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Teaching Methods, Students' Performance and Interest in Physics in Secondary Schools in Abak, Akwa Ibom State, Nigeria

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ABSTRACT

This study investigates the effect of teaching methods on students' performance and interest in Physics in secondary schools in Abak, Akwa Ibom State, Nigeria. Two research hypotheses were formulated to guide the study. The study adopted a quasi-experimental research design. The population for the study comprised all 3691 senior secondary one Physics students of the 2025/2026 academic session in the 11 public secondary schools in the area. The sample size was 272 SS1 Physics students (146 students in experimental group one and 126 in experimental group two). Using a simple random sampling technique, one intact class was sampled from two schools. The Physics Performance Test on Projectiles (PPTP) was used for data collection with a reliability index of 0.87. Three validators from the Department of Science Education, Akwa Ibom State University, validated the instrument. The data collected were analysed using descriptive statistics and ANCOVA to test the hypotheses at a 0.05 level of significance. The findings of the study revealed that there was a significant difference between the mean performance scores of Physics students when taught Projectiles using a field trip compared with those taught using a demonstration method; students' interest was higher with the field trip than the demonstration method in Physics. It was concluded that students' academic performance could be improved with a field trip rather than demonstration methods. Based on these findings, it was recommended that the field trip method should be used in teaching projectiles and other concepts in Physics.

Keywords: *Field trip, demonstration, Projectiles, performance, interest, Physics*

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INTRODUCTION

Our communication, movement, leisure and functional education are all products of principles of practical Physics. The way Physics is taught and learn is closely related to the many benefits derivable from it (Utibe & Olah, 2024). Despite the importance of Physics principles in enhancing daily living in our society, students' performance in the subject still remains poor (West African Examinations Council, WAEC, results, 2026). This poor performance is a very big problem for the students who are expected to obtain a pass at credit level, to be eligible for admission into various science courses in the tertiary institutions in Nigeria (FME, 2018; NUC, 2025). The Federal Ministry of Education in the National Policy of Education (FME, 2018) recommends guided discovery as the official teaching method. This method from the observation of the researchers does not seem guarantee good performance of students in Physics results. The increasing poor performance and the importance of Physics motivated the researchers to investigate other teaching methods that can improve students' performance in Physics.

This study considers the concept of projectiles as one of the concepts which students often have problems with in the WASSCE, as reported in the WASSCE Chief Examiner's Report (2025). There are many problems facing Physics teaching in secondary schools. These problems are likely to affect the performance of students in public examinations. Some of these problems are poor teaching methods, poor staffing and poor textbook quality in Physics (Babayemi et al., 2023). Even when guided-discovery is recommended for Physics teaching in the secondary schools, the researchers in this study are considering field trips and demonstrations as alternative teaching methods. The poor performances of students in Physics are reported in the research literature (Utibe & Onwioduokit, 2019; Inyang et al., 2023). According to Williams (2018), academic performance is often seen in the students' results in local and public examinations. According to Zumyil (2019), academic performance is described as students' output when they are tested with what has been taught. Utibe et al. (2022) reported that academic performance can also be interpreted as a result of students ' performance in school and external examinations.

The performance of candidates in Physics examinations conducted by NECO is usually not very good, as published by NECO-SSCE (NECO Results, 2026). There had been a consistently poor performance in Physics for the five years considered in this study. For example, the failure in Physics in 2021 was 49.70%, 2022 was 51.17%, 2023 was 49.94%, 2024 was 48.29% and 2025 was 46.38% respectively. Furthermore, NECO CERs for school based candidates between 2021 and 2025 point to a display of poor understanding and difficulty in the Senior School Certificate Examinations. Based on these observations, the Physics teacher should adopt a technique that assists students in developing interest in the subject, the concept and improving their performance while

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taking care of individual differences within the teaching environment. The study was anchored on two theories namely Jerome Bruner's theory of instruction by Bruner (1966) and the Developmental Theory of Learning and Thinking by Jean Piaget (1952), (Ausubel *et al.*, 1978).

