International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 5, pp 36-45, May-2024

https://doi.org/10.47001/IRJIET/2024.805006

Effect of Classroom Management on Physics Students' Academic Performance in Akamkpa Local Government Area Cross River State

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Abstract - **This study investigated the effect of Classroom Management strategies on Physics students' academic performance in Akamkpa Local Government Area of Cross River State, Nigeria. The main objectives were to examine the impact of Classroom Management approaches, gender differences, and age groups on students' achievement in physics. The research employed a quasi-experimental design, with senior secondary school two (SS2) Physics students randomly assigned to experimental groups receiving authoritative or inclusive classroom management interventions, and a control group. Data were collected through Pre-tests, Post-tests, Classroom observations, and student survey over a four-week intervention period. The study sample consisted of 152 SS2 Physics students, and data analysis was conducted using analysis of covariance (ANCOVA).The findings revealed a significant positive effect of Classroom Management Strategies on student academic performance in Physics. Both the authoritative and inclusive approaches resulted in substantially higher average scores compared to the control group, with the inclusive style yielding the highest achievement. A large effect size indicated that Classroom Management Strategies explained a substantial portion of the variance in student performance. While gender alone did not have a significant main effect, there was a notable interaction between gender and Classroom Management Strategy. Male students performed better under authoritative management, while female students excelled in the control group. Interestingly, the inclusive strategy led to similarly high performance for both genders, suggesting its effectiveness in enhancing physics performance regardless of student gender. The study also found significant main effects for both Classroom Management Strategies and age groups on student academic performance in Physics. However, the absence of a significant interaction effect indicated that the impact of classroom management strategies on academic performance was consistent across different age groups. These findings underscore the importance of implementing comprehensive classroom management strategies and considering students' age when developing instructional approaches to optimize learning outcomes in physics education.**

Keywords: Classroom Management, Strategie, Students, Academic Performance, Physics.

I. INTRODUCTION

Physics 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. Physics is a fundamental science which is concerned with the basic principles of the universe (Josiah and Okonkwo, 2020). The subject provides the theories behind technology and it is the foundation of any theoretical and applied knowledge. It is from among the physics students at secondary levels that future physicists, engineers, doctors and technologies among others emerged (Josiahand Okonkwo, 2020). Physics is taught as science in secondary school which intends to groom learners in the aspect of understanding nature (Omeodu, 2013). The teaching of physics in secondary schools is seen as a major issue of concern to science educators because physics is one of the basic science subjects that must be taught in senior secondary school. The teaching of physics provides the learners with the understanding skills and scientific knowledge needed for scientific research fostering economics and technological growth in the society where they live which improves the standard of living (Adeyemo, 2012).

Education is very important in every society as it is a process by which individual capabilities are developed, thereby actualizing the individual potential to become more than what it was before (Asuquo 2020). When talking about education the first point of interest is to look at the classroom. A school classroom is a fundamental unit within the

ISSN (online): 2581-3048
Volume 8, Issue 5, pp 36-45, May-2024
https://doi.org/10.47001/IRJIET/2024.805006

educational system where teaching and learning activities take place. It is a microcosm of the broader school environment, influenced by various factors such as teacher competence, classroom management strategies, and the overall school culture (Lamb & Fullarton, 2002).

Additionally, the classroom environment plays a significant role in shaping students' academic self-concept and enjoyment of subjects like physics (Liu et al., 2022). Classroom quality, including emotional, organizational, and instructional support, has been linked to teacher, classroom, and school characteristics, highlighting the importance of a supportive and engaging classroom atmosphere (Cadima et al., 2013). Moreover, the concept of a classroom extends beyond physical space; it encompasses interactions between teachers and students, the implementation of teaching practices, and the integration of technology to enhance learning experiences (Koster et al., 2017). Ultimately, a well-functioning classroom is essential for promoting student engagement, fostering academic growth, and creating a conducive learning environment within the broader school setting.

