

EFFECTS OF INDIVIDUALIZED COMPUTER-BASED INSTRUCTION ON JUNIOR SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN BUSINESS STUDIES

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ABSTRACT

The study investigated the effect of individualized computer based instruction on junior secondary school students' academic achievement in Business Studies. The study adopted a pre-test post-test control quasi-experimental design. Eighty (80) students purposively selected in public schools in Abeokuta, Ogun State, Nigeria participated in the study. Three hypotheses were formulated and tested at 0.05 level of significance. The Business Studies Achievement Test (BSAT) $r = 0.88$ was the major instrument used for data collection. The data from the study were analysed using analysis of co-variance (ANCOVA) and Multiple Classification Analysis (MCA). There was a significant main effect of treatment on students' achievement in Business Studies ($F(1,75) = 347.617$, $P > 0.05$). Furthermore, there was no two-way significant interaction effect of treatment and gender ($F(1,75) = .956$, $P > 0.05$) on students achievement in Business Studies. It is recommended among others, that computer based instructional strategy should be incorporated into the teaching and learning of Business Studies with a view to enhancing students' academic performance in the subject at the junior secondary level of education in Nigeria.

Keywords: Computer-based learning, business education, secondary school, adolescent learning, academic achievement

INTRODUCTION

Business Studies is a commercial subject that formed the essential foundation in the Junior Secondary school system in Nigeria. It is one of the pre-vocational subjects which provides the essential skills and theoretical knowledge needed for performance in business world either for government employment or for self-employment. The National Policy on Education (2004), emphasized the inclusion of vocational and technical education subjects in the curriculum in order to make the recipients immediately employable or self-reliant on leaving school. To this end, the secondary school system is presented in two stages, namely, the junior secondary school (JSS) and the senior secondary school (SSS).

The broad goals of the secondary education are (a) the preparation of the students for useful living in the society and (b) the preparation of students for higher education. Hence, the following business subjects are offered: Typewriting, Shorthand, Book Keeping, Financial Accounting, Office Practice, Commerce and Economics.

Business Studies consists of skills and non-skills subjects. The component of Business Studies are Typewriting, Shorthand, Book Keeping, Office Practice, Computer and Commerce and are offered at the junior secondary school level. The Nigerian Educational Research and Development Council (2016), itemised the goals of Business Studies as follows:

- i. to provide the orientation and basic skills with which to start an occupation for those who may not have opportunity to further training;
- ii. to provide basic business skills for personal use now and in the future; iii. to prepare students for further training in Business Studies; and iv. to develop basic skills in office occupation

However, Wosu (2021) affirmed that the performance of students in Junior Secondary certificate examination in Business Studies has been declining; the students' attitude towards the subject tends to be negative and most of the Business Studies teachers have been inadequate and ill-prepared for the teaching of Business Studies. The application of appropriate teaching methods is therefore crucial to successful teaching and learning of the subject. As a matter of fact, Alio and Harbour (2020) claimed that the instructional strategy employed by the teacher influences the cognitive and affective outcomes of the students.

A number of strategies have been recommended for use in the teaching of vocational subject among these are cooperative learning, peer tutoring, guided discovery method, constructivist based approaches and the use of information and communication technology (ICT) aided learning. The use of technology in education provides students with a more suitable environment to learn, serves to stimulate interest and a learner-centred atmosphere, and helps enhances students' academic achievement (Isman, Baytekin, Balkan, Horzum & Kiyia, 2020).

Individualized computer assisted instruction is a relatively new strategy in which the topics to be taught are carefully planned, written and programmed in a computer which could be run at the same time in several computer units and it allows each student to one computer terminal (Safo, Ezenwa & Wushishi, 2019). According to Babalola (2019), the most important feature in computer based instruction is that, it permits a high degree of individualization. This in effect means that students can proceed at their own pace, following a path through the curriculum as suited to their particular interest and talent (Achuonye, 2020). Computer Based Instruction (CBI) enables the student to learn by self-evaluating and reflecting on their learning process. CBI motivates children to learn better

by providing them with the immediate feedback and reinforcement and by creating an existing and interesting game-like atmosphere.

