

EFFECT OF INTERACTIVE COMPUTER-ASSISTED INSTRUCTION ON STUDENTS' PERFORMANCE IN GENERAL STUDIES EDUCATION

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Abstract

This study investigated the effects of Interactive Computer Assisted Instruction (ICAI) on students' performance in general studies education. The research was guided by three research questions and three corresponding hypotheses. The quasi-experimental design of pretest- posttest non-equivalent control group design was utilized. The population of the study comprised 250 NCE II General Studies Education (GSE) students from the three Federal (Technical) Colleges of Education of the south-south geopolitical zone. A validated instrument tagged GSE Performance Test (GSEPT) with reliability coefficient of 0.75 was used to collect data for the study. The experimental group was taught using ICAI while the control group was taught the same topics using the lecture method (LM). The hypotheses were tested using the t-test and analysis of variance (ANOVA) statistics at 0.05 level of significance. The results revealed that students taught using ICAI performed better than those taught using the LM. In addition, the female students performed better than their male counterpart in the ICAI group but the difference was not significant. Based on the results, the study recommends that ICAI should be inculcated into the teacher training programme as a teaching method to enhance performance among students. Also, the National Commission for the Colleges of Education (NCCE) should integrate and popularize ICAI as a valid teaching method. Moreover, Colleges of Education students should be encouraged to participate in ICAI classes to enhance and expose them to technologically driven approach to learning which has become a global trend.

Keywords: ICAI, Performance, General Studies, Education, Students, Lecture Method.

Introduction

General Studies Education is an interdisciplinary programme, highly desirable in a rapidly changing world and provides greater flexibilities in creating a functional curriculum for all students in different fields of study. Anyadike (2013) sees it as a programme that inculcates in the students a broad-based education which widens the students' intellectual horizons and endows students with potential for effective and functional citizenship. According to the National Commission for Colleges of Education (NCCE) Minimum Standard (NCCE, 2020:22), the philosophy of the General Studies Education (GSE) is:

... to expose students to a variety of knowledge across disciplines. It aims to enable students appreciate the relationship among disciplines in an integrated world, which has become a big global village in large part due to advances in science and technology which in likewise, has broken traditional boundaries in human knowledge and communication. The internet is also actively making obsolete the compartmentalization of human knowledge. General studies, therefore offers the potential for bridging gaps in human knowledge, thereby preparing the students to meet the challenges of the changing world adequately.

This philosophy is quite laudable especially as the world's use of technology is increasing and broadening in every field of human endeavour. The GSE courses listed by the NCCE Minimum Standard (2020: 24 - 25) to be offered by students in the Colleges of Education (COEs) include: General English, Introduction to Library Studies, Basic General Mathematics, Family Life & Emerging Health Issues, Citizenship Education, Entrepreneurship, Science and Technology in the Society, Political Economy and Computer Studies.

The Minimum Standard (NCCE, 2020) posits that a student needs to pass a minimum of the compulsory 18 credits GSE courses as requirement for graduation. Ogunniyi and Akerele (2021) added that students are expected to participate fully in the study of GSE courses and must pass them all before graduation, irrespective of their chosen discipline. However, the performance of students in the COEs in the GSE courses have not been encouraging. Studies such as Olanipekun (2015), Olufemi, Adediran & Oyediran (2018) and Akerele, Awoyemi & Ogunniyi (2022) lamented on the poor performance of students in GSE courses and other courses offered by them.

The poor performance of students in the COEs has been a reoccurring decimal over the years. This is a similar trend being reported in other tertiary institutions. Many factors have been indicted having influence on students' performance and this include methodology, poor attitude, poor interest for learning amongst others (Eraikhuemen & Omoregbe, 2017). The commonest method adopted in teaching GSE courses in Nigerian Colleges of Education is the lecture method (Raijokornar, 2013, Ogunniyi & Akerele, 2021 and Ogunniyi, Akerele & Awoyemi, 2022). It is a teacher dominated method of teaching that involves verbal presentation of ideas, concepts, generalization and facts. Lecture method is mostly used to deliver a large amount of information to the students in a short period irrespective of class size. According to Gehlen -Baum & Eeiberger (2014), Lecture method involves a formal discourse or exposition on a subject matter to attain a stated instructional objective. The teacher does the talking while the learners listen and occasionally take notes. In lecture method, the teacher tells the students what to do instead of activating them to discover for themselves (Miles, 2015).