A field trip is a teaching method where students are taken outside the normal classroom for the purpose of learning, observation and obtaining some practical information. It could be in a nearby school farm, national park, institution, agency, and government parastatal, industry, forest or game reserve. In this study, the students were taken to the University of Uyo, Akwa Ibom State, where they were physically and practically taught various concepts and sub-concepts in projectiles. It is an important component of teaching basic Physics (Aromosele & Eholuenetala, 2016). According to Zumyil (2019), a field trip is taking students out of the regular classroom to outdoor places where they can see concrete illustrations of concepts. It also offers direct observation and interpretation of the substance in its natural environments. It requires the use of basic skills such as observation, identification, classification and manipulation of substances in natural environments. It provides real-life context for the material being taught. It can be remembered if students can actually see where and how concepts are taught, work or take place in real life.

Demonstration is a teaching method used to communicate an idea, a visual presentation, an action and activity or practical work related to the concepts taught by the teacher in the classroom (Anwar & Zulkifli, 2020). A teacher, while using the demonstration method, can demonstrate personally, using students only or a combination of teacher and students in a practical form to teach objects, instruments, actions and events related to the concepts. All students in the class simultaneously gain practical experience and the common demonstration is exhibited to them by the class-teacher. It is a means of clearly showing by reason or proof, explaining or making clear by use of examples or experiments. It often occurs when students have a hard time connecting theories to real life practice or when students are unable to understand application of theories (Utibe *et al*., 2022). Leeuwen & Janssen (2019) defined demonstration method as a class activity involving the teacher or students doing practical activities in front of the class and explaining the steps as the activity progresses.

Edikpo et al. (2024) identified lack of interest as one of the major problems that science students are facing. Because of such low levels of interest, the number of students studying sciences during their senior school years becomes few, and this in turn leads to a shortage of science students in various disciplines. Students' interest towards learning science subjects like Physics, Chemistry, Biology and Mathematics has long been a common concern among teachers. Students' interest towards Physics has been considered an important factor influencing participation and success in Physics (Uboh et al., 2024). The engagement of students in the process of learning tasks is considered higher when the learner is interested in that task, and when learners become so involved

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in the learning task, thereby performing higher in the subject (Salisu, 2015). Nuni et al. (2018) revealed that field trips as an active method of teaching physics are hardly utilised despite schools having buses to transport students to various learning sites near the schools. It was noted that school administrators are less supportive of field trips and focus mainly on non-academic formal activities. Both teachers and students indicated that field trips promoted learning since they are participatory, interesting and provide a link with real application of science to classroom work.

Utibe & Onwioduokit (2019) observed the effect of guided-discovery and demonstration methods on Senior Secondary Physics Students' Acquisitions of Entrepreneurial Skills in household electrical circuit sketch and wiring skills in Abak Local Government Area of Akwa Ibom State. The present study is based on the findings and recommendations on instructional methods used in teaching motion in Physics. Inyang et al (2023) showed a significant difference between the mean achievement scores of Physics students when taught waves using guided-discovery and expository instructional methods in favour of the guided-discovery method. It recommended guided-discovery instructional methods in teaching waves to Physics students. The above empirical studies are related to the present study in terms of the design used, test, and method of data analysis. It is against this background that this study examines the effect of teaching methods on students' performance and interest in Physics in secondary schools in Abak, Akwa Ibom State, Nigeria.

Statement of the Problem

From the review, it can be seen that teaching methods have a significant influence on students' performance in Physics in secondary schools. Studies reviewed have shown that for Physics to be taught effectively, there should be other teaching methods that will improve students' performance, interest and results in examinations. This new method of Physics teaching should be able to improve knowledge impartation and students' activities. This new way of teaching Physics is sometimes absent in the senior secondary school level in Nigerian classrooms, causing the researchers to now carry out this study to give a statistical position. It is on this premise that this study is carried out to investigate the effect of field trip and demonstration teaching methods on students' performance and interest in Physics in secondary schools in Abak, Akwa Ibom State, Nigeria.

Purpose of the Study

The purpose of this study was to determine the effect of field trip and demonstration teaching methods on students' performance and interest in Physics in secondary schools in Abak, Akwa Ibom State. The study was designed to achieve the following specific objectives: to

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1. Compare Physics students' mean performance using field trip versus demonstration methods when learning projectiles.
2. Compare the mean interest scores of Physics students when taught projectiles using field trip and demonstration methods.

