UNIJERPS
Unizik Journal of Educational Research and Policy Studies VOL.18 (1);
July-December, 2024 https://unijerps.org
2023 Impact Factor:* 6.834;** 2022 ***Impact Factor: 5.156; ***2021 Impact Factor: 5.641; 2020 Impact Factor: 5.355.***
Indexing and Impact Factor URL: *http://sjifactor.com/passport.php?id=21363*

EFFECTIVENESS OF MULTIPLE INTELLIGENCE-BASED AND INDIVIDUALIZED LEARNING ACTIVITIES ON INTEREST IN COMPUTER STUDIES AMONG ANAMBRA STATE SECONDARY SCHOOL STUDENTS

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ABSTRACT

Computer studies as a school subject, is of a great value and an indispensable tool for equipping individuals with the required knowledge and skills for self-reliant and life-long learning. This study investigated the effectiveness of multiple intelligence-based and individualized learning activities on students' interest in computer studies. Two research questions and three hypotheses guided the study. The study adopted a quasi-experimental research design. The sample consisted of 181 SS2 computer studies students, made up of 87 males and 94 females from the sampled schools using multi-stage sampling technique. Intact classes were used for the study. Data was collected using an adapted Interest Scale Questionnaire with a reliability index of 0.71 determined using Cronbach Alpha technique. Data obtained were analyzed using mean, standard deviation and Multivariate analysis of covariance (MANCOVA) statistics. The findings revealed among others, that there was significant ($F= 17.01$, $p=.000 < \alpha = 0.05$), difference in the mean interest ratings of the students taught computer studies with MIBA and ILA relative to their counterparts who were taught with lecture method, in favor of the treatment groups. It was recommended that teachers should be encouraged to adopt MIBA and ILA in combination with lecture method as they foster learners' interest in computer studies.

Keywords: Multiple intelligence-Based activities, individualized learning activities, students' interest, gender

Introduction

A computer study is a course of study devoted to using and programming computers. It is much more than ways of representing objects and processes, knowing how to use computer, applications and analyses that help to solve various human problems (Dsbn, 2024). Wits (2024) defined computer studies as a discipline of solving problems via solutions that are implemented on computer. It also prepares students to design and create algorithmically complex

software and develop new and implement software and devise new ways to use computer (FRN, 2014). Hence, the general goals of computer studies are to encourage computer literacy in ~~every state of~~ Nigeria. Specifically, its objectives were to:

i. develop the use of computers as teaching tools in all subjects and familiarize students with the use of information technology,
ii. enable the current generation of high school students to appreciate the use of computer in teaching and learning.

The aforementioned general goals of computer studies lead the Federal Republic of Nigeria (2014) to introduce computer studies in secondary schools. This means that presently, computer studies is taught in schools using different approaches to stimulate students' interest in the discipline.

Different teaching approaches have been adopted by researchers in order to enhance learners' interest in computer studies from teacher-centred methods to learner-centred methods. Interestingly, no teaching method is more widely used and yet more strongly criticized than the lecture method (LM). (Owoyemi, 2018). In a typical Nigerian vocational, science, engineering and technology classroom, lecture method is often used in teaching which leads to rote memorization devoid of meaningful learning (Agogo & Onda, 2014; Okekeokosisi, 2024). This method does not require active involvement of learners rather learners sit and listen to the teacher as teaching takes place. Studies on non-involvement of learners in learning process had necessitated researches on learner-centred activities that could stimulate teaching-learning process(Ezeh, 2013, Okekeokosisi, 2021). However, none of such studies was conducted exploring the efficacy of MIBA and ILA in Anambra state. Thus, the researchers explored the effectiveness of multiple intelligence-based activities (MIBA) and individualized learning activities (ILA) on students' interest in computer studies.