Classroom management has been highlighted across many research studies in education as a major variable that affects student academic performance and sets a stage for the teaching and learning process; secondly, it sets a tone in the classroom and triggers student attention as a necessity for effective teaching and learning (Marzano, 2008). The teaching and learning of physics in the educational institution takes place in the walls of the classroom, and laboratory. It is therefore pertinent for physics teachers to have a substantial knowledge of classroom management to enhance the instructional objectives (Omeodu, 2018). Many researchers have concluded that an effectively managed classroom tends to improve student achievement. The classroom is that space bounded by the wall and roof in which a teacher houses his student for the purpose of giving instruction or it is a shelter for both teachers and learners so as to engage in education activities (Adeyemo, 2012). (Omedou, 2018) sees the classroom as the atomic part of an educational institution where learning takes place. The classroom comprises the teacher and student including all necessary instructional materials that facilitate the teaching and learning process. A classroom is a carved-out space that provides a conducive environment where teaching and learning can take place without or with less interruption from the external environment. Management can be seen as the process of designing and maintaining any setting in which people work in groups to accomplish predetermined goals (Adeyemo, 2012).

Classroom management according to (Everton and Weir-Stein, 2006) is the action taken by teacher to create a supportive environment for the academic and social emotional learning of the students. (Doolard, 2004) sees classroom management as the action taken by a teacher to create an environment that support and facilitate instruction delivery. It is also the process of creating favourable condition as well as regulates student behaviour toward learning. This assertion is obvious in that a chaotic and disorganized classroom resulting from poor management is highly unlikely to enhance expensive learning and student goals or achievement may be jeopardized. In a jeopardized class no serious learning can take place.

Good classroom managers are teachers who understand and use specific techniques to control student behaviour (Marzano, Marzano and Pickering, 2013). (Walter, 2006) opined that classroom management differs from one teacher to another due to the teacher's personality, teaching style, preparedness for class and the number in a class. A teacher by nature of the profession is a manager of the classroom activities. The classroom teacher's job unlike any other profession is concerned with maintaining order, regarding the event distribution and directing the learner's attention toward academic goal achievement. The success of any educational system is the function of effective Classroom Management (Asuquo, 2020). Classroom teachers are managers and so ought to be in control from the beginning to the end of the lesson, to ensure that students benefit from the interactive business that transpires in the classroom.

Poor classroom management, on the other hand, refers to the inability of teachers to effectively control and organize the classroom environment, leading to disruptions, lack of engagement, and overall chaos within the learning space. This lack of management may have detrimental effects on students' academic performance. Scholars such as (Korpershoek et al., 2016)have shown that ineffective classroom management is associated with lower academic achievement, behavioural issues, emotional distress, and reduced motivation among students. When classroom management is poor, students may struggle to focus on the subject matter, leading to a lack of understanding and retention of key Physics concepts.

In the context of Physics education, poor classroom management can significantly hinder students' ability to grasp complex scientific principles and engage meaningfully with the subject matter. (Yonas et al., 2023) maintained that when teachers face challenges in managing their classrooms effectively, students' academic achievement in Physics tends to suffer. Disruptions caused by poor management can disrupt the flow of instruction, limit opportunities for hands-on experiments and demonstrations, and create an environment where students may feel discouraged or disinterested in learning Physics concepts.

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Furthermore, the impact of poor classroom management on students extends beyond just the immediate learning environment. Students in classrooms with ineffective management are more likely to experience long-term negative academic, social, and behavioural outcomes (Emmer & Stough, 2001). This highlights the critical role that well-implemented classroom management strategies play in fostering a conducive learning atmosphere for Physics education, where students can actively participate, engage with the material, and ultimately excel in their academic pursuits. With this background, this present study sought to investigate the impact of classroom management strategies on students' performance in Physics.

