
**LEARNERS ATTITUDE TOWARDS THE ACADEMIC PERFORMANCE IN MATHEMATICS, CASE
STUDY NDEJJE SCHOOLS WAKISO DISTRICT UGANDA****1 Muhindo Percy, 2 Kabanda Richard, 3 Dr Arinaitwe Julius****1, 2, 3 Metropolitan International University****ABSTRACT**

Students' learning and performance in mathematics is affected by a number of factors, including students' attitude towards the subject, teachers' instructional practices, and school environment. This study was conducted to investigate students' attitudes towards learning mathematics at Ndejje campuses in wakiso district in Uganda. It also sought to ascertain reasons for the liking or disliking mathematics and the relationship between attitude and performance. We employed the ABC Model and the Walberg's Theory of Productivity to investigate students' attitudes towards mathematics and associated factors. The quantitative and qualitative data were collected from 419 southern campuses of Ndejje secondary school students, 318 secondary school students, and 132 Northern campuses of Ndejje secondary school students. Survey was also used especially to some advanced level students since their school time table could not favor them to be in the same class always. The collected data were analyzed using percentages, means, standard deviations, ANOVA, correlation, regression and thematic analysis. The results show that initially students exhibit a positive attitude towards mathematics, but their attitude becomes less positive as the students move forward to higher levels of education. A significant positive weak correlation between students' attitude and performance was established. Mathematics' Enjoyment and attitude significantly predicted students' performance in our data. The factors influencing the students' liking or disliking of mathematics constituted student's aptitude attribute, instructional and social psychological environmental factors. Furthermore, the results show that failure in examinations is attributed to teacher didactic strategies, institutional resources, poor learning and examination strategies, and failure to understand instructions. The results provide insights for future research and inciting changes in teaching- learning practices that would promote mathematics enjoyment and subsequent better performance in the subject.

Keywords: students' attitude, mathematics, students' performance, Ndejje schools.

Background of the study

The study assessed the relationship between learners' attitude and academic performance in mathematics using a case study of Ndejje secondary in Wakiso District in Uganda (Godfrey et al., 2023). The study was important given the recent difficulties in students performance in mathematics as a subject that led to

serious questioning of the credibility in mathematics as a subject (Godfrey et al., 2023).

In Uganda, mathematics is one of the core mandatory subjects to all students in primary and ordinary level secondary schools (Lower secondary) (Micheal et al., 2023). For example, in ordinary level secondary

Received: 22.09.2023**Accepted: 25.09.2023****Published on: 30.09.2023**

Corresponding: Author: research.miu.ac.ug/publications

school curricula, there are seven core subjects, notably, Mathematics, Geography, biology, English, physics, chemistry, History among others (Ministry of Education, science, Technology and sports 2020)(Micheal et al., 2023). Yet, mathematics is seen as the most difficult subject in many parts of the world (Zulaikah & Rebecca, 2023) and Uganda is not exceptional. Walberg's theory postulated that individual students' psychological attributes and the psychological environments surrounding them influenced cognitive, behavioural and Attitudinal learning outcomes (Victoria et al., 2023). This theory was relevant for this study because it was a suitable lens through which we explained the reasons for the attitudes that students form towards mathematics (Mark et al., 2023).

Students consistently performed poorly in mathematics and other science subjects which made Uganda lose economic advantages over other countries. Students' achievement in countries within East Africa is ranked far below the average point in international assessments (Mark et al., 2023). Bethell further points out that the long-run development of countries in East Africa Required significant improvements in science subject education if they were to benefit

In a competitive global economy driven by new technologies (Kazaara, Prudence, et al., 2023). In this regard, it was important to find ways to improve students' performance in the subject. The study of students' attitudes towards mathematics with

associated factors and their connection to academic performance was certainly worth examining. The results provided teachers, students, parents, and other education stakeholders with information that will help to develop strategies to improve students' learning of mathematics (Richard et al., 2023).

Statement of the Problem.

There was a consistent decline in the academic performance of mathematics subject in ordinary level classes generally. A report by UNEB (2008) UCE results showed that was a slight decline in performance which continued to scare the stakeholders (Christopher et al., 2022).

Statistically by UNEB, at UCE a report in Daily monitor newspaper of march 2012, page four, that was out on Wednesday showed that there was a slight decline in candidates' performance in subjects like mathematics, biology and English (Ntirandekura et al., 2022).

38percent of the total number of candidates who sat for the examination had a minimum of five credit passes including English and mathematics, the situation got slightly worse in the following year 2013 as performance dipped to 36.57 percent, it further deteriorated in 2014 as only 529425 candidates out of the total 1705976 that the examination representing 31.28) had five credit passes including biology, physics and mathematics. Though the situation was not the same in 2014 where it was better by 4.3 percent (Kazaara, Kazaara, et al., 2023).