Research Hypotheses

To guide the study, the following null hypotheses were formulated and tested at a 0.05 level of significance.

1. There is no significant difference between the mean performance scores of Physics Students' when taught projectiles using field trip and demonstration methods.
2. There is no significant difference between the mean interest scores of Physics Students' when taught projectiles using field trip and demonstration methods.

Significance of the Study

The study would be beneficial to students, teachers and researchers. The work, when published, would sensitise Physics students and teachers on other teaching methods that can be used in the class for improved performance and interest in Physics. The results would also contribute to research in education, Physics, and science education in general, for other researchers.

Scope of the Study

This study was delimited to the field trip and demonstration teaching methods, performance, interest, the concept of projectiles among SS1 students from public secondary schools in Abak, for 2025/2026 academic session.

Methods

This study adopted a quasi-experimental pretest-posttest comparison group design. This design was considered appropriate because it allowed the researchers to use the intact classes in the school without disrupting the system (Price *et al*., 2024). The structure is as shown below:

$E_{1\ (\text{taught using field trip method})}$: $O_{1\ (\text{pre-test})}$ X $_{(\text{Treatment})}$ $O_{2\ (\text{post-test})}$

$E_{2\ (\text{taught using demonstration method})}$: $O_{1\ (\text{pre-test})}$ X $_{(\text{Treatment})}$ $O_{2\ (\text{post-test})}$

This study was conducted in public secondary schools in Abak, Akwa Ibom State, Nigeria. The reason for his area of study is that the performances of students in Physics over the years have not been encouraging. The review also shows that this type of study has not been carried out in the area before, and it would provide statistical data for the area.

The population of this study comprised all the senior secondary one (SS1) Physics students in the 2025/2026 academic session. There are 11 public secondary schools with

3691 Senior Secondary One (SS1) Physics students (Abak LEC, 2026). The study sample comprised 272 SS1 Physics students (146 students in experimental group one and 126 in experimental group two). Two public secondary schools were selected using a simple random sampling technique.

The researchers developed an instrument tagged "Physics performance test on projectiles (PPTP) used for data collection. The PPTP have two sections, A and B. Section A elicited personal information such as the interest of the respondents in Physics, while Section B comprises 25 objective tests in Physics with four options lettered A – D, with only one correct option; the students were expected to tick only one option as an answer. The items were drawn to cover concepts in projectiles and related sub-concepts. The instrument was used for measuring the students' pre-test and post-test performance and interest in Physics.

Face validation was used for validating the instrument and the lesson packages. Three validators from the Department of Science Education, Akwa Ibom State University, validated the instrument. For content validation, the test blueprint was used as a guide in the development of the test items. To establish the reliability of the PPTP, the instrument was administered to a trial testing group of 30 students in schools of comparable status in the area of study that did not take part in the main study. The scores obtained were subjected to KR20 statistics since the instrument was dichotomously scored. The result obtained showed a reliability coefficient of 0.87. Based on the high index, the instrument was deemed reliable and suitable for conducting the study.

To obtain data for the study, relevant permission was obtained from the Director of Schools, Local Education Committee (LEC), Abak, for the use of the two selected secondary schools in the LEC for the conduct of the study. The approval was conveyed to the Principals of the selected schools for proper arrangement for use of the Physics students, teachers and laboratory facilities in the school for the conduct of the study, having briefed them of the purpose and the benefit of the study to the students, school and the Ministry of Education. All the groups were taught the same concept on projectiles, but with different teaching methods. In planning for the field trip, the researchers follow these steps:

i. Visit the field location (selected sites in the University of Uyo, Akwa Ibom State) and observe the environment to ensure its suitability for the study.
ii. Discuss the field trip with the University Authority and obtain approval.
iii. Acquainted themselves with the Departments and units: this is done by visiting the places, interacting with Technical Officers and obtaining a date and time for the trip well in advance.
iv. Obtain permission from other teachers whose periods are to be taken up by the field-trip.
v. Define safety and behaviour standards and also plan for appropriate dressing for the trip condition.

