Effects of Out-door Activities on Students' Attitude towards Physics in Secondary Schools

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Abstract

The study investigated the effects of out-door activities on students' attitude towards learning of Physics in Senior Secondary School Physics in Ekiti State, Nigeria. The research design adopted in the study was Pretest-Posttest Quasi-experimental. The sample for the study was 150 Senior Secondary One (SSI) Physics students (this sample was divided into the experimental and control groups in ratio 1: 1 i.e. 75 in each group), selected through the multistage sampling technique from a total population of 7,852 SS I students offering Physics in all the 184 public Senior Secondary Schools in Ekiti State. The instrument used to collect relevant data from the subjects was Physics Attitudinal Scale (PAS). The reliability of the instrument was determined through the split-half method with the reliability coefficient of 0.83. Two null hypotheses were tested at 0.05 level of significance. The data collected were analysed using inferential statistics of t-test and Analysis of Covariance (ANCOVA). The results of the analyses showed that there was significant difference in the attitude of students to Physics in the experimental and control groups in favour of experimental group. Based on the findings of the study, it was recommended that non-conventional teaching approaches such as using out-door activities, should be introduced into the teaching of Physics in the nation's secondary schools to reinforce the hitherto adopted conventional teaching method and Physics teachers should be encouraged to make use of these new teaching approaches.

Key words: Out-door, out-door activities, attitude and students' attitude

1. Introduction

Physics is a cross-cutting discipline that has applications in many sectors of economic development, including health, agriculture, water, energy and information technology [7]. There is no doubt that a good part of the scientific knowledge is derived from the principles of Physics. Indeed, the knowledge of Physics has led to so many inventions such as the production, application and utilization of integrated circuits, production and use of machines and other contrivances. It also accounts for the discovery and production of hydroelectric power, gas turbine and thermonuclear power plant, telephones, refrigerators, heaters and gas/electric cookers.

The invention of modern technologies such as Information and Communication Technology (ICT) which has made the world a global village is also part of the benefits of Physics. Other benefits that are derivable from the knowledge of Physics include the construction of modern vehicles, rockets, nuclear bombs, missiles, diodes, computers and other electronic systems [9].

In Nigeria, in spite of the enormous role that Physics plays in national development and the efforts of government in the provision of necessary science equipments in schools with good teachers and

parents/guardians in providing for their children/wards educational needs at improving science education, Physics results in the examination conducted by most certified examination bodies like the West African Examinations Council (WAEC) and National Examinations Council (NECO) have not been satisfactory. In particular, reports on WAEC results of Senior School Certificate Examination in Ekiti State over the years often revealed low performance of students in Physics. A fluctuation trend was recorded in the performance of students in Physics in the past five years (between 2008-2012) in May/June WASSCE (Table 1).

Table 1: Summary of trends of performance in Physics in the West African Senior Secondary School Certificate Examination, Ekiti State (between 2008-2012)

YEAR	TOTAL No EXAMINED	CREDIT A1- C6	PASSES D7- E8	FAILURE F9
2008	3385	1274 (37.6%)	797 (23.5%)	1314 (38.9%)
2009	4289	2296 (53.5%)	1036 (28.7%)	937 (17.8%)
2010	5459	2569 (49.8%)	1825 (31.6%)	1065 (18.6%)
2011	6859	4020 (58.6%)	1124 (16.4%)	1715 (25.0%)
2012	5081	2514 (49.5%)	1379 (27.1%)	1188 (23.4%)

Source: [1].

A cursory look at table 1 revealed that: in 2008, out of 3,385 candidates examined for Physics in MAY/JUNE WASSCE, only 1,274 (37.6%) scored A1 to C6 grade, 797 (23.5%) got pass and 1,314 (38.9%) candidates failed. In 2009, 4,289 candidates were examined for Physics, only 2,296 (53.5%) recorded A1 to C6 grade, 1,036 (28.7%) scored pass and 937 (17.8%) failed. Also, in 2010, out of 5,459 candidates that were examined for Physics, only 2,569 (49.8%) had A1 to C6 grade, 1,825 (31.6%) scored pass and 1,065 (18.6%) failed. In 2011, out of 6,859 candidates that were examined for Physics, only 4,020 (58.6%) had A1 to C6 grade, 1,124 (16.4%) scored pass and 1,715 (25.0%) failed. Finally, in 2012, 5,081candidates were examined, 2,514 (49.5%) recorded A1 to C6 grade, 1,379 (27.1%) scored pass and 1,188 (23.4%) failed.

