Performance Analysis of E-Learning on Students' Attitudes and Achievements: An Experimental Approach
A Case Study of Ajara Comprehensive-School and AraromiIlogbo Junior Secondary School Oko-afo, Badagry, Lagos. Nigeria

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ABSTRACT:
Learning is a key factor in acquiring education. This study focuses on analyzing of students' attitude and achievements in E-learning by experimenting with 128 students selected randomly from two Junior Secondary Schools in Lagos, Nigeria. Dependent variable comprises students' achievement and students' attitude while the independent variable consist of the E-learning Software (ELS) and Traditional Lecture Methods (TLM). Selected students were grouped into control group taught with TLM and experimental groups, taught with ELS. Pre and Post-test cognitive achievement, attitude evaluation were performed on both group for a period of three weeks interval. Results showed that $\lambda= 0.717$ (F=23.909, P<0.05), meaning that univariates F for the cognitive achievements and attitude of students to E-learning have stronger statistical value.
Keyword: E-learning Software; Traditional Lecture Method; students' achievement; students' attitude, control group; experimental group

1.0   INTRODUCTION

Learning is the act of acquiring new, or modifying and reinforcing existing, knowledge, behaviors, skills, values, or preferences which may lead to a potential change in synthesizing information, depth of the knowledge, attitude or behavior relative to the type and range of experience. Education can be described as a process by which people are prepared and trained to live and function effectively, efficiently and productively in and around their environments (Ukeje, 2004).The main motto of education is to provide knowledge, make every one aware about proper conduct and gain technical competency. Education helps in the development of an individual, physically, mentally and socially. The importance of education particularly secondary school education is that it helps prepare students for greater responsibility.

There are developments in the Nigerian education sector which indicate some level of Information and Communication Technology (ICT) application in the secondary schools. The Federal Government of Nigeria, in the National Policy on Education (Federal Republic of Nigeria, 2004), recognizes the prominent role of ICTs in the modern world, and has integrated it into the Nigeria education system. To actualize this goal, the document states that government will provide basic infrastructure and training at the primary school. At the junior secondary school, computer education has been made a pre-vocational elective, and is a vocational elective at the senior secondary school. It is also the intention of government to provide necessary infrastructure and training for the integration of ICTs in the secondary school system.

Computer technology has gain recognition worldwide whether it is being used for academics, financing, chatting, emailing getting job done fast, etc; that is why it is always said that computer education is a must since almost every activity is computer driven and one cannot be able to make progress as far as his career options are concerned except it is matched with knowledge of computer and/or computing technology. Computer studies has become a branch of science that has being sustaining the daily practices of man (Unodiaku, 2013).

E-learning is a broadly inclusive term that describes educational technology that electronically or technologically supports learning and teaching. Bernard Luskin, a pioneer of e-learning, advocates that the "e" should be interpreted to mean "exciting, energetic, enthusiastic, emotional, extended, excellent, and educational" in addition to "electronic." This broad interpretation focuses on new applications and developments, and also brings learning and media psychology into consideration. Eric Parks (2012) suggested that the "e" should refer to "everything, everyone, engaging, easy".

E-learning is inclusive is synonymous with multimedia learning, technology-enhanced learning (TEL), computer-based instruction(CBI), computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education, virtual learning environments(VLE) (which are also called learning platforms), m-learning, and digital educational collaboration.

However, students fail computer studies in internal and external examination, which may be as a result of poor performance of teachers in shying away from teaching the concept. The attitude of students in computer studies depends greatly on the exposure giving to them by their teachers in terms of practical or access to computer tools will be of great assistance to their performance in examination (Junior Secondary School Certificate Examinations). It was in the intention of this study to further explore E-learning Software Package (ELSP) in the Nigerian Junior Secondary School setting. This study focuses on determining the relative effect of e-learning on the cognitive achievement and attitudes of junior secondary school students.

2.0 LITERATURE REVIEW

E-learning refers to the use of electronic media and information and communication technologies (ICT) in education. It is broadly inclusive of all forms of educational technology in learning and teaching. According to Markus (2008), e-learning can be defined as a learning process created by interaction with digitally delivered content, network-based services and tutoring support. E - Learning is any technologically mediated learning using computers whether from a distance or in face to face classroom setting (computer assisted learning). . E-learning technologies offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives to manage access to e-learning materials, consensus on technical standardization, and methods for peer review of these resources.

