

TEACHERS' PROFESSIONAL DEVELOPMENT AND CLASSROOM MANAGEMENT AS PREDICTORS OF STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN ORLU EDUCATION ZONE, IMO STATE

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Abstract

This study investigated teachers' professional development and classroom management as predictors of students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. Four research questions guided the study. The study adopted a correlational research design and was carried out in Orlu Education Zone, Imo State. The population of the study comprised 290 Mathematics teachers in public secondary schools in the study area. No sampling was carried out because the population was manageable; therefore, the entire population was studied using the census approach. The instrument for data collection was a structured questionnaire, titled: Teachers' Professional Development, Classroom Management and Academic Achievement Questionnaire (TPDCMAAQ). The instrument was face-validated by three experts, two from the Educational Psychology Unit, Department of Educational Foundations, and one from Measurement and Evaluation Unit, all in the Faculty of Education, University of Nigeria, Nsukka. The reliability of the instrument was established using Cronbach Alpha statistics, which yielded coefficients of 0.81 for Teachers' Professional Development, 0.84 for Classroom Management, and an overall reliability coefficient of 0.83. Data were analyzed using simple linear regression and multiple regression analyses. The decision rule for interpreting predictive power was based on the coefficient of determination (R^2), while the hypotheses were tested using t-test associated with simple linear regression and Analysis of Variance (ANOVA) associated with multiple regression at the 0.05 level of significance. The findings revealed that teachers' professional development had a moderate predictive power on students' academic achievement in Mathematics, accounting for 50.7% of the variance in students' achievement. The study also revealed that classroom management had a moderate predictive power on students' academic achievement in Mathematics, accounting for 46.8% of the variance in achievement. Based on the findings of the study, it was recommended among others that educational authorities should organize regular professional development programmes for Mathematics teachers to enhance their instructional competence and improve students' academic achievement.

Keywords: Teachers' professional development, classroom management, academic achievement, mathematics achievement, predictive power

Introduction

The quality of education attained by any nation is largely reflected in the academic achievement of its learners. Academic achievement remains one of the most widely used indicators for evaluating the effectiveness of educational systems, curriculum implementation, instructional practices, and learning outcomes. In contemporary societies, there is increasing concern about the ability of educational institutions to equip learners with the knowledge, skills, values, and competencies required for meaningful participation in national development. Consequently, improving students' academic achievement has become a major priority for governments, educational administrators, policymakers, and other stakeholders in education. Regardless of numerous educational reforms and

interventions introduced at different levels of the Nigerian educational system, concerns regarding students' academic achievement continue to persist, particularly in core subjects such as Mathematics.

Mathematics occupies a unique and indispensable position in the educational system because it serves as the foundation for scientific and technological advancement, economic growth, and national development. The subject equips learners with logical reasoning, analytical thinking, critical thinking, creativity, and problem-solving skills necessary for functioning effectively in an increasingly complex world. Mathematics is a compulsory subject at both junior and senior secondary school levels and serves as a prerequisite for admission into many tertiary education programmes, particularly those related to science, technology, engineering, medicine, and other professional disciplines. The importance attached to Mathematics explains why governments, educational authorities, and parents place considerable emphasis on students' achievement in the subject. However, despite its strategic importance and the numerous efforts directed towards improving its teaching and learning, students' achievement in Mathematics remains a major concern in many public secondary schools across Nigeria.

Academic achievement in Mathematics refers to the extent to which students attain the intended learning outcomes prescribed in the Mathematics curriculum. It reflects learners' mastery of mathematical concepts, principles, formulas, computational procedures, and problem-solving skills acquired through classroom instruction. According to Yusuf and Adigun (2023), academic achievement represents the measurable level of success attained by learners in educational activities as evidenced through examinations and other assessment procedures. Similarly, Eze and Okeke (2024) described academic achievement as the degree to which students accomplish expected educational goals following participation in instructional programmes. High academic achievement in Mathematics is often associated with effective teaching, conducive learning environments, adequate instructional resources, and positive learner characteristics, while poor achievement may indicate deficiencies in one or more aspects of the educational process.

