The Relationship between Classroom Management and Students' Mathematics Performance in Public Secondary Schools in Makindye Division, Kampala, Uganda

Kayindu Vincent, Asmaa Elsayed Emara, Sofia Sole Gaite, Nakiyingi Sarah
Kampala International University, Uganda

Abstract:-**The study investigated, among other things, the relationship between classroom management and student's mathematics performance in four public secondary schools, in Makindye Division, Kampala. The respondents were 212 senior four (S.4) students and 12 teachers of Mathematics from four selected schools. Questionnaires, observation checklists and interview guide were used to gather data. Frequency, percentage, means, standard deviations and Pearson Linear correlation coefficient were used to analyze the data. The finding was that teachers' classroom management was not significantly related to students' performance in mathematics in the studied schools. Based on the findings, the study recommends that as for classroom management, a mathematics teachers need to exhibit flexibility and emphasize roll calls before or after class.**

Key words: **Classroom management, Mathematics performance; Public schools.**

I. INTRODUCTION

Classroom management is one of the aspects of teacher classroom interactive behavior. Teacher interactive behaviors are the specific actions that allow for positive communication between the teacher and students. Classroom interactive behavior focuses mainly on what teachers do in the class with students in order to reach at the learning outcome prepared by the school. The development of learning skills such as listening, speaking and understanding or thinking happen in the classroom under teacher classroom interactive behavior (Brophy, 2006; Berk, 1988). Thus, the class has to be managed well for all this to be done effectively. The management of classrooms by teachers has been highly debated across the globe as a predictor of the performance of students. For instance, in Sweden, teacher classroom behavior has significantly influenced the performance of students in the recent history. In this way, the students condition their teachers' behavior and vice-versa. The interaction has been mainly based on teaching and/or learning process through verbal and non-verbal actions. The verbal actions are mainly featured through dialogues, whereby a teacher may ask question and the student can respond to the question. The behavior can also be non-verbal by giving the students problems to solve, working out problems on the chalkboard or marking students work (Ifamuyiwa, 2008).

Classroom management involves teacher's conversation with learners, collaborative learning, classroom discussions, classroom management, and lesson development, dissemination of knowledge, resource management and role play. Some of the key activities to be performed include the use of relevant teaching methods, instructional planning, classroom control time, question skills and techniques, student participation, gender concerns and relevant instructional materials. In Uganda, despite the efforts put in place By the Ministry of Education and Sports so as to improve students' performance in Mathematics and other science subjects, such as the review of the curriculum, teachers and facilities being availed to schools, as well as school supervision, the performance of mathematics has been poor (Muhumuza, 2018). This prompted this study

Problem Statement

Despite considerable educational reforms in Uganda, there has been tremendous dropping in students' performance especially in Mathematics year after year both in schools. For instance, in the year 2015, 4800 sat for the examination only 1200 passed. In Makindye division, the passes in three consecutive years were 25%, 36% and 38% of students who sat for mathematics Mock examinations in 2015, 2016, and 2017 respectively (Muhumuza, 2018). As students' academic performance in mathematics continue to decline, there have been mixed feelings among researchers and education practitioners, mostly attributing to the weaknesses in teaching approaches and large class sizes especially in the public schools where Universal Secondary Education (USE) operates, hence making classroom management difficult (Luswata, 2017). Thus, this study investigated how classroom managementis related to the performance of public secondary school students in mathematics, in Makindye Division, Kampala, Uganda.

II. LITERATURE REVIEW

Mathematics as a formal area of teaching and learning was developed about 5,000 years ago by Sumerians. Since its inception, mathematics has been a powerful tool for developing the faculty of knowledge and therefore a pre-requisite for many other disciplines. Potentials of mathematics have been also

reflected through the fact that all sciences require Mathematics; and it is one of the easiest sciences because no one's brain rejects it whether laymen or semi-illiterate they know how to count and record. Mathematics enables people to mediate and to be able to develop a sharp way of thinking as one cannot do mathematics without reasoning; and its techniques provide very scientific and cheap way of analysing and solving various problems that we face in our day to day living. It enables students to be rational, critical thinkers engaged in logical processes and conjectures in a variety of ways. The subject fits in groups of many subjects for example there is Mathematics in Geography, Biology, Accounts and Economics. Mathematics is very vital in science. Just as the language of true literacy not only specifies and expresses thoughts and process of thinking but also creates them in turn so does mathematics not only specify, clarify and make rigorous workable concepts and laws of science, but also at certain crucial instances it becomes an indispensable constituent of their creation and emergence as well (Middleton and Spanias, 2013).