The theoretical framework of this study is anchored on behavioural and cognitive theories. Operant conditioning, a form of behavioural theory, is of most importance to this study. Operant conditioning is a type of learning in which a learner achieves some outcome by producing an action, which is called the operant. If the operant is followed by something pleasant, the outcome is positively reinforced. In computer facilitated learning, students' behaviour are reinforced by being permitted to proceed to the next frame when they get the right answer (Bigge and Shermis, 2004 in Seria, 2011). Tabassum (2004) argued that Skinner's reinforcement theory is central to computerised learning; especially drill and practice and tutorial learning. Owusu, Momey, Appiah and Wilmot (2010) also asserted that the use of computer assisted instruction especially in tutorial's mode is supported mostly by the behaviourist view of learning due to the principle of practice and reinforcement.

Cognitive theorists, on the other hand, recognize that much learning involves associations established through contiguity and repetition. They also acknowledged the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. Good and Brosphy (1990) opined that cognitive theorists view learning as involving the acquisition or reorganisation of the cognitive structures through which humans process and store information. Cognitivism is related to this study because it recognizes the place of background knowledge, simplification of contents to be taught into meaningful parts, practice and the careful organisation of lesson contents from simple to complex.

Many studies have revealed that the students' achievement increases when the CBI technology is provided as a supplement to the classroom education. Kausar, Choudhry and Gujjar (2018) revealed that students that were instructed through CAI performed better than those who were instructed through conventional strategy such as lecture method. Liao (2017) found that CBI had a positive effect on individuals by comparing 52 research studies carried out in Taiwan in his meta-analysis study. Senteni (2014) also found out that CBI enabled the students to increase their motivation and achievements and to develop positive attitudes.

Gender refers to socially constituted differences between male and female scholars, policy makers and practitioners have observed and seems to agree upon socially constructed differences between male and female and its significance efforts in their lives. Studies conducted across the world among the students studying in different levels found a significant gender differences in academic performance. Studies have also observed gender inequality in the classroom because of instructional design during teaching and learning process. For example, Achunoye (2020) found significant difference in academic achievement of male and female students taught using CAI in favour of male students. Yusuf and Afolabi (2018) report that gender has no influence on performance of male and female pupils exposed to CAI. While empirical studies have established the efficacy of CAI in the teaching of various school subjects at both the international and national level, the

extent to which it is beneficial in vocational subjects have not been adequately ascertained. This study therefore investigated the effects of individualized computer-based instruction on students' academic achievement in Business Studies. The effect of gender on the academic achievement of students who used the individualized computer based instruction was also examined.

Hypotheses

The study tested the following three hypotheses at 0.05 level of significance

1. There is no significant main effect of treatment on students' achievement in Business Studies.
2. There is no significant main effect of gender on students' achievement in Business Studies.
3. There is no significant interaction effect of gender and treatment on students' achievement in business studies.

METHODOLOGY

This study adopted a pre-test, post-test control group quasi-experimental research design. The population of this study was made up of all junior secondary school two (JSS2) students in public secondary schools in Abeokuta North and South Local Government Area of Ogun State, Nigeria. The purposive sampling technique was used to select eighty students in four schools for the study. Three research instruments were used in this study, two are treatment instruments and the other one is a test instrument.

The Individualized Computer Based Instruction Guide: This package was developed by the researcher. The instrument was given to experts in the field of evaluation and educational technology for constructive criticism. This was later trial tested on 25 students, who did not participate in the study to see the workability. The instructional package which has six units takes between 4 to 6 hours to complete depending on the learner. The objective to be achieved were stated at the beginning of every unit and a quiz was attached at the end to measure how much he/she has learnt. Immediate Knowledge of Result (IKOR) was provided at the end of every quiz and students were allowed to revisit any session of the instruction if the need arises. An activity sheet or workbook was provided for each of the learner. The user guide page of the CBI directed the user to attend to each unit of the activity sheet after the completion of a unit of the instruction. Learners were also advised to take down as much note as possible in the personal note session of the activity sheet.

Conventional Method Instructional Guide (CMIG): Conventional Method Instructional Guide was developed by the researcher based on the prevailing conventional methods of teaching in schools. Students in this group were not exposed to the treatment. The

students were given task to carry out in form of class exercises and home work. The guide was also given to experts in Business Studies for their input and suggestions.

