International Journal of Novel Researches in Science, Technology & Engineering
Vol. 4 No. 1 September, 2021
ISSN 2141 825X
www.oasisinternationaljournal.org

CLASSROOM INTERACTIVE PATTERN AND ATTITUDE TOWARDS MATHEMATICS AMONG PRIVATE AND PUBLIC JUNIOR SECONDARY SCHOOL STUDENTS IN OWERRI, NIGERIA

[1]Olawuyi, Oluseye M., [2]Osuji, Nnedimma C.,
[3]Chinaka Augustina I.,[4]Nwugha, Victor N. (PhD),
Department of Basic Sciences
School of General Studies
Alvan Ikoku Federal College of Education
Imo State, Nigeria.

Abstract

The study was designed to establish the descriptive nature of classroom interactive pattern and attitude of students towards mathematics and to ascertain if there were differences among participants based on school type (private and public). Descriptive survey research design was adopted. Owerri Municipal Local Government Area was selected and schools in the area were public and private schools. Simple sampling technique was finally used to select six schools (3 private and 3 public), and One hundred and eighty (180) students (30 per school). One hundred and sixty-four (164) respondents that filled the questionnaires administered were used for the research. One multi-stage questionnaire was used to collect data. Descriptive statistics and independent sample t-test were used for the analysis. The result shows that there is no significant difference in Junior Students' attitude towards Mathematics between public and private schools selected. Also, the students demonstrated positive classroom interaction perception and attitude towards the subject. Their perception towards the mathematics teachers' attitude to teaching was also positive.

Keywords: **Interactive Pattern, Attitude, Mathematics and Students**

Introduction

In several education systems all over the world, mathematics is one of the important subjects within the list of foundation subjects that constitute the core curriculum for basic education. The basic knowledge acquired in mathematics at the junior secondary school level is important for a student to progress to senior secondary schools. Mathematics is a core subject in schools all over the world and occupies a privileged position in the school curriculum. It is studied in the elementary school systems. In recent times, performance in the subject mathematics by students has not

been impressive at the Junior Secondary School level. This is mainly associated or ascribed to students' negative attitudes towards mathematics among others. According to Stipek (2019), attitude plays an important role in students' academic performance especially in mathematics. Attempts have been made by researchers in defining attitude; Sarmah and Puri (2014); Kobella (2017); Robert (2014); Mejia-Rodriguez, Hans and Martina, (2020), Sarmah, *et al* (2014), for instance defined attitude as "A learned predisposition or tendency on the part of an individual to respond positively or negatively to some object, situation, concept or another person". According to Cassidy, Franco, Meo (2018), "Attitude is the tendency of an individual to react favorably or unfavourably toward a designated class of stimuli". In reviewing numerous definitions of attitudes, Robert (2014), concluded that these definitions differ in almost every conceivable important way.

Available literature suggests that educational researchers have spent time and energy trying to research into the attitudes of students towards the learning of mathematics at junior secondary school levels; Leon-Mantero, Casa-Rosal., Pedrosa-Jesus, Maz-Machado (2020); Khan and Rodrigues (2012); Dickson (2011); Mensah, Oykere and Kuranchie (2019) and Khan, *et al* (2012) in their study "the influence of school type on student's attitudes towards mathematics", for instance, found that both public and private school's students had highly positive attitudes towards mathematics, though students from the private schools showed a slightly high degree of confidence in learning mathematics as compared to students from the public schools. A similar research conducted by Alderman, Orazem and Paterno (2001), Arif, and Saqib (2003), Aslam (2009) and Marc and Ping Ching (2015), found that students from private schools showed significantly more positive attitudes towards mathematics than students from public schools. In studying the relationship between attitude of students towards mathematics and achievement they found that there is strong positive correlation between student's attitudes towards the learning of mathematics and their achievements. It was also clear from his study that urban boys and girls had a more positive attitude towards mathematics than rural boys and girls. According to Leon-Mantero *et al* (2020), students with better attitudes towards mathematics have higher perceptions and better mathematical self-concept and are able to display approach behaviours towards mathematics.

