

EFFECT OF PROJECT-BASED INSTRUCTION (PBI) ON THE ACADEMIC ACHIEVEMENT OF STUDENTS IN COMPUTER STUDIES IN SECONDARY SCHOOLS IN AGBANI EDUCATION ZONE

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Abstract

This study was conducted to determine the effect of project-based instruction (PBI) on the academic achievement of students in computer studies in secondary schools in Agbani education zone. The study adopted a quasi-experimental research design using pre-test and post-test. The population for the study consisted all three thousand seven hundred and twenty-one Senior Secondary School Two (3,721 SSII) students in all the 45 secondary schools in Agbani education zone, Enugu State with a sample size of one hundred and sixty (160) computer studies students (75 males and 85 females) obtained using multi-stage sampling technique. Two research questions and two null hypotheses guided the study. The instrument for data collection was a Computer Achievement Test (CAT) developed by the researcher. The instrument is a multiple choice question-type, consisting of 50 items with options lettered A – E with each question allocated 2 marks of 0 and 100% minimum and maximum scores. The instruments were validated by three experts while the reliability was determined using Richardson formula K-R20, giving the reliability index of 0.77. The data collected were analyzed using mean scores. The pretest-posttest mean scores of each of the two groups were computed. Thereafter, the mean values of the students were computed to determine the effect of treatment and the effect of gender (male and female) on achievement of the students in the subject. The hypotheses formulated for the study were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). Findings of the study revealed that students taught computer using PBI achieved higher than students taught using lecture method. Also, there is a significant difference (effect) between the mean achievement scores of students taught using PBI as compared with the lecture group. It was thereafter recommended that computer studies teachers should be trained when necessary on innovating teaching strategies like PBI for enhanced productivity in secondary schools in Agbani education zone of Enugu State. Appropriate authorities should visit secondary schools periodically for assessment of the competencies of teachers, especially in the use of PBI for enhanced students' academic achievement.

Keywords: Project-Based Instruction (PBI), Academic Achievement, Computer Studies.

Introduction

Secondary school, just as the name implies, is the second level of education at which teaching and learning activities takes place. The secondary school mediates between the primary and

tertiary institution levels. According to Agu, Charity and Agogbua (2021), secondary education as a very significant level of education in Nigeria where solid basis for higher education and useful living is laid. It is one of the levels of education empowered by the government to make available to everyone in the country. The secondary school provides a ground for social life and entrance into the tertiary institution by offering different subjects and areas of specialization. According to Federal Republic of Nigeria (2014), in its National Policy on Education stated that apart from serving as the link between primary and tertiary education, it provides opportunity for a child to acquire additional knowledge, skills and traits beyond primary education. Different subjects are offered in secondary schools including computer science/study.

Computer study is a science subject that is concerned with the knowledge, skill and operational principles of computer system. Computer study according to Okekeokosisi (2021) deals with the ways of representing objects and processes which include algorithmic processes, principles, hardware and software designs, applications and their impact on the society. It involves the study of computer system, application analysis and processes that embrace solving problems of our everyday life (Anaehobi et al, 2019). The study of computer in recent times can be said to be highly competitive, owing to the advancement in technology and other aspects of life. Computer science in secondary school is an increasing interest and concern to educators as well as to computer science professionals (Karamti, 2016).

However, the possession of sound knowledge of computer can be said to be an essential for students and advantage to schools which teaches students how to use computer, as well as navigate some computer programs. Bada et al, (2015) stated that the ability to use computers effectively has become an essential part of everyone's education. The knowledge of computer in present time can be said to be indispensable as the utilization of virtually all technologies requires at least, the basic knowledge of computer. Thus, computer when utilized in the classroom teaching and learning can foster mastery and retention. Abari et al., (2022) noted that computer knowledge improves learners' performance, develops their problem solving their satisfaction among others. These benefits can be obtained through the utilization of innovative instructional strategy like project based instruction (PBI).

