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Original Article

Gender Differences in Attitude towards Mathematics among Secondary School Students in Rukungiri District, Southwestern Uganda

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Gender Differences, Attitude, Mathematics, Academic Achievement, Students, Secondary Schools, Rukungiri district, Southwestern Uganda.

ABSTRACT

Introduction: Attitude towards mathematics plays a significant role in the academic life of a student and his/her interests in the subject (Heyder *et al*., 2021). This study sought to investigate whether student attitude towards mathematics differs by gender. **Objectives.** To examine the gender differences in attitude towards mathematics among secondary school students in Rukungiri district, Southwestern Uganda. **Methodology.** A cross-sectional research design was adopted to collect and analyze data from a sample of 313 students of S.2 and s.3 classes selected from a population of 1747 students in six secondary schools in Rukungiri District, Southwestern Uganda. A stratified sampling technique was used in the selection of respondents while a self-administered questionnaire was used in data collection. Data was analyzed by generating inferential statistics. **Findings**. The findings show no significant gender difference in student attitudes towards mathematics (Mean. Diff=.03127; p>0.05). **Conclusion**. The study concluded that attitude towards mathematics is not influenced by gender stereotypes among students. **Recommendations**. The study recommends teachers of mathematics, school administration, parents and curriculum planners to use instruction materials and learner-centred methods that benefit both males and females in understanding mathematics concepts. This will promote a positive attitude towards mathematics among students in secondary schools.

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INTRODUCTION

Worldwide, mathematics is a powerful tool for global understanding and communication that organizes our lives (Centre for Global Education, 2022; The Scientific World, 2018). Mathematics is a field of science concerned with numbers and their operations, interrelations, combinations, generalizations, and abstractions and space configurations and their structure, measurement, transformations, and generalizations (Merriam-Webster, 2022). Mathematics originates from Africa where Africans used numerals, algebra, and geometry in daily life thousands of years ago (Herald, 2021; Iraki, 2016). This knowledge spread throughout the entire world after a series of migrations out of Africa, beginning around 30,000 BC, and later following a series of invasions of Africa by Europeans and Asians around 1900 BC-present (Gerdes, 1994; Herald, 2021).

Today, mathematics has become the backbone for success in every field of life (Pandey, 2017), because of its applicability in different disciplines including accounting, finance, banking, engineering, and computer science among others (The Scientific World, 2018). Mathematics has been a key subject in education curricula for every country since the introduction of formal education to Africa by European colonialists (Herald, 2021). The subject has been made compulsory in secondary education curricula of many African countries and has been recognized in the Science, Technology, Engineering and Mathematics (STEM) program as one of the subjects that can unlock Africa's potential for job creation and innovation (Sichangi, 2018).

Attitude towards mathematics plays a significant role in the academic life of a student and their interests in the subject (Heyder *et al*., 2021). Concerning mathematics, student attitude refers to the emotional disposition of students towards mathematics as measured by specific mathematical cognitions/ thoughts/ perceptions (value, gender roles/ beliefs, confidence, self-concept), affects (enjoyment, anxiety) and behavioural intentions (ingress and tendency to spend more time learning mathematics subjects) (Wen, & Dubé, 2022). According to Naungayan (2022), most students still have a negative attitude towards mathematics thinking that it is hard and difficult to deal with. In Uganda, around 65.4% of the students in secondary schools have negative attitudes towards mathematics subject (Amanya, 2018). Less than 30 per cent of the candidates register for mathematics among the options at A level (Nangonzi, 2020).

