

Classroom Management in Physics Class: Does it have any Impact on Public Secondary School Students' Achievement?

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Abstract

This study analyzed the impact of classroom management on secondary school students' achievement in physics in Jos metropolis, Plateau State, Nigeria. Secondary school students' achievement in physics has not been satisfactory which could be attributed to the manner in which the teacher manages the classroom. Quasi-experimental research design of the non-equivalent control group pre-test, post-test type was employed to guide the study. The population of the study consisted of 2,450 senior secondary two (SS II) students offering physics in public co-educational secondary schools in Jos metropolis. The sample for the study consisted of 92 SS II students offering physics in intact classes of two public co-educational senior secondary schools obtained from the population of the study. This sample was obtained using purposive sampling technique. Physics Classroom Management Observation Schedule (PCMOS) and Physics Achievement Test (PAT) were the instruments used to gather data. Three research questions were raised and two null hypotheses were formulated for the study. While the research questions were answered using mean, the hypotheses were tested, at 0.05 level of significance, using t-test for unrelated samples. Findings of the study revealed that students taught under effective classroom management had higher achievement in physics compared to those taught under ineffective classroom management. Findings also showed that no significant disparity existed in the achievement in physics of male and female students who were taught under effective classroom management. One recommendation was that physics teachers should learn to manage the classroom effectively, since classroom management has been found to be gender-friendly.

Keywords: Classroom Management, Physics, Students' Achievement, Students' Gender.

Introduction

Physics is a branch of science that deals with the study of matter and energy and their interaction. It is a physical science, sometimes referred to as the science of measurement, and its knowledge has contributed greatly to the production of instruments and devices of tremendous benefit to humanity. This implies that the application of the principles of physics have contributed immensely to the quality of life in the society. Physics is a fundamental science which is concerned with the basic principles of the universe. Ike (2000) viewed physics as the study of laws that determine the structure of the universe with reference to the matter and energy in the universe. The objective of physics is to find a limited number of fundamental laws that govern natural phenomena; use these laws to develop theories that can predict results of future experiments; and express the laws in the language of mathematics (Serway & Jewett, 2014). There exists a strong link between progress in physics and technological advancement of the society, since physics provides the theories behind technology and it is the foundation of any theoretical and applied knowledge.

The objectives of teaching physics at secondary school level, highlighted by the Federal Ministry of Education (2014), include learning of fundamental facts and principles of science and development of the abilities and skills needed to engage in the process of science. It is expected that it is from among the students at secondary level that future physicists, engineers, doctors and technologists, among others will emerge. For physics to retain its position as the bedrock of science and technology and for the objectives of teaching physics at the secondary school level to be achieved, it is important to ensure that the way it is being taught enhances understanding in the students, thereby improving their achievement. There is, then, the need to carefully identify, select an effective means of teaching that enhances student's achievement in physics.

Despite the importance of physics to the human race, there are a number of observable problems plaguing the teaching and learning of the subject, especially at the secondary school level in Nigeria. These problems include the manner in which physics teachers manage their classrooms. Many of the teachers view teaching as merely transmitting knowledge to students; thereby relegating classroom management to the background. MacAulay; and Walker, Colvin, and Ramsey, as cited in Suleman and Hussain (2014), concluded that an effectively managed classroom tends to improve students' achievement. This problem might have resulted to the not too impressive and fluctuating achievement of students in physics in Nigeria, as attested to by results of physics examinations organized by West African Examinations Council (WAEC) and National Examinations Council (NECO) over the years (Josiah, 2019). Nzewi, as cited in Godwin and Okoronka (2015), attributed the not too impressive achievement of students in physics to gender bias, such that the physical sciences and technical courses which are dominated by male students were regarded as hard while biological sciences, Home Economics and Secretarial studies were regarded as soft and are dominated by female.

There is no human endeavour that does not require proper management for its proper functioning. All types of organization, government establishment, business enterprises, hospital, schools' cooperatives, amongst others, require effective

management to function. Management is one of the most important activities that govern all organizations. When people work together in an organization for the attainment of set goals and objectives, there is need for management that is charged with the responsibility of ensuring that the goals and objectives are realized. Agogo (2012) observed that, all along, emphasis has only been placed on teacher's pedagogy at the expense of students' learning. This situation seems to have labeled the Nigerian secondary school physics teacher as professionally incompetent and might have resulted to the poor achievement in physics on the part of students. In other to improve students' achievement in school subjects, educators have evolved with better ways of managing the classroom.