In taking a quick look back at development of ICT in Nigeria education, a major landmark is seen in the mid-1980s. Since the mid-1980s when getting personal computers more readily into classrooms became more of reality than a dream, the Federal Ministry of Education proactively empanelled a Committee which developed the first core curriculum for computer studies for junior secondary schools (now basic 7-9). There was a dearth of teachers to implement the curriculum and the plan to quickly breakdown the barrier through crash courses for new and practising teachers failed to be successfully activated (Okebukola, 2010).

The integration of e-learning into education can catalyze the shift toward applying adult learning theory, where educators will no longer serve mainly as the distributors of content, but will become

more involved as facilitators of learning and assessors of competency. Using technology in the classroom has a far greater effect than benefiting just the student population. Gulek and Demirtas (2005) reported that teachers that incorporate technology in classrooms generally have a constructivist approach to teaching. They also suggest that the use of technology makes teachers feel more empowered in the classroom and consequently spend less time lecturing because their students are involved in critical-thinking based problem solving activities, active learning, and interactions with fellow students.

2.1   **Methods of Learning**
Historically, there have been two forms of learning: namely traditional learning and computer assisted instruction.

Traditional teaching is concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher and they play the role of instructor (in the form of lectures) and decision maker (in regards to curriculum content and specific outcomes). They regard students as having 'knowledge holes' that need to be filled with information. In short, the traditional teacher views that it is the teacher that causes learning to occur (Novak, 1998). The traditional approach to teaching, as ancient as formal teaching itself, involves the directed flow of information from teacher as sage to student as receptacle. How effective this transmission has been can then be tested by posing various exercises to the student. Too often, however, what are actually tested are the student's pattern matching abilities. Too often, also, what appears as excellent teaching actually turns out to be facilitated pattern-matching. On the other hand, the teaching of processes cannot be accomplished in this way. For this reason, it is hived off from cognitive education and, in the UK at least, is often treated as a less noble calling.

Computer Assisted Instruction (also called computer-based learning and computer based training) uses computers to aid in the delivery of stand-alone multimedia packages for learning and teaching. Multimedia uses two or more media, such as text, graphics, animation, audio, or video, to produce engaging content that learners access via computer. Computer-assisted instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place. Learners find that multimedia e-learning enhances both teaching and learning. These advantages can be categorized as targeting either learning delivery or learning enhancement. Learning delivery is the most often cited advantage of e-learning and includes increased accessibility to information, ease in updating content, personalized instruction, ease of distribution, standardization of content, and accountability. Accessibility refers to the user's ability to find what is needed, when it is needed. Improved access to educational materials is crucial, as learning is often an unplanned experience. Updating electronic content is easier than updating printed material: e-learning technologies allow educators to revise their content simply and quickly. Learners have control over the content, learning sequence, pace of learning, time, and, often, media, which allows them to tailor their experience to meet personal learning objectives. Internet technologies permit the widespread distribution of digital content to many users simultaneously anytime and anywhere. CAI refers to the use of the computer as a tool to facilitate and improve instruction. CAI programs use tutorials, drill and practice, simulation, and problem solving approaches to present topics, and they test the student's understanding.

2.2   Technologies used in Electronic learning

Various technologies are used to facilitate e-learning. Most e-learning uses combinations of these techniques, including blogs, collaborative software, e-Portfolios, and virtual classrooms.

1. Audio

The radio has been around for a long time and has been used in educational classrooms. Recent technologies have allowed classroom teachers to stream audio over the internet. There are also webcasts and podcasts available over the internet for students and teachers to download. For example, iTunes has various podcasts available on a variety of subjects that can be downloaded for free.

2. Video

Videos allow teachers to reach students who are visual learners and tend to learn best by seeing the material rather than hearing or reading about it. Teachers can access video clips through the internet instead of relying on DVDs or VHS tapes. Websites like YouTube are used by many teachers. Teachers can use messaging programs such as Skype, Adobe Connect, or webcams, to interact with guest speakers and other experts. Interactive video games are being integrated in the curriculum at both K-12 and higher education institutions.