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The scores obtained from pretest and posttest were analysed using descriptive statistics, while the null hypotheses were tested using Analysis of Covariance (ANCOVA) with pretest as covariates. All hypotheses were tested at a 0.05 level of significance.

RESULTS AND DISCUSSION

Table 1: Mean Pretest/Posttest Scores of the Students taught with field trip and demonstration methods

Instructional Methods	N	Pretest		Posttest		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Field trip	96	14.44	4.29	66.92	10.71	52.48
Demonstration	76	12.50	3.67	63.20	11.46	50.70

Table 1 shows the pretest and posttest mean scores of students taught with field trip and demonstration methods. Based on the result, students taught projectiles using field trip method had a pretest mean performance score of $\bar{x}$ = 14.44 (SD = 4.29) and a posttest mean score of $\bar{x}$ = 66.92 (SD = 10.71). The mean difference score was 52.48, On the other hand, the demonstration method had a pretest mean performance score of $\bar{x}$ = 12.50 (SD = 3.67) and a posttest mean score of $\bar{x}$ = 63.20 (SD = 11.46) with a mean difference score of 50.70. The differences existing between the mean performance scores of Physics students when taught projectiles using field trip and demonstration methods is 1.78. This shows that field trip method was more potent in improving the mean performance scores of students in projectiles.

Table 2: Mean Posttest/Interest score of students taught with field trip and demonstration methods

Instructional Methods	N	Interest		Post-test		Mean difference Score
		$\bar{x}$	SD	$\bar{x}$	SD	
Field trip	96	66.92	10.71	76.24	10.70	9.32
Demonstration	76	63.20	11.46	71.28	9.93	8.08

Table 2 shows the interest and posttest mean scores of Physics students taught projectiles using field trip and demonstration methods. The result, shows that Physics students taught projectiles using field trip method had an interest mean score of $\bar{x}$ = 66.92 (SD = 10.71) and a posttest performance mean score of $\bar{x}$ = 76.24 (SD = 10.70). The mean difference score was 9.32. More so, the Physics students exposed to demonstration

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method had an interest mean score of $\bar{x}$ = 63.20 (SD = 11.46) and a posttest mean performance score of $\bar{x}$ = 71.28 (SD = 9.93) with a mean difference score of 8.08. The differences existing between the mean interest scores of Physics students when taught projectiles using field trip and demonstration methods is 1.24. This shows that field trip method was more potent in improving the mean interest scores of students in projectiles.

Table 3: Analysis of Covariance (ANCOVA) of the Effect of instructional methods on Physics students` performance in projectiles

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6362.981[a]	4	530.248	6.326	.000	.357
Intercept	28162.427	1	28162.427	336.009	.000	.710
Pretest	1191.971	1	1191.971	14.222	.000	.094
Instructional Method	539.128	1	269.564	3.216	.043	.045
Error	11482.593	169	83.815			
Total	624844.000	172				
Corrected Total	17845.573	171				

a. R Squared = .357 (Adjusted R Squared = .300)
Significant at 0.05 level of significance

Table 3 shows the ANCOVA of the effect of field trip and demonstration on Physics students` performance in projectiles. The result shows that an F-ratio $F(1,169)$ = 3.216; (p<0.05) was obtained. Since the associated probability value of 0.043 is less than 0.05 set as level of significance, the null hypothesis that there is no significant difference between the mean performance scores of Physics Students' when taught projectiles using field trip and demonstration methods was rejected. Thus, inference drawn is that there is a significant difference in mean performance scores of Physics students in projectiles when taught using field trip and demonstration instructional methods. The result further showed an effect size of η^2_p = 0.045, indicating that 4.5% of the variance on Physics students` performance scores in projectiles was due to the treatment.

Table 3 shows that there is a significant difference between the mean performance scores of Physics students when taught projectiles using field trip and demonstration teaching methods in favour of field trip method. This implies that hypothesis one is rejected. The initial differences in the mean performance score among those exposed to field trip and demonstration methods were found to be significant when subjected to hypothesis testing. The finding of this study was in line with the work of Utibe & Onwioduokit, (2019) that carried out a study to examine the effect of guided-discovery, demonstration methods and senior secondary Physics students' acquisitions of entrepreneurial skills in household electrical circuit sketch and wiring skills in Akwa Ibom State.