Classroom management is paramount in improving students' understanding and their achievement. For meaningful learning to be achieved in physics, learners' commitment is of great importance. Babajide (2010) agreed that students' commitment to learning science translates to their achievement in science subjects. This commitment may be realized when teachers are able to manage the classroom effectively. Classroom management, as opined by Aliakbari and Bozorgmanesh (2015), refers to the activities employed by teachers to organize and direct classes so as to achieve specific goals. Martin and Sass, as cited in Aliakbari and Bozorgmanesh (2015) and Emmer and Stough (2012) did consider classroom management as a term which embraces teachers' actions to manage classes, students' behaviours and their learning. Teachers' actions involved in classroom management include checking of class attendance, record keeping of class progress, dealing with students' misbehaviours by teachers, taking care of students' cognitive and emotional needs, and instilling order in the class while providing appropriate teaching instruction for effective learning.

Oliver and Reschly (2011) noted that classroom management is a factor that influences students' achievement in schools. This implies that effective classroom management is a necessity for the academic success of students. Effective classroom management is much more than just administrative corrective measures when a student misbehaves; it is much more than discipline. Kausher (2013) posited that effective classroom management is about the teacher developing pro-active ways to prevent problems from occurring in the first place while creating a positive learning environment. The teachers that are effective in managing their classrooms create orderly, safe environment where students feel valued, comfortable, thereby setting the stage for enhanced teaching and learning. Such a teacher provides a structured, caring environment that meets students' personal and academic needs. Such teachers are also perceived as authority figures in the classrooms. High behavioural expectations are shared, developmentally appropriate lessons are designed and/or implemented, and behavioural guidelines are established and enforced by the effective teacher. However, where effective classroom management is lacking, teaching and learning would be disrupted or adversely affected; this may lead to students' underachievement. A teacher that is ineffective in classroom management is a poor classroom planner. Such a teacher does not start lessons on time, use limited/inappropriate teaching strategies and spends most of the lesson duration dictating/copying notes for students. A classroom that is ineffectively managed leads to a disorganized environment and promotes unclear academic and behavioural expectations.

Contributing to the quest for effective classroom management, Balwin (2012) maintained that the necessary equipment to help the teacher manage the class with ease should be provided. Maintenance of class discipline, giving rewards and punishments, motivation, vested knowledge of the subject matter, methods of instruction and individual differences of the students are some of the classroom equipment. Adeyemo (2012) posited that physics occupies a unique position among the science subjects that are taught in secondary schools and that when teachers manage their classes effectively when teaching, disrupted classroom is avoided leading to improvement in students' achievement. This implies that secondary school students' achievement in physics in Nigeria may be improved through effective classroom management by physics teachers.

Findings from Adeyemo's (2012) study on the relationship between effective classroom management and students' achievement, indicates that effective classroom management strongly and positively influences students' achievement in physics. Although Igbino and Marvelous' (2015) study was at the junior secondary school level of education and not in physics, the finding also indicated that a strong relationship existed between classroom management and students' achievement. Even though in consonance with the findings of Adeyemo (2012), Igbino and Marvelous' (2015) and Aliakbari and Bozorgmanesh's (2015) studies revealed a weak positive correlation between classroom management and students' achievement scores in English Language. Another study by Suleman and Hussain's (2014) revealed a significant difference between the mean achievement scores of students taught using effective classroom management and those taught using ineffective classroom management. However, Saifi, Hussain, Salamat and Bakht (2018) found out that classroom management had no significant impact on students' achievement.

Gender issues in academic achievement are contemporary and global, just like other gender-based issues. Roache and Ramon (2011) asserted that effective classroom management increases both male and female students' achievement. Researches carried out by Eriba and Ande (2006) and Inyang and Josiah (2016) on gender and students' achievement showed that male students achieve higher than their female counterparts in the sciences. However, in their separate studies, Trisma and Josiah (2008) and Godwin and Okoronka (2015) found no significant disparity in achievement in physics between male and female students.

Statement of the Problem

The achievement in physics of secondary school students in Nigeria has not been satisfactory over the past years; and, although there has been improvement in the recent past years, the achievements have been fluctuating. This is vividly seen in the statistical report obtained from the West Africa Examinations Council (WAEC) and National Examinations Council (NECO) (Josiah and Gana, 2019; Josiah and Mankilik, 2018). There are factors that might have contributed to the unsatisfactory and fluctuating achievement of students in physics, some of which Agommuoh and Nzewi (2013), Josiah and Larina (2015) and Sule and Mankilik (2015) identified as teaching methods used in physics, lack of well-equipped physics laboratory, lack of curriculum content coverage, teacher's quality, negative attitudes of students towards physics, lack of frequent practice by students, and poor background in mathematics.

