

Attitude Towards Mathematics And Academic Performance Among Girls In Public Secondary Schools In Mwingi Central Sub-County, Kitui County, Kenya

Nzuki Cornelius Mutuku

Department of Educational Psychology, South Eastern
Kenya University

Dr. Ruth Mwanzia. PhD

Department of Educational Foundations, South Eastern
Kenya University

Dr. Lucia Ngei. PhD

Supervisors, Department of Educational Psychology, South
Eastern Kenya University

Abstract: Attitude towards Mathematics is an important factor that may influence learners' engagement with the subject and their academic performance. This study examined the relationship between attitude towards Mathematics and academic performance among girls in public secondary schools in Mwingi Central Sub-County, Kitui County, Kenya. The study was guided by the Theory of Planned Behaviour. A descriptive research design was adopted. The target population consisted of Form Three girls in public secondary schools in the sub-county. A sample of 300 girls was targeted, out of which 285 completed and returned the questionnaires, representing a response rate of 95%. Mathematics teachers were also involved in the study to provide complementary information. Data were collected using students' questionnaires, teacher interviews, and documentary analysis of students' Mathematics performance. Descriptive statistics and Pearson product-moment correlation were used to analyse the data. The findings showed that a majority of the girls demonstrated low attitudes towards Mathematics, with 180 (63.3%) respondents falling within the low-attitude category. The study also found a moderate positive relationship between attitude towards Mathematics and academic performance, with a correlation coefficient of $r = .58$. The study concludes that more positive attitudes towards Mathematics are associated with better academic performance among girls. The study recommends that schools, Mathematics teachers, parents, and education stakeholders should implement strategies that promote positive attitudes towards Mathematics among girls.

Keywords: attitude, Mathematics, academic performance, girls, secondary schools, Kenya

I. INTRODUCTION

A. BACKGROUND TO THE STUDY

Mathematics is regarded as the key ingredient behind scientific progress, technological advances and socioeconomic growth. It provides learners with important skills such as logical thinking, critical analysis and problem-solving skills which are important for success in STEM-related disciplines and life in general (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2015). Notwithstanding

this, learners' performance in mathematics remains one of the greatest concerns in education worldwide. According to the Organisation for Economic Co-operation and Development (OECD, 2023), the results of the PISA 2022 demonstrated a considerable fall in mathematics performance in participating countries which makes it necessary to reveal factors influencing students' achievement.

It is known that among the many factors influencing mathematics achievement, attitude is one of the most powerful factors predicting academic success. An attitude can be defined as learners' feelings, beliefs, interests, self-confidence

and predisposition towards learning mathematics. Learners having a positive attitude show more motivation, persistence, engagement in class and eagerness to solve difficult mathematical problems, whereas learners with a negative attitude suffer from anxiety and avoid mathematics lessons (Hwang & Son, 2021).

The findings of research carried out in Singapore by Hwang and Son (2021) indicated that students with positive attitudes towards mathematics, including belief in one's mathematical capabilities and the value of the subject, performed significantly better in examinations than other students. In addition, the researchers noted that confidence in learning mathematics was the most effective attitudinal predictor of achievement. According to Hildebrand, Posid, Moss-Racusin, Hymes and Cordes, (2023), girls with positive attitudes towards mathematics including confidence and interest in the subject performed better in mathematics.

The evidence from Africa is also indicative of the connection between attitude and achievement in mathematics. For instance, Awofala, Lawal, Arigbabu and Fatade, (2022) found that the attitude of the students towards mathematics was a significant predictor of their performance in the discipline with learners having positive attitudes consistently performing better than those with negative attitudes. Similarly, the studies carried out in Tanzania and Zimbabwe found that negative attitude towards mathematics was responsible for poor performance in mathematics in secondary schools (Makondo & Makondo, 2020; Mazana, Montero & Casmir, 2020). This is consistent with the situation in Kenya where mathematics is also one of the core subjects taught at the secondary education level. The performance levels in mathematics among girls have remained relatively low. According to Mulandi (2021), a study conducted in Kirinyaga County found a significant positive correlation between girls' attitudes towards mathematics and their performance levels and recommended mentorship and guidance programs in order to cultivate positive attitudes. In addition, according to Gichaga, Kithiji and Magaju (2022), negative attitudes were a major contributor to poor performance in mathematics among girls in Kajiado County. This was similar to what Mutinda, Ileri and Mugambi (2020) found in Kitui County.