A wide range of studies have found that gender stereotypes/differences have a significant influence on attitudes towards mathematics. However, inconsistencies are observed in different studies with some indicating that male students have a more positive attitude towards mathematics than their counterparts (Bassey *et al*., 2015; Herbert *et al*., 2020; Mutai, 2016; Oluyemo *et al*., 2020; Samuelsson, & Samuelsson, 2016). On the contrary, some studies indicate that there is no statistically significant difference in attitude towards mathematics and mathematics achievement between males and females (Amatobi, & Amatobi, 2020; Anokye-Poku, & Ampadu, 2020; Batool *et al*., 2020; Ghasemi *et al*., 2019; Kaur, 2017; Ndekei, & Bisonga, 2021). For example, Anokye-Poku, & Ampadu (2020) in Ghana revealed that in general, both female and male students held positive attitudes towards mathematics, and there was no significant difference in attitudes between genders toward mathematics. There are limited published studies on gender differences in student attitudes towards mathematics in secondary schools in the Ugandan context in general and Rukungiri district in particular. It is against the above introduction that this study sought to examine the gender differences in attitude towards mathematics among secondary school students in Rukungiri district Southwestern Uganda.

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Scope of the Study

The study seeks to examine the gender differences in attitude towards mathematics among secondary school students in the Rukungiri district. The study was conducted in Rukungiri district located in the Kigezi sub-region of Southwestern Uganda. The district is bordered by Lake Edward to the North West, Rubirizi District to the Northeast, Mitooma District to the Northeast and East, Ntungamo District to the East and Southeast, Rukiga District and Rubanda District to the South, Kanungu District to the West, and the Democratic Republic of the Congo via Lake Edward to the Northwest. The district is located approximately 382 Kilometres (237 mi), by road, South-west of Kampala, Uganda's capital city. The district was selected because it has a wide range of schools where students still have negative attitudes towards mathematics. The study was conducted for a period of twelve (12) months from January to December 2023.

Significance

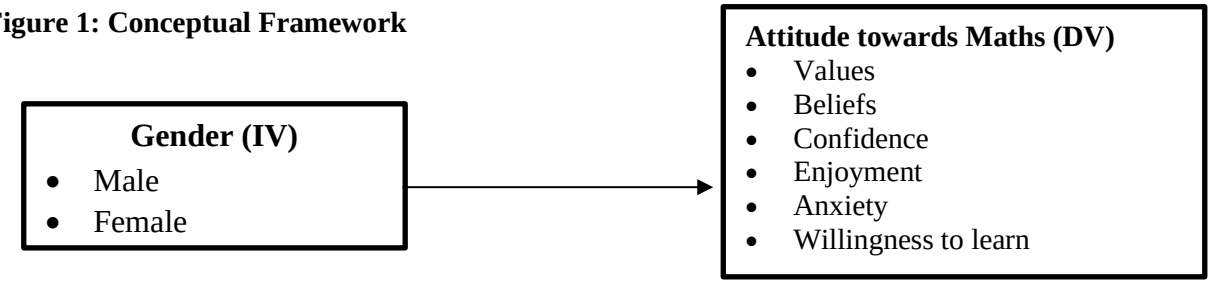
Attitude plays a significant role in influencing the perceptions, beliefs and behavioural intentions of both male and female students to learn particular subjects. Therefore, an understanding of gender differences in attitude is of significant value to policymakers in developing policies of creating equal attitudes to achieve equal performance which would in turn promote equitable education outcomes. The study might assist mathematics teachers in secondary schools to understand the gender differences in attitude towards mathematics which makes it easy to streamline the teaching methods in such a way that both males and females understand and like mathematics as a subject. This would not only improve teachers' performance but also the achievement of students in national examinations. The study might assist curriculum developers in designing the curriculum for mathematics in a way that makes it easy for both males and females to excel and like the subject. This would in turn create a positive attitude towards mathematics for both males and females. The study added to the existing body of literature on attitude in mathematics. This would assist other researchers and academicians in finding relevant literature on related studies.

Justification for the Study

Given the powerful role of mathematics in understanding and communication and the fact that mathematics is one of the essential subjects considered for one to quality for science-related courses in institutions of higher learning (The Scientific World, 2018), a study on gender differences in attitudes towards mathematics at the secondary level is relevant in predicting the variations in a number of male and female students in accounting, finance, banking, engineering and other science-related disciplines (Herald, 2021). Therefore, this study was conducted to assist in reducing the wide gender gap in science courses thereby contributing to the realization of Sustainable Development Goals (SDGs) by promoting Education for All, innovation and equal employment in science-related jobs and disciplines (European Union, 2019).