Middle grade teachers must be willing to break the rules and transcend convention. The strategies that describe the dealing with the most difficult of students are in many ways just that—unconventional. Students' prior experience and knowledge base and emphasize students' exploration and understanding. However, the trainee teacher's teaching should not be describe as mechanical. The expert mathematics teacher should have more pedagogical content knowledge than the novice teacher does (Cited in Muhumuza, 2018).

Other essential elements for classroom behavior are students' characteristics such as intelligent quotient and the ability to respond to teacher's teaching instruction and students' ability to comment and contribute to the teaching process. However, it is important to note that the impact of these factors on classroom behavior and students' performance are not harmonious across scales.

Interaction between teacher and students is an essential part of teaching and learning. Teacher is the main performer in classroom. During classroom interaction the teacher's actions are critical. In classroom interaction, the role of the teacher is to direct students what to do, as well as to impart knowledge, learning is greatly enhanced when there is active interaction between teachers and students. Teachers control both the topic of conversation and turn taking, and orchestrate the whole interaction process to facilitate learning. Eliciting the information through referential questions which have natural and communicative responses is one of the teacher's duties. Repair depends on the teacher's goal, whether he is focusing on fluency or accuracy. Modification is fundamental because it is the link between comprehension and mathematics progress and illuminate the modes of teacher participation during whole -class discussion (Kumpulainen and Wary, 2002).

Various studies such as the one conducted by Flunders (1970) revealed the presence of mathematics teacher's dominance in classroom discussions. A study on exploration of behavior of teachers in relation to behavior of students during classroom interactions. The author dealt with high school students in Britain and it was observed that direct contribution is applied by the teacher in order to defend her/his position. Studies on classroom behavior have also been conducted in Tanzania. For example, the study conducted by Katunz (1992) and Mbunda (1996). The study covered a sample of primary schools in five regions such as Tanga, Mbeya, Dar-es-salaam, Dodoma and Morogoro. The study investigated classroom interactive behaviors in science, English, Geography and Mathematics classes. The result revealed that most of the time teachers used teacher centered approach which did not produce good results. In Mpama (1984) and Muhumuza's studies, the findings revealed that even if classroom management is good, the students fail Mathematics because of the negative stereotype they have, that Mathematics is a hard subject, which some people especially the girls cannot manage.

In the study carried out by Muhumuza in the year 2018 about the factors affecting the performance of secondary school students in Mathematics, it was revealed that some teachers themselves are to blame in the sense that they threaten students that Mathematics is a hard subject; only the serious and bright people can manage it. This creates a negative stereotype in the minds of the learners that not many students can do this subject well, he thus blamed teachers' lack of professionalism as a factor in the poor performance of Mathematics.

III. METHODOLOGY

Using a cross-sectional survey design, the study was conducted in Makindye Division, one of the five administrative divisions of Kampala, Uganda's capital city. There were four public secondary schools in the area under study, namely Kibuli Secondary School, St. Denis Ssebugwawo Secondary School, St. Peter's Nsambya Secondary School and Kansanga Seed Secondary School. Makindye Division was used because the results in the Uganda Certificate of Education (UCE) showed that the students had for many years, performed poorly in Mathematics. Twelve teachers of Mathematics and 212 students were used in the study as respondents.

To measure students' academic performance in Mathematics, three sets of data were collected; 1) Through one question in the questionnaire, students were asked to indicate their score in mathematics in the third term of 2018; 2) The researchers also collected records of the Mathematics score of the third term, 2018 to compare with what the students reported as their Math score in that term; 3) The researchers observed the mathematics teachers teaching and after which, the teacher gave a mid-term test and finally end of term one 2019 exams, which two sets of exams were added and an average was used on end of term reports students took home. The data on this average math score was collected and used in this analysis. Descriptive statistics for these three sets of data on math performance are comparatively presented in table 1.

Table 1: Descriptive Statistics on Students Mathematics Performance in the four Public Secondary Schools (Terms three 2018 and term one 2019)