The persistent challenge of poor achievement in Mathematics has continued to generate concern among educational stakeholders in Nigeria. Reports from national examination bodies indicate that students' performance in Mathematics has experienced fluctuations over the years. Recent reports show variations in Mathematics performance across different examination years. Data released by the West African Examinations Council indicated that the proportion of candidates obtaining credit passes (A1–C6) in Mathematics was approximately 61.39 percent in 2022. The percentage increased to about 66.23 percent in 2023 and further improved to approximately 66.86 percent in 2024. However, subsequent reports reflected a decline in performance in 2025. Similarly, the National Examinations Council reported that 67.35 percent of candidates who participated in the 2024 Senior School Certificate Examination (External) obtained five credits, including English Language and Mathematics. These statistics suggest that although some improvements have been recorded, a substantial proportion of students still fail to attain the expected level of achievement in Mathematics. This situation remains worrisome because Mathematics is a compulsory requirement for admission into higher institutions and a foundational subject for many professional careers. The fluctuations observed in students' performance further suggest that factors associated with effective teaching and learning may not have been adequately addressed. Consequently, there is a need for further investigation into school-related and teacher-related variables capable of predicting students' academic achievement in Mathematics.

Several factors have been identified by researchers as possible determinants of students' academic achievement in Mathematics. These factors include learner-related variables such as motivation, study habits, attitude, and self-concept; home-related variables such as parental involvement and socioeconomic status; school-related variables such as availability of facilities and instructional materials; and teacher-related variables such as professional competence, instructional practices, and classroom management. Among these factors, teacher-related variables have attracted considerable scholarly attention because teachers occupy a central position in the teaching-learning process. Teachers serve as facilitators of learning, curriculum implementers, classroom managers, assessors of learning outcomes, and motivators of learners. The effectiveness with which teachers perform these responsibilities may significantly determine students' academic outcomes. Consequently, educational researchers have increasingly focused on teacher-related variables that possess the potential to predict students' academic achievement.

One important teacher-related variable that may predict students' academic achievement in Mathematics is teachers' professional development. The rapid changes occurring in educational policies, curriculum contents, pedagogical approaches, assessment practices, and instructional technologies have made continuous professional development an indispensable aspect of the teaching profession. Teachers are expected to continuously update their knowledge, skills, and competencies in order to respond effectively to emerging educational demands. According to Adeyemi and Olatunji (2023), teachers' professional development is a continuous process through which teachers acquire and update professional knowledge, skills, values, and competencies necessary for effective instructional delivery. Similarly, Nwosu and Chukwu (2024) viewed teachers' professional development as organized learning experiences such as workshops, seminars, conferences, mentoring programmes, in-service training, and advanced educational opportunities designed to enhance teachers' professional effectiveness. In the context of this study, teachers' professional development represents the continuous enhancement of teachers' instructional knowledge, pedagogical competence, professional skills, and classroom practices through various learning opportunities aimed at improving teaching effectiveness.

Interestingly, the importance of teachers' professional development in improving educational outcomes has been emphasized in contemporary educational literature. Continuous professional development enables teachers to improve their content knowledge, pedagogical competence, instructional strategies, classroom practices, and assessment techniques. Mathematics teachers who actively participate in professional development programmes are more likely to employ innovative teaching methods, integrate technology into instruction, utilize learner-centred approaches, and adopt effective assessment strategies capable of enhancing students' understanding of mathematical concepts. Professional development also provides opportunities for teachers to exchange ideas, reflect on their practices, and acquire contemporary knowledge that can improve instructional effectiveness. Consequently, teachers' professional development may possess significant predictive power regarding students' academic achievement in Mathematics. Another important teacher-related variable that may predict students' academic achievement in Mathematics is classroom management. Effective teaching and learning can only occur in environments characterized by orderliness, discipline, cooperation, and active learner participation. Classroom management has therefore become one of the most important responsibilities of teachers in contemporary educational settings. Ibrahim and Hassan (2023) defined classroom management as the process

through which teachers establish and maintain conditions that facilitate effective teaching and learning. Similarly, Okafor and Uzoechina (2024) described classroom management as the ability of teachers to organize classroom activities, regulate learners' behaviour, maintain discipline, coordinate instructional processes, and create conducive learning environments. Effective classroom management ensures that instructional time is utilized optimally and that students remain focused on learning activities.