Available literature revealed that studies that compared gender differences in mathematics are mostly in favour of boys. Mubeen, Saeed and Manzoor (2013); Mazana, *et al* (2019), whiles others such as Opolot-Okurot (2005), reported in favour of girls. For instance, Mubeen, et al (2013), in a study on the topic "Attitude towards mathematics and academic achievement in mathematics among secondary school boys and girls" revealed that girls achieved better results in mathematics as compared to boys. Opolot-Okurot (2005), on the other hand found that for all the attitudinal variables (anxiety, confidence and motivation), boys had higher mean scores than girls. That is, boys have a better attitude towards mathematics than girls. Other researchers like Lindberg, Hyde., Petersen and Linn (2010), saw no significant difference between the attitude of boys' and girls' students towards mathematics. During the past several years, a number of valuable studies have been conducted by researchers in an attempt to design instruments to investigate the underlying dimensions of attitudes towards mathematics Baser, (2013); Parveen, Sanwar and Waleed (2014), Tapia and Marsh

(2004), Tripti and Mala Dutt (2004), and Wiebe, Williams, Yang, and Miller (2003), for instance conducted survey to measure students' attitudes towards computer programming and computer science in general. A survey instrument consisting of 57 positive and negative statements was used.

An evaluation of internal consistency of the instrument for five (5) subscales namely:

i. Confidence in learning,
ii. Attitude toward success in computer science,
iii. Computer science as a male domain,
iv. Usefulness of computer science, and
v. Effective motivation in computer science.

These gave a Cronbach's Alpha values ranging from 0.83 to 0.91. Parveen, *et al* (2014), developed an instrument to measure computer science students" attitude towards mathematics. The reliability coefficient, Cronbach alpha value, for the instrument was found to be 0.81 and coefficients for four (4) subscales ranged from 0.81 to 0.92. The subscales were:

i. Self-efficacy,
ii. Enjoyment,
iii. Anxiety, and
iv. Relevance.

The alpha values asserted that a successfully and efficient instrument was developed and can be used to carry out a study on student's attitude towards mathematics. Baser, (2013) examined the relationship among students" attitude towards computer programming, their gender and academic achievement in programming. Responses of One Hundred and Seventy-Nine (179) students were collected through a survey. Exploratory Factor Analysis (EFA) extracted four (4) subscales namely;

i. Confidence in learning computer,
ii. Usefulness of computer,
iii. Attitudes toward success in computer, and
iv. Effective motivation in computer programming.

Pearson Correlation showed a significant positive correlation between students' attitudes and their achievements. The results also showed that male students had a more positive attitude than female students. Tripti, *et al* (2004) also conducted a study to find out the factors affecting the attitude of students towards the higher education system in India.

Factor analysis on statements in questionnaire considered showed that, there are four major factors which impact the attitude of students;

i. Class participation and Practical approach;
ii. Extra-curricular and Infrastructural facilities;
iii. New undergraduate structure; and
iv. Curriculum and Evaluation.

The researchers review of the previous works on students' attitude towards Mathematics confirmed the statement by Asanti, (2012) that "Most of the studies on student's attitudes towards Mathematics have centred on Western samples, whilst very few studies have been conducted from Africa". Another interesting observation of the studies conducted so far showed that they are primarily focused on secondary students' Mathematics attitudes and the effect of gender. Very few studies looked at public and private Junior Secondary School students' attitudes towards Mathematics despite the assertion by previous researchers that academic performances of students from private schools are better than students from public schools. Attempt to improve attitudinal inclination towards Mathematics at Junior level will provide the base for Higher studies in Mathematics. It will also have positive

effect on achievement in Mathematics at Senior Secondary School level as stated by Shahid, *et al* (2008).

