Learners' Achievements in Mathematics in Public Secondary Schools Kiambu County, Kenya"***.

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELIUD NJAGI
AG. EXECUTIVE DEAN, GRADUATE SCHOOL

Appendix H: Research Authorizations from Ministry of Education

MINISTRY OF EDUCATION
State Department for Early Learning and Basic Education

Telegram: .....
Telephone: 0718 232 268
Fax: .....
E-mail: deoruiru@gmail.com

SUB COUNTY DIRECTOR OF EDUCATION
RUIRU SUB COUNTY
P O BOX 140
RUIRU

Ref: RIR/RSCH/75/VOL I/120

7th June, 2024

To the Principals
Public Secondary Schools
RUIRU SUB COUNTY

RE: RESEARCH AUTHORIZATION – IYAMUREMYE REGIS

The above cited has been authorized to undertake a study on ***"Peer tutoring strategy and its influence on learners' achievement in mathematics in public secondary schools Kiambu County Kenya"*** for a period ending 5th June 2025.

Please accord him the necessary assistance.

P/P

SUB COUNTY DIRECTOR OF EDUCATION · P.O. BOX 140-00232, RUIRU · 07 JUN 2024 · Sign.

J.M. NJOROGE
SUB COUNTY DIRECTOR OF EDUCATION
RUIRU

MINISTRY OF EDUCATION
State Department For Basic Education

Telephone: Kiambu (office) 0768 970412

Email:directoreducationkiambu@yahoo.com
When replying please quote

COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY
P. O. Box 2300
KIAMBU

KBU/CDE/DEPT 8/VOL.I

6TH June 2024

Mr. Iyamuremye Regis
Kenyatta University
NAIROBI

RE: RESEARCH AUTHORIZATION

Reference is made to NACOSTI letter Ref. No. NACOSTI/P/24/36559 dated 5TH June 2024.

You have been authorized to research on **"PEER TUTORING STRATEGY AND ITS INFLUENCE ON LEARNERS' ACHIEVEMENT IN MATHEMATICS IN PUBIC SECONDARY SCHOOLS IN KIAMBU COUNTY** - for a period ending **5TH June 2025.**

Please accord him the necessary assistance.

COUNTY DIRECTOR OF EDUCATION ★ KIAMBU COUNTY ★ KENYA
12 JUN 2024

STEPHEN KIMANI
For: COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY

Appendix I: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 456024

Date of Issue: 05/June/2024

RESEARCH LICENSE

This is to Certify that Mr.. Iyamuremye Regis of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: PEER TUTORING STRATEGY AND ITS INFLUENCE ON LEARNERS' ACHIEVEMENT IN MATHEMATICS IN PUBLIC SECONDARY SCHOOLS KIAMBU COUNTY, KENYA for the period ending : 05/June/2025.

License No: NACOSTI/P/24/36559

456024

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions

Appendix J: Map of Area Study