Conceptual Framework

Figure 1: Conceptual Framework



Source: Adopted from the literature (Gelisli, & Kazykhankyzy, 2021).

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The conceptual framework above presents the dimensions and constructs of variables in the study and how they are related to each other. As shown in the figure, attitude towards mathematics is the dependent variable while gender is the independent variable. Wen, & Dubé (2022) conducted a systematic review of 95 studies focused on mathematics attitudes to clarify the construct and measurement of mathematics attitudes. The review suggested the adoption of a multidimensional definition that regards mathematics attitudes as a combination of specific mathematical cognitions/thoughts/perceptions (value, gender roles/beliefs, confidence, self-concept), affects (enjoyment, anxiety), and behavioural intentions (i.e., willingness and tendency to spend more time.

EMPIRICAL LITERATURE REVIEW

Significant gender differences in attitude towards mathematics among secondary school students have been reported in various studies in Nigeria (Anaeche *et al*., 2019; Dan'inna, 2016), the United States (Ayebo, & Dingel, 2021), Pakistan (Hussain *et al*., 2020), Thailand (Khun-Inkeeree, 2016), Kenya (Mutai, 2016), Norway (Opstad, 2021; Opstad, & Årethun, 2019). However, no significant gender differences in attitude towards mathematics have been reported in studies in countries like the Philippines (Naungayan, 2022), India (Bhowmik, & Banerjee (Roy), 2016), Ethiopia (Abebe, 2014; Simegn, & Asfaw, 2017), Ghana (Anokye-Poku, & Ampadu, 2020), Pakistan (Batool *et al*., 2020; Chaudhary *et al*., 2020; Tanveer *et al*., 2000), China (Jiang, 2021), Uganda (Julius, 2013), Nepal (Thapa, & Paudel, 2020), Maldives (Waheed, & Mohamed, 2016).

Girls have been reported to have negative attitudes towards mathematics subject and do not have any interest in it while boys have a positive attitude towards learning mathematics (Ayebo, & Dingel, 2021; Dan'inna, 2016; Hussain *et al*., 2020; Mutai, 2016). In one study by Mutai (2016) in Kenya, girls had formed negative attitudes towards the mathematics subject and they did not have any interest in it and boys have a positive attitude towards learning mathematics. Females have been reported to have substantially lower values in terms of self-confidence, enjoyment and value in mathematics and that is why students can choose between practical and theoretical mathematics at upper secondary school (Opstad, & Årethun, 2019). Some studies show that female and male students specifically differ in terms of self-confidence towards computing mathematics expressions with boys being more confident than girls (Anaeche *et al*., 2019; Opstad, 2021). However, some studies show significant gender differences concerning the enjoyment dimension of attitude but show no significant differences in self-confidence, motivation and usefulness of mathematics (Khun-Inkeeree, 2016).

However, it has been revealed in some studies that both female and male students held positive attitudes towards mathematics but there was no significant difference in attitudes between genders toward mathematics (Anokye-Poku, & Ampadu, 2020). Studies show no significant differences between male students and female students in common logic, inequalities, algorithms, probability, sequence, solid geometry and derivative knowledge modules, mathematical abstraction, logical reasoning and intuitive imagination (Jiang, 2021).

Other studies show that perceived self-efficacy is good since both girls and boys have a positive and good attitude towards mathematics courses but there is no gender variation in the attitude of students learning mathematics between girls and boys (Thapa, & Paudel, 2020). Other studies however show that a significant difference in the student's attitude toward mathematics exists among students but does not differ by gender (Abebe, 2014; Bhowmik, & Banerjee (Roy), 2016). Chaudhary *et al*. (2020) revealed that most males and females do not feel at ease while they are in the mathematics classroom but did not bring out the gender differences. Findings from a study by Julius (2013) revealed that both boys and girls have the same attitude towards mathematics but the difference arises only due to stereotypes that mathematics is a male domain dominated subject.