National development is the ability of a country to improve the social welfare of the people. It involves development of infrastructure such as roads, hospitals, airports, dams, schools, education, health, sports as well as development of its citizenry. National development encompasses economic development which is the increase in the standards of living of a Nation's population with sustained growth from a simple, low-income economy to a modern, high–income. So, economic development and growth implies a national development which demands the application of Mathematics. Mathematics is a branch of knowledge that deals with measurement, numbers and quantities. Mathematics is a tool, it's knowledge and skills are the bedrock of all societal transformation and transfer of ideas into reality. Each of the diverse branches of Mathematics has useful applications on which fields of human endeavour hangs. This pivotal position that Mathematics occupies makes it a tool for rebranding. This paper focuses on classroom interactive pattern and attitude towards Mathematics among Private and Public Junior Secondary Schools which is of a great factor to national development.

Statement of the Problem

The uncertainty determinant of classroom interactive pattern (CIP) and students' attitudes towards mathematics as core subject among secondary school students on Owerri, Nigeria. This work seeks to address the following problems:

i. Determine classroom interactive pattern (CIP) of reactions towards mathematics.
ii. Students' attitude towards learning mathematics at Junior Secondary School level.
iii. Causes of low performance in mathematics test and examinations.
iv. Low enrolment in mathematics and mathematics-specific courses at Higher school levels.

Purpose of the Study

The purpose of this work is to determine classroom interactive pattern (CIP), as a driver to attitudes of private and public junior secondary school students towards learning mathematics as a core subject.

The research was conducted with aim of achieving the following objectives:

(i) To find out the attitudes of junior secondary school students towards classroom interactive pattern (CIP), and the study of Mathematics.
(ii) To find out whether differences in attitudes exist among private and public students towards classroom interactive pattern (CIP), and the study of Mathematics.
(iii) To determine private and public JSS students' perception towards Mathematics' Teachers attitude towards teaching.

Research Questions

This study sought to get answers to the following questions:

(i) What are the attitudes of Students towards classroom interactive pattern (CIP), and Mathematics?
(ii) Is there any significant difference between the attitude of private and public junior secondary school students towards

classroom interactive pattern (CIP), and Mathematics?

(iii) What are private and public JSS students' perception towards Mathematics' Teachers attitude towards teaching?

Methodology

The study utilized the descriptive research design of the survey type to determine the classroom interactive pattern (CIP), and attitude towards mathematics among private and public junior secondary school students.

The target population was Two Hundred and Ninety (290) Junior Secondary School III (JSS 3) students in Owerri Municipal Local Government Area (OMLGA). The schools in this area was stratified into public and private schools. Simple sampling was used to select six (6) schools (3 publics and 3 private) and One Hundred and Eighty (180) JSS 3 students (30 per school). However, only one hundred and sixty-four (164) participants were used for the research (consisting of 90 students from public and 74 students from private)

The instrument for data collection is a multi-stage survey instrument. Self- structured questionnaire was used to determine JSS 3 students' responses to 16 items. This questionnaire was referred to as Students Attitude Scale (SAS).

The survey has three compartment:

(a) student's interactive pattern (SIP)

(b) student's attitude towards mathematics (SATM)

(c) student's perception of mathematics teacher's attitude (SPMTA).

Each compartment indicated a construct based on which students' attitude towards mathematics were measured. The first compartment SIP had four items set to answer research question 1. The second compartment (SATM) had 8 items set to answer research question 2 and 3, and the third compartment (SPMTA) had 4 items set to answer question 4.

The students' attitudes towards mathematics were ascertained by asking them to rate each statement in the survey (questionnaire) in terms of, strongly agreed, agreed, disagreed, strongly disagreed. Some of the statement in the survey were positive and some were negative for positive statement. Strongly agreed (SA) was scored 4 points, agreed (A) 3 points, disagreed (D) 2 points and strongly disagreed (SD) 1 point. For negative statement, the scoring pattern was reversed. For content validity, the instrument was examined by 2 experts; one in Measurement and Evaluation, and other in Mathematics Education. After changes had been made, the student attitude scale (SAS) instrument was piloted on twenty (20) JSS 3 students in one JSS school in Owerri North LGA. This school did not form part of the sample. The alpha was 0.87.