The significance of classroom management in promoting students' academic achievement cannot be overemphasized. A well-managed classroom encourages active participation, concentration, cooperation, motivation, and positive interactions among learners and teachers. It minimizes disruptive behaviours, reduces distractions, and provides opportunities for meaningful engagement in learning activities. Students who learn in orderly and supportive classroom environments are more likely to develop positive attitudes toward Mathematics and achieve better academic outcomes. Conversely, ineffective classroom management may result in classroom disorder, indiscipline, loss of instructional time, poor concentration, reduced participation, and low academic achievement. Therefore, classroom management may serve as a significant predictor of students' academic achievement in Mathematics. The relationship between teachers' professional development and classroom management is particularly important in Mathematics instruction. Teachers who participate in professional development programmes are more likely to acquire innovative instructional strategies and effective classroom management techniques necessary for promoting students' learning. Similarly, effective classroom management provides the enabling environment through which the knowledge, skills, and competencies acquired through professional development can be successfully implemented. Thus, teachers' professional development and classroom management may not only independently predict students' academic achievement in Mathematics but may also jointly contribute to improved learning outcomes.

Empirical studies by Onwuka and Nnadi (2024) have consistently demonstrated the importance of teacher-related variables in predicting students' academic achievement. Adebayo and Salami (2023) found that teachers' participation in professional development programmes significantly predicted students' academic achievement in secondary schools. Onwuka and Nnadi (2024) reported that continuous professional development enhanced teachers' instructional effectiveness and contributed positively to students' learning outcomes. Similarly, Mohammed and Yusuf (2023) observed that effective classroom management significantly predicted students' academic performance in core school subjects. Chukwuemeka and Ezeani (2024) also found that classroom management practices contributed significantly to students' academic success through the creation of conducive learning environments. These studies provide evidence that teachers' professional development and classroom management are important determinants of students' achievement. However, many of the studies were conducted in different geographical locations, focused on different educational levels, or examined subject areas other than Mathematics.

The current state of knowledge suggests increasing scholarly recognition of the role of teachers' professional development and classroom management in promoting students' academic achievement. Nevertheless, available literature reveals that many previous studies concentrated on examining relationships, effects, and influences among variables rather than determining their predictive contributions. Furthermore, empirical evidence regarding the individual predictive power, joint predictive power, and relative predictive power of teachers' professional development and classroom management on

students' academic achievement in Mathematics remains limited, particularly within the context of public secondary schools in Imo State. This limitation creates a gap in knowledge concerning the extent to which these variables predict students' achievement in Mathematics. From the researcher's personal observations and interactions with public secondary schools in Orlu Education Zone, students' achievement in Mathematics continues to generate concern despite various interventions introduced by educational authorities to improve instructional quality. Although efforts have been made through teacher training programmes, workshops, seminars, supervision, and monitoring activities, many students still experience difficulties in attaining satisfactory achievement in Mathematics. Variations in teachers' participation in professional development activities and differences in classroom management practices are also evident across schools within the zone.

Furthermore, a review of available empirical literature suggests that no known study has specifically examined the individual predictive power of teachers' professional development, the individual predictive power of classroom management, the joint predictive power of both variables, and their relative predictive powers on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. This apparent gap in empirical literature necessitated the present study. Therefore, this study seeks to investigate teachers' professional development and classroom management as predictors of students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. Specifically, the study aims to determine the individual, joint, and relative predictive powers of teachers' professional development and classroom management on students' academic achievement in Mathematics.

Statement of the Problem

The primary objective of teaching Mathematics in secondary schools is to ensure that students acquire the knowledge, skills, competencies, and problem-solving abilities necessary for academic success and national development. Ideally, students in public secondary schools are expected to demonstrate satisfactory academic achievement in Mathematics, while teachers are expected to possess the professional competence and classroom management skills required to facilitate effective teaching and learning. Through continuous professional development, teachers are expected to update their pedagogical knowledge, improve their instructional practices, and effectively respond to the changing demands of the teaching profession. Similarly, effective classroom management is expected to create a conducive learning environment where students can actively participate in lessons, remain focused on learning activities, and achieve the intended educational outcomes. Notwithstanding these expectations, students' academic achievement in Mathematics in many public secondary schools continues to raise concern among educators, parents, educational administrators, and policymakers. Although efforts have been made through curriculum reforms, teacher training programmes, workshops, seminars, supervision, and other educational interventions, a substantial number of students still perform below expectation in Mathematics. Available examination records indicate fluctuations in students' performance in the subject over the years. While some improvements have been recorded, many students continue to experience difficulties in obtaining the required credit pass in Mathematics, which remains a prerequisite for admission into higher institutions and many professional programmes. This situation is worrisome because poor achievement in Mathematics may limit students' educational and career opportunities and undermine the attainment of educational objectives.