Multiple intelligence-based activities (MIBA) refer to ~~as~~ teaching learning theory propounded by Howard Gardner in 1983 which encourages the use of activities such as observation, oral expression, analytical, creative and practical thinking activities as well as metacognitive processes in learning (Rajadurai and Ganapathy, 2023). MIBA is a framework that helps teachers design instruction-based activities and provide varied learning experiences tailored to each learner (Samuel & Abba, 2020). This implies that MIBA embraces instructional techniques that are activity oriented which motivates and fosters learners' preference to learning. Al-Nakhbi and Barza (2016) added that MIBA challenges students to understand the world around them and create connections between their lives and their interest. This could be used within the classroom in order to promote and sustain learners' interest in school subjects. Thus, teachers are required to provide learners with varied opportunities in the learning environment that could usher in learners' zeal and portray learners' potentials.

Individualized learning activities (ILA) refer to the instructional techniques in learning derived from constructivist theory of learning where learners build themselves with regards to knowledge acquisition and its application in one's daily activity. ILA is a complex activity-oriented approach that its product lays on self-organization, self-motivation, self-directed, self-customized strategy-instruction that considers individual needs and goals (Shemshack & Spector, 2020). This strategy does not require a coach or facilitator during learning rather it frees the teachers from focusing on needs and problems of individual students. However, Gibney (2000) emphasized that ILA could be approached in several ways in order to improve, sustain, stimulate and bring about guided and directed instructional learning. ILA supports hands-on-activities, creativity of individual learner, skill development of individual learner, intellectual curiosity, stimulates learners' interest through continuous drill and practice and as well help learners to gain self-confidence. In the same vein, the researcher seek to ascertain if the mentioned activities in learning are capable of stimulating and sustaining learners' interest in learning information and communication technology which is presented as a theme in computer studies curriculum.

Interest is the desire to learn something. It is an important variable that gears learners towards learning. Interest could be viewed from a generalized perspective is the feeling of one whose attention, concern or curiosity is particularly engaged by something or that which concerns, involves or draws the attention of or arouses the curiosity of a person (Carter in Abonyi & Eze, 2007). Okekeokosisi and Okigbo (2021) defined interest as the attraction which forces or compels a child to respond to a particular stimulus. This points out the fact that a child develops an interest in an attractive and arousing stimulating environment. This means that the child is bound to pay attention as a lesson goes on if he is interested in that particular lesson. In other words, interest could be attributed to emotional manifestation of ones like or dislike towards an object, activity or combination of both (Njoku & Okigbo, 2021). It is useful in predicting the success and satisfaction which an individual is likely to obtain from engaging in certain activities now and in future (Egolum, Samuel & Okonkwo, 2021). This x-rays the need for appropriate instructional strategies that could stimulate and sustain male and female students' interest in computer studies.

Gender is one of the factors that may influence students' interest in computer studies. Anaekwe, Nnaka and Anaekwe (2018) described gender as economic, social, cultural attributes and opportunities associated with being male or female. It is a psychological term that describes behaviours, attitudes and personality traits that are designated as either masculine or feminine in a given culture (Brown & Jewell, 2019). This behavior and attributes could be seen as cultural constructs that distinguishes the roles, mental, emotional characteristics and behaviours of male and

female in a society. Research conducted by Eze (2018) discovered that gender had significant effect on computer studies students' interest. In the opinions of Okekeokosisi and Okigbo (2021), there is no significant difference in the mean interest scores of male and female students exposed to computer studies when taught with ABIS. In view of these contradicting findings, this study was set out to investigate the effectiveness of multiple intelligence-based and individualized learning activities on students' interest in computer studies, irrespective of gender.

Statement of the Problem

Federal Republic of Nigeria in her National Policy on Education recognized the fact that the weakest link in the chain of the nation's development and advertisement is centred on Vocational, Science, Engineering and Technology (VSET) in which computer studies is the key subject in Nigeria secondary schools (FRN, 2014). Unfortunately, it has been reported that students' interest in computer studies as taught in Nigerian secondary schools are not being sustained WAEC(2018-2022), NECO(2018-2022), and NABTEB (2018-2022). This could be attributed to inappropriate use of instructional strategies for instructional delivery. It therefore, becomes imperative to explore the efficacy of MIBA and ILA in facilitating male and female students' interest in computer studies.