Data for the study were collected November 10, 2020. The questionnaire was distributed to the students in each of the selected JSS3 classrooms in the mornings, between 8:30 and 9:00 am. The purpose of the study was explained to the students and explanations were given as how to respond to the items. The completed instruments were collected that same morning.

Results:

Results of Tables 1,2 and 4 are based on benchmark of 2.50.

Table 1: Student's Classroom Interactive Pattern (SIP)

SIP	SD	D	A	SA	MINI SCORE	MAX SCORE	MEAN SCORE
1	0	4	92	68	1	4	3.39
2	52	77	28	7	1	4	3.06
3	32	53	54	25	1	4	2.56
4	13	55	45	51	1	4	2.82

Table 2: Public and Private Students' Attitudes towards Mathematics (SATMQ)

SATMQ	SD	D	A	SA	MINI SCORE	MAX SCORE	MEAN SCORE
1	34	71	50	9	1	4	2.79
2	46	67	25	26	1	4	2.81
3	11	24	62	67	1	4	3.13
4	9	43	67	45	1	4	2.90
5	33	59	41	31	1	4	2.57
6	62	74	23	5	1	4	3.18
7	55	54	33	22	1	4	2.87
8	14	12	35	83	1	4	3.26

Table 3: Summary of Public and Private Students' Attitud1e towards Mathematics (SATM)

Construct	School Type	Number	Mean	SD	Total	p value
Students Attitude Towards Mathematics (SATM)	Public	99	20.12	3.01	0.239	0.689
	Private	65	20.0	3.35		

Table 4: Student's Perception of Mathematics Teacher's Attitude (SPMTA).

SPTAQ	SD	D	A	SA	MINI SCORE	MAX SCORE	MEAN SCORE
1	56	62	18	28	1	4	2.89
2	59	51	34	19	1	4	2.91
3	44	57	33	30	1	4	2.70
4	8	7	61	88	1	4	1.60

Table 1,2, and 3 answer the research questions 1 and 2. They are descriptive statistic results that show that students demonstrated positive classroom interaction and attitude towards mathematics. Their perception towards the mathematics teachers' attitude to teaching was also positive.

Table 4, answer research question 3. It is t-test statistical result that show there is no significance in Junior students' attitude towards mathematics between private schools (Mean 20.00, SD = 3.35); t (162) = 0.239, p = 0.689 and public schools (Mean = 20.12, SD = 3.01).

Discussion of Findings

Findings shows there is no significant difference in the classroom interaction pattern (CIP), and attitude to mathematics among private and public JSS 3 students. This is in agreement with Khan, *et al* (2012), which found that both private and public school's students had highly positive attitudes towards mathematics.

This study found:

i. Both private and public students have a good attitude to classroom interactive pattern towards mathematics.
ii. There is no significant difference between the attitude of private and public JSS 3 students towards mathematics.
iii. Both private and public JSS 3 students have positive perception of their Mathematics teachers' attitude towards teaching.

Though, to the researchers' surprise, we discovered that the public schools showed a slightly high degree of confidence in learning mathematics as compared to students from the private schools. Contrary to Khan, *et al* (2012) findings.

At the school level, three (3) factors are particularly important to influence students' performance:

i. classroom interactive pattern,
ii. students' attitude towards the subject, and
iii. their perception of their teachers' attitude towards teaching.

Therefore, it is the responsibility of educational administrators, leaders and policy makers to initiate and implement policies that will enhance classroom interactive pattern, student attitude towards the subject, and their perception of their teachers' method of teaching.