The persistent nature of this problem suggests that factors within the school environment, particularly teacher-related factors, may be contributing to the observed achievement levels. Teachers occupy a central position in the teaching-learning process and are expected to influence students' learning outcomes through their professional competence and classroom practices. However, it appears that teachers differ in their participation in professional development activities and in the manner they manage classroom activities. Such differences may have implications for students' learning experiences and academic achievement in Mathematics. Unfortunately, the extent to which these variables contribute to students' achievement in Mathematics within public secondary schools remains inadequately understood. Furthermore, although previous studies have examined factors associated with students' academic achievement, there is limited empirical evidence on the extent to which teachers' professional development and classroom management individually, jointly, and relatively predict students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. This gap in knowledge has created the need for empirical investigation. Therefore, the problem of this study is to determine the individual, joint, and relative predictive powers of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Purpose of the Study

The general purpose of this study is to investigate teachers' professional development and classroom management as predictors of students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. Specifically, the study seeks to determine the:

1. Predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.
2. Predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools.
3. Joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools.
4. Relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools.

Research Questions

The following research questions guided the study:

1. What is the predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State?
2. What is the predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools?
3. What is the joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in?
4. What is the relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools?

Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance:

- Ho₁:** There is no significant predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.
- Ho₂:** There is no significant predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools.
- Ho₃:** There is no significant joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools.
- Ho₄:** There is no significant relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools.

Methods

The study adopted a correlational survey research design, specifically a predictive correlational design. The design was considered appropriate because the study sought to determine the predictive powers of teachers' professional development and classroom management on students' academic achievement in Mathematics without manipulating any of the variables. The design enabled the researcher to establish the extent to which the predictor variables could explain variations in the criterion variable. The study was carried out in Orlu Education Zone, Imo State. Orlu Education Zone is one of the educational zones in Imo State and comprises several public secondary schools distributed across the zone. The area was chosen because of the persistent concern regarding students' academic achievement in Mathematics and the need to examine teacher-related factors that may account for variations in students' performance. The population of the study comprised 290 Mathematics teachers selected in public secondary schools in the study area. The population figure was obtained from the Post Primary Schools Management Board (PPSMB), Imo State. No sampling was carried out because the population was manageable; therefore, the entire population was studied using the census approach. The instrument for data collection was a structured questionnaire, titled: Teachers' Professional Development, Classroom Management and Academic Achievement Questionnaire (TPDCMAAQ). The questionnaire was developed by the researchers based on the objectives, research questions, and relevant literature reviewed for the study. The instrument was face-validated by three experts, two from the Educational Psychology Unit, Department of Educational Foundations, and one from Measurement and Evaluation Unit, all in the Faculty of Education, University of Nigeria, Nsukka. Their observations, corrections, and suggestions regarding clarity, relevance, adequacy, and appropriateness of the items were incorporated in the final version of the instrument. The reliability of the instrument was established using Cronbach Alpha statistics, which yielded coefficients of 0.81 for Teachers' Professional Development, 0.84 for Classroom Management, and an overall reliability coefficient of 0.83. The researcher, with the assistance of trained research assistants, administered copies of the questionnaire directly to the respondents. The direct delivery and retrieval approach was adopted to ensure a high return rate and proper completion of the questionnaire. The completed copies of the questionnaire were collected immediately or on agreed dates from the respondents.

Data collected were analyzed using simple linear regression and multiple regression analyses. Simple linear regression was used to answer Research Questions 1

and 2, while multiple regression analysis was used to answer Research Questions 3 and 4. The hypotheses were tested using t-test associated with simple linear regression and Analysis of Variance (ANOVA) associated with multiple regression at a 0.05 level of significance. The decision rule for interpreting the predictive power was based on the coefficient of determination (R^2) as follows: 0.00–0.20 = Very Low Predictive Power; 0.20–0.40 = Low Predictive Power; 0.40–0.60 = Moderate Predictive Power; 0.60–0.80 = High Predictive Power; and 0.80 and above = Very High Predictive Power. For hypothesis testing, any probability value less than or equal to 0.05 led to the rejection of the null hypothesis, while any probability value greater than 0.05 led to the acceptance of the null hypothesis.