Whereas there have been studies to show the influence of attitudes on the performance of mathematics, there has been minimal research to show the nature of attitudes displayed by girls at public senior secondary schools in Mwingi Central Sub-County, Kitui County. In addition, records from sub-county examinations have shown poor performance among girls in mathematics over the years. This could be due to the presence of negative attitudes among girls in mathematics.

Consequently, this research analyzed the effect of the attitude of girls towards Mathematics on their performance in public senior secondary schools in Mwingi Central Sub-County, Kitui County, Kenya. The research aimed at identifying the various forms of attitudes that the girls have towards Mathematics and the impact of these attitudes on their performance. The outcome of this research is anticipated to add to the existing literature on Mathematics education.

B. STATEMENT OF THE PROBLEM

Mathematics is a core and compulsory subject in the Senior school curriculum in Kenya and serves as a foundational requirement for placement in post-secondary institutions as well as entry into careers such as accounting, economics, engineering and banking. Performance in Mathematics is particularly critical because it influences students' eligibility for competitive courses at universities and colleges. Despite its importance, national examination results over the years have indicated a persistent trend of comparatively low performance in Mathematics among girls raising concern among educators, parents and policymakers. Although several studies conducted in different regions of Kenya and other countries have identified students' attitudes toward Mathematics as a significant predictor of academic performance, these findings cannot automatically be generalized to all contexts due to variations in socio-cultural, economic and school-related factors.

In Kitui County and specifically in Mwingi Central Sub-County, no empirical study has specifically examined how girls' attitudes toward Mathematics relate to their performance in the subject. Existing studies in the county have largely focused on overall academic performance, school resources or general gender disparities without isolating attitude as a variable of interest among girls. This presents a clear knowledge gap, while attitude has been shown elsewhere to influence Mathematics achievement there is limited localized evidence explaining whether and how girls' attitudes toward Mathematics contribute to their persistent poor performance in public senior schools in Mwingi Central Sub-County.

Without such context-specific evidence, interventions aimed at improving performance may fail to address key underlying psychological factors. Therefore, the central concern of this study was the persistent poor performance in Mathematics among girls in public senior schools in Mwingi Central Sub-County which may be associated with their attitudes toward the subject. The study sought to generate empirical evidence to establish whether a significant relationship existed between girls' attitudes towards Mathematics and their academic performance within this specific context, thereby informing targeted interventions and policy decisions.

C. OBJECTIVE OF THE STUDY

The study sought to:

Determine the relationship between forms of attitudes towards Mathematics and academic performance among girls in public secondary schools in Mwingi Central Sub-County, Kitui County, Kenya.

D. RESEARCH QUESTION

The study was guided by the following research question:

What is the relationship between forms of attitudes towards Mathematics and academic performance among girls in public secondary schools in Mwingi Central Sub-County, Kitui County, Kenya?

II. LITERATURE REVIEW

A. ATTITUDE TOWARDS MATHEMATICS

Students' attitudes toward Mathematics have consistently been identified as important determinants of academic performance. Attitude encompasses learners' feelings, beliefs, interest, confidence and willingness to engage in mathematical activities. Positive attitudes are generally associated with greater motivation, persistence and higher academic achievement, whereas negative attitudes often result in anxiety avoidance of mathematical tasks, and poor performance (Hwang & Son, 2021).

International evidence demonstrates a strong association between attitude and Mathematics achievement. In Australia, Darmawan (2020) examined the relationship between students' attitudes and academic performance among 3,200 Grade Eight students from 240 schools using structural equation modelling. The study found that students' enjoyment of Mathematics had declined and that positive attitudes were significantly associated with improved academic performance. These findings suggest that learners' attitudes remain an important predictor of achievement across different educational systems.

Similarly, Hwang and Son (2021) investigated the forms of attitudes exhibited by secondary school students in Singapore using latent profile analysis. The study identified four distinct attitude profiles: very negative, negative, neutral and positive. Learners with positive attitudes consistently achieved higher Mathematics scores than those with negative attitudes, while the largest proportion of students exhibited negative attitudes toward the subject. The findings demonstrate that attitudes toward Mathematics are multidimensional and that different attitude profiles are associated with varying levels of academic achievement.