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

On the issue of gender differences regarding attitude towards mathematics, observed by Gutbezahl (1995) that there was a common belief that females are less mathematically capable than males. This belief was fairly constant across population and classroom studies had shown that that belief was in place by the time children entered advanced level. Therefore, if the problem was not diagnosed earlier, the intended objectives of making mathematics a compulsory subject in ordinary level and primary levels would

not be achieved. without mathematics of cryptography, there would not be current level of electronic financial transactions across the world (Oscar et al., 2023). It would also result into challenges in career aspects like producing poor quality mathematicians in future (suggested by Farouk 2008) therefore, it was important that educators and research got access top instruments that are suitable for assessing students' attitude towards mathematics in all levels of education.

Specific objectives of the study

1. To examine the students' attitudes towards learning mathematics.
2. To find out why students have a like or a dislike towards mathematics
3. To assess the relationship between each attitude aspects and students' performance (grades).

Research Questions

1. What are the students' attitudes towards learning mathematics?
2. Why students acquire a like or a dislike towards mathematics?
3. What is the relationship between each attitude aspects and students' performance (grades)?
4. What is the relationship between attitude and student grades?

Methodology

Research design

In line with Hourigan, Leavy, and Carroll's (2016) viewed that there was no single instrument that could guarantee the complete truth, a parallel convergent mixed research approach was adopted in this research. The researcher combined qualitative and quantitative methods to achieve a comprehensive view of the problem at hand. Both quantitative and qualitative data were simultaneously collected, analyzed separately for the purpose of establishing the facts. This was because the attitude was primarily measured by attitude scales that showed whether the attitudes were positive or negative. Nevertheless, finding out the factors influencing attitude called for qualitative methods (Yilmaz, et al., 2010).

Population of the study

The participants in this study constituted 869 students (409 males and 460 females) from the two campuses in Ndejje secondary school which included Ordinary level (Lower secondary) and (Upper secondary), Advanced level students in the two campuses.

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

The school had classes with mixed learning ability students. Students' social, economic and academic background in mathematics shall be taken into account.

As shown in Table 2, the majority of respondents were the lower-class students from senior one up to senior two from both campuses (48.2%) followed by upper students from senior three up to senior four from both campuses (38%). Advanced level students accounted for only 15.2% since this group had the most-few students in the two campuses.

Table 1 Summary of respondent's demography Variable category

GENDER	NUMBER	PERCENTAGE
MALE	409	47.1
FEMALE	460	52.9
AGE		
12-14	419	48.2
14-16	330	38.0
16-18	113	13.0
20-22	6	0.7
22 and above	1	0.1
Study level		
Lower ordinary level (s1and s2)	419	48.2
Upper ordinary level (s3 and s4)	318	36.6
Advanced level (s5 and s6)	132	15.2

Sampling Technique

Students were sampled based on multistage sampling technique. In this case, among the six classes, a class was selected, then a sample of 10 students was randomly selected from each class and from all the two campuses, northern and the southern campuses. According to Kothari (2004, 66), a multistage sampling technique was appropriate when the study involved a large area. Since the population was geographically scattered, the selection of students followed the inclusion and exclusion criteria known as a three-stage stratified cluster sampling technique (Mabula, 2015).

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

Data Analysis**Quantitative data analysis**

A quantitative method was used to analyze quantifiable portion of the survey. Using SPSS descriptive analysis, correlation analysis and binary logistic regression was performed. Data obtained from closed-ended items was coded and entered in the SPSS computer programme (Nelson et al., 2022). Mean scores were calculated for each statement of attitude aspect to get variables which can be used in subsequent analysis. The first research question of the study required establishing the students' attitude towards mathematics. Towards this end, descriptive statistics such as mean and standard deviation were used where mean values of all attitude aspects was averaged to get the overall attitude. One way ANOVA with study level as an independent variable was used to account for the observed mean differences in the overall attitude and attitude aspects (Nelson et al., 2023).

Correlation analysis was used to establish the relationship existing between variables. Binary logistic regression analyses were employed by taking attitude aspects and attitude as predictors of performance. The performance data was coded as F (0) = Fail and A, B, C, D, E (1) = Pass.

The Model Fit was inspected using Hosmer and Leme show goodness of fit test statistics ($p > 0.05$ indicating good fit) and by considering the explained variance through the Negelkerke R-Square.