One of the major GSE courses offered at the COEs is the 'Introduction to Computer Studies' which is coded as GSE 123 and GSE 213. An important objective of the GSE Computer is use of computers to carry out tasks in the contemporary world (NCCE, 2020). It recognizes the effectiveness of computers in the contemporary world and hence emphasized on the use of media like internet, application packages and database as part of its curriculum in General studies. This can be achieved by designing of computer programmed instruction capable of conducting learning which is referred to as CAI. CAI has the capacity to provide all that lecture method entails with additional qualities of transforming the classroom to a technologically based environment, devoid of stress for both the teacher and the learners and learning becomes student-centered rather than teacher centered. CAI can be seen as a self-learning and interactive technique, usually offline or online using the computer as a tool to facilitate and improve instruction (Sharma, 2017; Eyo, 2018). Okebukola (2013), identified that CAI can be used for all ages and forms of education; from preschool to professional school and even in many employment areas. It can be used in a wide range of fields including all the main disciplines in both elementary, secondary schools and higher institutions of learning.

Performance of students in the use of CAI has experienced a lot of research in the past few decades. CAI has been observed to enhance students' performance better than the conventional method of

teaching (Safo, Ezenwa & Wushishi, 2013; Omiola, Awoyeni & Mohammed, 2014). It has also been used in teaching courses in the COEs and students exposed to it performed better than their counterparts who were taught using the lecture method (Samaila, 2016). It is also worthy of note that researches in CAI suggest different results with respect to gender.

A study by Muchiri (2018) reports that male students outperformed the female students with the use of CAI. Other studies such as Yusuf & Afolabi (2010), Egunjobi (2014), Achuonye (2018), Falalu & Atadoga (2018), Gongden & Gongden (2019) and Ekundayo (2022) reported that there was no significant difference between the performance of students irrespective of gender when taught using CAI. Based on the foregoing, this study will investigate the effect of interactive computer-assisted instruction on students' performance and interest in general studies.

Statement of the Problem

General Studies Education (GSE) is a very important aspect of the curricula of Colleges of Education (COEs) with a view to expose students to a variety of knowledge across disciplines. Many courses comprised the GSE and students are expected to pass them all since they are compulsory courses as referenced by their NCE requirements for graduation by the NCCE Minimum standard. Research has reported poor performance among students in the GSE for which teaching methods and strategies used in lesson delivery were indicted. This is because the instructional method utilized by the teacher plays a major role in acquisition of content, development of basic necessary skills and interest for meaningful learning. Generally, the lecture method of teaching is most used among lecturers in the teaching of GSE courses in COEs. This method has been deemed limited and leaves the students frustrated because of its teacher-centered nature. In addition, the GSE class is densely populated and with the lecture method, students lose interest in the courses because they are only passively involved in the learning. This results in poor performance among the students. One of the affected GSE courses used by this study is Introduction to Computer Studies II, coded GSE 213 which every student is expected to pass.

To curb the malady of poor performance and encourage keen interest for learning GSE courses, there is a need to use proven methods of teaching such as the new paradigm shift from the traditional lecture to technologically driven methods. The world has in recent times moved on from the teacher-centered approaches to student centered methods. This is because the technologically driven approaches to learning are more flexible, encourages learning, produces better performance among students and enhances interest for learning.

Moreover, with the advent of the Covid-19 which affected the educational sector by halting learning, there is the need to embrace new approaches like the Computer Assisted Instruction (CAI). CAI is a learner-centered approach that makes use of technological devices such as phones, I-pad, laptops, and computer desktops which the students are familiar with and can access. With the CAI, learning moves from the group spaced to the individual space and is not limited by location.

ICAI users can also collaborate in and outside of the classroom and this can invoke meaningful learning among students. Hence, it has become necessary to investigate if ICAI can address the problem of poor performance of students in GSE computer studies. The problem of the study, therefore, is to find out the effect of ICAI on the performance of students in GSE computer studies.