Comparable findings have been reported in Africa. In Nigeria, Awofala et al. (2022) employed a correlational research design involving 1,600 female students from 40 senior secondary schools and established that positive attitudes significantly predicted higher Mathematics achievement, whereas negative attitudes were associated with lower performance. Likewise, Mahlangu and Chireshe (2021) reported that South African students who perceived Mathematics as difficult and uninteresting were more likely to perform poorly, while those with positive attitudes achieved significantly better academic outcomes. These studies provide consistent evidence that students' attitudes play a significant role in Mathematics achievement across diverse African contexts.

Evidence from Kenya also supports the relationship between attitude and Mathematics performance. Mutege, Gitonga and Rugano (2021) examined the association between Mathematics anxiety, attitude and academic performance among secondary school students in Embu County. Their findings indicated that learners with positive attitudes reported lower levels of Mathematics anxiety and achieved better academic results than those with negative attitudes. The study concluded that improving learners' attitudes could contribute to enhanced Mathematics performance.

Although previous studies consistently demonstrate that positive attitudes are associated with better Mathematics

achievement, most have been conducted outside Mwingi Central Sub-County or have examined broader populations of secondary school students rather than focusing specifically on girls. Moreover, many studies have treated attitude as a single construct without examining the distribution of the different forms of attitudes exhibited by learners within specific educational contexts. Consequently, little is known about the predominant forms of attitudes toward Mathematics among girls in public senior secondary schools in Mwingi Central Sub-County and how these attitudes relate to their academic performance.

The present study sought to address this contextual gap by examining the forms of attitudes toward Mathematics among girls in public senior secondary schools in Mwingi Central Sub-County, Kitui County and determining how these attitudes relate to academic performance. By providing evidence from a rural Kenyan context, the study contributes to the growing body of literature on attitudes toward Mathematics and offers findings that may inform interventions aimed at improving girls' achievement in the subject.

B. ATTITUDE AND ACADEMIC PERFORMANCE

Academic performance refers to the level of achievement attained by a learner in a given subject and is commonly measured using examination or assessment scores. In the present study, academic performance refers to girls' achievement in Mathematics as reflected in their Mathematics assessment results. A growing body of research has established that students' attitudes toward Mathematics are closely associated with their academic achievement. Attitude influences learners' motivation, confidence, persistence and willingness to engage in mathematical learning all of which contribute to performance outcomes (Hwang & Son, 2021).

Several international studies have reported a positive relationship between attitude and Mathematics achievement. Darmawan (2020) found that Australian students who demonstrated positive attitudes toward Mathematics achieved significantly higher academic performance than those with negative attitudes. Similarly, Hwang and Son (2021) identified four forms of attitude; very negative, negative, neutral and positive and established that students with positive attitudes consistently outperformed their counterparts with negative attitudes. Their findings further indicated that confidence and enjoyment of Mathematics were important dimensions of attitude associated with improved academic performance.

Evidence from Africa supports these findings. In Nigeria, Awofala et al. (2022) reported that positive attitudes significantly predicted higher Mathematics achievement among female secondary school students, whereas negative attitudes were associated with lower performance. Likewise, Mahlangu and Chireshe (2021) found that South African learners who viewed Mathematics as interesting and valuable achieved better academic outcomes than those who perceived the subject as difficult or irrelevant. These studies suggest that learners' attitudes play a critical role in shaping their success in Mathematics across diverse educational contexts.

Similar findings have been reported in Kenya. Mutege, Gitonga and Rugano (2021) established that students with positive attitudes toward Mathematics experienced lower

levels of Mathematics anxiety and performed significantly better than those with negative attitudes. The study concluded that improving learners' attitudes could enhance Mathematics achievement by increasing confidence, motivation and engagement in classroom activities.

The relationship between attitude and academic performance, however is not always straightforward. Although learners with positive attitudes generally demonstrate greater interest, persistence and commitment to learning Mathematics, academic achievement may also be influenced by other factors such as instructional quality, availability of learning resources, learner ability and the home environment (Mutege et al., 2021; Awofala et al., 2022). Consequently, while attitude is an important predictor of achievement, its influence should be interpreted alongside other educational factors.

Although previous studies consistently report a positive association between attitude and Mathematics achievement, most have been conducted outside Mwingi Central Sub-County or have focused on broader student populations. Limited empirical evidence exists regarding how the different forms of attitudes toward Mathematics relate to the academic performance of girls in public senior secondary schools within Mwingi Central Sub-County, Kitui County. The present study therefore sought to address this contextual gap by examining the forms of attitudes exhibited by girls and determining their relationship with academic performance in Mathematics.