RESULTS**Table 2. Descriptive statistics for the overall students' attitude towards mathematics**

Lower secondary			upper secondary		A Level	
N=819	M	S. D	M	SD	M	SD
Attitude	4.36	0.49	3.74	0.63	3.89	0.66

To clarify the mean differences in the overall attitude (Table 2) one way ANOVA with study level as an independent variable was performed. The results show a significant effect on attitude towards mathematics, $F(2, 803) = 103.233$, $p < 0.001$, $\eta^2p = 0.2$, a Tukey post hoc test shows that attitudes' became less positive as students advanced from lower secondary level (mean = 4.36) to upper secondary levels (mean = 3.74), but there was a slight increase in advanced levels of secondary (s5 and s6) with (mean = 3.89); ($p < 0.05$, from lower to upper secondary; $p = 0.03$ upper secondary to advanced level of secondary) but the effect size is small.

Affect Self-confidence.

Scores above 3.0 on this aspect represent high self-confidence whereas scores below 3.0 indicate low confidence. The results presented in Table 2 show that lower secondary students had more confidence in mathematics, mean = 4.13 when compared to upper secondary students mean = 3.69 and advanced level students mean = 3.99

Table 4 shows a descriptive statistic regarding self confidence

Lower secondary	upper secondary	A level
-----------------	-----------------	---------

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

N=812	M	SD	M	SD	M	SD
Self confidence	4.13	0.71	3.69	0.79	3.99	0.77

*F (2, 812) = 109.063, $p < 0.001$, $\eta^2p = 0.21$; lower secondary level and upper secondary level $p < 0.001$, upper secondary and advanced level, $p = 0.194$.

This indicates significant differences between lower secondary and upper secondary students' anxiety ($p < 0.001$), but the difference between upper secondary and advanced level students' anxiety was not significant ($p = 0.194$).

Enjoyment of mathematics. A student who scored above 3.0 really enjoyed mathematics and the one, who scored below 3.0, had low enjoyment. As depicted in Table 6, the mean scores were above 3.0, indicating that students really enjoyed mathematics, but primary students highly enjoyed the subject, mean = 4.29 when compared to older colleagues.

Table 5. Descriptive statistics for mathematics enjoyment

	Lower secondary		upper Secondary		advanced level	
N=812	M	SD	M	SD	M	SD
Enjoyment of math	4.29	0.63	3.69	0.75	3.84	0.76

* F (2, 812) = 73.35, $p < 0.001$, $\eta^2p = 0.15$ lower to upper secondary $p < 0.05$; upper secondary to Advanced level $p = 0.041$

The results show significant differences between lower secondary level, upper secondary and advanced level students in terms of enjoyment of mathematics, although the effect size is very small.

Behavior

Intrinsic motivation. Similarly, the scores above 3.0 represent high motivation, below 3.0, low motivation. Table 7 shows that the mean values were above 4.0, indicating that students in the sample were highly motivated to learn mathematics.

Table 4.6. Descriptive statistics for intrinsic motivation

	Lower secondary		upper Secondary		advanced level	
N=812	M	SD	M	SD	M	SD

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

Math anxiety	4.59	0.57	4.10	0.96	4.25	0.92
--------------	------	------	------	------	------	------

*F (2, 812) = 33.464, $p < 0.001$, $\eta^2p = 0.077$; primary-secondary, $p < 0.001$, secondary- college, $p = 0.21$

The results show that no significant differences were found between upper secondary and advanced level students in terms of motivation ($p = 0.21$) but the difference between lower level secondary and Upper-level secondary students is statistically significant.

Cognition

Usefulness of mathematics. Results showed that respondents in the three groups highly valued mathematics. As shown in Table 4.7, the mean scores ranged between 3.97 and 4.44 and that they are far above the midpoint of the scale (3.0).

Table 6 Descriptive statistics for mathematics usefulness

Lower secondary.		Upper Secondary		Advanced level		
N=815	M	SD	M	SD	M	SD
Usefulness	4.44	0.54	3.69	0.71	3.97	0.74

*F (2, 812) = 50.74, $p < 0.001$, $\eta^2p = 0.11$. Lower- upper secondary, $p < 0.001$, upper secondary- Advanced level, $p = 0.907$.

The results indicate no significant differences between Upper secondary and advanced level students in terms of the perceived usefulness of mathematics ($p = 0.907$). The differences between lower secondary and upper secondary school students are statistically significant ($p < 0.001$). However, the effect size was very small. Generally, the results indicate that students had confidence, did enjoy mathematics classes, they were motivated and found it useful. Significant differences were found between lower secondary and Upper secondary students in terms of self-confidence, usefulness, enjoyment, motivation, and anxiety albeit the small effect size.