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Generally, there are mixed results on the gender differences in students' attitudes with some studies indicating the existence of significant differences in attitudes between males and females while others indicate that there are no significant gender differences in students' attitudes. Whereas some studies indicate that males generally have a better attitude towards mathematics than females, some studies show evidence that females have a better attitude toward mathematics than males. There is limited evidence in the Ugandan context, a gap that the study was meant to address.

METHODOLOGY

Research Design

The study adopted a cross-sectional study design which was correlational. Cross-sectional study design sought to obtain data from the population at only one point in time. A correlational approach was used in data analysis because the study sought to investigate whether or not there exists any significant difference or correlation between the attitudes and mathematics achievement between male and female students. Correlational research is a kind of quantitative research which involves determining whether two or more variables are related or not (Ranjit, 2019). It investigates a range of factors including the nature of the relationship between the variables and the theoretical model that might be developed and tested to explain these resultant correlations (Ranjit, 2019). Using correlational design enabled the researcher to look for variables that seem to interact with each other so that a change in one results in a change in the other (Ranjit, 2019).

Study Population

The study population comprised students in selected secondary schools in Rukungiri district. The study seeks to compare the attitudes and mathematics achievement of students in single (boys or girls) and mixed schools, both rural and urban settings, day and boarding sections, and private and government-aided schools. The study selected three (3) schools from rural school settings (schools under the control of Rukungiri district local government) and another three (3) schools from urban settings (schools under the control of Rukungiri municipality).

Six (6) secondary schools were selected including; Sch. A, Sch. B, Sch. C, Sch. D, Sch. E and Sch. F. These schools were purposively selected because they had been in existence for quite a long time over 10 years and have well-established structures. In addition, the varying environments in such different schools can also influence attitudes and mindsets that the study is interested in (Davadas, & Lay, 2020; Fauzi *et al*., 2017). The schools selected and their student population is shown below;

Table 1: Study Population

Code	Location	Type	Study Population		
			S.2	S.3	Total
Sch. A	Rural	Mixed gov't aided day and boarding	112	96	208
Sch. B	Rural	Mixed private day and boarding	79	55	134
Sch. C	Rural	Mixed gov't aided day and boarding	177	163	340
Sch. D	Urban	Single (girls) gov't aided boarding	410	250	660
Sch. E	Urban	Single (boys) gov't aided boarding	30	23	53
Sch. F	Urban	Mixed private day and boarding	189	163	352
Total			**997**	**750**	**1,747**

Source: *Rukungiri District Education Statistics 2022*

Sample Size

The sample size included 313 respondents who were selected from six (6) schools in Rukungiri District as shown in Table 3.2 below. The sample size was determined using Krejcie and Morgan Tables 1970 (Appendix 3). The stratum sample size (s_i) for each school and each class was computed by determining the ratio of sample size (S=313) to the total population size (N=1747)

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multiplied by the stratum population size (n_i) as suggested by Hayes *et al*. (2023) as shown in the formula below;

$$s_i = \frac{S}{N} x\ n_i$$

Where i refers to the number defining the school code which can be; a, b, c, d, e & f for school codes A, B, C, D, E & F respectively.

Table 2: Sample Size

Code	Senior two (S2)		Senior three (S3)		Total	
	Population	**Sample**	**Population**	**Sample**	**Population**	**Sample Size**
Sch. A	112	20	96	17	208	37
Sch. B	79	14	55	10	134	24
Sch. C	177	32	163	29	340	61
Sch. D	410	74	250	45	660	119
Sch. E	30	5	23	4	53	9
Sch. F	189	34	163	29	352	63
Total	**997**	**179**	**750**	**134**	**1747**	**313**

Source: *Rukungiri District Education Statistics 2022*

Sampling Units

The unit of analysis included students in six (6) selected secondary schools in Rukungiri district since the study is being conducted about mathematics achievement among students in secondary schools in Rukungiri district. This implies that mathematics achievement was not studied on an organizational level basis but rather individual level basis by collecting data from each student selected from each of the six (6) selected secondary schools.