Business Studies Achievement Test (BSAT): Business Studies Achievement Test (BSAT) was used in the study for the purpose of data collection. BSAT was developed by the researcher to measure the achievement of students using a table of specification. It consisted of two sections, A and B. Section A had information on students' personal profile such as name of school, class and gender. Section B had fifty (50) multiple choice items. The contents of the topics were picked as indicated in JSS" Business Studies syllabus. The generated items were given to experts in Business Studies as well as experienced secondary school Business Studies teachers for vetting and scrutiny. The pilot testing was done by administering the items to a randomly selected sixty (60) JSS2 students who did not take part in the study. The reliability of the items of the test was established using Kuder-Richardson Formula (KR20) which yielded a reliability coefficient of 0.88. Items with the discrimination index above 0.3 and difficulty level indices between 0.40 and 0.60 were included in the final test. The result of the item analysis helped to reduce the number of items from 90 to 50. BSAT was dichotomously scored. 1 mark was assigned to a correct response, while 0 was assigned to a wrong response.

Procedure: The selected schools were assigned to treatment and control groups. The pre-test was administered to participants before the treatment. The two groups were exposed to treatment after which post-test was administered on them.

RESULTS

H01: There is no significant main effect of treatment (i.e. individualized compute-based instruction and C.M) on students' achievement in business studies.

NOTE: I-C-I is individualized computer-based instruction and C.M is conventional method)

Table 1: Summary of Analysis of Covariance of Students' Achievement Scores in Business Studies According to Instructional Mode and Gender

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. of F
Main Effects	201.820	1	201.820	8.675	.004
Covariates (pre-test)	3.297	1	3.297	.142	.708
Instructional Mode	8086.773	1	8086.773	347.617	.000*
Gender	4.400	1	4.400	.189	.665
2 Way Interactions					
Instr. Mode * Gender	22.235	1	22.235	.956	.331

Explained	8350.441	4	2087.610	89.738	.000
Residual	1744.759	75	23.263		
Corrected Total	10095.200	79			

* indicate significant F at .05 level R Squared = .829 (Adjusted R Squared = .818)

The result in Table 1 shows the outcome of the analysis to test the main effect of individualized computer-based instruction on the secondary school students' achievement in business studies. The result shows significant main effect of instructional mode ($F_{(1, 75)} = 347.617$, $P < 0.05$), thus implying that the difference in the students' post-test achievement scores in business studies after exposure to individualized computer-based instruction and the conventional method is statistically significant at the .05 level of significance. Hence, the null hypothesis one (H_{01}) is rejected.

The magnitudes of the post-test mean achievement scores of the students in business studies across the levels of instructional mode and gender in order is presented in the multiple classification analysis (MCA) that follows.

Table 2: Multiple Classification Analysis of Students' Achievement Scores According to Instructional Mode and Gender Grand Mean = 30.668

Variable + Category	N	Unadjusted Deviation	Eta	Adjusted Independent Covariates	for Beta +
Instructional Mode					
1. I-C-I-Mode	40	10.200		10.205	
2. Conventional Method	40	-10.200	.908	-10.205	.909
Gender					
1. Male	31	-.051		0.277	
2. Female	49	0.032	.004	-.175	.020
Multiple R Squared					.825
Multiple R					.908

The result in Table 2 shows the magnitudes of the post-test mean achievement scores of the students exposed to the two levels of instructional mode. The MCA shows that with a grand mean of 30.668, the students exposed to individualized computer-based instruction recorded higher adjusted post-test mean achievement score of 40.873 (i.e. $30.668 + 10.205$) than the students exposed to the conventional method with the least adjusted post-test mean achievement score of 20.463 (i.e. $30.668 - 10.205$). This outcome thus shows that when order of magnitude of the post-test mean

achievement scores of the participants is considered, the students exposed to individualized computer-based instruction performed better than the students exposed to the conventional method. The result in Table 2 further shows that the treatment (i.e. instructional mode) accounted for 90.9% of the variance in the students' achievement scores while the independent variables (including moderator) jointly accounted for 82.5% of the variance in the students' achievement in business studies.

H₀₂: There is no significant main effect of gender on students' achievement in business studies.

The result of the analysis of covariance in Table 1 shows no significant main effect of gender on the students' achievement scores in business studies ($F_{(1, 75)} = .189, P > 0.05$). This result implies that there is no significant difference in the post-test mean achievement scores of the sampled male and female students after exposure to the two levels of instructional mode used in the study. Hence, the null hypothesis two (H₀₂) is retained.