1.1 Theoretical Framework

This study is anchored on the theory of management that is considered relevant to this research. To this effect, the human relations theory was considered appropriate for this study. The proponents of human relations approach to administration and management share the view that developing and maintaining harmonious relations between employed and supervisors, teachers and students is quite fundamental to all organization. (Akpakum, 2008) was the early advocates of this theory and in their work; they emphasized the human side of the theory, which is that a satisfied student is an effective student. The theory therefore emphasized that an increase of employee or student classroom discipline, motivation, use of appropriate teaching methods and morals will increase their productivity or achievement. The human relations theory basically holds that financial remunerations through a significant motivator is not the driving force behind workers effectiveness or students' effectiveness (Mallum and Haggai, 2000). Other non-economic factors such as the physical and psychological work or classroom atmosphere can be powerful motivators, (Usman, 2005).

The theoretical framework for this study is the teacher behaviour continuum of Wolfgang and Glickman (Martin & Sass, 2010). According to the continuum of Wolfgang and Glickman, instructional and behavioural classroom management can be conceptualized as interventionist, noninterventionist, and internationalist, (Lane and Cmobori, 2011); (Martin & Sass, 2010).

The cognitive development theory by Jean Piaget in (1980) appeared to be the most outstanding. Originally trained as a Biologist and Philosopher, he developed deep concern for biological influences of how people think and react with respect to their environment. He believed that human beings are distinctively different from animals because of their ability in abstract reasoning. His findings in test conducted in Paris instigated further interest in knowing how organisms adapt to their environment. He therefore construed that human behaviour is basically a reaction of humans to their environment i.e. their adaption to the environment, which is controlled through a mental organization called Schema.

By implication, this theory laid emphasis on environmental effects on the child's mental development. For reasons of de-alienation of other factors affecting the cognitive growth of children, curriculum contents were either enriched or watered down for school children based on their categorization as fast or slow learners, which in turn will yield positive learning outcome. If students like teachers, relate with other students, have learning resources, adequate classroom size, they will develop a positive attitude toward their study, hence enhancing their academic performance in Mathematics. Teachers should create a friendly environment to spur up learners, learning resources like reading and writing materials as well as drawings should be adequate enough to make learning concrete rather than abstract. This is in conformity with Piaget's assertion that teachers should consider school environment for better acquisition, retention and recall.

1.2 Statement of the Problem

Classroom Management is the action a teacher takes to create an environment that supports and facilitates instructions, academic, social and emotional learning. It is the process of creating favourable conditions to facilitate instructions as well as that of regulating social behaviour of students. The quality of Science and Technology in any developing nation revolves round the quality of Physics education received by the students. Despite the importance of Physics in all fields of human endeavour, the performance of students in both internal and external examinations continues to decline. Studies by (Harbor, Peters, 2002) and (Usman, 2005) identified teaching approaches and strategies used in the Classroom Management by teachers as one of the root causes of undesirable poor performance in Physics. The problem today includes inequality of opportunity in the classroom, improper promotion of rights of students, improper school leaders, inconsistency of the classroom teachers, and poor level of preparedness on the part of the teacher to adequately pass on instructions and so on.

Of late, the situation in the secondary schools seem worst, if one walks into any of these schools during lesson periods. Many classes, if not all, may not be recognized, there may be no form of discipline in these classrooms, no form of motivation for these students to learn. There may be no teachers to monitor and control the activities of the students in the classes. Consequently, the major problem of this study put in question form is; how does classroom management

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influence students' academic achievement Physics among secondary schools in Akamkpa Local Government Area of Cross River state?

1.3 Purpose of the Study

The main purpose of the study was to investigate the effect of Classroom Management on Physics student academic performances in Akamkpa Local Government Area of Cross River State.

The specific objectives of the study were to:

i. Investigate the effect of classroom management strategies on student academic performance in Physics.
ii. Examine the interaction effect of gender and classroom management strategies on student academic performance in physics, independent of other factors.
iii. Study the interaction effects of age group and classroom management strategies on student academic performance in Physics.