The unit of inquiry included students in senior two (S.2) and senior three (S.3) since these are more likely to be stable in school than others. Senior one (S.1) students were not selected because at the time when this study was conducted, senior one (S.1) students had just joined the schools and had not developed either a positive or a negative attitude towards mathematics. Senior four (S.4) and senior six (S.6) were not selected because they were too busy with their reading and studying their attitude becomes quite challenging during the period when a student is in serious revision. On the other hand, senior five (S.5) were not selected because a majority of the students had selected mathematics as their choice and selecting such students would make the results biased. Some students take mathematics at S.5 because of subject combinations but these are usually very few especially those who take economics in their combinations.

Sampling Techniques

The study used a stratified sampling technique to categorize respondents into classes; S.1&S.2 in each school selected. Stratified sampling is a type of probability sampling technique where the study population is divided into different categories called 'strata' such that the sample size is also categorized by strata in equal proportions of the study population (Simkus, 2022). From each stratum, proportionate random sampling was used by giving each respondent in senior 2 and senior 3, an equal and independent chance to participate in the study. This method was used because it ensures that the demographic characteristics, views, and opinions of students in each school are represented in the study (Simkus, 2022). This helped to obtain an accurate overall estimate of the current status as regards students' mindset, attitude towards mathematics as well as mathematics achievement which later can be used to make inferences about the entire population (Simkus, 2022).

Data Collection Instrument

A self-administered questionnaire was used for data collection. The questionnaire consisted of sections on demographics, mindset, attitude and

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mathematics achievement scale. All the variables were scored on a 5-point Likert scale that is 1= Strongly disagree to 5= Strongly Agree. The attitude was measured using Smith *et al*. (2015) three-component model, also known as the ABC model of attitude which includes: cognitive, emotional, and behavioural responses towards the attitude objects. The cognitive component relates to the individual's thoughts, knowledge and beliefs about the attitude object. The affective component involves emotions and evaluations of the individual about the attitude object; and the behavioural component is about how students' attitude affects their actions and leads to their behaviour (Gelisli, & Kazykhankyzy, 2021). Some of the items included under the cognitive are, "I think I am not wasting time in Learning mathematics, "I think I need Mathematics for my future career", and "I think it is important to do well in Mathematics". Some items under the emotional include, "When I am in mathematics class, I usually feel at ease and relaxed", "I feel I would not avoid Mathematics even if it was optional". On the other hand, some items about the behavioural component include, "I like to solve mathematics problems with care and interest", "I like mathematics and enjoy learning it". These items have been tested in prior studies and found to have Content Validity Index (CVI) and reliability above 0.80 (Gelisli, & Kazykhankyzy, 2021pg 470-475).

Data Collection Procedure

After completing the proposal, clearance was obtained from the Mbarara University Research Ethics Committee (MUREC). Using the REC approval letter, the researcher went ahead and sought permission from the Dean Faculty of Science and the District Education Officer (DEO) of Rukungiri district to allow data collection from selected schools in their district.

In the same vein, the researcher sought permission from the head teachers of the selected schools immediately after entry into the school. This was backed up by a detailed self-introduction, an explanation of the study, how and on whom data was collected and how ethical considerations were ensured. Upon having received permission from head teachers, the researcher arranged with the class teachers of S.2 and S.3 in each school to introduce the researcher to the classrooms and obtain consent and assent from students to participate in the study.

First, the researcher introduced himself in class, introduced the study, the reasons for the study and how students participated. Then copies of written informed consent or assent forms were administered to each student. Students were given time ranging from 10-15 minutes to read on their own and attach a signature on the form indicating their willingness to participate. Students who willingly signed the consent were recruited while those who were not willing to participate were requested to go out.

The study was conducted in the evening during game time in order not to interfere with class studies. Participation took place in the classrooms at the time when there were no classes and it took less than an hour to administer research instruments such that students could reserve part of their time for games or other co-curricular activities. Arrangements were made by class teachers of S.2 and S.3 who mobilized students, put them in the classroom and helped in administering the questionnaires. Class teachers were also involved in checking for students' previous performance in mathematics performance records and could tell the scores to students who could not remember their previous term's scores in mathematics for filing in the questionnaire. This helped to ensure confidentiality by preventing the researcher from accessing students' names. After the questionnaires had been filled, they were collected and screened to check for any unanswered items before tabling them for data analysis.