Objectives of the Study

The objectives of the study are to:

- i. determine the performance of GSE students taught computer studies using ICAI and the LM of instruction.
- ii. ascertain the performance of male and female students taught computer studies using ICAI.
- iii. Determine the interaction effect of methods by gender on performance of students in GSE?

Research Questions

The following research questions were raised to guide the study:

- i. What is the difference in post-test performance mean scores in GSE between students taught using ICAI and those taught with LM of instruction?
- ii. What is the difference in the performance mean scores in GSE between male and female students taught using ICAI?
- iii. What is the interaction effect of methods by gender on performance mean scores of students in GSE?

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

- i. There is no significant difference in the post-test performance mean scores in GSE between students taught using ICAI and those taught with LM of instruction?
- ii. There is no significant difference in performance mean scores in GSE between male and female students taught using ICAI.
- iii. There is no significant interaction effect of methods by gender on performance mean scores of students in GSE.

Methodology

The study employed the quasi-experimental design of pretest, posttest non-equivalent control group design. The population of the study comprised 250 NCE II GSE students from the three Federal (Technical) Colleges of Education of the south-south geopolitical zone. Two of the colleges were sampled using the simple random method and placed into Experimental and Control groups. The experimental group was an intact class of 31 students while the control group was an intact class of 25 students. A validated instrument tagged: GSE Performance Test (GSEPT) with reliability coefficient of 0.75 was used to collect data for the study. The GSEPT validation was ascertained by presenting the instrument to two GSE 213 senior lecturers, who have taught for over fifteen years in a college of Education and the third validator is a Professor from Curriculum and Instructional Technology Department, University of Benin, Benin City. The experimental group were taught topics in computer studies using ICAI while the control group were taught same topics using the LM for eight (8) weeks. Data collected were analyzed using the mean and standard deviation statistics. The hypotheses were tested using the t-test and analysis of variance (ANOVA) and at 0.05 level of significance.

Results

Hypothesis One: There is no significant difference in the posttest performance mean scores in GSE between students taught using ICAI and those taught with LM of instruction?

Table 1: Summary of Independent Samples t-test for Post-test Performance in GSE between students taught with ICAI and LM.

Method	N	Mean	SD	Df	t-value	p-value	Result
ICAI	31	25.23	6.969	54	6.311	0.000	Rejected
LM	25	15.12	4.371				

Table 1 shows that there was significant difference between the mean scores of students in the experimental group (Mean = 25.23, SD = 6.969) and control group (Mean = 15.12, SD = 4.371), $t(54) = 6.311$, $p = 0.000$. Therefore, hypothesis one, was rejected. It was concluded that ICAI was more efficient at improving students' performance than LM evidenced.

Hypothesis Two: There is no significant difference in performance mean scores in GSE of male and female students taught using ICAI.

Table 2: Summary of Independent Samples t-test for Posttest Performance in GSE between male and female students taught with ICAI.

Gender	N	Mean	SD	Df	t-value	p-value	Result
Male	10	24.70	6.019	29	-.285	0.777	Retained
Female	21	25.48	7.507				

Table 2 shows that there was no significant difference between the mean scores of male (Mean = 24.70, SD = 6.019) and female (Mean = 25.48, SD = 7.507), students taught using ICAI $t(29) = 7.507$, $p = 0.777$. This result implies that gender has no significant effect on students' performance in GSE. Therefore, hypothesis two was retained. It was concluded that ICAI is gender friendly as both male and female students similarly.

Hypothesis Three: There is no significant interaction effect of methods by gender on performance mean scores of students in GSE computer studies.

Table 3: Descriptive Statistics of the Interaction Effect of Method by Sex on Students' Performance in GSE.

Method	Sex	N	Mean	SD
ICAI	Male	10	24.70	6.019
	Female	21	25.48	7.507
	Total	31	25.23	6.969
Lecture	Male	5	15.00	3.741
	Female	20	15.15	4.602
	Total	25	15.12	4.371

Table 3 reveals that female students taught with ICAI and LM performed better than their male counterpart. The respective students' scores for the ICAI group are: female (Mean = 25.48, SD = 7.507) and male (Mean = 24.70, SD = 6.019) while that of the LM group are: females (Mean = 15.15, SD = 4.602) and male (Mean = 15.00, SD = 3.741). To test whether there were interactions among the means, a 2-way ANOVA statistics was computed (see Table 4).