C. THEORETICAL FRAMEWORK

This study was guided by the Theory of Planned Behavior (TPB) developed by Ajzen (1985). The theory proposes that an individual's behaviour is influenced by three interrelated constructs: attitude toward the behaviour, subjective norms and perceived behavioural control (Ajzen, 1991, 2005). Attitude refers to an individual's positive or negative evaluation of performing a particular behaviour and is regarded as a key determinant of behavioural intention and subsequent action.

Within the context of Mathematics education, TPB suggests that girls who develop positive attitudes toward Mathematics are more likely to engage actively in learning activities, persist when solving challenging problems and ultimately achieve better academic outcomes. Conversely, negative attitudes may reduce motivation, effort and participation, leading to lower academic performance. Previous studies have consistently reported that positive attitudes are associated with improved Mathematics achievement (Hwang & Son, 2021; Awofala et al., 2022; Mutege, Gitonga, & Rugano, 2021).

The theory was considered appropriate for this study because it provides a framework for explaining how girls' attitudes toward Mathematics influence their learning behaviours and academic performance. Although TPB also incorporates subjective norms and perceived behavioural control, the present study focused specifically on the attitude component as the principal variable influencing Mathematics achievement among girls in public senior secondary schools in Mwingi Central Sub-County, Kitui County.

Despite its usefulness, TPB has some limitations. The theory assumes that behaviour is largely rational and may not

fully account for emotional factors such as Mathematics anxiety or contextual influences including teaching quality, learning resources and cultural expectations that may affect girls' achievement. Nevertheless, TPB remains a suitable theoretical foundation because it emphasizes the central role of attitude in shaping learners' behaviour and has received substantial empirical support in educational research (Ajzen, 1991; Archie, Hayward, Yoshinobu & Laursen, 2022).

D. CONCEPTUAL FRAMEWORK

The conceptual framework for this study was derived from the Theory of Planned Behavior (Ajzen, 1991, 2005) and empirical evidence demonstrating that learners' attitudes influence their academic achievement in Mathematics (Hwang & Son, 2021; Awofala et al., 2022; Mutege, Gitonga, & Rugano, 2021). The framework conceptualizes the forms of attitude toward Mathematics as the independent variable and academic performance in Mathematics as the dependent variable. It assumes that girls who exhibit positive attitudes toward Mathematics are more likely to engage actively in learning, demonstrate persistence when solving mathematical problems and achieve higher academic performance than those with neutral or negative attitudes.

Conceptual Model

Independent Variable → Dependent Variable

- Forms of Attitude toward Mathematics
 - ✓ Positive attitude
 - ✓ Negative attitude
- Academic Performance in Mathematics
 - Improved performance
 - Declining performance
- Other factors, such as teacher-related factors, parental support, learning resources and school environment may also influence academic performance.

III. METHODOLOGY

A. RESEARCH DESIGN

The study adopted a descriptive research design. The design was appropriate because the study sought to examine the existing attitudes of girls towards Mathematics and determine the relationship between attitude and academic performance. The design enabled the researcher to collect quantitative data from the girls and complementary qualitative information from Mathematics teachers. However, because the study was descriptive and correlational in nature the findings indicate relationships between variables but do not establish direct cause-and-effect relationships.

B. STUDY POPULATION

The study was conducted among girls in public secondary schools in Mwingi Central Sub-County, Kitui County, Kenya. The target population consisted of 1,010 Form Three girls in

public secondary schools. Forty-four Mathematics teachers were also included to provide additional information regarding learners' attitudes and Mathematics performance.

C. SAMPLE SIZE AND SAMPLING

The sample size was determined using the Krejcie and Morgan approach. From the target population of 1,010 girls, a sample of 285 respondents was required. To cater for possible non-response and attrition, the researcher targeted 300 girls. Of the 300 questionnaires administered, 285 were properly completed and returned giving a response rate of 95%. Twenty Mathematics teachers from the participating schools were also involved in the study.