A surface look at the analysis revealed that not very many of the candidates had credit pass in Physics over the period of observation. In addition, over 40% of the candidates that were examined over the period of observation scored below passes level (i.e. A1 to C6) grade required for admission purpose to read science based courses in the tertiary institutions. This situation is disturbing and not in the best interest of the technological growth and development of the country.

Some of the factors inhibiting the learning of Physics and leading to students' poor academic performances in Physics have been identified. These factors, according to [7] include; poor teaching methodology, students' negative attitude towards Physics, students' lack of interest in Physics, school location, gender inequality and poor quality of Physics teacher.

Since sense of hearing alone easily leads to forgetting, more effective learning goes on when many senses are involved. However, this could be improved upon by combining it with other more effective methods and strategies that are activity-based. The search for methods and procedures for effective teaching and learning has engendered the birth of many procedures and methods that include classroom outdoor activities. A variety of natural settings can be used for science investigation on out-doors, such as: school yards, playgrounds, gardens and amusement parks [12].

Teaching Physics through outdoor activities may reduce the perceived abstract nature of Physics to a vivid reality by exposing the students to the practicality of Physics. In the outdoor Physics activities, learning objects are real material objects in the surrounding with their properties reflected in scientific principles, laws and theories of Physics. The learner performs actions on the learning objects, transforming the objects in intellectual and /or practical ways and changing him or herself in that process. Different forms of activities like

object manipulation/transformation, sport and play activities can dynamically contribute to the development of learning Physics activity outside of the traditional educational context.

Attitude is an opinion or general feeling about something [2]. Also, [11] defines attitude as "the way that you think and feel about somebody or something". [8] defined attitude as an approach, temperament, sensation, situation etc. with regards to a person or thing: inclination or course, especially of the mind. Similarly, [6] asserted that attitude is a hypothetical construct that indicates an individual's likes and dislikes towards an item. It may be positive, negative or neutral.

According to [7], the attitude of a student triggers his behavior. Attitudes are antecedents which serve as inputs or stimuli that trigger actions. [5] reported that students' positive attitudes to science correlate highly with their science achievement. Similar reports were recorded by [16] and [13], that students show more positive attitudes after been exposed to self-learning strategy such as computer and text-assisted programmed instruction, self-learning device, self- instructed and problem- based instruction.

[4] affirmed that attitude, whether positive or negative, affect learning in science and Physics in particular. However, it is well known that a negative attitude towards a certain subject makes learning or future-learning difficult. Therefore, helping students develop positive attitude towards Physics course should be considered an important step in science education. [4], also opined that students' success in achieving their goals will encourage them to develop positive attitudes towards Physics and other problem-solving activities.

Outdoor teaching activities could allow for better acquisition of knowledge by students, as the activity could be experienced with different senses as a result of their physical interaction with nature within their environs, this would make them to form their personal opinion about events [10]. The students was exposed to the original/actual materials instead of bringing the dummy to the classroom to demonstrate. The students need activity-oriented lesson for them to master most concepts in Physics.

This study therefore intends to ascertain whether the use of out-door activities, as a teaching and learning approach, would improve students' attitude to Physics.

2. Research Hypotheses

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

1. There is no significant difference in the students' attitude towards Physics before and after treatment.
2. There is no significant difference in the attitude of male and female students to Physics in each of the experimental and control groups before and after the treatment.

3. Methodology

The research design adopted in the study was Pretest-Posttest Quasi- experimental. The sample for the study was 150 Senior Secondary One (SSI) Physics students (this sample was divided into the experimental and control groups in ratio 1: 1 i.e. 75 in each group), selected through the multistage sampling technique from a total population of 7,852 SS I students offering Physics in all the 184 public Senior Secondary Schools in Ekiti State.

The instrument used to collect relevant data from the subjects was Physics Attitudinal Scale (PAS). The reliability of the instrument was determined through the split-half method with the reliability coefficient of 0.83.

The administration of the instrument was in three stages: the pre-treatment stage (two weeks), the treatment stage (four weeks) and the post-treatment stage (two weeks). Eight weeks altogether were used for the whole study. The experimental group was treated with out-door instructional package (i.e. the students were taught outside the classroom with the package) while, the control group were taught with the same concepts but through the conventional teaching approach.

Two null hypotheses were tested at 0.05 level of significance. The data collected were analysed using inferential statistics of t-test and Analysis of Covariance (ANCOVA).

4. Results and Discussion

Hypothesis 1

There is no significant difference in the students' attitude towards Physics before and after treatment.