1.4 Research Hypothesis

i. There is no significant effect of Classroom Management strategies on student academic performance in Physics.
ii. There is no significant effect of gender and Classroom Management strategies on student academic performance in Physics.
iii. There is no significant effect of age group and Classroom Management strategies on student academic performance in Physics.

II. RESEARCH METHODOLOGY

This study employed a quasi-experimental research design, specifically an intact group Pre-test and Post-test control group design. This design was chosen because it allowed for the investigation of the effect of different Classroom Management Strategies on students' academic performance in Physics while maintaining the existing class structure and minimising disruption to the regular educational process. The participants were intact classes of senior secondary school two students in Akamkpa Local Government Area, Cross River State, Nigeria.

The classes were randomly assigned to either the experimental or control groups. The experimental group received instruction using authoritative Classroom Management Strategies involving clear rules, consistent consequences, and a structured learning environment; and inclusive student Classroom Management which involved open communication, and a supportive learning environment. While the control group received no intervention at all. Before the intervention, the entire groups were administered a pre-test to assess their baseline knowledge and performance in Physics.

The intervention lasted for four weeks before the first assessment of the second term, during which the experimental and control groups received instruction in Physics using their respective Classroom Management Strategies. Throughout the intervention period, data were collected through various means, including classroom observations, student surveys, and academic performance assessments. Classroom observations were conducted by trained researchers to monitor the implementation of Classroom Management Strategies and document student behaviour and engagement. At the end of the intervention, both groups were administered a Post-test to measure their academic performance in Physics. The pre-test and post-test scores were compared within and between the groups to determine the effect of the classroom management strategies on students' academic performance.

The population of the study will consist of all SS II Physics students in the Local Government Area. According to the area Education Authority, there are 350 students offering physics in the L.G.A. The choice of this class is that they have offered the subject for one year and are about to take their Senior School Certificate Examination (SSCE) and will be able to answer the instructions. The sample of the study consisted of 152 SSII Physics students. A stratified random sample technique was used to select 152 students from the population of students using sample random sampling of hats and caps.

Physics achievement test was the major instrument used for data collection. it was 50 multiple-choice items developed by the researchers, and validated by experts. The reliability estimate was ascertained with the use of Kuder Richardson 20. The aim was to ascertain the internal consistency of the test instrument. The instrument exhibits a reliability coefficient of .78 which was a good reliability estimate for the test instrument. Data collected from the research instrument were analysed using analysis of covariance (ANCOVA).

III. RESULT

Research hypothesis one

There is no significant effect of Classroom Management Strategies on student academic performance in Physics. This hypothesis was tested using Analysis of Covariance (ANCOVA) at a .05 level of significance. The result of the analysis is presented in Table 1.

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Table 1: ANCOVA result showing the effect of classroom management strategies on student academic performance in physics

Tests of Between-Subjects Effects						
Treatment		Mean	Adjusted mean	Std. Dev.		N
Authoritative Classroom management		35.70	35.486[a]	3.164		50
Inclusive classroom management		39.06	38.888[a]	3.042		51
Control group		19.47	19.851[a]	1.629		51
Total		31.38		9.011		152
Source	Type III Sum of Squares	df	Mean Square	F	p-value	η_p^2
Corrected Model	11203.69[a]	3	3734.56	523.31	.00	.91
Intercept	1448.01	1	1448.01	202.90	.00	.57
Pre-test	29.85	1	29.85	4.18	.04	.02
Treatment	7797.88	2	3898.94	546.35	.00	.88
Error	1056.17	148	7.13			
Total	161950.00	152				
Corrected Total	12259.868	151				
a. R Squared = .914 (Adjusted R Squared = .912)						
(I) Treatment	(J) Treatment		Mean Difference (I-J)	Std. Error	p-value	
Authoritative Classroom management	Inclusive classroom management		-3.402*	.532	.000	
	Control group		15.635*	.606	.000	
Inclusive classroom management	Authoritative Classroom management		3.402*	.532	.000	
	Control group		19.038*	.594	.000	
Control group	Authoritative Classroom management		-15.635*	.606	.000	
	Inclusive classroom management		-19.038*	.594	.000	