Project-based learning is defined as a learning method that adopts problems as the first step in collecting and integrating new idea, knowledge based on experience and actual activities. Boss and Krauss (2017) defined PBL as a learning model that emphasizes student activity in solving open-ended problems and applying their knowledge to working on a project to produce a certain authentic product. PBL as an instructional strategy can be significant in improving students' academic performance in sciences. Almulla (2020), in a study of the effectiveness of PBL approach, found that PBL technique improved student engagement by facilitating the sharing of knowledge, information, and discussion. PBL can encourage students to take ownership of their learning by allowing them to choose projects, set goals, and monitor progress. Chen and Yang (2018) also reported that project-based learning positively impacted students' academic performance compared to traditional instruction. Dorji (2018) stated that the project-based learning approach improved the quality of learning by promoting collaboration and teamwork, planning and organization, creativity, and innovation among children. Project-based learning can also promote collaboration among

teachers, students, and parents to make learning meaningful for children which can be evident in their academic achievement.

Academic achievement is the measure of imparts of an instruction into the learner. Abumchukwu and Okeke (2020) perceived academic achievement as the extent to which the goals of instruction have been achieved by the students. It depicts how much learners own learning. Eremie and Doueyi-Fiderikumo (2018) conceived academic achievement as the degree or level of success attained at the end of an academic endeavor. Hence, it is commonly measured by examinations or continuous assessment, but there is no general agreement on how it is best tested or which aspect is most important. As for Buseri (2017), academic achievement is the outcome of education, the extent to which a student teacher or institution has achieved his or her educational goals. Academic achievement measures the extent an instruction delivered had imparted into the learners, irrespective of the said learner's gender.

Gender qualifies the attribute of a male or female entity. According to Adigun, Onihunwa, Irunokhai, Sada and Adesina (2015), gender can be seen as the variation of substantial, natural, psychological and performance features relating to and distinguishing between the feminine and masculine population. Ezenwafor, Okoye and Obi (2020) noted that the project-based method improved male and female students' psychomotor skill development while both methods equally promoted male and female students' interest.

Despite the increasing importance and usefulness of computer study to the world at large, and Nigeria in particular, the secondary school students' including Agbani education zone of Enugu State performance in the subject remain discouraging. Serious concern has been expressed by parents and other stakeholders in the society in relation to the poor performance of students in computer in the senior school certificate examinations and others. Oliver (2019) noted that students' performance in computer science is low in both national and state examinations. Many factors seem to being attributed to be part of the problems that students encounter in the learning computer science. These include the science curricula, teacher's methods of teaching, parents, government, lack of science facilities and others. Bada et al, (2015) emphasized that, student lack interest in learning computer science simply because the tools or equipment use in teaching student are not provided and these includes: a) Lack of qualified teacher. b) Poor learning environment among others etc. Olarewaju (2016) was the opinion that lack of adequate knowledge by the teachers or neglect of activity-oriented method by the teachers grossly contribute to students' low performance in computer studies. Ajayi, (2017) revealed that inadequacy of good instructional materials, equipment and laboratory facilities in the schools also affect negatively the effective learning of computer studies in the schools. In view of the above, the study sought to determine the effect of project-based instruction (PBI) on the academic achievement of students in computer studies in secondary schools in Agbani education zone.

Statement of the Problem

There has been a serious concern by stakeholders in education about the poor performance of students in secondary schools in Agbani education zone of Enugu State. However, the state of teaching and learning of computer studies in these secondary schools in Agbani education zone of Enugu State has been poor. In place higher academic achievement, low performance and in most cases, poor achievement is been recorded amongst these students. As a result, a

number of these students are said to have lost interest in computer studies as there has been a track record of poor academic achievement over time. The students' inability to do well in both internal and external examinations as observed by the researcher and noted in literature has been attributed to teacher's use of ineffective strategies in teaching computer. Thus, this has resulted to delays in the actualization of the set-educational goals, which had invariably contributed to the slow pace of socio-economic development in Enugu State. Regrettably, these half-baked graduates from these secondary schools are found in their numbers involving in socio-cultural misconducts like kidnapping, thuggery, smoking, robbery, among others. There is need therefore, to explore the effectiveness of other innovative teaching instructional strategies like PBI. Hence, the problem of the study is "What is the effect of project-based instruction (PBI) on the academic achievement of students in computer studies in secondary schools in Agbani education zone?"

Purpose of the Study

The study aims at determining the effect of project-based instruction (PBI) on the academic achievement of students in computer studies in secondary schools in Agbani education zone. Specifically, the study sought to determine the mean:

1. Mean achievement scores of SSII students taught computer studies using project-based instruction and those taught using lecture method.
2. Mean achievement scores of male and female SSII students taught computer studies using project-based instruction and those taught using lecture method.