Research on the use of video in lessons is preliminary, but results have shown an increased retention and better results when video is used in a lesson. Creating a systematic video development method holds promise for creating video models that positively impact student learning.

3. Computers, tablets and mobile devices

Computers and tablets allow students and teachers' access to websites and other programs, such as Microsoft Word, PowerPoint, PDF files, and images. Many mobile devices support m-learning.

4. Blogging

Blogs allow students and teachers to post their thoughts, ideas, and comments on a website. Blogging allows students and instructors to share their thoughts and comments on the thoughts of others which could create an interactive learning environment. Courts and Tucker (2012)

5. Webcams

The development of webcams and webcasting has facilitated the creation of virtual classrooms and virtual learning environments. Virtual classrooms supported by such technology are becoming more and more popular, especially since they are contributing as a main solution to solving problems with travel expenses. Virtual classrooms with such technology also provide the benefits of being easy to set up.

In summary of the review on e-learning, it has been observed that performance of student in terms of their attitudes and achievement can be affected by electronic learning system.

3.0   METHODOLOGY

In this study, an experimental research was carried out. The research design involved Pre-test and Post- test of random samples. Two groups were created, the experimental group and the control group. A pre-test was performed on the groups, the pre-test lasted for a period of 3weeks. The post-test was carried out on the two groups to ascertain the possible effect of the treatment. Independent and dependent variables were used at the experimental stage; the independent variable comprises of E-learning software Package (ELSP) and traditional lecturing method (TLM), while the dependent variable comprises of students' achievement and attitude.

Two Schools were selected namely; Ajara Comprehensive- School Badagry and AraromiIlogbo Junior Secondary School Oko-afo, both in Lagos State. A population of 128 Students which comprises of 62 males and 66 females were collected by simple random sampling technique. Fifty

(50) Students was sampled from school 1 Ajara Comprehensive school and 78 students from AraromiIlogbo Junior Secondary School. The computer teachers and the students were also involved in the study because the software had to do with them teaching the concept of data base to the students.

3.1   Data Collection Instrument:

Two instruments were developed and used to collect data in this study: they are
i.   Concept of Database Achievement Test (CDAT),
ii.   Database Attitude Questionnaire (DAQ)

Concept of Database Achievement Test (CDAT)

This was designed by the researchers in collaboration with two computer studies teachers. The CDAT is a 20 item multiple –choice test with four (4) options (A-D) based on the four database topics as specified in the Computer Studies for Junior Secondary School (JSS 3) third term scheme of work; Definition of database, Database technologies, Database Application area and Benefits and limitation of data.

It was designed to measure the students' achievement in database concept of computer studies. The items were carefully selected from the combined Lagos State past questions and answers from 2009-2014(Akwaah, 2014). It was used for pre-test and later used for the post-test experiment.

Database Attitude Questionnaire

This instrument is an inventory meant to assess students' ability level on Database. The inventory is divided into two sections: A and B. section A requires the demographic information of the students. Such information includes the name, age, sex, school and class. Section B is a 10-item inventory which uses a 4-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

The items on the DAQ instrument were scored as follows:

Strongly agree = 4; Agree = 3; Disagree = 2; and Strongly Disagree = 1. For positive items while the reverse for negative items.

3.2   Validity and Reliability of Research Instrument

The validity of instruments: CDAT and DAQ used for the research was greatly scrutinized by the supervisor. Lecturers in the same field of computer science in education contributed greatly and experts (teachers) in secondary schools also added their own inputs which were all incorporated.

The Database Achievement Test comprises twenty objective questions. It was first trial tested on a group of students that had same characteristics as the sample students but not involved in the main study. The reliability of the CDAT was determined by using the split half method of analysis and reliability co-efficient obtained was considered adequate for the study. The R value obtained was 0.78.

The reliability of the Database Attitude Questionnaire was also done having been scrutinized by the supervisor and was considered adequate for the study.

3.3   Research Analysis:

In this study, research questions and hypotheses was used, and responses were analysed using statistical expression such as standard deviations andStudents' scores in the achievement test were analysed using MANCOVA (Multivariate Analysis Of Covariance) to answer the research questions and test the hypothesis raised in the study. The research questions and hypothesis are stated below:

Research Questions
This study seeks to answer the following questions:

i. Is there any difference in (a) achievement (b) attitude of junior secondary school students taught database using ELSP and Traditional Lecture Method(TLM)?
ii. Is there a difference in the mean (a) achievement (b) attitude of male and female students taught database using ELSP and TLM?
iii. Is there a difference in the interaction of group and sex on (a) achievement (b) attitude of students taught database using ELSP and TLM.