Table 1 provides strong evidence that classroom management strategies significantly influence student achievement in physics. Firstly, the average scores for both the authoritative (35.70) and inclusive classrooms (39.06) are substantially higher than the control group (19.47). This initial observation suggests a potential benefit for using these management styles compared to no specific approach. The "F" statistic (546.35) and its corresponding p-value (.00) are particularly crucial. A high F-value (F(2,148) = 546.35) indicates a statistically significant difference between the means of the three groups. The exceptionally low p-value (less than 0.05) further confirms this significance.

From the table, it's highly unlikely (less than 5% chance) that these observed differences happened by random coincidence. The Eta-squared (η^2) value of .88 is another important indicator. It represents the proportion of variance in physics performance explained by the different classroom management styles. A value this high (close to 1) signifies a very strong effect size, meaning a substantial portion of the difference in student achievement can be attributed to the different classroom management strategies employed.

The multiple comparison section of the table details pairwise comparisons between the groups. All the p-values are 0.00, indicating statistically significant differences in achievement between each management style and the control group, as well as between the authoritative and inclusive classrooms themselves. Students in both active management groups performed significantly better than the control. Additionally, the inclusive classroom showed a statistically significant advantage over the authoritative approach. In conclusion, based on the substantial differences in means, highly significant F-statistic and p-value, large effect size, and significant pairwise comparisons, the researchers can firmly reject the null hypothesis. Classroom management strategies, particularly the inclusive approach in this study, have a clear and significant positive impact on student academic performance in physics.

Research hypothesis two

There is no significant effect of gender and classroom management strategies on student academic performance in physics. To ascertain whether to accept or refute this null hypothesis, an analysis of Covariance (ANCOVA) was used. The result of the analysis is presented in Table 2:

Table 2: ANCOVA result showing the effect of gender and classroom management strategies on student academic performance in physics

Treatment	Gender	Mean	Adjusted mean	Std. Dev.	N
Authoritative Classroom management	Male	37.26	37.019[a]	3.525	19
	Female	34.74	34.490[a]	2.529	31
	Total	35.70	35.755[a]	3.164	50
Inclusive classroom management	Male	39.04	38.947[a]	3.482	25
	Female	39.08	38.778[a]	2.622	26
	Total	39.06	38.862[a]	3.042	51
Control group	Male	18.57	18.785[a]	.514	14
	Female	19.81	20.339[a]	1.777	37
	Total	19.47	19.562[a]	1.629	51
Total	Male	33.52		9.056	58
	Female	30.06		8.773	94
	Total	31.38		9.011	152
Tests of Between-Subjects Effects					
Dependent Variable: Post test					
Source	Type III Sum of Squares	Df	Mean Square	F	p-value	η_p^2
Corrected Model	11303.137[a]	6	1883.856	285.513	.000	.922
Intercept	1313.019	1	1313.019	198.998	.000	.578
Pre-test	38.799	1	38.799	5.880	.017	.039
Treatment	7522.155	2	3761.077	570.020	.000	.887
Gender	4.991	1	4.991	.756	.386	.005
Treatment * Gender	91.854	2	45.927	6.961	.001	.088
Error	956.731	145	6.598			
Total	161950.000	152				
Corrected Total	12259.868	151				
a. R Squared = .922 (Adjusted R Squared = .919)						

Table 2 presents the results of a study investigating the effects of gender and classroom management strategies on students' academic performance in physics. The study involved three treatment groups: Authoritative Classroom Management, Inclusive Classroom Management, and a Control Group. The table displays the mean scores, adjusted means, standard deviations, and sample sizes for each treatment group, broken down by gender.