Data set	School	Sample	Mean	Std. Deviation	Minimum	Maximum	F	Sig.
Math's score end of Term3 2018, Students' Response	Kibuli S.S	186	73.06	11.145	40	96	48.673	.000
	KCCA School	119	58.73	17.387	1	98		
	St. Peters	127	72.57	14.653	20	100		
	St. Denis SS	94	56.35	14.614	24	90		
	Total	526	66.71	16.041	1	100		
Math's score end of Term three 2018 Records	Kibuli S.S	398	50.39	17.92194	.00	96.00	185.3	.000
	St. Peters	140	41.05	19.559	2.50	94.00		
	KCCA seed	273	19.03	15.778	.00	90.00		
	St. Denis	123	28.38	17.535	1.00	91.00		
	Total	934	36.93	22.129	.00	96.00		
Math's score End of Term1 2019 Records	Kibuli S.S	349	44.81	16.638	1.00	88.00	25.99	.000
	St. Peters	206	36.58	16.165	4.70	81.50		
	KCCA seed	211	34.05	20.409	3.00	96.00		
	St. Denis	66	29.55	16.513	2.00	71.00		
	Total	832	38.83	18.327	1.00	96.00		

Source: Primary Data (2019)

According to the results in Table 1, based on the records gathered from the different math departments of the four schools, students' performance in mathematics was generally poor, since for the two terms under assessment, the average score is below average (36.93% in 2018 and 38.83% in 2019). However, considering students' responses, the performance was generally good, with a general average of 66.71%. The researcher considered the data generated from the official records because they are more reliable than those got from students, responses. To further analyses the performance results, the scores were categorized based on performance ratings indicated in Table 2.

Table2: Students' Performance and Mathematics Based on Performance Ratings

Performance Ratings	Math Performance in Term three 2018		Math Performance in Term one 2019	
	Frequency	Percent	Frequency	Percent
Very poor (Below 30%)	242	39.0	220	37.6
Poor (30 – 49%)	181	29.2	209	35.7
Fair (50 – 59%)	83	13.4	76	13.0
Good (60 – 74%)	78	12.6	57	9.7
Very good (75% and above)	36	5.8	23	3.9
Total	620	100.0	585	100.0

Source: Primary Data (2019)

The results in Table 2 suggest that majority of the students in the four public schools of Makindye Division were poor performers. Almost 70% or more are in the category of very poor and poor, followed by more than 13% who performed fairly. Less than 20% of all students performed good or very good in the two terms assessed. This confirms that majority of the students in the schools studied performed below average.

During the interview session, participants were asked whether their students are doing well in mathematics or not and why. One of the participants gave his view as follows; "*some do well, some don't because their background in S1, S2 and S3 was poor*". This participant did not explain why the background was poor. Another participant said; "*they do fairly (average), not bad, because there are no materials no provided books, math sets or any educational materials. Another issue is student absences"*. From St. Peters Nsambya, a participant only gave a reason which implied that the students were also not doing well in mathematics, saying that; "*the students only share interaction verbally without going to the board or prepare lessons and doing the role of teachers even if for few minutes"*. This concerns lesson development, and it indicates that the students' poor performance can be partly attributed to poor lesson development by the teacher. This is because, it is the teacher to prepare students and given them tasks and instructions that can allow them go to the board and discuss or teach others what they have prepared. So, if the teacher does not prepare this, it is difficult for students to do it.

From the interviews, it was revealed that some students do well others fair while many perform poorly. What was common that most participants from KCCA and St. Denis indicated that the performance was not generally good? For example, one participant from one of these two schools said;

> *"Not well, because their performance is poor due to universal secondary education,*

> *they came when they were poor. Also, they don't care neither do their parent".*

And another one added that; "*some are high, some are low and others are in the middle, because its dependents on their nature*". A similar view also came from one participant in one of the two schools;

> *"Not all, for example, 15 out of 90 students pass, because fist of all, their attitude towards math is bad, they think just the same because math is a hard subject. And their background in the primary and they are lazy by themselves".*

Yet another gave a percentage bigger than that; "*not all of them, about just 30% perform well because they do not have materials (necessary requirements like books, exercise book), they have poor background and there is no part of the subject to apply*". These findings are in agreement with what was got from the records. This confirms that performance of students in math is still generally poor.

The exceptional case was from Kibuli SSS, where both quantitative findings based on records of marks and qualitative findings based on the views of math teachers indicate that students' math performance in this school is not poor. For example, one participant from Kibuli said; "*Yes, they do, but in average. They have different capacity*". Another one in this same school said that their students perform "*well, because they over ask to understand*". And concerning the reasons why these students perform well, the participant said; *"the teachers are so active, and care about students' performance. They have knowledge on how to handle students' interaction behavior and with themselves"*. One participant explains the general reasons why students may not perform well in math, giving the main reason as less financial pay or small salary, limited time to cover the syllabus and students' poor background;

> *"Yes, less than 20% get less than 50%, this is because first of all, teachers demotivate them, since teachers are paid 600,000 shillings without accommodation or transport, what do you expect from them? Also, students had come with their problems in primary (universal primary education), in addition to that the number of teachers is to cover all those students".*