However, it is apparent that little emphasis on researches concerning the influence of classroom management on students' achievement in physics has been made.

This study was undertaken as there appeared to be no thorough research on the effects of classroom management issues in physics in Jos metropolis, Nigeria. Moreover, due to the importance attached to classroom management, this study intended to investigate its impact on public secondary school students' achievement and to find out whether it affects their achievement gender-wise.

Research Questions

The following research questions were raised to guide the study:

1. What are the pre-test mean achievement scores of senior secondary two (SS II) students taught physics before intervention under classroom management?
2. To what extent does classroom management affect SS II students' achievement in physics?
3. What is the extent to which effective classroom management affects SS II male and female students' achievement in physics?

Hypotheses

The following hypotheses were formulated and tested at significant level of 0.05:

1. There is no significant difference between the mean achievement scores of SS II students who were taught physics under effective classroom management and those taught under ineffective classroom management.
2. There is no significant difference between the mean achievement scores of SS II male and female students who were taught physics under effective classroom management.

Methodology

This study adopted the quasi-experimental research design; specifically, the non-equivalent control group pre-test, post-test design. This design was used because it was not possible for the researchers to randomly select the study sample and also assign them to the two groups without disrupting their academic programmes. In this study, the independent variable was classroom management, the dependent variable was students' achievement in physics and the extraneous variable was students' gender. The sample for the study consisted of 92 SS II students offering physics in intact classes of two public co-educational senior secondary schools obtained from the population of the study, using purposive sampling technique.

Two instruments were developed by the researchers for data collection: Physics Classroom Management Observation Schedule (PCMOS) and Physics Achievement Test (PAT). PCMOS is a 20-item instrument which sought to elicit information on teachers' effective management, or otherwise, of their classroom when they taught physics using the conventional lecture method (CLM). One of the teachers in the two sampled schools was observed by the researchers (using PCMOS) to be effective in classroom management during the intervention, while the teacher from the second school was observed to be ineffective. PAT is a 25-item multiple-choice test instrument on the concepts of linear momentum, equations of motion and machines.

The items were drawn from the SS II physics curriculum using Table of Specifications.

PCMOS and PAT were each validated by three experts from the University of Jos. The internal consistency of PAT was obtained using the Cronbach Alpha on SPSS version 25; its reliability coefficient was obtained as 0.85. PAT was administered on the two groups as pre-test by the researchers. The scores provided data on the students' achievement in physics prior to intervention of teaching employing effective and ineffective classroom management. One of the two groups (the first school) was taught the concepts of linear momentum, equations of motion and machines for four weeks using the CLM under effective classroom management. The second group (the second school) was also taught the same concepts for four weeks using the same CLM, but under ineffective classroom management. Thereafter, PAT was administered as post-test by the researchers and data gathered were used to analyze the effectiveness, or otherwise, of classroom management on the students' achievement in physics. The mean, which is descriptive statistics, was employed to answer all the research questions, while t-test for separate samples was used to test hypothesis and the pooled variance method was used to test hypothesis two.

Results

Research Question One

What are the pre-test mean achievement scores of senior secondary two (SS II) students taught physics before intervention under classroom management?

The descriptive statistics performed on research question one is presented in Table 1.

Table 1: Summary Statistics of SS II Students' Achievement in Physics prior to Intervention Under Classroom Management

School	N	Mean	SD
A	50	45.50	7.03
B	42	43.00	7.13
Mean Achievement difference		2.50	

Prior to intervention under classroom management, the mean achievement score of the SS II students in the school with 50 students (students that were later taught physics under effective classroom management) was 45.50 (Table 1), while that of the students in the school with 42 students (students that were later taught physics under ineffective classroom management) was 43.00. Their mean achievement difference was 2.50. This implies that the entry mean achievement scores of the students in the two sampled schools did not differ much.

Research Question Two

To what extent does classroom management affect SS II students' achievement in physics?

Table 2 shows the summary of the statistics performed on research question two.

Table 2: Summary Statistics of SS II Students' Achievement in Physics after Exposure to Intervention under Classroom Management

Classroom Management	N	Mean	SD
Effective	50	71.01	11.51
Ineffective	42	50.61	6.45
Mean Achievement difference		20.40	

From Table 2, the mean achievement score of the SS II students that were taught physics under effective classroom management was 71.01 while that of the students that were taught under ineffective classroom management was 50.61; the mean achievement difference being 20.40. It can be observed that the SS II students that were taught physics under effective classroom management achieved higher than their counterparts that were taught under ineffective classroom management.