The descriptive statistics reveal some interesting observations. In the Authoritative Classroom Management group, male students had a higher mean score (37.26) compared to female students (34.74). However, in the Inclusive Classroom Management group, both male and

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 5, pp 36-45, May-2024

https://doi.org/10.47001/IRJIET/2024.805006

female students had similar mean scores (39.04 and 39.08, respectively). Interestingly, in the Control Group, female students had a higher mean score (19.81) compared to male students (18.57).

To test the hypothesis of no significant effect of gender and classroom management strategies on student academic performance in physics, an analysis of variance (ANOVA) was conducted. The Tests of Between-Subjects Effects table presents the results of this analysis. The significant main effect of Treatment ($F(2, 145) = 570.020$, $p < 0.001$, $\eta p2 = 0.887$) indicates that the classroom management strategies had a significant impact on students' academic performance.

However, the non-significant main effect of Gender ($F(1, 145) = 0.756$, $p = 0.386$, $\eta p2 = 0.005$) suggests that gender alone did not have a significant effect on academic performance. Interestingly, the significant interaction effect between Treatment and Gender ($F(2, 145) = 6.961$, $p = 0.001$, $\eta p2 = 0.088$) indicates that the effect of classroom management strategies on academic performance differed between male and female students. Therefore, based on these results, the hypothesis of no significant effect of gender and classroom management strategies on student academic performance in physics is partially rejected.

Research hypothesis three

There is no significant effect of gender age group and Classroom Management Strategies on student academic performance in Physics. This hypothesis was subjected to testing using Analysis of covariance (ANCOVA). Table 3 present the result of the statistical analysis.

Table 3: ANCOVA result showing the effect of gender age group and classroom management strategies on student academic performance in physics

Treatment	Age	Mean	Adjusted mean	Std. Dev.	N
Authoritative Classroom management	> 15 years	36.09	35.828[a]	3.592	35
	< 15 years	34.80	34.591[a]	1.568	15
	Total	35.70	35.210[a]	3.164	50
Inclusive classroom management	> 15 years	39.23	39.280[a]	.832	13
	< 15 years	39.00	38.724[a]	3.503	38
	Total	39.06	39.002[a]	3.042	51
Control group	> 15 years	20.04	20.568[a]	.824	26
	< 15 years	18.88	19.209[a]	2.027	25
	Total	19.47	19.889[a]	1.629	51
Total	> 15 years	31.00		8.580	74
	< 15 years	31.74		9.442	78
	Total	31.38		9.011	152

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	p-value	η_p^2
Corrected Model	11245.749[a]	6	1874.292	267.989	.000	.917
Intercept	1347.181	1	1347.181	192.622	.000	.571
Pre_test	36.933	1	36.933	5.281	.023	.035
Treatment	7429.919	2	3714.959	531.169	.000	.880
Age	35.105	1	35.105	5.019	.027	.033
Treatment * Age	3.878	2	1.939	.277	.758	.004
Error	1014.119	145	6.994			
Total	161950.000	152				
Corrected Total	12259.868	151				

a. R Squared = .917 (Adjusted R Squared = .914)

Table 3 presents the mean scores and adjusted mean scores of student academic performance in physics, categorized by different classroom management strategies (authoritative, inclusive, and control group) and age groups (above 15 years and below 15 years). To test the hypothesis that there is no significant effect of age group, and classroom management strategies on student academic performance in physics, an analysis of variance (ANOVA) was conducted. The Tests of Between-Subjects Effects table shows the results of the ANOVA analysis, which evaluates the significance of the main effects and interaction effects of the independent variables on the dependent variable (student academic performance).

The ANOVA results indicate that the corrected model, which includes all the independent variables and their interactions, is statistically significant ($F = 267.989$, $p < 0.001$), suggesting that at least one of the independent variables or their interactions has a significant effect on student academic performance. The effect size ($\eta p2 = 0.917$) indicates that 91.7% of the variance in student academic performance is explained by the corrected model.