Ethical Considerations

The researcher sought clearance from the MUREC and an official approval letter from MUREC was obtained. All the copies of the questionnaire contained a stamp and signature

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from MUREC. Official permission was sought from the Dean faculty of science and the District Education Officer (DEO) of Rukungiri district as well as head teachers of the selected schools before carrying out research from the students.

The researcher ensured that Corona Virus Disease (COVID-19) and Ebola standard operating procedures were adhered to. For instance, the researcher ensured social distancing and wearing of face masks and all the participants were sanitized at the time of responding to the questionnaires.

The participants were briefed by the researcher on the purpose of the study to encourage their participation. They were informed of their rights and obligations. A self-administered questionnaire was given to participants and it contained a preamble explaining who is conducting research and the purpose of the study. Then the participants were guided on how to fill out the questionnaire considering all ethical issues.

The researcher emphasized that the information provided was to be handled with the highest level of confidentiality and that the information given was for academic purposes only. Participants' privacy was respected by requesting them not to indicate their names on the questionnaires. During the documentary review, confidentiality was ensured by engaging class teachers of S.2 and S.3 as research assistants who assisted in reviewing students' records and helped to remind or confirm each student, of his/her previous mathematics score.

Participation in this research was voluntary, that is the right to participate, refuse to participate or withdraw from the study at any stage in case one felt they could not continue to participate for the reasons best known to them. Informed consent was sought from students or their teachers. This was done by having each participant sign an informed consent form to ensure that they are not coerced into the study but rather they are participating willingly.

The questionnaires with serial numbers for easy future reference were given to participants. Considerable time was given to participants to fill out the questionnaire after which they were collected and screened to check for any unanswered items. The questionnaires were administered when students' study was not interfered with. This was done in the presence of a teacher for students' security. The questionnaires with incomplete items were considered for data analysis.

Data Analysis

Data was analyzed by generating inferential statistics with the help of Statistical Package for Social Scientists Software. This was used to determine the differences in attitude towards mathematics among students of different background characteristics. Gender differences in students' attitudes were analyzed by comparing the mean, standard deviation and standard error mean of both males and females for the different items of student attitude scales. This was done by generating independent samples t-tests using SPSS software. Significant gender variations in attitude occur if the p-values for t-tests are all less than the critical values (0.05) at a 95% confidence level (Brown, & Forsythe, 1974; Grice, 2018).

RESULTS

Table 3 below presents the t-test results showing gender differences in the students' attitudes towards mathematics in selected secondary schools in Rukungiri district.

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Table 3: Independent Samples Test Showing Gender Differences in the Students' Attitude towards Mathematics

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Attitude towards Mathematics	Equal variances assumed	2.240	.135	-.366	311	.715	-.03127	.08541
	Equal variances not assumed.			-.383	277.431	.702	-.03127	.08174

Mean (males) = 4.3718; Mean (females)= 4.4031, Std. dev. (males)= .65044; Std. dev. (females)= .77512; Std. Error. Mean(males)= .06013; Std. Error. Mean(females)= .05537