However, the result of the multiple classification analysis (MCA) of gender on achievement in Table 2 shows that with a grand mean of 30.668, the male students recorded higher adjusted post-test mean achievement score of 30.945 (i.e. $30.668 + 0.277$) than the female students who recorded adjusted post-test mean achievement score of 30.493 (i.e. $30.668 - 0.175$). This outcome thus shows that when order of magnitude of the post-test mean achievement scores of the secondary school students according to gender is considered, the male students recorded higher mean achievement score than the female students, although, the difference in their post-test mean achievement scores is not statistically significant.

The result in Table 2 further shows that gender, as a moderator variable, accounted for 2.0% of the variance in the secondary school students' achievement in business studies.

H₀₃: There is no significant interaction effect of treatment and gender on students' achievement in business studies.

The result of the 2-way interaction effect of treatment and gender in Table 1 shows no significant interaction effect of instructional mode and gender on the secondary school students' achievement in business studies ($F_{(1, 75)} = .956, P > 0.05$). This outcome implies that the students' post-test mean achievement scores in business studies across the two levels of instructional mode used in the study (I-C-I Mode and conventional method) do not vary significantly across the two levels of gender in the study (male and female). Hence, the null hypothesis three (H₀₃) is retained.

DISCUSSION OF FINDINGS

The result showed that there was a significant main effect of treatment (individualized computer based instruction) on Junior Secondary School Students' achievement in Business Studies. The result clearly showed the efficacy of computer based instruction over the conventional teaching method. This might be as a result of the potency of the teaching method that were introduced which allow students to learn at their own pace and comprehend concepts and information meaningfully. Also the orientation given to students before the treatment might have contributed significantly to their performance.

The implication of this finding therefore is that computer based instruction is more effective than conventional methods in enhancing students achievement in Business Studies. This finding is similar to the finding of Singh (2019) who found that there was a significant difference in Mathematics achievement of experimental group taught with computer assisted instruction and control group taught with conventional teaching methods in favour of the experimental group. This result is also in agreement with Dange and Wehb (2020). They found out that computer assisted instruction enhanced students' achievement in Physics. Tenth grade students in Singapore were treated with computer assisted instruction method and the students in these group performed significantly better than those taught with the conventional method.

The findings from hypothesis two showed that gender has no effect on achievement of students taught Business Studies using the individualized computer based instruction. This might be due to equal level of commitment from both gender as well as the fact that the level of gender interaction between the media-teacher and the students is less. Consequently, the 'role model effect' where boys tend to learn better from male teacher and girls from female teacher was reduced. It can be seen that gender has no effect on student academic achievement in Business Studies when taught using computer assisted instruction. The finding above is in agreement with the result of other studies. These include Kareem (2019), Animashaun (2018), Serin (2018), Dantala (2016), Gambari (2015). They all found no significant effect of gender on Academic performance when computer assisted instruction strategy is used.

However, the results of other studies shows that gender has a significant effect on the academic performance of students taught with computer assisted instruction (CAI). Among these are: Kolawole (2017), whose finding show that boys performed better than girls in both cooperative and competitive learning strategies in Mathematics. Vian (2014) reported that female achieve slightly higher grades than males. The outcome of this study also revealed that there is no significant interaction effect of the treatment and gender on students' academic achievement in Business Studies. This implies that the treatment and gender when combined did not predict students' achievement in Business Studies. Earlier studies by Senteni (2014), Denge (2020) confirm this assertion.

CONCLUSIONS

The results of the study provides empirical evidence that there is a significant main effect of computer based instruction on students' achievement in Business Studies. This is an indication that students perform better when appropriate teaching method is used in the classroom. Individualized computer-based instructional strategy provides an excellent route of getting concepts, innovative ideas across and help learners perform better in Business Studies.

RECOMMENDATIONS

The study recommends that:

- i. curriculum developers should incorporate computer based instruction among the strategy for the teaching of Business Studies at the Junior Secondary School level of education in Nigeria with a view to enhancing students' academic achievement;
- ii. Government should provide adequate ICT resources in secondary schools in Nigeria for pedagogy and learning purposes.
- iii. Capacity building workshop should be organised for the teachers of Business Studies in the use of computer instructional software and other ICT teaching devices.

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