Recommendations

The attitude of the students, as revealed from findings, shows that no matter how good interventions that might be proposed to address the problem of performances by private and public school students in Owerri Municipal Local Government Area of Imo State, they will be unlikely to succeed with isolated efforts by individuals. It is therefore suggested that:

1. A wider sensitization of teachers, at least in the Departments of Mathematics, Mathematics Education, School of Science and Basic Education, in the post-secondary training colleges and in the Colleges of education or Universities, to the case of the difficulties students faces in learning and understanding Mathematics be organized.

2. Workshops should be organized for Mathematics teachers already in the field. During the workshops, the teachers must be required to reflect on their classroom practice. This is to get teachers to be part of an action to remedy the acute problems.

3. If student involvement is extended to being researchers rather than only subjects of research, they may have awakened to a number of issues, which might help improve their beliefs, attitudes and performances with respect to Mathematics ethics.

It is therefore recommended that both students and teachers should demonstrate positive attitude towards mathematics and actively interact with their classmates to enhance learning effectiveness.

References

Adebule, S.O., Aborisade, O.J., (2014). Gender comparison of Attitude of Senior Secondary School Students towards Mathematics in Ekiti State. European Scientific Journal, 10(19), 153 – 160

Alderman, H., Orazem, P. F., & Paterno, E.M., (2001). School quality, school cost, and the public / private school choices of low-income households in Pakistan, *The Journal of Human Resources,* 36 (2), 304 – 326.

Arif, G.M., and Saqib, N., (2003). Production of cognitive life skills in public, private, and NGO schools in Pakistan. *Pakistan Development Review*, 42 (1), 1 – 28.

Asante, O., Kwaku, (2012). Secondary Students' attitudes towards mathematics, *IFEIA, Psychology*, 20 (1), 121-133.

Aslam, M., (2009). The relative effectiveness of government and private schools in Pakistan: Are girls worse off? *Education Economics*, 17 (3), 329 - 354.

Baser, M., (2013). Attitude, gender and achievement in computer programming, *Middle East Journal of Scientific Research*, 14(2), 248-255.

Cassidy, K., Franco, Y., Meo, E., (2018). Preparation for Adulthood: A Teacher inquiry study for facilitating life skills in secondary education in the United States. *Journal of Educational Issues*, 4(1), 33-46.

Dickson, S. O., (2011). Students' Sex and Attitudes Toward Mathematics: A Case of Secondary School Students in Eldoret Municipality, Uasin Gishu District, Kenya. *International Journal of Educational Research and Technology*, 2(2), 56 – 61.

Field, A. P., (2009). Discovering statistics using SPSS, 3rd ed., London: Sage, United Kingdom.

Khan, A. K., Rodrigues, S., (2012). The Influence of School Type on Students‟ Attitudes towards Mathematics in Quetta, Pakistan. *Journal of Research and Reflections in Education*, 6(2), 95–102.

Khatun, N., (2021). Applications of Normality Test in Statistical Analysis. *Open Journal of Statistics*, 11(1), 113-122.

Kobella, T. R., (2017). Changing and measuring attitudes in the science classroom. National Association for Research in Science Teaching: www.narst.org/publications/research/attitude.cfm.

Leon-Mantero, C., Casa-Rosal, J.C., Pedrosa-Jesus, C., Maz-Machado, A., (2020). Measuring attitudes towards Mathematics using Likert scale surveys: The weighted average. *PLOS ONE*, 15(10): e0239626.

Lindberg, S. M., Hyde, J. S., Petersen, J. L., and Linn, M. C., (2010). New trends in Gender and Performance in Mathematics. *A Meta-Analysis, Psychological Bulletin*, 136(6), 1123–1135.

Majeed, A. A. I., Darmawan, G. N., and Peggy, L., (2013). A Confirmatory Factor Analysis of Attitudes Toward Mathematics Inventory (ATMI). *The Mathematics Educator*, 15(1), 121-135.

Marc, F., and Ping Ching, W.C., (2015). Academic outcomes of Public and Private High School Students: What lies behind the differences? Social Analysis and Modelling Division, Statistics, Canada.