Specifically, the main effects of the treatment (classroom management strategies) ($F = 531.169$, $p < 0.001$, $\eta p2 = 0.880$) and age ($F = 5.019$, $p = 0.027$, $\eta p2 = 0.033$) were statistically significant, while the interaction effect between treatment and age was not significant ($F = 0.277$, $p = 0.758$, $\eta p2 = 0.004$). Based on these results, the hypothesis that there is no significant effect of age group and classroom management strategies on student academic performance in physics can be rejected. However, the lack of a significant interaction effect suggests that the effect of classroom management strategies on student academic performance does not depend on the age group.

3.1 Discussions of Findings

Findings from eh first hypothesis indicate that authoritative and inclusive classroom management approaches resulted in significantly higher average scores compared to the control group. This finding is supported by (Korpershoek et al., 2016), who conducted a meta-analysis showing that classroom management strategies focusing on teacher-student relationships and student behaviour have positive effects on academic outcomes. Moreover, the large eta-squared value in the study indicates a strong effect size, signifying that classroom management strategies explain a substantial portion of the variance in student achievement. This aligns with the findings of (Oliver et al., 2011), who demonstrated that disruptive classroom behaviors can significantly impact academic engagement and student grades. The rejection of the null hypothesis in the study underscores the clear positive

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Volume 8, Issue 5, pp 36-45, May-2024

https://doi.org/10.47001/IRJIET/2024.805006

effects of implementing effective classroom management strategies, particularly the inclusive approach, on physics learning outcomes. This is consistent with the notion that proactive and inclusive strategies can contribute to creating a conducive learning environment that fosters academic success.

The pairwise comparisons conducted in the study further validate the significant differences between each classroom management strategy and the control group, as well as between the authoritative and inclusive approaches. The preference for the inclusive style in yielding the highest achievement resonates with the literature by (Goodman-Scott & Boulden, 2022), highlighting the importance of utilizing effective classroom management strategies to optimize student learning experiences.

While gender alone did not show a significant main effect on academic performance, there was a notable interaction between gender and classroom management strategy. The findings indicated that male students performed better under Authoritative management, while female students excelled in the Control group. Interestingly, the Inclusive strategy led to similarly high performance for both genders, suggesting that an inclusive classroom environment is most effective in enhancing physics performance regardless of student gender (Sebutu & ISSA, 2021).

Research on Classroom Management Strategies and programmes has shown that teacher-focused programmes can positively influence students' academic outcomes. Effective classroom management practices have been linked to improved academic, behavioural, emotional, and motivational outcomes among students. The level of implementation of classroom management activities has been found by Kiogolo & Mtana, (2022) to vary across schools, with schools effectively employing multiple strategies experiencing higher academic performance. This underscores the importance of implementing comprehensive classroom management strategies to enhance students' overall academic performance.

Moreover, the research work by (Khan, 2021) suggests that gender differences in academic performance can be influenced by various factors such as personality traits, engagement levels, and attitudes towards academic work. (Khan, 2021) further indicated that females may have a more positive attitude towards academic work compared to males, potentially contributing to gender differences in academic performance. Additionally, the mediating role of student engagement in the association between gender and academic performance highlights the complex interplay of factors that can impact students' educational outcomes. Understanding these dynamics can help educators tailor their classroom management strategies to create an inclusive and supportive learning environment that benefits all students.

The results from hypothesis three further revealed significant main effects for both classroom management strategies, specifically authoritative and inclusive approaches, and age groups categorized as above 15 years and below 15 years. These findings are consistent with existing literature emphasizing the critical role of effective classroom management in impacting student outcomes (Korpershoek et al., 2016). The absence of a significant interaction effect indicates that the impact of classroom management strategies on academic performance was consistent across different age groups, highlighting the universal importance of employing suitable classroom management techniques regardless of students' age (Korpershoek et al., 2016).

The ANCOVA results supported the rejection of the null hypothesis that age group and classroom management strategies do not significantly affect student academic performance in physics. This finding aligns with prior research demonstrating the essential role of classroom management in influencing student academic achievement (Korpershoek et al., 2016). The study contributes to the existing knowledge by offering empirical evidence of the individual impacts of classroom management strategies and age groups on student performance in physics. These results underscore the necessity for educators to consider both classroom management practices and students' age when developing instructional approaches to enhance academic outcomes (Korpershoek et al., 2016).