Research Hypothesis
To guide this study, the following hypotheses have been formulated:

H_01: There is no significant difference in the (a) cognitive achievement (b) attitude of students taught database using e-learning software package (ELSP) and TLM.

H_02: There is no difference in the mean (a) achievement (b) attitude of male and female students taught database using ELSP and TLM?

H_03: There is no difference in the interaction of group and sex on (a) achievement (b) attitude of students taught database using ELSP and TLM.

3.4   Research Procedure
The two methods involved in the study were the use of e-learning software package and traditional method of teaching i.e. lecture method. There was a control group and an experimental group consisting of 128 Students which comprises 62 boys and 66 girls. The experimental group was taught through the educational software (ELSP), while the control group was taught through the traditional methods of teaching (Lecture method). However, the same content was taught in the two groups.

Activity on the Experimental Group
- ✓ the teacher states the objectives of the content to be learnt by students
- ✓ the teacher projects the software containing the content to the students
- ✓ she explains the content to the students and the usage of the package to them
- ✓ students were given their user name and password generated by teacher in order to access the package at their leisure time
- ✓ the teacher leaves the students to complete their learning task.

Activity on the Control Group
- ✓ the teacher specifies the learning objectives
- ✓ she gives instruction to students using the lesson plan designed by the researcher
- ✓ she poses questions to students occasionally while teaching
- ✓ students listens attentively while the lesson was going
- ✓ assignments was given to student after the class.

After exposing the students to the two method of teaching for the two groups (Experimental and Control), the post- test was introduced using the same concept of database achievement test used for the pre-test and like the administration of the pre-test, the researcher was careful to ensure the focus of the study was maintained.

Also administered at the end of treatment was the database attitude questionnaire (DAQ) in order to access the change in the attitude of students toward database concept.

The pre-test and pro-test for both achievement and attitude for the control group were collected back in each of the school from the students after answering. The two tests were collected the same day to ensure high percentage returns, which made the collection of analysis of data to be more accurate and efficient. The pre-test for both achievement and attitude for the experimental group given to the students were collected for collation. After which that of the post-test also for both achievement and attitude given to students after the treatment for three (3) weeks was collected and collated for data analysis.

4.0   RESULTS AND DISCUSSION

In this section, analysis of data, result derived from the analysed data and the summary of findings are presented and discussed. The analysis was done in line with the stated research questions and hypotheses.

Research Question 1: Is there any difference in (a) achievement (b) attitude of junior secondary school students taught database using ELSP and lecture method?

To answer this question, the mean and standard deviation of students' attitude and achievement test scores were used. The result is presented in Table I

Table I : Mean and standard deviation of students' scores in attitude and achievement test

Dependent variable	Group	N	Mean	Standard deviation
Achievement	Experimental	50	12.14	2.52
	Control	78	8.14	1.67
Attitude	Experimental	50	29.74	1.76
	Control	78	28.00	4.08

Table I: shows that the MEAN scores of students taught data base concepts using the ELSP are 12.14 while the control group taught with lecture had 8.14. This implies that a difference existed in the achievement mean scores of the two groups. The table further shows that the attitude mean score towards data base concepts of the experimental group is higher (29.74) than the score of the control group (28.00). Therefore, there is a difference in the mean scores.

To ascertain whether the observed difference was of any significant, the null hypothesis 1 was tested.

H_{01}: There is no significant difference in the (a) cognitive achievement (b) attitude of students taught database using e-learning software package (ELSP) and lecture method.

This hypothesis was tested using the multivariate analysis of covariance (MANCOVA) statistical technique at $p < 0.05$ significance. This statistical tool was considered as the most appropriate since two dependent variables were of interest in the study - cognitive achievement and attitude of students using ELSP, and random assignment of experimental and control groups was not achieved. The result is shown in Table II.