Source: *Primary data, 2023*

The results in Table 3 above show that there is no significant gender difference in the attitudes of students towards mathematics in selected secondary schools in Rukungiri district. This can be observed from the group statistics which indicate that the mean response for males (Mean=4.3718) is almost similar to the mean response for females (Mean=4.4031). Levene's Test for Equality of Variances indicates that the p-value for the equality of variances (p= 0.135) is bigger than the critical value (p>0.05) at a 95% confidence level. Likewise, the t-test for Equality of Means shows that the p-values for both the Equal variances assumed (p= 0.715) and Equal variances not assumed (p= 0.702) are both above the critical value (p>0.05) at a 95% confidence level which shows no significant difference in means of males and females as regards to their attitudes towards mathematics. The mean difference for both the equal variances assumed and not assumed is similar to each other (Mean. Diff=-.03127), and the test statistic (t) is almost similar for both the equal variances assumed and not assumed (t= -.366/-.383) which also confirms that there are no significant gender differences in the attitudes towards mathematics among students in secondary schools in Rukungiri district. The study therefore accepts the null hypothesis $H0_1$ which states that there are no statistically significant gender differences in attitude towards mathematics among secondary school students in Rukungiri district. The adopted theories also do not show a clear premise that mathematics achievement differs by gender differences. However, the theories show that there are significant differences in the attitudes of all students regardless of their gender. The achievement goal theory for example contends that variations in the way in which students judge their ability and define achievement in mathematics is a critical antecedent for understanding differences in mathematics achievement among students but does not highlight the gender aspect (Dweck, & Leggett, 1988; Nicholls, 1989). This means that both males and females have positive or negative attitudes towards mathematics. This is also noted in the expectancy-value theory where psychologists claim that beliefs, and attitudes about how well students perform in the subject and the value that the subject has for them determine the students' choice, persistence and vigour invested in the subject rather than gender stereotypes (Atkinson, 1957).

DISCUSSIONS

The study findings revealed that there is no significant gender difference in the attitudes of students towards mathematics in selected secondary schools in Rukungiri district. This implies that both males and females have similar attitudes towards mathematics. The above findings are in agreement with several other studies such as in the Philippines (Naungayan, 2022), India (Bhowmik, & Banerjee (Roy), 2016), Ethiopia (Abebe, 2014; Simegn, & Asfaw, 2017), Ghana (Anokye-Poku & Ampadu, 2020), Pakistan (Batool *et al*., 2020; Chaudhary *et al*.,

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2020; Tanveer *et al*., 2000), China (Jiang, 2021), Nepal (Thapa, & Paudel, 2020), Maldives (Waheed, & Mohamed, 2016) and Uganda (Julius, 2013). All these studies revealed no significant difference in the attitudes of students towards mathematics subject. However, the present findings do not agree with the findings in Nigeria (Anaeche *et al*., 2019; Dan'inna, 2016), the United States (Ayebo, & Dingel, 2021), Thailand (Khun-Inkeeree, 2016), Norway (Opstad, 2021; Opstad, & Årethun, 2019) and Kenya (Mutai, 2016) since all these studies revealed a significant gender difference in attitude towards mathematics among secondary school students. Based on the findings, it is imperative that developing strategies that can enable students to have a positive attitude towards mathematics can stimulate their interest in learning which would improve their mathematics achievement.

CONCLUSIONS

The study concludes that both male and female students do not differ in terms of attitude towards mathematics. Therefore, attitude towards mathematics is not explained by differences in gender stereotypes among students. Education actors can only obtain higher levels of mathematics achievement if they promote a positive attitude towards mathematics for both male and female students.

Recommendations

Teachers of mathematics need to exert more effort in promoting positive attitudes among both male and female students by developing teaching strategies that will improve instruction in Mathematics for the benefit of all students. Teachers should promote a shared understanding of the concept of mathematics among students by encouraging both male and female students to put in more effort in mathematics to excel in the same. Students could be reminded that when confronted with difficult work and persist in accomplishing the task, their intelligence grows. If students understand that the brain can change with learning and that this requires effort on the part of the learner, then this may shift students from embracing a fixed mindset or negative attitude. Teachers need to use instruction materials and learner-centered methods when teaching. This helps to motivate learners to like mathematics thereby promoting a positive attitude towards mathematics.

Suggested Areas for Further Study

The study was limited to only secondary schools but attitudes often develop from lower levels, especially at the primary level. Hence, further study should be conducted from a primary school setting which is the foundation of children's attitudes. Given the fact that the study was limited to only schools in Rukungiri district, the findings may not be generalized to other districts. Therefore, the same study should be replicated in other districts. The study was limited to only a single subject-mathematics but students also have negative attitudes in other science subjects. Further study should therefore be conducted on gender differences in attitude towards science subjects other than mathematics.

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