Career prospects:

With regards to career development, some respondents said that they expected to study mathematics in advanced levels. They perceived mathematical skills as essential when it is linked with their career aspirations like science, engineering, business, and the like. The following quote illustrates the finding "... I like to be a pilot or an engineer, so I will have to study mathematics because all combinations which I want to study consist of mathematics e.g. PCM, BCM" (Lower secondary)

These findings suggest that students at different levels of education understood the value of mathematics in their present lives and future. Thus, mathematics teachers are advised to consider these aspects in their teaching practices.

Good results:

Having good results also surfaced as a reason for liking mathematics. Some respondents indicated that when a person receives a good grade in examinations, he or she is likely to engage in mathematics at higher levels. This is

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

as one respondent narrated “I like mathematics because once I was at primary school, I used to perform well... in my last examination (P L E) I got a distinction one (D1)”.

Mathematics is a compulsory subject:

Other respondents indicated that students liked mathematics or because the subject was compulsory. A quote from one respondent supports the finding “... because mathematics is among the mother subjects that are recommended by the Ministry of Education, Science and Technology and Sports.” (Upper secondary). Mathematics is a compulsory subject in school education and in some college courses like engineering, and even business studies. Students are mandated to pass mathematics.

Self-confidence:

The respondents were of the view that they lacked confidence in themselves as mathematics learners. They believed that they were not good at mathematics. “... Because I am not good at mathematics...” (Lower Secondary). This illustrates the importance of self-confidence and that lack of confidence had a negative influence on the student’s attitude towards mathematics. Thus, teachers should use strategies that will boost up students’ confidence in mathematics.

Career prospects:

The responses showed that some students learned mathematics because it was relevant to what they aspired to be. If this link is not evident, they developed a dislike for the subject. Some respondents opined that; mathematics was not important for their careers. This is evident in the following quote: “...mathematics is not in my career... for me is not the thing that I like...” (Advanced level). This indicates that teachers should try to teach mathematics highlighting its applicability in different careers.

Receiving a bad grade:

The relevance of the subject matter: The respondents pointed out the fact that they disliked mathematics because of the feeling that other topics were not relevant to the daily life application, wondering about where one will use this. One respondent’s answer supports the finding “Other topics do not relate to actual societal needs, like those of Algebra equation...” (upper secondary). This illustrates the importance of emphasizing on the application of mathematics in real- life experiences. Thus, teachers should give examples highlighting real-life applications of different mathematical concepts.

Table 7 Correlations between variables

	Grade	Confidence	Enjoyment	Usefulness	Motivation	Anxiety
Grade	-----					
Confidence	0.171**	-----				

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

Enjoyment	0.184**	0.604**	-----			
Usefulness	0.129**	0.587**	0.541**	-----		
Motivation	0.130**	0.455**	0.537**	0.546**	-----	
Anxiety	0.059	0.522**	0.461**	0.566**	0.278**	-----
Attitude	0.170**	0.784**	0.773**	0.811**	0.701**	0.748**

**Significant at 0.01 level

The correlation scores between students' mathematics grade and attitude aspects were generally positive, significant, but not strong. The most positive relationship highlights the association between attitude and most of the aspects. The correlation scores varied between 0.55 and 0.81 representing moderate to high positive correlations. However, the relationship between mathematics anxiety and mathematics grade was not significant.

Regression analysis

Tables 8 (a) and (b) summarize the findings. score a pass grade by the same amount.

Table 8 (a). Binary Logistic regression analysis between attitude aspects and performance

	B	S.E	Wald	Sig.	Exp (B)
Constant	-3.66	0.835	19.25	0.000	0.026
Confidence	0.259	0.248	1.092	0.296	1.295
Enjoyment	0.698	0.235	8.85	0.003	2.009
Usefulness	0.145	0.253	0.328	0.567	1.156
Anxiety	0.203	0.155	1.717	0.190	1.225
Motivation	0.299	0.172	3.026	0.082	1.348

-2LL 382.175, NagelkerkeR2 =0.18, Hosmer and Lemeshow p = 0.259

Table 9 (b). Binary Logistic regression analysis between Attitude and performance

Constant	-3.637	0.791	21.127	0.000	0.026
Attitude	1.589	0.220	52.281	0.000	4.897

A logistic regression analysis was conducted to predict students' performance from confidence, enjoyment, usefulness, anxiety, motivation, and attitude. A test of the Full Model against Constant Only Model was statistically significant, indicating that the predictors reliably distinguished between the pass and failures ($\chi^2= 63.416$, $p < 0.001$, $df =5$). Nagelkerke R2 of 0.181 indicates a weak relationship between prediction and grouping. The overall prediction success was 92%. The Wald criterion demonstrates that enjoyment and the overall attitude made a