Table 4: Summary of 2-Way ANOVA for Interactional Effect of Method by Sex on Students' Performance in GSE.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1417.540 ^a	3	472.513	12.852	.000

Intercept	16227.333	1	16227.333	441.355	.000
Method	1008.624	1	1008.624	27.433	.000
Sex	2.157	1	2.157	.059	.810
Method * Sex	.986	1	.986	.027	.871
Error	1911.888	52	36.767		
Total	27358.000	56			
Corrected Total	3329.429	55			

a. R Squared = .426 (Adjusted R Squared = .393)

The F-value for interaction effect of method on sex in Table 4 is 0.027 with $df = (1, 52)$ and p -value = 0.871. At an alpha level of 0.05, the p -value (0.871) is greater than the stated alpha level (0.05). Therefore, hypothesis three was retained. It was concluded that there was no interaction effect of methods by sex on students' performance in GSE.

Discussion

From Table 1, the students taught using ICAI (Mean = 25.23, SD = 6.969) performed better than those taught using the LM group (Mean = 15.12, SD = 4.371). In addition, the t -test revealed t -value of 6.311 at $df = 54$ and $p = .000$ which implies a significant difference exists between the performance of the ICAI and LM groups. This finding agrees with Safo, Ezenwa & Wushishi (2013), Sharma (2017), Omiola, Awoyeni & Mohammed (2014), Samaila (2016), Eyo (2018) and Csizmadial (2019) who reported that students exposed to ICAI performance better than their counterpart who were taught using the conventional method. Generally, literature posit that exposure to ICAI improves students' performance better than the LM or Conventional Method.

Table 2 revealed that there was no significant difference in students' performance in the experimental group taught with ICAI. The mean scores of male students taught using ICAI (Mean = 24.70, SD = 6.019) and female students taught using ICAI (Mean = 25.48, SD = 7.507), at $df = 29$, $t = 7.507$, and $p = .777$, suggest that gender has no significant effect on students' performance in GSE. It can therefore be concluded that ICAI is gender friendly as both male and female students benefited from the method. This finding corroborates with Nwanne & Agommuoh (2017) and Ekundayo (2022) who reported that there was no significant difference between the performance of students irrespective of gender when taught using ICAI. In particular, the students felt more competent and improved their performance during the learning process. However, this finding negates Muchiri (2018) who reported that male student outperformed the female students when taught using the ICAI.

Tables 4 showed that the F-value for interaction effect of method on sex was 0.027 with $df = (1, 52)$ and p -value = 0.871 which was greater than the stated alpha level (0.05). Therefore, hypothesis three was retained. The finding implies that there was no significant interaction effect of methods by gender on students' performance in GSE. This finding tallies with the observation of Akintade (2017), Umoru & Adekunle (2019), Nwosu & Ndanwu (2020) who reported that interaction effects of gender and teaching methods was not significant when students are exposed to ICAI.

Conclusion

Based on the findings of the study, it was concluded that GSE students who were taught with ICAI performed better than those taught using the LM. This implies that ICAI is more efficient at improving students' performance in GSE computer studies than the LM. In addition, ICAI was found to be a gender friendly method of instruction evidenced by the similar performance of male

and female students exposed to it. Moreover, the interaction effects of gender and teaching methods was not significant when students are exposed to ICAI. This make ICAI a result oriented pedagogical approach that can be used in Nigerian Colleges of Education to teach pre-service teachers with a view to enhancing their performance. This will also expose the teachers in training students trending technological driven methods of needed for global relevance.

Recommendations

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

- i. Based on the result, the study recommends that ICAI should be inculcated into the teacher training programme as a teaching method to enhance performance among students.
- ii. The National Commission for the Colleges of Education (NCCE) should accept and popularize ICAI as a valid teaching method.
- iii. Colleges of Education students should be encouraged to participate in ICAI classes to enhance and expose them to technologically driven approach to learning which has become a global trend.

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