D. DATA COLLECTION INSTRUMENTS

The study used three main data collection instruments:

a. STUDENTS' QUESTIONNAIRE

Data were collected using a structured self-administered questionnaire designed to assess girls' attitudes toward Mathematics. The instrument comprised two sections. Section A collected demographic information, while Section B contained 16 attitude statements measured on a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). The attitude items were adapted from the Fennema-Sherman Mathematics Attitudes Scales (Fennema & Sherman, 1976), which have been widely applied in Mathematics education research (Oribhabor, 2020; Jailani, Rosli & Mahmud, 2024). The questionnaire was selected because it provides a reliable and standardized measure of learners' attitudes toward Mathematics and is suitable for descriptive and correlational analysis. Prior to the main study, the instrument was pilot-tested and its internal consistency was assessed using Cronbach's alpha with a coefficient of 0.70 or higher considered acceptable for research purposes (Cronbach, 1951).

b. TEACHER INTERVIEW GUIDE

A semi-structured interview guide was used to collect qualitative data from Mathematics teachers on girls' attitudes toward Mathematics and their influence on academic performance. The guide comprised two sections. Section A collected demographic information while Section B explored teachers' perceptions of the forms of attitudes exhibited by girls the behavioural indicators of these attitudes and their observed influence on Mathematics achievement. The interview questions were informed by previous studies on Mathematics attitudes and achievement (Yang, Huang & Liu, 2020; Oribhabor, 2020; Bukhari, 2021; Murangira, Uworwabayeho & Twagilimana, 2024). The semi-structured format enabled teachers to provide detailed explanations and contextual insights that complemented the quantitative findings from the students' questionnaire.

c. DOCUMENTARY ANALYSIS

Document analysis was used to obtain objective data on girls' academic performance in Mathematics. The document analysis schedule captured Form Three Mathematics scores from three school-based assessments administered during Term One of 2026: the opening test, mid-term examination and end-term examination. The records were used to establish learners' Mathematics achievement and to complement data obtained from the students' questionnaire and teachers' interviews. The use of multiple data sources enhanced the credibility of the findings through methodological triangulation (Creswell & Creswell, 2020).

E. VALIDITY AND RELIABILITY

The student questionnaire was subjected to the judgment of experts so that its face, content and construct validity could be established (Cooper & Schindler, 2011). The recommendations of the education experts from the School of Education, South Eastern Kenya University were used to fine-tune the tool so that its wording, relevance and adequacy were improved. On the other hand, the teachers' guide was pilot tested among three Mathematics teachers who were not involved in the main study to ascertain the relevance and applicability of each question in the interview guide (Creswell & Poth, 2021; Braun & Clarke, 2021).

The reliability of the student questionnaire was tested by determining Cronbach's alpha value after their pilot testing. The reliability analysis showed that the questionnaire had a Cronbach's alpha value of 0.81 which is above the reliability threshold of 0.7 for social science research (Cronbach, 1951; Creswell & Creswell, 2020). Therefore, it can be said that the questionnaire was reliable enough to use in the study of girls' attitudes in Mathematics.

F. DATA ANALYSIS

Quantitative data obtained from the students' questionnaires and document analysis were coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 30. Descriptive statistics, including frequencies, percentages, means and standard deviations were used to summarize the forms of attitudes toward Mathematics and students' academic performance. Pearson's product-moment correlation coefficient was computed to determine the relationship between girls' attitudes toward Mathematics and their academic performance. Qualitative data from the teachers' interviews were analyzed using thematic analysis following the procedures proposed by Braun and Clarke (2021). Findings from the questionnaires, interviews and document analysis were triangulated to enhance the credibility of the results (Creswell & Creswell, 2020).

IV. RESULTS

A. QUESTIONNAIRE RETURN RATE

A total of 300 questionnaires were distributed to Form Three girls in public senior secondary schools in Mwingi Central Sub-County. Of these, 285 were completed and returned yielding a response rate of 95% which was considered adequate for data analysis (Mugenda & Mugenda, 2019). In addition, all 20 sampled Mathematics teachers participated in the interviews, resulting in a 100% response rate for the qualitative component of the study.

Participants	Questionnaires issued	Returned	Return rate
Girls	300	285	95%

Table 4.1: Questionnaires Return Rate

B. DISTRIBUTION OF RESPONDENTS ACCORDING TO ATTITUDE TOWARDS MATHEMATICS

The study examined the forms of attitudes towards Mathematics of the girls in public senior secondary schools in Mwingi Central Sub-County. The scores ranged from 1.0 to 3.9 with 1.0-1.9 being low, 2.0-2.9 moderate and 3.0-3.9 high. According to Table 4.2 below, about 63.3% ($n=180$), 20% ($n=57$) and 16.7% ($n=48$) of the respondents had low, moderate and high attitudes towards Mathematics respectively. Thus, most of the respondents had a negative attitude towards Mathematics.