The following research questions guided the study:

1. What are the achievement scores of SSII students taught computer studies using project-based instruction and those taught using lecture method?
2. What are the mean achievement scores of male and female SSII students taught computer studies using project-based instruction and those taught using lecture method?

Hypotheses

The following null hypotheses formulated guided the study:

1. There is no significant effect in the mean achievement scores of SSII students taught students taught computer studies using project-based instruction and those taught using lecture method.
2. There is no significant effect in the mean achievement scores of male and female SSII students taught students taught computer studies using project-based instruction and those taught using lecture method.

Method

The study adopted a quasi- experimental research design using pre-test and post-test. The population for the study consisted all three thousand seven hundred and twenty-one Senior Secondary School Two (3,721 SSII) students in all the 45 secondary schools in Agbani education zone of Enugu State with a sample size of one hundred and sixty (160) computer students (75 males and 85 females) obtained using multi-stage sampling technique. Two research questions and two null hypotheses guided the study. The instrument for data collection was a Computer Achievement Test (CAT) designed on computer studies. The instrument is a multiple choice question type consisting of 50 items with options lettered A-E with each question allocated 2 marks of 0 and 100% minimum and maximum scores. The

instrument was validated by three experts while the reliability of the instrument was determined using Kuder Richardson formula (K-R 20) technique because the instrument was multiple-choice type, giving the reliability index of 0.77. The data collected were analyzed using mean scores. The pretest-posttest mean differences for each of the two groups were computed. Thereafter, the mean values of the students were computed to determine the effect of treatment and the effect of gender (male and female) on achievement of the students in the subject. The hypotheses formulated for the study were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA).

Results

This section deals with the analysis of data collected on the course of the study. The data are presented in tables in line with the research questions and the hypotheses which guided the study. Data for all the research questions were presented in table for all research questions before that of the hypotheses.

Research Question 1:

What are the achievement scores of SSII students taught computer studies using project-based instruction and those taught using lecture method?

Table 1:

Mean score and standard deviation of SSII Students Taught Computer Studies using Project-Based Instruction and those Taught using Lecture Method.

Group	Statistics	Pretest	Posttest	N
PBI	Mean	26.35	61.37	75
	SD	10.51	11.58	
LECTURE	Mean	27.93	35.09	85
	SD	11.14	9.49	
Difference in Mean			26.28	

In table 1, the pretest mean achievement score and standard deviation of the experimental group (PBI) were 26.35 and 10.51 respectively while those of the control group (Lecture) were 27.93 and 11.14 respectively. However, the posttest mean achievement scores and standard deviation were 61.37 and 11.58 respectively for the experimental group (PBI) while 35.09 and 9.49 respectively for control group (Lecture). Thus, in the posttest, experimental group achieved higher with a mean score of 61.37 and standard deviation of 11.58 whereas control group had mean score of 35.09 and standard deviation of 9.49. The difference in mean score of 26.28 shows that PBI is more superior in teaching and learning of computer than lecture method.

Research question 2:

What are the mean achievement scores of male and female SSII students taught computer studies using project-based instruction and those taught using lecture method?

Table 2:

Mean score and standard deviation of male and female SSII Students Taught Computer Studies using Project-Based Instruction and those Taught using Lecture Method.

Group	Gender	Statistics	Pretest	Posttest	N
PBI	Male	Mean	27.14	63.42	36
		SD	10.72	11.83	
	Female	Mean	25.62	59.49	39
		SD	10.40	11.15	
LECTURE	Male	Mean	28.33	32.88	40
		SD	10.46	8.84	
	Female	Mean	27.58	37.07	45
		SD	11.81	9.70	

In table 2, in experimental group(PBI), the pretest mean achievement score and standard deviation were 27.14 and 10.72 for male students and 25.62 and 10.40 for female students respectively while in control group (Lecture) the pretest mean score and standard deviation were 28.33 and 10.46 for male students and 27.58 and 11.81 for female students respectively. However, the posttests mean achievement scores and standard deviation for experimental group were 63.42 and 11.83 for male students and 59.49 and 11.15 for female students respectively. For control group (Lecture) the posttest mean score and standard deviation were 32.88 and 8.84 for male students and 37.07 and 9.70 for female students. Thus, in the posttest, in experimental group the male achieved higher with a mean score of 63.42 and standard deviation of 11.83 whereas female students had mean score of 59.49 and standard deviation of 11.15. In control group, the female achieved higher with a mean score of 37.07 and standard deviation of 9.70, whereas male students had mean score of 32.88 and standard deviation of 8.84. From the table, it shows that male (63.42) learns and achieve better than their female (59.49) counterparts when taught computer using shows that PBI than when taught using lecture method.

