

EFFECT OF OUTDOOR LABORATORY TEACHING STRATEGY ON ACADEMIC PERFORMANCE AMONG COLLEGES OF EDUCATION STUDENTS OF DIFFERENT ABILITY LEVELS IN NORTH-WEST ZONE NIGERIA.

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Abstract

The paper investigated the effects of outdoor laboratory teaching strategy on the performances of students undergoing Nigeria Certificate in Education (NCE) Programme of different ability levels in Biology. The performances of students in high, medium and low ability levels were compared after exposing them to teacher-directed outdoor instruction. It was found that there was no significant difference ($P \geq 0.05$) in the performance of students in the different ability levels after treatment. Outdoor teaching strategy was found to influence the academic performance of low achievers as found by long (1981) and Adesoji (2008). Also the outdoor laboratory exposure showed no significant difference in the academic performance of male and female students, thus showing that it is gender friendly and that outdoor laboratory strategy was advocated in teaching Science. This would go a long way in improving the performance of students no matter their ability level and gender.

Keywords: Outdoor laboratory; Performance; NCE (Nigeria Certificate in Education); Ability levels.

Introduction

There is disparity in the ability of students to perform specific tasks (Adesoji, 2008). Students are not the same especially when we find out the rate at which facts and principles in sciences are being assimilated. Several studies within the Nigerian environment have however, shown that learners are quantitatively different in their ability levels and in learning problems (Ehinder, 1980). Some studies have also shown that method of instruction can influence the performances of low achievers (Kempa and Dube, 1974; long 1981, Adesoji, 1992; Okebukola, 1992; Lavioe, 1993 and Iroegbu, 1998). However, achievements of low ability students have been found to be lowest while that of high ability students was the highest (Kempa and Dube, 1974; Roberts, 1995; Talca, 2001). It has also been observed that outdoor laboratory instruction strategy was effective in teaching students of different ability levels (adesoji, 1995, 1997, 2008 and Usman, 2010).

Various activity-based teaching strategies have been employed for the purpose of improving the teaching/learning of Biology at NCE level. These are inquiry method, demonstration, process approach, cooperative learning and laboratory activity method (NCCE, 2008). These teaching strategies usually took place within the classroom environment but in biology of NCE level, there are topics which demand the use of outside classroom investigations in form of outdoor laboratory activities. For example Ecological concepts the various studies cited the teaching strategy employed by teachers is limited to the indoor laboratory investigations. The aspect of the outdoor laboratory

activities are often neglected, or in some cases converted to the traditional lecture method as observed by Stanley (2008) and Duniya (2009). Stanley (2008) and Duniya (2009) claimed that the outdoor laboratory is more effective than the indoor in the teaching of biology concepts due to the facts that outdoor demands the students to handle, observe and collect on the spot information of a particular concept unlike the indoor in which the materials are brought to the classroom for students to observe and make investigation within the limited classroom environment. While Haruna (2008) and Usman (2010) claimed that both indoor and outdoor laboratory strategies enhance students' performance at senior secondary chemistry and Junior Secondary Integrated Science respectively. These studies were done at secondary school level. This study is therefore intended to further investigate these claims with regard to biology at NCE level. Therefore, the aim of this study is to investigate the effectiveness of outdoor laboratory teaching strategy on students' academic performance in biology at NCE level in North-West Zone Nigeria.

On the issue of gender, Ogunkola (1999) and Usman (2007) found out from their various studies that boys perform well in any 'rigorous' work, while girls show to settle seated for less rigorous work. While Mari (1994), Bichi (2008) believed that girls perform better than boy in problem solving type of activities. Another dimension, if boys and girls are given the equal opportunities, they will perform equally well (Yoloye, 2004, Nworgu, 2005 and Usman, 2010). The issue of gender in science teaching seems to be controversial. In this study therefore, there is need to investigate the issue of gender difference on performance in biology using outdoor laboratory activities at college of education level.

Problem

On the various studies cited (Maduanbum, 1990; Akale, 1992; Usman, 2007 and Usman, 2010), it was observed that the problems of teaching and learning biology more especially at NCE level still persist. Despite various innovations on the use of effective activity based teaching strategy. The poor performance of students persists in biology at NCE level as reported by chief moderators National Commission for Colleges of Education (NCCE, 2008). This has been attributed to constant use of lecture method and indoor classroom activity-based teaching strategies, Usman (2004) and Stanley (2000). There is need, therefore, to provide an alternative teaching strategy which will hopefully suit the outdoor demand of biology at NCE level. The problem of the study, therefore, is what is the effectiveness of outdoor laboratory activity teaching strategy on College of Education Student' academic performance in biology?

Purpose of the study

The purpose of the study is to find out whether the performances of students in biology will reflect their ability levels after exposing them to teacher-directed outdoor laboratory teaching strategy

Hypothesis

- Ho₁ There is no significant difference in the performance of students in the high, medium and low ability after exposing them to outdoor laboratory teaching strategy
- Ho₂ There is no significant difference in the mean performance of male and female biology students exposed to outdoor laboratory activity at college of education level.

Methodology

Population: ninety (90) college of education 200 level biology students were randomly selected from two State Colleges of Education in North-West Zone Nigeria. (Jigawa State College of Education Gumel and Kano State College of Education, Kumbotso). Thirty (30) students were randomly selected from each of the two (2) schools. One school (Kano State College of Education, Kumbotso) was assigned the control group and the other (Jigawa State College of Education Gumel) the experimental group by tossing.