Table II: Multivariate test of effect of method on post cognitive achievement and attitude scores

Effect		Value	F	Hypothesis df	Error df	Sig.
GROUP	Pillai's Trace	.283	23.909[a]	2.000	121.000	.000
	Wilks' Lambda	.717	23.909[a]	2.000	121.000	.000
	Hotelling's Trace	.395	23.909[a]	2.000	121.000	.000
	Roy's Largest Root	.395	23.909[a]	2.000	121.000	.000

The preliminary multivariate test result in Table II shows that the data satisfied the assumptions of homogeneity of covariance, independence of observations and normality. Using SPSS version 17, the pre-test and post-test cognitive achievement and attitude data from the experimental and control groups were inserted into the MANCOVA equation. The result shows that the Wilks' lambda associated with the overall multivariate analysis of covariance (MANCOVA) is $\lambda = 0.717$; (F = 23.909, p< 0.05) confirming the significance of the MANCOVA .This indicated that the univariates F shown in Table II for the cognitive achievements and attitudes of students have strong statistical value thus justifying deeper probe into the F values relating to the independent variables of the study on the dependent variables of cognitive achievement and attitude.

Table III:Tests of Between-Subjects Effects on post cognitive achievement and attitude

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
GROUP	POSTATTITUDE	2.921	1	2.921	.268	.605
	POSTACHIEVEMENT	187.907	1	187.907	48.136	.000
Error	POSTATTITUDE	1328.396	122	10.888		
	POSTACHIEVEMENT	476.247	122	3.904		
Total	POSTATTITUDE	106807.000	128			
	POSTACHIEVEMENT	13187.000	128			
Corrected Total	POSTATTITUDE	1523.867	127			
	POSTACHIEVEMENT	1038.492	127			

a. R Squared = .128 (Adjusted R Squared = .093)

b. Computed using alpha = .05

c. R Squared = .541 (Adjusted R Squared = .523)

The result in Table III shows ELSP and lecture method is a significant factor in junior secondary school students' cognitive achievement in database concept ($F_{(1,127)} = 48.136$, p < 0.05) and its effect on the attitude is not significant ($F_{(1,127)} = 0.268$, p > 0.05). Based on the results of the multivariate analysis of covariance (MANCOVA), the null hypothesis of no significant difference in the cognitive achievement is rejected. This means that there is a difference in the cognitive achievement of students while that of the attitude of students in database concept when taught using ELSP and lecture method is not rejected. In addition, the adjusted R Square (0.093) shows that 9.3% variance is contributed by the group. In order to account for the difference and identify which of the group made the contribution, pair wise comparisons (Bonferroni) post hoc analysis was carried out as presented in Table IV.

Table IV: Pairwise comparisons analysis of effect of group on post cognitive achievement and post attitude scores

Dependent Variable	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.[a]
POSTATTITUDE	EXPERIMENTAL	CONTROL	.445	.860	.605
	CONTROL	EXPERIMENTAL	-.445	.860	.605
POSTACHIEVEMENT	EXPERIMENTAL	CONTROL	3.572[*]	.515	.000
	CONTROL	EXPERIMENTAL	-3.572[*]	.515	.000

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

*. The mean difference is significant at the .05 level.

As indicated in Table IV, the significant mean difference was found between experimental group and control group (3.572) on the cognitive achievement of students while the difference between experimental group and control group (0.445) on the attitude of students was not significant.

Research Question 2: Is there a difference in the mean (a) achievement (b) attitude of male and female students taught database using ELSP and lecture method?

To answer this question, descriptive statistics was conducted to find out the difference in the cognitive achievement and attitude of male and female students taught database concept using experimental group and control group. The result is presented in Table V.

Table V: Mean and standard deviation of male and female students' scores in achievement and attitude

	SEX	MEAN	STD DEVIATION	N
POSTATTITUDE	MALE	28.8871	3.40734	62
	FEMALE	28.4848	3.53115	66
POSTACHIEVEMENT	MALE	10.2258	3.10166	62
	FEMALE	9.2879	2.55262	66

Table V: shows that the male students have a mean score of 10.23 with standard deviation of 3.10 while the female students has a mean score of 9.29 with standard deviation of 2.56 for the cognitive achievement test. The table also shows the mean score of male students 28.89 with a standard deviation of 3.41 while the female students have a mean score of 28.48 with standard deviation of 3.53 for attitude of students towards the concept of database. There is no marginal difference in the male and female students in both achievement and attitude scores when taught using ELSP and lecture method.