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Table 4: Analysis of Covariance (ANCOVA) of the effect of teaching method on the mean interest scores of Physics students in projectiles

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7953.432[a]	4	662.786	11.989	.000	.512
Intercept	10347.486	1	10347.486	187.178	.000	.577
Posttest	575.823	1	575.823	10.416	.002	.071
Teaching Method	1353.442	2	676.721	12.241	.000	.152
Error	7573.561	169	55.281			
Total	786087.000	172				
Corrected Total	15526.993	171				

a. R Squared = .512 (Adjusted R Squared = .470)
Significant at 0.05 level of significance

Table 4 shows the ANCOVA of the effect of field trip and demonstration on Physics students` interest scores in projectiles. The result shows that the F-ratio $F(2,169) = 12.241$; ($p<0.05$, $\eta^2_p = 0.152$) was obtained. Since the obtained associated exact probability value of 0.000 is less than 0.05 set as level of significance, the null hypothesis that there is no significant difference between the mean interest scores of Physics Students' when taught projectiles using field trip and demonstration methods was rejected. Hence, it is concluded that there was a significant difference in the mean interest scores of Physics students in projectiles when taught using field trip and demonstration teaching methods in favour of field trip. The result further showed an effect size of $\eta^2_p = 0.152$, indicating that 15.2% of the variance on Physics students` interest scores in projectiles was due to the treatment.

Table 4 shows that there was a significant difference between the mean interest scores of Physics students in the concept of projectiles using field trip and demonstration methods in favour of field trip method. This implies that hypothesis two is rejected. The initial differences in the mean interest score between those exposed to field trip and demonstration methods was found to be significant when subjected to hypothesis testing. The finding of this study was at variance with the study conducted by Anwar & Zulkifli (2020) to investigate the influence of demonstration method education in the knowledge of tooth brushing in children age 10–12 years.

The finding agreed with the study of Inyang, *et al.* (2023) who determines the effect of guided-discovery and expository instructional methods on secondary schools students' academic achievement in Physics in Ikot Abasi local government area, Akwa Ibom State, Nigeria. It follows that teaching method is a strong determinant of interest in Physics.

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CONCLUSION

The purpose of this study was to determine the effect of field trip and demonstration instructional methods on students' academic performance and interest in Physics in public secondary schools in Abak, Akwa Ibom State. The study was guided by two hypotheses, which were tested at a 0.5 level of significance. The literature review of this study covered: theoretical, conceptual and empirical works. This study adopts a quasi-experimental pretest-posttest comparison group design. The study comprised all Senior Secondary one (SS1) Physics students. A simple random sampling technique was used to select two public schools for the year 2025/2026 session. The population was 3691 Physics students. A total of 272 SS1 Physics students (146 students in experimental group one and 126 in experimental group two) constitute the sample size for the study.

The Physics Performance Test on Projectiles (PPTP) was the instrument used for data collection. Two teaching packages (first for the field trip and second for the demonstration methods) were prepared by the researchers for the purpose of teaching projectiles based on the objectives of the study. The data collected were analysed using descriptive statistics and ANCOVA to test the hypotheses at the 0.05 level of significance. The findings of the study revealed that there was a significant difference between the mean performance scores of Physics students when taught Projectiles using a field trip compared with those taught using a demonstration method; students' interest was higher with the field trip than the demonstration method in Physics. It was concluded that students' academic performance could be improved with a field trip rather than demonstration methods. Based on these findings, it was recommended that the field trip method should be used in teaching projectiles and other concepts in Physics. Based on the findings of the study, the researchers hereby concluded that the field trip method had a significant effect on the academic performance and interest of students in projectiles. This implies that the field trip method increases students' performance and interest more than the demonstration method.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. Physics teachers should make effective use of field trip teaching method in teaching projectiles and other concepts in physics.
2. Field trip teaching method should be integrated into the curriculum of Physics as one of the teaching methods for improved performance and interest.

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