Hypotheses

1: There is no significant effect in the mean achievement scores of SSII students taught students taught computer studies using project-based instruction and those taught using lecture method.

2: There is no significant effect in the mean achievement scores of male and female SSII students taught students taught computer studies using project-based instruction and those taught using lecture method.

Table 3:

Two-way ANCOVA results on group and gender on mean achievement scores of SS II Computer Students using Project-Based Instruction and those taught using Lecture Method.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision
Corrected Model	28177.106 ^a	3	9392.369	87.144	.000	
Intercept	369525.167	1	369525.167	3428.516	.000	
Group	27871.263	1	27871.263	258.594	.000	S
Gender	.683	1	.683	.006	.937	NS
Group * Gender	655.331	1	655.331	6.080	.015	
Error	16813.669	156	107.780			
Total	404662.000	160				
Corrected Total	44990.775	159				

Table 3 shows that the F-value on the mean achievement scores of SS II computer students taught “Computer” using PBI as compared with the lecture group is 258.594, significant at 0.000 level of significance, which is less than 0.05 level of significance set for the study and therefore the null hypotheses is rejected. This means that there is a significant effect in the mean achievement scores of SSII students taught students taught computer studies using project-based instruction when compared with those taught using lecture method.

Table 3 also shows that F-value on the mean achievement scores of SSII students taught students taught computer studies using project-based instruction as compared with students in the lecture group is 0.006, not significant at 0.937 level of significance, which is greater than 0.05 level of significance set for the study and therefore the null hypotheses is not rejected. This means that there is no significant effect in the mean achievement scores of male and female SSII students taught students taught computer studies using project-based instruction as compared with students in the lecture group.

Discussion of findings

The findings show that students taught computer using PBI achieve higher than students taught computer using lecture method. Evidently, the difference in mean score between the control and experimental groups show that the students taught computer using PBI achieved better than those taught using lecture method. Based on the hypothesis, the study revealed that there is a significant effect in the mean achievement scores of SSII students taught students taught computer studies using project-based instruction when compared with those taught using lecture method. This by implication shows that PBI is more effective for teaching computer studies than the conventional method. This finding tally with Kolikant (2016), who emphasized that PBL provides a platform for students to apply theoretical knowledge to practical projects, fostering the development of technical skills. In addition, Handrianto and Rahman (2019) highlighted the multifaceted positive contributions of PBL to students' learning experiences. PBL has been shown to enhance knowledge, abilities, intellectual skills,

collaborative and social skills, attitudes, high-level or critical thinking, and exposure to real-world problem-solving.

Similarly, regarding theme and achievement scores of male and female SSII students taught computer studies using project-based instruction and those taught using lecture method, the study revealed that the male students taught computer using PBI achieves better than their female counterpart. It is therefore noteworthy that PBI when utilized in classroom teaching. Especially in computer studies can improve students' academic achievement in secondary schools in Agbani education zone of Enugu State. However, the result of the hypothesis showed that there is no significant effect in the mean achievement scores of male and female SSII students taught computer studies using project-based instruction as compared with students in the lecture group. This finding agrees with Armah et al. (2021) who stated that males outperform females, especially in mathematics and science subjects. In contrast, Workman and Heyder (2020) argued that females seem to do better than males in language and the arts, as well in the natural sciences, despite the latter being a traditional area of male dominance. Abidye and Onyilo (2022) found no significant difference between the mean critical thinking skills scores of male and female taught using scaffolding instructional strategy.

Conclusion

The result of this study has provided an empirical basis that PBI is an appropriate teaching strategy capable of improving the achievement of students in computer studies. It is therefore evident that the use of PBI can enhance students' achievement in real sense than the conventional method. Based on the result of this study, it can be concluded that PBI have significant effect on students' academic achievement in teaching and learning of computer studies in secondary schools in Agbani education zone of Enugu State.

Recommendations

In view of the findings of the study, the following recommendations were made:

1. Computer studies teachers should be trained when necessary on innovating teaching strategies like PBI for enhanced productivity in secondary schools in Agbani education zone of Enugu State.
2. Appropriate authorities should visit secondary schools periodically for assessment of the competencies, especially in the use of PBI by teachers for enhanced students' academic achievement.

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