Research Question Three

What is the extent to which effective classroom management affects SS II male and female students' achievement in physics?

Table 3 provides the summary of the statistics performed on research question three.

Table 3: Summary Statistics of SSII Male and Female Students' Achievement in Physics when exposed to Intervention under Effective Classroom Management

Gender	N	Mean	SD
Male	27	72.02	8.61
Female	23	70.00	9.12
Mean Achievement difference		2.02	

From Table 3, the SS II male students' mean achievement score was 72.02 while their female students' counterpart had a mean achievement score of 70.00; with a mean difference of 2.02. It can be observed that there was no much difference in the gender mean achievement scores of the students taught physics, under effective classroom management.

Hypothesis One

There is no significant difference between the mean achievement scores of SS II students who were taught physics under effective classroom management and those taught under ineffective classroom management.

Table 4 provides a summary of the t-test for two unrelated samples performed on hypothesis one.

Table 4: Summary of t-test for two unrelated samples performed on hypothesis one

Classroom Management	N	Mean	SD	Df	t-cal.	t-critical
Effective	50	71.01	11.51	90	10.69	1.98
Ineffective	42	50.61	6.45			

$P < 0.05$

Table 4 shows that the calculated t-value (10.69) was greater than the critical value of t (1.98), at 0.05 level of significance and 90 degree of freedom. The null hypothesis was, therefore, rejected. The implication is that there was a significant difference between the mean achievement scores of SS II students who were taught physics under effective classroom management and those taught under ineffective classroom management.

Hypothesis Two

There is no significant difference between the mean achievement scores of SS II male and female students who were taught physics under effective classroom management.

Table 5 indicates a summary of the t-test for two unrelated samples using pooled variance method performed on hypothesis two.

Table 5: t-test Analysis of the Physics Achievement of SS II Male and Female Students taught under Effective Classroom Management Intervention

Gender	N	Mean	SD	Df	t-cal.	t-critical
Male	27	72.02	8.61	48	0.80	2.01
Female	23	70.00	9.12			

$P > 0.05$

From Table 5, the calculated t-value (0.80) was less than the critical t-value (2.01), at 0.05 level of significance and 48 degree of freedom. The null hypothesis was, therefore, retained. This implies that there was no significant difference between the mean achievement scores of SS II male and female students who were all taught physics under effective classroom management.

Discussion

The result of the findings in Table 1 showed that prior to intervention of teaching using conventional lecture method under effective and ineffective classroom management. The entry mean achievement scores of the students in the two sample schools did not differ much. However, the finding from Table 2 indicated that students who were exposed to the teaching of physics under effective classroom management achieved higher than those who were taught under ineffective classroom management. Findings from Table 4 showed that students who were exposed to the teaching of physics under effective classroom management achieved significantly higher than their counterparts who were taught under ineffective classroom management. This finding is in discordance with that of Saifi, Hussain, Salamat and Bakht (2018) who found out that classroom management had no significant impact on students' achievement. However, the finding is in agreement with those of Adeyemo (2012) and Igbinoba and Marvelous (2015) who found out that students' achievement was significantly influenced by effective classroom management. This implies that the use of effective classroom management in the teaching and learning of Physics enhances students' achievement.

The findings in Table 3 revealed no much difference in the gender mean achievement scores of the students in public secondary schools when taught under effective classroom management. Further findings showed that the students' achievement improved when compared with their achievement before the intervention of teaching under effective classroom management. Table 5 revealed no significant disparity between the mean physics achievement scores of male and female students because the teacher effectively managed his classroom. This finding concurs with those of Trisma and Josiah (2008) and Godwin and Okoronka (2015) who found no significant difference in achievement in physics between male and female students. This implies that effective classroom management has significant impact on students' achievement in physics and is gender-friendly.

Conclusion

It can be concluded that the achievement of students in physics in public secondary schools can be significantly improved if teachers manage their classrooms effectively during lesson delivery. This may go a long way in curbing the unsatisfactory approach to physics education, which leads to the not too impressive achievement by students in public secondary schools.

Recommendations

This study sought to explore the impact of classroom management on students' achievement in physics in public secondary schools in Jos Metropolis, Nigeria. Based on the findings of the study, the following recommendations were made:

1. Since classroom management has been found to affect students' achievement positively, physics teachers should keep abreast with classroom management skills by periodically attending workshops, conferences and seminars on classroom management.
2. Physics teachers should learn to manage the classroom effectively, since classroom management has been found to be gender-friendly.

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