Treatment and instrument: One treatment and an instrument were developed for use in the study. The treatment was Outdoor Laboratory Teaching Procedure (OLTP) while the instrument was multiple tests used for both pretest and posttest.

The OLTP was based on ecology as contained in the minimum standards for Nigeria Certificate in Education (NCE) Biology document.

Validity and Reliability: The content of the OLTP was assessed and corrected by five biology education lectures and it was certified to be adequate for teaching steps and strategies of outdoor laboratory.

The twenty multiple choice questions were obtained from thirty questions initially constructed by the researchers. Ten of the questions were not selected because their levels of difficulties were either too low or too high. The reliability determination was carried out using Kuder-Richarson (KR-21) formula. $K-R 21=0.624$

Procedure: Lecturers of the course taught ecological concepts for three weeks after administrating the pretest. The researchers taught the outdoor laboratory strategy procedure for another three weeks. Many questions were solved and students were given enough questions to practice with, they were exposed to posttest after the treatment.

Results:

The results of data analysis were pretested in table 1-3 with pretest, posttest and stated hypothesis.

Table1: summary of one-way Analysis of variance (ANOVA) of pretest score of students in the high, medium and low ability groups.

Source of variation	df	ss	ms	f	p
Between group	2	648	324	203	0.05
Within group	42	67	1.6		
Total	44	715			

Significant at $p \leq 0.05$

The pretest scores of students in the three groups subjected to analysis of variance (table 1) showed that there is significant difference in the performances of the three groups as f-calculated (203) is greater than the f-critical (55.76). Therefore, the H_{01} is rejected.

Table 2: one way Analysis of variance (ANOVA) of posttest means score of biology students of high, medium and low ability levels exposed to outdoor laboratory instruction.

Source of variation	df	ss	ms	f	p
Between group	2	11.00	22.55	26.85	0.05
Within group	42	35.10	0.84		
Total	44	46.10			

$P \leq 0.05$

Table 2 results showed that there was no significant difference in the performance of students in the three ability groups in posttest after exposing them to the teacher-directed outdoor laboratory strategy as the f-calculated value (26.85) is less than the f-critical value (55.76). Hence the H_{02} is hereby retained.

Table 3: t-test Analysis of mean score of male and female biology students' performance exposed to outdoor laboratory activity.

Variables	N	mean	sd	df	t-value	p	remark
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Female	20	16.75	0.97	43	1.53	0.05	not significant
Male	25	16.32	1.03				

$p \leq 0.05$

table 3 result shows that the t-value calculated was 1.53 less than the t-critical = 2.86 at $p \leq 0.05$, hence there is no significant difference in the academic performances of male and female students exposed to outdoor laboratory activity in biology. These revealed that the method of instruction is gender friendly.

Discussion

From the findings in table 1, the study revealed that there was significant difference in the academic performance of college of education biology students in the three ability groups (High, Medium and Low abilities) exposed to pretest. The significant difference indicates that those in high ability group recorded the highest mean score followed by those in the medium and low abilities respectively. This finding supports those of Adesoji (2008) and Usman (2010)

From table 2, the findings of the study shows that there was no significant difference in the performance of college of education biology students in the three ability groups exposed to the treatment (outdoor laboratory strategy). The finding is in agreement with that of Barker, Slingsby and Tilling (2003), Stanley (2008) and Usman (2010) who reported that innovative teaching method such as outdoor laboratory activity is more effective than the indoor laboratory strategy in Science. The superiority of outdoor laboratory strategy is been attributed to the opportunity given to students to collect specimens by themselves as well as making use of their mental process during the on-the-spot data collection and it improves teacher-student, student-student interactions vital for effective learning and teaching in science.

Table 3 shows that there was no significant difference in the academic performance of the male and female subject exposed to outdoor laboratory activity in biology at college of education level. This observation shows that the outdoor laboratory activity is in favour of both male and females exposed to it. According to Duniya (2009), when students are exposed to outdoor laboratory activity to be able to make scientific investigation by using their senses in their immediate environment which is an important learning in science. This is in agreement with findings of Yoloye (2004), Nworgu (2005) and Usman (2010), who found that if boys and girls are given equal opportunity, they will perform equally well. The findings also show that the outdoor laboratory activity is gender friendly. It is suitable for both male and females exposed to it in biology at college of education level. The lack of significant difference could not be by chance, because the outdoor laboratory activity allows students active participation despite their gender differences to collect data and make an on-the-spot observation, analyse and report their findings.

According to Duniya (2009) and Usman (2010), when students were exposed to outdoor laboratory activity they will be able to make scientific investigation which is an important aspect of learning in science. In this study male and female students were given equal opportunity using the outdoor activity. Therefore, the outdoor laboratory has the potential of enhancing both the male and female students' academic performance in biology of college of education level.

CONCLUSION

The outdoor laboratory activity enhances the academic performance of students in biology at college of education level. The outdoor laboratory strategy is also gender friendly. It enhances the academic performance of students in spite of their gender differences.

Authors Biography

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2. Na'ima S. Lawan was born on 28th march 1978 to the family of Mr. and Mrs Sulaiman Lawan in Gumel Local Government of Jigawa State Nigeria, West Africa. She obtains the following academic qualifications from reputable institutions of learning, namely: Federal College of Education Kano, Bayero University Kano and Ahmadu Bello University NCE, B.sc (Ed) Med (in view) and currently a lecturer with College of Science and Technology, Jigawa State Polytechnic Dutse. She is happily married to Alh. Ali Saje.

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