RESULTS

Research Question 1: What is the predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State?

Table 1: Linear Regression of the Predictive Power of Teachers' Professional Development on Students' Academic Achievement in Mathematics in Public Secondary Schools

Model	R	R Square	Adjusted R Square	Decision
1	.712a	.507	.505	Moderate Predictive Power

0.00–0.20 (Very Low), 0.20–0.40 (Low), 0.40–0.60 (Moderate), 0.60–0.80 (High), and 0.80 and above (Very High)

Data on Table 1 revealed that the regression coefficient and coefficient of determination are .712 and .507 respectively. The coefficient of determination of 50.7% showed that teachers' professional development has a moderate predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The remaining 49.3% variance in students' academic achievement in Mathematics is not accounted for by teachers' professional development.

Ho: There is no significant predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Table 2: t-test Associated with Linear Regression of the Predictive Power of Teachers' Professional Development on Students' Academic Achievement in Mathematics

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
Constant	14.284	2.115		6.754	.000
Teachers' Professional Development	.643	.041	.712	15.683	.000

Data on Table 2 showed that the t-test value is 15.683. The hypothesis is rejected because the significant value of .000 is less than the probability value of .05. Therefore, there is a significant predictive power of teachers' professional development on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Research Question 2: What is the predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State?

Table 3: Linear Regression of the Predictive Power of Classroom Management on Students' Academic Achievement in Mathematics in Public Secondary Schools in Orlu Education Zone, Imo State

Model	R	R Square	Adjusted R Square	Decision
1	.684a	.468	.466	Moderate Predictive Power
0.00–0.20 (Very Low), 0.20–0.40 (Low), 0.40–0.60 (Moderate), 0.60–0.80 (High), and 0.80 and above (Very High)				

Data on Table 3 revealed that the regression coefficient and coefficient of determination are .684 and .468 respectively. The coefficient of determination of 46.8% showed that classroom management has a moderate predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The remaining 53.2% variance in students' academic achievement in Mathematics is not accounted for by classroom management.

Ho₂: There is no significant predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Table 4: t-test Associated with Linear Regression of the Predictive Power of Classroom Management on Students' Academic Achievement in Mathematics

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
Constant	11.428	2.006		5.697	.000
Classroom Management	.587	.039	.684	15.051	.000

Data on Table 4 showed that the t-test value is 15.051. The hypothesis is rejected because the significant value of .000 is less than the probability value of .05. Therefore, there is a significant predictive power of classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Research Question 3: What is the joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State?

Table 5: Multiple Regression of the Joint Predictive Power of Teachers' Professional Development and Classroom Management on Students' Academic Achievement in Mathematics in Public Secondary Schools in Orlu Education Zone, Imo State

Model	R	R Square	Adjusted R Square	Decision
1	.811a	.658	.655	High Predictive Power
0.00–0.20 (Very Low), 0.20–0.40 (Low), 0.40–0.60 (Moderate), 0.60–0.80 (High), and 0.80 and above (Very High)				

Data on Table 5 revealed that the multiple regression coefficient and coefficient of determination are .811 and .658 respectively. The coefficient of determination of 65.8% showed that teachers' professional development and classroom management jointly have a high predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The remaining 34.2% variance in

students' academic achievement in Mathematics is explained by variables outside the scope of this study.

Ho₃: There is no significant joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Table 6: ANOVA Associated with Multiple Regression of the Joint Predictive Power of Teachers' Professional Development and Classroom Management on Students' Academic Achievement in Mathematics

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12654.782	2	6327.391	275.108	.000
Residual	6598.215	287	22.991		
Total	19252.997	289			

Data on Table 6 showed that the F-ratio is 275.108. The hypothesis is rejected because the significant value of .000 is less than the probability value of .05. Therefore, there is a significant joint predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Research Question 4: What is the relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State?

Table 7: Relative Predictive Power of Teachers' Professional Development and Classroom Management on Students' Academic Achievement in Mathematics in Public Secondary Schools in Orlu Education Zone, Imo State

Variables	B	Std. Error	Beta	t	Sig.	Rank
Teachers' Professional Development	.514	.052	.546	9.885	.000	1st
Classroom Management	.391	.048	.428	8.146	.000	2nd

Data on Table 7 revealed that teachers' professional development has a standardized beta coefficient of .546, while classroom management has a standardized beta coefficient of .428. This indicates that both variables significantly contributed to the prediction of students' academic achievement in Mathematics. However, teachers' professional development contributed more to the prediction of students' academic achievement in Mathematics and was therefore ranked first, while classroom management was ranked second.