Purpose of the Study

The purpose of the study was to investigate the effectiveness of MIBA and ILA on secondary school students' interest in computer studies. Specifically, the study;

1. Compared the mean interest rating of students taught computer studies using MIBA, ILA and those taught using LM
2. Compared the mean interest rating of male and female students taught computer studies using MIBA, ILA and those taught using LM
3. Interaction effect of gender and teaching methods (MIBA, ILA and LM) on students' interest in computer studies

Research Questions

The following research questions guide the study:

1. What are the mean interest ratings of students taught computer studies using MIBA, ILA and those taught using lecture method?
2. What are the mean interest ratings of male and female students taught Computer studies using MIBA, ILA and those taught using lecture method?

Hypotheses

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

1. There is no significant difference in the mean interest rating of students taught computer studies with MIBA, ILA and those taught with lecture method.

2. There is no significant difference in the mean interest rating of male and female students taught Computer studies using MIBA, ILA
3. There is no interaction effect of gender and teaching methods on students' interest rating in computer studies.

Research Method

The design of the study was quasi-experimental research design. Specifically, the pre-test, post-test, non-randomized control group involving three groups (two experimental and one control group) were used. Quasi-experimental design is an experiment where random assignment of subjects is not possible because it was not possible to subject students to pure experimental conditions (Nworgu, 2015). The administrative set up in the school was also such that students were already organized in their classes and the administration would not allow the class to be disrupted for the study. The study was carried out in Ogidi Education Zone of Anambra State, Nigeria. The population consists of three thousand two hundred and twenty four (3,224) co-educational senior secondary two (SS2) students in the 24 public co-educational secondary schools offering computer studies enrolled for 2022 / 2023 academic session in the Zone. The study employed purposive sampling technique which was used to select 19 public co-educational secondary schools out of 24 public co-educational secondary schools (PCESS).Co-educational schools were used because the researchers are studying gender as one of the variables of the study. The selected schools are far away from each other and thus would aid in control of extraneous variables like experimental bias and class interaction. A simple random sampling technique (balloting without replacement) was used to select 7 (PCESS) from 19 (PCESS). A sample size of 181 SS2 computer studies students, made up of 87 males and 94 females from the 7 schools were involved in the study. Intact classes from the 7 schools were used. The choice of SS2 computer studies students is because they have been well-exposed to the contents specified in the curriculum for the subject. The instrument used for data collection was an adapted interest scale questionnaire of Okekeokosisi and Anaekwe (2024). The adapted instrument was a 15 item, 4-point rating scale of Strongly Agree (4points), Agree (3points), Disagree (2points) and Strongly Disagree (1point). These items contained both positive and negative statements of feelings and interest from the students' point of view. The instrument was validated by three experts. The reliability of the interest scale tagged Information and Communication Technology Questionnaire (ICTQ) was determined using Cronbach Alpha method, which yielded reliability co-efficient of 0.71 indicating that the instrument is reliable. The researcher trained regular computer studies teachers from experimental and control group schools with the researchers' developed lesson plans for four days on how to use MIBA, ILA and LM as research assistants. The three groups were taught and allowed to feel the impact

on the concept taught using MIBA, ILA and LM respectively. The teaching was done by their regular class teachers using their regular lesson periods and applying the models specified (MIBA, ILA and LM).

Before the teaching commenced, pre-test questionnaire was administered to learners in the sampled schools. After the pre-test was administered to sampled schools, only experimental groups were taught Information and Communication Technology using MIBA and ILA. ICTQ were retrieved from the research subjects and the items in the pre-test were re-organized and used as post-test. After the treatment which lasted for 4 weeks, the post-test questionnaire (ICTQ) was administered to both groups. ICTQ was collated accordingly and posttest scores, noted. The research questions were answered using descriptive statistics while the hypotheses were tested at 0.05 level of significance using Multivariate analysis of covariance (MANCOVA). In taking decision, reject the null hypotheses if the probability value (P-value) is less than or equal to significant value of 0.05 ($P \leq 0.05$); otherwise, do not reject the hypotheses.

Presentation of Results

Research Question 1: What are the mean interest ratings of students taught computer studies using MIBA, ILA and those taught using lecture method?