The interviewees gave different views. Asked what should be done in order to deal with the problem of poor performance in Mathematics, one of them replied that students should be urged to revise as well as not to fear numbers. Mathematics is like any other subject which is passable. These extra lessons also require extra pay, which most of the teachers reported that it was missing. This argument is in line with a view got from a participant of Kibuli SSS; who reiterated that if the teachers were paid well, they will teach well. Also, to provide a suitable number of math teacher. However, other participants gave solutions which more of pedagogical than financial motivation. For example, one participant said that, when starting a math class, you are not supposed to start by giving them difficult questions, instead, start with simple items. This deals with the methodological motivation of students towards Mathematics. Another one gave a similar solution in the way students are taught, saying that;

> *"Giving them more exercises or practical, because we have limited time. We also need to follow their performance and find out what they need. And then award them when they get high marks to motivate them".*

While this may also require extra allowances if these take extra or more time and require more time and energy to mark outside the normal time table, the teacher can use their own time on the time table to plan and give these exercises and practices. Group discussions can also work better in this regard ad require less costs to organize. However, based on another view from one participant, group discussions require that students are well oriented on self-reading and that it may "*need a lot of teaching aids; textbooks (especially, if we group to improve their performance then where are the teaching aids*). In addition to this view, another participant said; "D*eep discussion questions, coordinators leaders and more exercises, we also need to test them every after two weeks or week by week".* A similar point view was also give showing that mat teachers should "*change the teaching approaches and methods. For example, they have to move and try to think by themselves, need more support and encouraging them to share with teacher in math like share in blackboard for example*. Another one suggested the use of projectors, to move round the class and to encourage students to do models by themselves.

One participant gave a solution to improve the performance of girls in math, saying that; "E*ncouraging the girls to share and by showing them that mathematics are not only for men and it's not hard, it can be done step by step. I pick the weak students and ask them to stand and answer to get attention, and next time and I enforce them to ask if they don't know*". This has to do with academic counseling, which may be done by the teachers themselves during their time of teaching and through special counseling sessions organized once in a while.

Relationship between Classroom Management and Students' performance in Mathematics

Classroom management was found to be very good, the researchers went ahead to examine if this good management helps to produces good performance results in mathematics. For this reason, the researchers correlated the computed class room management index with students' scores in mathematics for third term 2018 and first term 2019, using Persona's linear correlation coefficient (PLCC). Table 3 shows these results.

Table 3: Pearson Correlation for Classroom Management and Students' performance in Mathematics

Variables correlated	R-value	Sig.	Interpretation	Decision on Null hypothesis
CRM Vs Math Scores in Term3 2018	.080	.064	Insignificant correlation	Accepted
CRM Vs Math Scores in Term1 2019	.041	.350	Insignificant correlation	Accepted

*CRM= Classroom Management

The Pearson's correlation coefficient results in Table 3 reveal that teachers' classroom management behaviour had an insignificant positive relationship with students' performance in mathematics in all the results assessed (all p-values> 0.05). Therefore, with all the sets of mathematics scores, it was revealed that classroom management was insignificantly related with students' performance in mathematics. This implies that the good classroom management behaviours of math teachers did not help them to produce better performing students.

To further ascertain the results of the Pearson's correlation, simple linear regression was applied to help the researcher determine the strength of the effect teachers' classroom management behavior has on students' performance in mathematics. In line with this first objective, the researcher tested a null hypothesis that teachers' classroom management behavior has no significant effect on students' performance in mathematics in Makindye Division public secondary schools. Results of this test are indicated in Table 4.

Table 4: Regression Analysis for Classroom Management and Students' Performance in Mathematics

Variables Regressed	R^2	F-	Sig.	Interpretation	Decision on Ho
Classroom Management Vs. Math Scores in 2018	0.002	0.874	0.350	Insignificant effect	Accepted
Classroom Management Vs. Math Scores in 2019	0.006	3.445	.064	Insignificant effect	Accepted
Coefficients (2018)	Beta	t			
(Constant)	24.746	3.091	.002	Significant effect	Rejected
Classroom Management	.080	1.856	.064	Insignificant effect	Accepted
Coefficients (2019)					
(Constant)	31.962	4.484	.000	Significant effect	Rejected
Classroom Management	.041	.935	.350	Insignificant effect	Accepted

The results in Table 4 show that, classroom management explained only 0.20% towards variations in students' academic performance in Mathematics, third term 2018 (R^2 = 0.002). A similarly low value of r-square was got for the results of term one 2019 (0.006), suggesting that teachers' classroom management behaviour contributed only 0.6% towards students' math scores of the first term 2019. These low r-square values suggest that 99.8% and 99.4% of the variations in students' math performance in third term 2018 and term one 2019 respectively, were accounted for by other factors not considered here, such as the method of teaching used, the quality of content, the attitude of the learners and other factors.