Mazana, Y.M., Calkin, S.M., and Respickius, O.C., (2019). Investigating Students' Attitude Towards Learning Mathematics. *International Electronic Journal of Mathematics Education.* 14(1). 207-231.

Mensah, F., (2006). Attitude of Junior Secondary School Students towards the study of Science. African. *Journal of Educational Studies in Mathematics and Sciences*. 4(1). 33-39

Mensah, J., K., Oykere, M., and Kuranchie, A., (2019). Students' Attitude towards Mathematics and Performance: Does the teacher's Attitude matter*? Journal of Education and Practice.* 4(3). 132-139.

Mejia-Rodriguez, Ana Maria, Hans Luyten, & Martina, R.N., (2020). Gender differences in Mathematics self-concept across the World: An exploration of student and parent data of TIMSS 2015. *International Journal of Science and Mathematics Education.* 19, 1229-1250.

Mubeen, S., Saeed, S., and Manzoor, H.A., (2013), Attitude towards Mathematics and Academic Achievement in Mathematics among Secondary Level Boys and Girls. *Journal of Humanities and Social Science,* 6(4), 38-41.

Nathan, B., Jacqueline, C., Youngjun, L., Siwen, G., Israel, T., Kimberly, J., and William, S., (2019). A Review of the Literature on Teacher Effectiveness and Student Outcomes. *IEA Research Education*. 6(1). 7-17.

Nsiah, P.Y., (2004). Assessment of the role of private schools in the development of education in Ghana. A study of the Kumasi metropolis. *Journal of Science and Technology*, 24(2), 54 – 75.

Opolot-Okurot, C., (2005), Student attitude towards mathematics in Uganda secondary schools. *African Journal of Research in Mathematics, Science and Technology in Education*, 9(2), 167-174.

Parveen, J. A., Sanwar, A., and Waleed, E. F., (2014). An Instrument to Measure Math Attitudes of Computer Science Students, *International Journal of Information and Education Technology*, 4(5), 459–462.

Robert, A., (2014). Schema Theory: An Information Processing Model of Perception and Cognition. University of California: Berkeley.

Sarmah, A., and Puri, P., (2014), Attitude towards Mathematics of the Students Studying in Diploma Engineering Institute (Polytechnic) of Sikkim. *Journal of Research & Method in Education*, 4(6), 6-10.

Shahid, M. F., Zia, S., and Shah, U., (2008), Students' attitude towards mathematics, Pakistan Economic and Social Review, 46(1), 75-83.

Stevens, J. P., (2002). Applied multivariate statistics for the social sciences, 4th ed., Hillsdale, NJ: Erlbaum.

Stipek, D.J., (2019). Quality and Continuity in Young Children's Educational Experiences. In A.J. Reynolds & J.A. Temple (Eds.), Sustaining early childhood learning gains: Program, school, and family influences. Cambridge University Press, 160 – 181.

Suleiman, F., Muhd Rameli, M.R., and Ado, M., (2020). Attitude of Nigerian Primary School Students towards Mathematics Subject. *Journal of Research in Psychology*, 2 (2), 35-36.

Tapia, M., and Marsh, G. E., (2004). An instrument to measure mathematics attitudes, Academic Exchange Quarterly, 8(2). www.rapidintellect.com/AEQweb/cho25344l.htm.

Tripti, N., and Mala Dutt, D., (2004), Factor analysis of attitude of students towards the higher education system. *International Journal of Commerce, Business and Management*, 3(6), 850– 857.

Wiebe, E. N., Williams, L., Yang, K., and Miller, C., (2003), Computer Science Attitude Survey.www4.ncsu.edu/~wiebe/www/articles/prl-tr-2003-1.pdf.

Zuya, H. Z., (2014). Mathematics Teachers' Responses to Students' misconceptions in Algebra. International *Journal of Research in Education Methodology*. 6(2), 830-836.