Table 1: Pretest and Posttest interest mean scores of secondary school students taught Computer studies using multiple intelligence-based activities (MIBA), individualized learning activities (ILA) and those taught using lecture method

Source of Variation	N	Pretest Mean	Posttest Mean	Gained Mean	Remark
MIBA	70	28.34	53.06	24.72	more Effective
ILA.	60	27.82	53.87	26.05	most Effective
LECTURE	51	23.41	43.45	20.24	

In Table 1, it was observed that the secondary students taught computer studies using multiple intelligence-based activities had pretest mean score of 28.34 and posttest mean score of 53.06 with gained mean 24.72 in their interest, where those taught using individualized learning activities had pretest mean score of 27.82 and posttest mean score of 53.87 with gained mean 26.05 in their interest. While those taught using lecture method had pretest mean score of 23.41 and posttest mean score of 43.45 with gained mean 20.24. With posttest mean scores above the norm of 37.5, the three instructional methods are effective in enhancing secondary school students' interest scores in computer studies. However, ILA is more effective than the other two methods with gained mean of 26.05.

H0$_1$: There is no significant difference in the mean interest rating of students taught computer studies with MIBA, ILA and those taught with lecture method.

Table 2: MANCOVA on the interest mean scores of secondary school students taught Computer studies using MIBA, ILA and those taught using lecture method

Source of variation	SS	df	MS	Cal. F	Pvalue	P ≤ 0.05
Corrected Model	5801.085	6	966.847			
Intercept	32075.133	1	32075.133			
Interest1	1858.712	1	1858.712			
Instructional Method	2465.264	2	1232.632	17.009	.000 *	S
Gender	83.421	1	83.421	1.151	.285	
Instructional Method *Gender	206.473	2	103.237			
Error	12609.611	174	72.469			
Total	482180.000	181				
Corrected Total	18410.696	180				

Table 2 shows that at 0.05 level of significance, 1df numerator and 180df denominator, the calculated F is 17.01 with P-value of 0.000 which is less than 0.05. Therefore, the first null hypothesis is not accepted (F= 17.01, p=.000< α =.05). Therefore, the difference in the posttest mean interest scores of students taught Computer studies with multiple intelligence-based activities (MIBA), individualized learning activities and those taught with lecture method is significant.

Research Question 2: What are the mean interest ratings of male and female students taught Computer studies using MIBA, ILA and those taught using lecture method?

Table 3: Pretest and Posttest mean scores of male and female secondary school students taught Computer studies using MIBA, ILA and those taught using lecture method

Source of Variation	Gender	N	Pretest Mean	Posttest Mean	Gained Mean	Remark
MIBA	Male	36	28.92	53.75	24.83	
	Female	34	27.74	52.32	24.58	
ILA.	Male	31	28.06	52.00	23.94	
	Female	29	27.55	55.86	28.31	More Effective
LECTURE	Male	20	23.50	42.80	19.30	
	Female	31	23.35	43.87	20.52	

Table 3 reveals that the male secondary students taught computer studies using multiple intelligence-based activities (MIBA) had pretest mean score of 28.92 and posttest mean score of 53.75 with gained mean 24.83 in their Interest, while the female students taught using multiple intelligence-based activities (MIBA) had

pretest mean score of 27.74 and posttest mean score of 52.32 with gained mean 24.92. With posttest gained mean scores of 24.83 for male students as against 24.58 for female students, MIBA is more effective in enhancing male secondary school students' interest scores in computer studies.

Again, male secondary students taught computer studies using individualized learning activities had pretest mean score of 28.06 and posttest mean score of 52.00 with gained mean 23.94 in their interest, while their female counterparts had pretest mean score of 27.55 and posttest mean score of 55.86 with gained mean 28.31. With gained mean scores of 28.31 for the female students and 23.94 for the male students, individualized learning activities are more effective in enhancing female secondary school students' interest scores in computer studies.

Also, male secondary students taught computer studies using lecture method had pretest mean score of 23.50 and posttest mean score of 42.80 with gained mean 19.30 in their interest while their female counterparts had pretest mean score of 23.35 and posttest mean score of 43.87 with gained mean 20.52. With gained mean scores of 20.52 for the female students and 19.30 for the male students, lecture method is more effective in enhancing female secondary school students' interest scores in computer studies.