Table 2: Summary table of Paired samples t-test Analysis of students' attitude towards Physics before and after treatment

	N	$\bar{X}$	SD	df	t_{cal}	t_{tab}	Result
Attitude Pre-test	75	62.88	8.81	74	23.99	1.65	*
Attitude Post-test	75	88.72	9.63				

P < 0.05 (Result Significant at 0.05 level). * = Significant

As shown in table 2, when the mean score of students' attitude towards Physics before and after treatment were statistically compared, a *t-value* ($\mathbf{t_{cal}}$ = 23.99 > $\mathbf{t_{tab}}$ = 1.65) with P < 0.05 alpha level for Pre-test attitude and Post-test attitude scores was obtained, which was significant at 0.05 level. This implies that there exists significant difference in the students' attitude towards Physics before and after treatment. Consequently, the null hypothesis which states that there is no significant difference in the students' attitude towards Physics before and after treatment was rejected.

Hypothesis 2

There is no significant difference in the attitude of male and female students to Physics in each of the experimental and control groups before and after the treatment.

Table 3: Summary of ANCOVA analysis on the attitudinal mean scores of male and female students towards Physics in each of the experimental and control groups before and after the treatment

Source of variation	SS	df	Ms	F_{cal}	F_{tab}	P	Result
Corrected model	19672.244[a]	4	4918.061	122.49		0.000	
Covariate (pretest)	3955.859	1	3955.859	98.52	3.89	0.000	
Gender	94.763	1	94.763	2.36	3.89	0.127	NS
Group	15004.448	1	15004.448	373.69	3.89	0.000	*
Gender *Group	77.465	1	77.465	1.93	3.89	0.167	NS
Error	5822.029	145	40.152				
Corrected Total	25494.273	149					
Total	953289.000	150					

P > 0.05 (Result Not significant at 0.05 level), NS = Not Significant, and * = Significant

Table 3 showed that the computed *F-value* ($\mathbf{F_{cal}}$ = 2.36 < $\mathbf{F_{tab}}$ =3.89) with a *P-value* (P > 0.05 alpha level) obtained for students' gender was not significant. Hence, the attitudinal mean scores of male and female students towards Physics in each of the experimental and control groups before and after the treatment were not significantly different. The table also revealed that the computed F-*value* ($\mathbf{F_{cal}}$ = 1.93 < $\mathbf{F_{tab}}$ =3.89) with a *P-value* (P > 0.05 alpha level) obtained for the interaction of gender and group was not significant as well. The

null hypothesis was thus not rejected. It therefore implies that there was no significant interactions in the attitudinal mean scores of male and female students in each of the experimental and control groups. In other words, gender of students has no significant influence on either the effectiveness or otherwise of the approach of instruction applied in relation to their attitude towards Physics.

5. Discussion

Findings from the study showed that there is significant difference in students' attitude towards Physics before and after treatment. This shows that the outdoor teaching approach is more potent in changing students' attitude towards Physics than the conventional teaching method. This finding is consistent with the findings of [14], [15] and [17], who in separate studies established the fact that students' attitude to Physics improved after they have been exposed to teaching, using real-life contents.

The findings of this study also revealed that there was no significant difference in the attitude of male and female students towards Physics in each of the experimental and control groups before and after the treatment. In other words, students' gender has no effect on the effectiveness of the method of instruction applied. In other words, female students were found to have similar attitude towards Physics as their male counterparts in the two groups involved in the study. It could then be concluded within the limits of the findings of this study that gender was not a significant predictor of students' attitude towards Physics.

6. Conclusion

Based on the findings of this study, it can be concluded that outdoor activities teaching approach is more potent in stimulating students' attitude towards Physics in secondary schools than the conventional method in vogue in the nation. It can also be concluded that the effect of teaching approach on secondary school Physics was also found not to vary with gender of students. This simply implies that performance of students taught using different teaching approaches is not in any manner affected by their gender.

7. Recommendations

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

1. Since the hitherto commonly used conventional method of instruction in formal schools had been empirically discovered in this study to be less potent and less effective than out-door activities mode of teaching in improving secondary school students' attitude towards Physics, the conventional method presently in use by Physics teachers should ether be improved upon, modified or replaced with an activity- based teaching approach (as appropriate).
2. Physics teacher should be encouraged to adopt out-door teaching approach in order to: demystify Physics in its entirety; simplify the perceived abstract nature of Physics'-concepts for improved students' attitude towards Physics for improved academic performance and subsequently create an environment where people would realize that Physics is neither an 'abstract' nor 'esoteric' subject that cannot be understood by diligent learners as many currently erroneously presume.

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