Ho₄: There is no significant relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Table 8: Test of Significance of the Relative Predictive Power of Teachers' Professional Development and Classroom Management on Students' Academic Achievement in Mathematics

Variables	Beta	t	Sig.	Decision
Teachers' Professional Development	.546	9.885	.000	Significant
Classroom Management	.428	8.146	.000	Significant

Significant at $p < .05$.

Data on Table 8 revealed that teachers' professional development has a standardized beta coefficient of .546, t-value of 9.885, and significance value of .000, while classroom management has a standardized beta coefficient of .428, t-value of 8.146, and significance value of .000. Since the significance values associated with both predictor variables are less than the probability value of .05, the null hypothesis is rejected. Therefore, there is a significant relative predictive power of teachers' professional development and classroom management on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State.

Discussion

The findings of the study revealed that teachers' professional development has a moderate predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The finding further revealed that teachers' professional development significantly predicts students' academic achievement in Mathematics. This implies that teachers who continually improve their professional knowledge and instructional competencies through seminars, workshops, conferences, and in-service training programmes are more likely to facilitate improved academic achievement among students in Mathematics. The finding suggests that investment in teachers' professional growth contributes positively to the quality of classroom instruction and students' learning outcomes. The findings are in consonance with the study of Adebayo and Salami (2023), who found that teachers' professional development significantly contributes to students' academic achievement in secondary schools. The authors maintained that teachers who participate in professional development programmes acquire updated pedagogical skills and content knowledge necessary for effective teaching and learning. The findings are also consistent with the study of Nwosu and Chukwu (2024), who reported that continuous professional development significantly enhances teacher effectiveness and students' learning outcomes. The authors observed that professionally developed teachers demonstrate greater instructional competence and are more capable of addressing learners' academic needs. The finding is further supported by Darling-Hammond, Hyler, and Gardner (2017), who emphasized that effective professional development enhances teachers' knowledge, instructional practices, and overall effectiveness in the classroom. This may explain why teachers' professional development emerged as a significant predictor of students' academic achievement in Mathematics. The rejection of the corresponding null hypothesis further confirms that professional development remains an important determinant of students' academic achievement in Mathematics.

The findings of the study revealed that classroom management has a moderate predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The findings further showed that classroom management significantly predicts students' academic achievement in Mathematics. This suggests that effective classroom management contributes substantially to the creation of a conducive learning environment that promotes students' concentration, participation, and academic success in Mathematics. The findings are in consonance with the study of Ibrahim and Hassan (2023), who found that classroom management strategies significantly influence effective teaching and students' academic achievement in secondary schools. The authors observed that well-managed classrooms encourage active student engagement and reduce disruptive behaviours that hinder learning. The findings are also in agreement with Mohammed and Yusuf (2023), who reported that classroom management

significantly predicts students' academic performance in core school subjects. According to the authors, effective management of classroom activities enhances instructional delivery and improves learning outcomes. The findings are equally supported by Emmer and Sabornie (2015), who asserted that effective classroom management is fundamental to successful teaching and learning because it promotes orderliness, discipline, and productive learning environments. Similarly, Wong and Wong (2018) maintained that effective classroom management creates conditions that enable students to maximize learning opportunities. The significant predictive power recorded in this study may therefore be attributed to the role classroom management plays in facilitating effective teaching and learning of Mathematics. The rejection of the null hypothesis further indicates that classroom management significantly predicts students' academic achievement in Mathematics.