$H0_2$: There is no significant difference in the mean interest rating of male and female students taught Computer studies using MIBA, ILA and those taught with lecture method.

Table 4: MANCOVA on the interest mean scores of male and female secondary school students taught Computer studies using MIBA, ILA and those taught using lecture method

Source of variation	SS	df	MS	Cal. F	Pvalue	P ≤ 0.05
Corrected Model	5801.085	6	966.847			
Intercept	32075.133	1	32075.133			
Interest1	1858.712	1	1858.712			
Instructional Method	2465.264	2	1232.632	17.009	.000	
Gender	83.421	1	83.421	1.151	.285*	NS
Instructional Method * Gender	206.473	2	103.237	1.425	.243	
Error	12609.611	174	72.469			
Total	482180.000	181				
Corrected Total	18410.696	180				

In Table 4, it indicates that at 0.05 level of significance, 1df numerator and 180df denominator, the calculated F is 1.15 with P-value of 0.285 which is greater than 0.05. Therefore, the second null hypothesis is accepted ($F= 1.15$, $p = 0.285 > \alpha = 0.05$). So, the difference in the mean interest scores of students taught multiple intelligence-based activities, individualized learning

activities and those taught with lecture method is not significant.

$H0_3$: There is no interaction effect of gender and teaching methods (MIBA, ILA and LM) on students' interest rating in computer studies.

Table 5: MANCOVA on the interaction effect of gender and teaching methods (MIBA, ILA and lecture method) on students' interest scores in Computer studies

Source of variation	SS	df	MS	Cal. F	Pvalue	P ≤ 0.05
Corrected Model	5801.085	6	966.847			
Intercept	32075.133	1	32075.133			
Interest1	1858.712	1	1858.712			
Instructional Method	2465.264	2	1232.632	17.009	.000	
Gender	83.421	1	83.421	1.151	.285	
Instructional Method * Gender	206.473	2	103.237	1.425	.243*	NS
Error	12609.611	174	72.469			
Total	482180.000	181				
Corrected Total	18410.696	180				

Table 5, it was observed that at 0.05 level of significance, 1df numerator and 180df denominator, the calculated F is 1.43 with P-value of 0.243 which is greater than 0.05 . Therefore, the third null hypothesis is accepted (F= 1.43, p = 0.243 > α = 0.05). So, there is no significant interaction effect of gender and teaching methods (MIBA, ILA and lecture method) on students' interest scores in Computer studies.

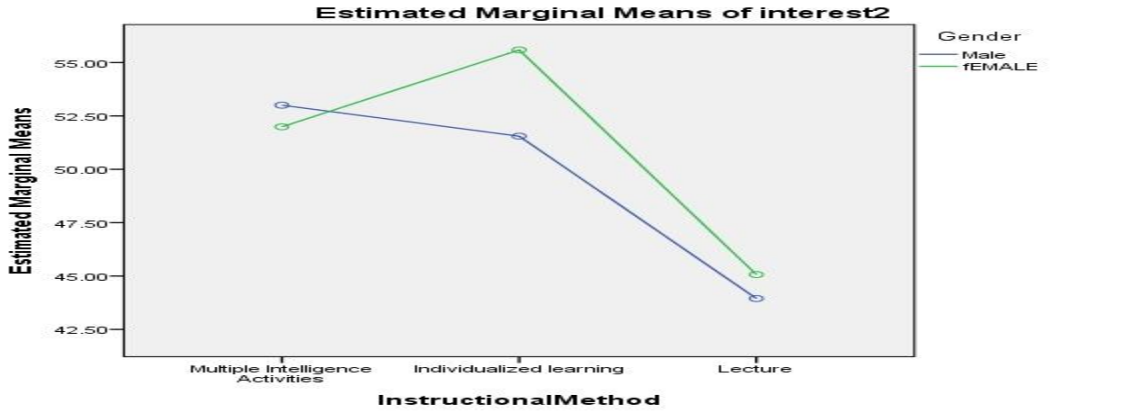


Figure 1 Plot of the interaction effect of gender and teaching methods (MIBA, ILA and lecture method) on students' interest scores in Computer studies

The Plot of the interaction effect of gender and teaching methods (MIBA, ILA and lecture method) on students' interest scores in Computer studies is significant and disordinal. This shows that the teaching methods are gender sensitive. They differ slightly in enhancing the students' interest scores in computer studies in all the teaching methods due to gender.