Category	Score Range	Frequency	Percentage
Low Attitude	1.0 – 1.9	180	63.3%
Moderate Attitude	2.0 – 2.9	57	20.0%
High Attitude	3.0 – 3.9	48	16.7%
Total		285	100%

Table 4.2: Distribution of attitudes toward mathematics

The study established a significant relationship between the attitudes of the selected learners towards the subject and their achievement levels. Most previous studies have shown that negative attitudes are among the primary factors that reduce the achievement levels of secondary school students in Mathematics. For instance, Hwang and Son (2021) concluded that students with positive attitudes towards Mathematics score higher in the subject than those with negative attitudes. Similarly, Awofala et al. (2022) discovered that positive attitudes significantly predict higher Mathematics achievement. Thus, learners' attitudes towards Mathematics continue to be a significant predictor of academic performance.

Therefore, the results of the quantitative aspects of the study, it is possible to conclude that negative attitudes towards Mathematics reduced the likelihood that the girls would engage in Mathematics-related activities, leading to poor performance. The results of the current study are in line with those of previous research that have revealed a similar relationship between learners' attitudes towards Mathematics and their performance in the subject (Mutegi, Gitonga, & Rugano, 2021; Mahlangu & Chireshe, 2021).

C. RELATIONSHIP BETWEEN FORMS OF ATTITUDE TOWARDS MATHEMATICS AND ACADEMIC PERFORMANCE

Pearson's product-moment correlation analysis revealed that there is a significant positive relationship between girls' attitudes toward Mathematics and their academic performance ($r=.58$). This implies that girls with positive attitudes toward Mathematics had better academic performance than those with negative attitudes. The strength of this relationship was moderate; hence, it is evident that girl students' attitudes toward Mathematics partially predict their academic performance.

These findings concur with previous results that also found a positive relationship between students' attitudes toward Mathematics and their academic performance. For example, Hwang and Son (2021) found that students with positive attitudes toward Mathematics, including confidence and enjoyment had significantly better academic performance than those with negative attitudes. Awofala et al. (2022) also found that positive attitudes significantly predicted Mathematics achievement among female secondary school students. Mutegi, Gitonga and Rugano (2021) found that positive attitudes toward Mathematics predicted higher academic achievement and reduced Mathematics anxiety among students, while Mahlangu and Chireshe (2021) found that positive attitudes increased learners' motivation and academic performance in Mathematics.

It can be concluded from these results that promoting positive attitudes among female students will improve their academic performance in Mathematics. However, since the relationship was moderate, other variables such as learner, school and context-level factors also contribute to Mathematics performance.

D. FINDINGS FROM MATHEMATICS TEACHERS

The qualitative results obtained from Mathematics teachers also showed similar results to those of the quantitative results regarding girls' attitudes towards Mathematics. The teachers reported that learners with positive attitudes towards Mathematics were more active during lessons, always did their assignments and participated in class discussions and asked for help when they were stuck. However, the female students with negative attitudes towards Mathematics were described by the teachers as shy and reluctant to participate in classroom activities and did not want to learn Mathematics. For instance, one respondent said:

The majority of girls in my class rarely do Mathematics assignments, refrain from practicing Mathematics, participate less during Mathematics lessons, while some deliberately avoid attending Mathematics lessons (Mathematics teacher, personal communication, May 11, 2026).

The teachers also noted that most girls considered Mathematics as a hard subject which made them reluctant to learn it because it would make them feel dumb if they failed. This finding concurs with the results of previous studies where positive attitudes of learners towards Mathematics were found to contribute to their motivation, involvement in learning activities and improved grades while negative attitudes led to

demotivation, lack of interest and poor performance (Awofala et al., 2022; Mutegei, Gitonga & Rugano, 2021; Hwang & Son, 2021).

In general, it can be concluded that the qualitative results supported the quantitative results to show that the attitudes of girls towards Mathematics have an impact on their involvement in classroom activities and grades.

V. DISCUSSION OF FINDINGS

The study showed that the majority (63.3%) of the sampled girls in public senior secondary schools in Mwingi Central Sub-County had a negative attitude towards Mathematics. Only a minority (16.7%) of the respondents had a positive attitude towards the subject. Therefore, most girls lacked interest, confidence and involvement in Mathematics leading to decreased involvement in classroom activities and problems solving resulting in poor performance.