A closer look at the F-statistic and p-values reveal that the regression models were not significant, indicating that classroom management has no significant effect on students' performance in mathematics. The coefficients section of the regression table (Table 4) give us the beta values, which tell us the magnitudes classroom management had on the respective results of 2018 and 2019.According to these betas, classroom management had no significant on students' performance in 2018 and in 2019, since all the corresponding p-values were greater than 0.05. The constant values indicated that when classroom management is taken to be zero (or very poor in this case) students' performance in math can be significantly high. Based on these results, the null hypothesis was accepted and a conclusion is made that teachers' classroom management does not significantly determine students' performance in mathematics.

IV. DISCUSSION, CONCLUSION AND RECOMMENDATION

The findings on this first objective revealed that teachers' classroom management behavior was rated by the students to be generally very good (average mean =4.26). The Pearson's linear correlation results revealed that there was and insignificant positive correlation between teachers' classroom management behaviour and students' performance in mathematics in all the two sets of results assessed (all p-values> 0.05). The results of simple linear regression indicated that classroom management had no significant effect on students' performance in mathematics in the studied schools. However, what was found out in this study did not indicate improved performance in math as a result of the good management of classroom.. This is a critical matter because, it expected, even acceptable in common sense, as also put up by Middleton and Spanias (2013) that teachers who exhibit high-quality relationships with students get better results compared to the opposite. Mpama (1984) reported that students whose teachers developed good relations had 31% fewer discipline problems, rule violations and other related problems than those whose teachers did not. One of the indicators of good teacher-student relations used in this study is classroom management and this investigation found out that it was generally very good.

It is also indicated that proper classroom management strategies are intended to enhance good behavior and increase student academic engagement. This indicates that the insignificant results in this study are also in disagreement with this view. According to Brophy (2006), effective classroom management principles work across almost all subject areas

and grade levels. So even for mathematics performance, it is expected to enhance it, unlike what is revealed in this study.

According to Hassan (2008), one critical aspect of developing good relationships with learners is knowing and understanding them. The findings in this study rated teachers' interaction good on three aspects related to this argument, which include talking to students with respect even when giving corrections; using and calling correctly student names in class and using minimum harshness when dealing with students who break class/school rules. These key interaction aspects help to create a positive attitude towards the teacher and the subject he/she is teaching and as some result students will love it and pass it as well.

V. RECOMMENDATIONS

As regards classroom management, there is need for teachers to emphasize roll calls before or after the class. They can do this by devising better ways of doing it without wasting much time, especially where the classes are very big. Also the teachers should provide guidance to their students so that students shun the negative stereotype that Mathematics is a hard subject. This will enable them to perform well in mathematics. It further recommends that there is need for the instructors to create favorable learning environments by being free with the learners so that the learners feel free to raise questions and comments to teachers, hence improve on the performance in mathematics.

REFERENCES

[1]. Berk, R. (1988).*Fifty reasons why student achievement gains does not mean teacher effectiveness.* Journal of Personnel Evaluation in Education, 1(4) 345–364.

[2]. Brophy, J. (October 1968): *Teacher influences on student achievement*. American Psychologist, 1069–1077

[3]. Hassan(2008). *Effectiveness of classroom interaction in education.* Nairobi, Kenya: Jomo Kenyatta Publisher.

[4]. Ifamunyiwa, G. (2008). *Conceptions of mathematics teacher education*. London, England: Sage.

[5]. Kumpulainen, K., Wray, Classroom Interaction and Social Learning (2002). Available from http://books.google.com/books.

[6]. Luswata, E. (2017). *Teaching methods and students' performance in Science subjects in Masaka district secondary schools.*MED Dissertation, Kampala International University, Uganda.

[7]. Middleton, J.A. and Spanias, P.A.(2013) "Motivation for achievement in Mathematics, Findings Generalization Research", *Journal for Research in Mathematics Education,30*(1), 56-66

[8]. Mpama, R. A. (1984). *Factors influencing mathematics performance in primary schools' students in Tanzania: A case study of Mtwara District*. MED Dissertation, University of Dar-es-Salaam, Dar es Salaam, Tanzania.

[9]. Muhumuza, P. (2018). *Factors affecting secondary school students' performance in Mathematics.* MED Dissertation, Kampala International University, Uganda.