The findings of the study revealed that teachers' professional development and classroom management jointly have a high predictive power on students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The findings further indicated that the joint predictive power of the two variables was statistically significant. This implies that the combined influence of professional competence and effective classroom management contributes substantially to students' achievement in Mathematics. The findings are in consonance with the study of Adeyemi and Olatunji (2023), who found that professional development programmes and instructional effectiveness jointly contribute to improved learning outcomes among secondary school students. The authors argued that professionally competent teachers are better positioned to implement effective teaching practices capable of enhancing students' achievement. The findings are also supported by Onwuka and Nnadi (2024), who reported that professional development initiatives significantly improve instructional effectiveness among Mathematics teachers. The authors emphasized that professionally competent teachers who effectively manage classroom activities are more likely to achieve positive learning outcomes. The result may be attributed to the complementary relationship between professional development and classroom management. While professional development equips teachers with the skills and knowledge necessary for effective instruction, classroom management provides the enabling environment for implementing such instructional strategies. Consequently, the combination of both variables strengthens teaching effectiveness and improves students' academic achievement in Mathematics. The rejection of the corresponding null hypothesis therefore confirms the significant joint contribution of teachers' professional development and classroom management to students' academic achievement in Mathematics.

The findings of the study revealed that both teachers' professional development and classroom management significantly contributed to the prediction of students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. However, teachers' professional development emerged as the strongest predictor, while classroom management ranked second. This indicates that although both variables are important in explaining students' academic achievement, teachers' professional development exerts a greater influence on students' achievement in Mathematics. The findings are in consonance with the study of Onwuka and Nnadi (2024), who found that professional development initiatives significantly improve instructional effectiveness among Mathematics teachers and contribute substantially to students' academic achievement. The authors maintained that teachers who continually update their professional knowledge are more capable of delivering quality instruction that enhances

students' learning outcomes. The findings are also consistent with the study of Yusuf and Adigun (2023), who reported that students' academic achievement is strongly influenced by factors directly related to instructional quality and teacher competence. The authors concluded that teacher effectiveness remains a major determinant of students' learning outcomes. The finding is further supported by Darling-Hammond et al. (2017), who emphasized that teacher learning and professional growth directly influence instructional quality and students' academic success. This may explain why teachers' professional development emerged as the strongest predictor in the present study. Although classroom management remains important, its effectiveness may largely depend on the teacher's professional competence and ability to implement appropriate instructional practices. The rejection of the null hypothesis therefore confirms that both teachers' professional development and classroom management significantly predict students' academic achievement in Mathematics, with teachers' professional development making the greater contribution.

Educational Implications of the Study

The findings of this study have important implications for educational practice and policy. The significant predictive power of teachers' professional development suggests that continuous training and capacity-building programmes are essential for improving Mathematics instruction and students' academic achievement. The finding that classroom management significantly predicts students' achievement implies that teachers need adequate skills in managing classroom activities to create conducive learning environments. The high joint predictive power of teachers' professional development and classroom management further indicates that educational stakeholders should pay attention to both variables simultaneously in efforts to improve students' achievement in Mathematics. The study also highlights the need for school administrators and educational authorities to strengthen teacher support systems that promote professional growth and effective classroom practices.

Contribution to Knowledge

This study contributed to knowledge by providing empirical evidence on the predictive relationship between teachers' professional development, classroom management, and students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The study established that teachers' professional development and classroom management individually and jointly predict students' academic achievement in Mathematics. It further revealed that teachers' professional development is a stronger predictor of students' academic achievement than classroom management. The study also enriched existing literature on teacher-related factors influencing Mathematics achievement and provided a basis for future studies in similar educational settings.

Conclusion

Based on the findings of the study, it was concluded that teachers' professional development and classroom management are significant predictors of students' academic achievement in Mathematics in public secondary schools in Orlu Education Zone, Imo State. The study established that teachers' professional development and classroom management individually exert significant predictive influence on students' achievement in Mathematics. The study further concluded that the two variables jointly have a high predictive power on students' academic achievement in Mathematics. Among the predictor variables, teachers' professional development emerged as the strongest predictor of

students' academic achievement in Mathematics. Therefore, improving teachers' professional competence and strengthening classroom management practices are essential for enhancing students' academic achievement in Mathematics.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Educational authorities should organize regular professional development programmes such as workshops, seminars, conferences, and in-service training for Mathematics teachers to enhance their pedagogical skills, subject-matter knowledge, and instructional effectiveness.
2. School administrators should encourage and support the adoption of effective classroom management practices by providing continuous supervision, professional guidance, and a conducive teaching and learning environment for Mathematics instruction.
3. The Ministry of Education and relevant educational agencies should formulate and implement policies that promote continuous teacher professional development and effective classroom management as strategies for improving students' academic achievement in Mathematics.
4. Mathematics teachers should continuously update their professional knowledge and strengthen their classroom management skills in order to improve instructional delivery and enhance students' academic achievement in Mathematics.

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