The study's results were consistent with prior research on learners' negative attitudes towards Mathematics which have been revealed as a key predictor of poor performance in the subject. Consistently with the results of this study, Robinson and Aldridge (2022) attributed learners' undesirable conduct and Mathematics anxiety to low self-confidence in their skills and negative attitudes towards Mathematics. Dowker and Sheridan (2022) also demonstrated that negative attitudes such as Mathematics anxiety and pessimism reduce the willingness to engage in mathematical activities which lead to poor performance. Indeed, Mahlangu and Chireshe (2021) noted that learners who held positive attitudes towards Mathematics performed significantly better in the subject than those who felt that Mathematics was dreadful, irrelevant, or too challenging.

The findings of this study were also congruent with the responses provided by teachers to the open-ended questions. The participant reported that learners who held negative attitudes towards Mathematics avoided engaging in classroom activities, rarely did the assigned tasks, and lacked confidence in addressing Mathematics tasks. Similarly, Mata, Monteiro, and Peixoto (2021) revealed that negative attitudes reduce participation and persistence in Mathematics. In contrast, learners who held positive attitudes were more likely to be committed, persistent and involved in learning activities. Indeed, Zhang, Zhao, and Kong (2020) noted that negative attitudes towards Mathematics and Mathematics anxiety contribute to diminished participation and persistence in Mathematics resulting in poor performance.

A significant positive correlation ($r = .58$) was found between learners' attitudes towards Mathematics and their performance in the subject. A positive attitude predicts enhanced performance. For instance, as revealed by Hwang and Son (2021), confidence, enjoyment and positive attitudes lead to improved performance. Besides, Awofala et al. (2022) showed that attitude predicted Mathematics performance for female secondary school learners.

The study's findings indicate that although attitude towards Mathematics significantly predicted performance, the strength of this relationship was moderate ($r = .58$) and therefore there exists scope for improving Mathematics

performance beyond simply cultivating positive attitudes. Although there is a need for educators to create positive learning environments where learners can engage in learner-centred activities and are encouraged to participate actively in classroom activities and develop confidence in performing Mathematics tasks other learner, school and context-related factors should be considered. For instance, according to Palomares-Ruiz and Garcia-Perales (2020), besides developing positive attitudes towards the subject, Mathematics performance could be improved particularly for girls through fostering self-confidence.

VI. CONCLUSION

This study established that girls in public senior secondary schools in Mwingi Central Sub-County had negative attitudes towards Mathematics. Only a small percentage of the respondents had positive attitudes towards Mathematics. Negative attitudes towards Mathematics were revealed as comprising of low interest, lack of confidence and low involvement which impede learning and achievement. The study also established that positive attitudes contributed to improved Mathematics achievement as reported by previous studies (Hwang & Son, 2021; Awofala et al., 2022; Mahlangu & Chireshe, 2021).

The study also established that attitudes towards Mathematics were a significant predictor of Mathematics achievement among the sampled girls. However, it was noted that attitude alone could not account for the variance in achievement as there were other variables that influenced Mathematics achievement at the individual, institutional and environmental levels.

In conclusion, this study revealed that positive attitudes towards Mathematics promoted enhanced levels of Mathematics performance among senior secondary school girls. This study also revealed the need for confidence-building measures and learner-centred strategies to promote positive attitudes towards Mathematics and improved achievement. The study highlights the need to consider attitudes towards Mathematics as a critical area for intervention in the effort to promote achievement among Kenyan secondary school students.

VII. RECOMMENDATIONS

Based on the findings, the study recommends that:

MATHEMATICS TEACHERS

Mathematics teachers should use learner-centred teaching approaches that encourage participation, confidence, collaboration and active engagement with Mathematics. Teachers should also provide constructive feedback and encourage girls to view mistakes as part of the learning process.

SCHOOLS

Schools should develop programmes that promote positive attitudes towards Mathematics among girls. Mathematics clubs, mentorship programmes, academic support programmes and career guidance may help girls appreciate the importance of Mathematics.

PARENTS

Parents should encourage girls to study Mathematics and avoid communicating negative stereotypes about the subject.

EDUCATION STAKEHOLDERS

Education stakeholders should develop interventions that address negative attitudes towards Mathematics in addition to improving teaching resources and instructional practices.

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