This study's results underscore the significance of implementing effective classroom management strategies, such as authoritative and inclusive approaches, to positively impact student academic performance in physics across different age groups. By highlighting the significant main effects of both classroom management strategies and age groups on student outcomes, the study emphasizes the critical role of these factors in shaping educational experiences and academic achievements. Educators and policymakers can utilize these findings to guide decision-making processes aimed at enhancing teaching practices and improving student learning outcomes in physics and potentially other subject areas as well (Korpershoek et al., 2016).

IV. CONCLUSIONS

The findings of this study provide compelling evidence for the significance of implementing effective classroom management strategies in physics education. The substantial differences in academic performance between the experimental groups utilizing authoritative and inclusive classroom management approaches, and the control group,

ISSN (online): 2581-3048
Volume 8, Issue 5, pp 36-45, May-2024
https://doi.org/10.47001/IRJIET/2024.805006

unequivocally demonstrate the positive impact of these strategies on student achievement. Notably, the inclusive management style emerged as the most effective, leading to the highest academic gains across gender and age groups. This highlights the importance of fostering an inclusive, supportive learning environment that promotes open communication and active engagement. While gender alone did not yield a significant main effect, the interaction between gender and classroom management strategy suggests that tailoring approaches to address specific needs and preferences of male and female students could further optimize outcomes. Interestingly, the inclusive strategy minimized gender disparities, reinforcing its efficacy in creating an equitable learning experience for all students. Furthermore, the study's revelation of significant main effects for age groups underscores the necessity of considering students' developmental stages when implementing classroom management techniques. However, the lack of an interaction effect between age and management strategies implies that the benefits of effective classroom management transcend age boundaries, emphasizing their universal relevance.

Ultimately, this research provides a strong empirical foundation for educational stakeholders to prioritize the implementation of comprehensive, evidence-based classroom management strategies in physics classrooms. By doing so, teachers can create conducive learning environments that foster academic success, engagement, and personal growth for students, regardless of gender or age. The findings underscore the pivotal role of classroom management in optimizing the teaching and learning experiences in physics education, paving the way for future advancements in this critical field.

V. RECOMMENDATIONS

1) Implement inclusive Classroom Management Strategies: The study found that the inclusive classroom management approach, which involves open communication and a supportive learning environment, led to the highest academic performance in physics across gender and age groups. Therefore, it is recommended that physics teachers adopt and implement inclusive classroom management strategies to create an engaging, equitable, and conducive learning environment for all students. This could involve techniques such as encouraging student participation, fostering open dialogue, and providing personalized support and feedback.
2) Tailor Classroom Management approaches based on gender: While the inclusive strategy minimized gender disparities, the findings suggest that male and female students may respond differently to certain classroom management approaches. It is recommended that physics teachers consider gender-specific preferences and needs when designing and implementing classroom management strategies. For example, male students may benefit from more structured, authoritative approaches, while female students may thrive in a more collaborative and supportive environment.
3) Consider student age and developmental stages: The study found significant main effects of age groups on academic performance in physics. It is recommended that physics teachers adapt their classroom management strategies to align with the developmental stages and age-specific needs of their students. For instance, younger students may require more structured routines and clear behavioural expectations, while older students may benefit from increased autonomy and opportunities for self-regulation within the classroom environment.

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ISSN (online): 2581-3048
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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 5, pp 36-45, May-2024

https://doi.org/10.47001/IRJIET/2024.805006

Citation of this Article:

Ekuri Kelly Agbor, Edet Monday Inah, Ogbe, Henry Okpokam, Igiri, Charles Egbomyi, "Effect of Classroom Management on Physics Students' Academic Performance in Akamkpa Local Government Area Cross River State" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 5, pp 36-45, May 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.805006

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