Discussion

Analysis of the results of the pretest and posttest interest mean scores of students shown in Table 1 portray that the two experimental groups: MIBA (Mean value = 53.06) and ILA (Mean value = 53.87) had higher post-test interest mean scores than the control group (Mean value = 43.45). This implies that MIBA and ILA groups are more effective in enhancing students' interest in computer studies than the lecture method.

Results further revealed significant difference (F= 17.01, p=.000< α =.05) in the mean interest scores of students taught computer studies using MIBA, ILA and lecture method as seen in Table 2. This points out that method has significant influence in students' interest. This agrees with Jaffar, Marei, Rathan and Ayoub (2022), Modupe (2021), Okekeokosisi and Okigbo (2021) and Onwubumpe and Okigbo (2021) who in their separate studies found that activity-oriented strategy stimulates students' interest in learning than the lecture method. This could be attributed to learners' are properly engaged, motivated, given ample opportunity for critical thinking and interact freely with one another.

More still, the evidence of the result revealed that the mean gain of MIBA is 0.25 whereas the SD for the pretest for male is 6.93, 9.39 for female. SD posttest for male is 8.29 and 8.84 for female. Furthermore, the mean gain of ILA is 4.37 whereas the SD for the pretest for male is 9.51, 7.42 for female. SD posttest for male is 9.72 and 5.96 for female. Mean gain for lecture method is 1.22 whereas the SD for the pretest for male is 11.99 and 10.98 for female. SD posttest for male is 10.78 and 10.70 for female. In other to find out if the difference in the mean interest scores between male and female students in the three groups was significant or not MANCOVA were used. The result of the study indicated that there was no significant difference (F= 1.15, p = 0.285 > α = 0.05) in the mean interest scores of male and female students taught computer studies using MIBA, ILA and lecture method. This shows that gender has no significant influence on students' interest. This result contradicts that of Eze (2018) who discovered that gender had significant effect on computer studies students' interest. Hence, this study examined gender effect on SS2 students' interest in computer studies.

The result of this study also revealed non-significant interaction effect of method and gender (F= 1.43, p = 0.243 > α = 0.05) on students' interest scores in computer studies. This finding is in agreement with the findings of Okekeokosisi (2021) and Ezeh (2013) who found that the interaction effect of method and gender on students' interest in computer studies and in difficult Biology

concept was not significant. This implies that the methods enhanced students' interest scores in computer studies as seen in figure 1.

Conclusion

The study showed that the two treatment strategies were effective in enhancing secondary school students' interest scores in computer studies. Specifically, the findings indicated that:

i. There was significant ($F= 17.01$, $p=.000 < \alpha = 0.05$), difference in the mean interest ratings of the students taught computer studies with MIBA and ILA relative to their counterparts who were taught with lecture method, in favor of the treatment groups.
ii. the difference in the mean interest ratings of students taught with multiple intelligence-based activities, individualized learning activities and those taught with lecture method was not significant ($F= 1.15$, $p = 0.285 > \alpha = 0.05$).
iii. there is no significant interaction effect of gender and teaching methods (MIBA, ILA and lecture method) on students' interest ratings in Computer studies ($F= 1.43$, $p = 0.243 > \alpha = 0.05$).

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Teacher training institutions should review the instructional activities used in preparation of prospective teachers and in-service teachers with a view to infusing some innovative instructional activities in their curriculum
2. Teachers should be encouraged to adopt MIBA and ILA in combination with lecture method as they foster learners' interest in computer studies.
3. Professional Associations like STAN and MAN should be encouraged to sensitize teachers to innovative teaching strategies that encourage students' learning outcomes irrespective of gender.

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