Received: 22.09.2023

Accepted: 25.09.2023

Published on: 30.09.2023

significant contribution to the prediction ($p = 0.003$, $p < 0.01$). Exp (B) values indicate that when enjoyment is raised by one unit the odds ratio is 2 times as large, thus students are 2 times more likely to score a pass grade. When attitude is raised by one unit, students are likely to -2LL 385.885, Nagelkerke $R^2 = 0.18$, Hosmer and Lemeshow $p = 0.046$

Conclusions

The study found that students exhibited a positive attitude towards mathematics. However, this starts changing when students enter secondary schools. Despite the number being small, negative attitudes may have a greater effect on students' learning, thus it should not be ignored.

Despite the fact that more than 80% of students exhibit positive attitude towards mathematics, the majority are failing their mathematics examinations. From our work, we understood that the problem is not only on the students' attitude toward the subject but there are other factors affecting their grades.

Recommendations

Based on the findings, the study recommends that, teachers should appropriately adopt instructional techniques that include learners' diversities or barriers to learning, minimize fear, enhance active interest, and enjoyment in what is being taught and learnt. They should apply corrective measures that will reduce tension and provide support to their students whenever they may require. This will foster mutual understanding in a non-threatening teaching and learning environment. Furthermore, students should use their time wisely so that they can have enough time to practice and internalize mathematical concepts learned in classrooms.

References

- Christopher, F., Moses, N., Muhindo, M. E., & Komunda, T. R. (2022). Employee Training and Organizational Performance: A Case Study of African College of Commerce and Technology in Kabale District, South Western Uganda. *International Journal of Academic Pedagogical Research*, 6(5), 1–7.
- Godfrey, W., Silvia, N., Kazaara, A. G., Nelson, K., Christopher, F., Deus, T., Micheal, T., & Catherine, M. (2023). *The Effect Of Teacher ' s Instructional Methods On The Learners Academic Performance In Mathematics Subject In Secondary Schools , A Case Study Of Buwesswa Secondary School In Manafwa District*. 7(2), 100–107.
- Kazaara, A. G., Kazaara, A. I., & Ismail, L. (2023). *The Impact Of Government Regulations On The Media Performance In Uganda . A Case Study Of Nbs Television*. 7(3), 372–377.
- Kazaara, A. G., Prudence, K., & Nicholas, K. (2023). *Effect Of Push - Pull Technology Options for Management of the Fall Armyworm on Damage , Growth and Yield of Maize a case study of mubende District*. 7(3), 154–161.
- Mark, N., Kazaara, A. G., Deus, T., Nelson, K., Catherine, M., Christopher, F., Benefansi, I., & Brighton, B. (2023). *Analysis of Students ' Enrollment and Graduation Rates in Gulu University in Uganda . A Case Study of Gulu*

University. 7(2), 1–9.

Micheal, T., Nicholas, K., Kazaara, A. G., & Nelson, K. (2023). *The Effect of Teacher ' s Motivation on Academic Performance of Students in Kole District a Case Study of Alito Sub-County*. 7(2), 64–72.

Nelson, K., Christopher, F., & Milton, N. (2022). *Teach Yourself Spss and Stata*. 6(7), 84–122.

Nelson, K., Kazaara, A. G., & Kazaara, A. I. (2023). *Teach Yourself E-Views*. 7(3), 124–145.

Ntirandekura, M., Friday, C., & Muhammad, M. (2022). Rewards and Staff Retention in Public Sector in Uganda: An Empirical Study from Kabale District Local Government. *International Journal of Academic Management Science Research*, 6(7), 165–170.

Oscar, O., Kazaara, A. G., Kazaara, A. I., & Micheal, T. (2023). *Impacts of Farmer ' s Cooperative Societies in Marketing of Agricultural Produce . A Case Study of Loro Sub County , Oyam District*. 7(3), 272–278.

Richard, A., Deus, T., James, T., Ijeoma, A., & Janice, B. (2023). *The impacts of using music instruments on learning in post- secondary institutions in Uganda*. 7(3), 35–39.

Victoria, N., Nelson, K., Kazaara, A. G., & Kazaara, A. I. (2023). *The Impact Of Staff Development On The Pupils ' Academic Performance In Primary Schools In Kimaanya Sub-County , Masaka District A Case Study Of Kimaanya Sub-County , Masaka District*. 7(3), 179–186.

Zulaikah, W., & Rebecca, N. (2023). *The Study on the Effect of Child Labour on the Learners Academic Performance in Secondary Schools . A Case Study of Nansana Municipality*. 7(3), 160–167.