Table VI: Test of between - subjects effect on Male and Female students

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
SEX	POSTATTITUDE	.003	1	.003	.000	.987
	POSTACHIEVEMENT	18.491	1	18.491	4.737	.031
Error	POSTATTITUDE	1328.396	122	10.888		
	POSTACHIEVEMENT	476.247	122	3.904		
Total	POSTATTITUDE	106807.000	128			
	POSTACHIEVEMENT	13187.000	128			
Corrected Total	POSTATTITUDE	1523.867	127			
	POSTACHIEVEMENT	1038.492	127			

a. R Squared = .128 (Adjusted R Squared = .093)

b. Computed using alpha = .05

c. R Squared = .541 (Adjusted R Squared = .523)

From the table above, Table VI shows that there is no significant difference in the mean achievement of male and female students taught using ELSP and lecture method: ($F_{(1,122)}$ = 4.737, p > 0.05. therefore, the hypothesis that says there is no difference in the mean achievement of male and female students taught using ELSP and lecture method is hereby not rejected. And the difference on attitude is significant ($F_{(1,122)}$ = 0.000, p < 0.005). Therefore, the hypothesis which states that there is no difference in the mean attitude of male and female students taught database using ELSP and lecture method is hereby rejected.

Research Question 3: Is there a difference in the interaction of group and sex on (a) achievement (b) attitude of students taught database using ELSP and lecture method.

To answer this question, the mean score of the Group*Sex were used. The result is presented in Table VII.

Table VII: Mean score both Method used in teaching and the Gender differences

Dependent Variable	GROUP	SEX	Mean
POSTATTITUDE	EXPERIMENTAL	MALE	28.638[a]
		FEMALE	29.283[a]
	CONTROL	MALE	28.828[a]
		FEMALE	28.203[a]
POSTACHIEVEMENT	EXPERIMENTAL	MALE	12.405[a]
		FEMALE	11.453[a]
	CONTROL	MALE	8.679[a]
		FEMALE	8.035[a]

Table VII shows that the achievement scores of male students taught using the ELSP (12.41) is higher than the mean scores of female students (11.45) with a difference of 0.95 while the mean scores of male students taught using lecture method (8.68) and the female students with the mean scores of (8.04) giving a difference of 0.64.

Table VIII:Test of between –subjectseffect on the Group and Gender of the students

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
GROUP * SEX	POSTATTITUDE	11.125	1	11.125	1.022	.314
	POSTACHIEVEMENT	.655	1	.655	.168	.683
Error	POSTATTITUDE	1328.396	122	10.888		
	POSTACHIEVEMENT	476.247	122	3.904		
Total	POSTATTITUDE	106807.000	128			
	POSTACHIEVEMENT	13187.000	128			
Corrected Total	POSTATTITUDE	1523.867	127			
	POSTACHIEVEMENT	1038.492	127			

a. R Squared = .128 (Adjusted R Squared = .093)

b. Computed using alpha = .05

c. R Squared = .541 (Adjusted R Squared = .523)

The results in Table VIII shows that there is no significant difference in the interaction of group and sex on cognitive achievement test of students in junior secondary school taught database concept using ELSP and lecture method ($F_{(1,127)} = 0.168$, $p > 0.05$) and its effect on the attitude of student is also not significant ($F_{(1,127)} = 1.022$, $p > 0.05$). Based on the results of the multivariate analysis of covariance (MANCOVA), the null hypothesis of no significant difference in the interaction of group and sex on achievement of students taught database using ELSP and lecture method is not rejected while that of the attitude of students in database concept when taught using ELSP and lecture method is also not rejected. These means there is no difference in the interaction of group and sex on both achievement and attitude of students taught database using ELSP and lecture method which means the ELSP is gender friendly.

5.0   CONCLUSION

From the analysis of results obtained, it could be concluded that there is a significant difference in the cognitive achievement of students taught using ELSP and lecture method. There is no difference in the attitude of students taught database concept using ELSP and lecture method. There is no significant difference in the mean achievement of male and female students taught using ELSP and lecture method. There is a significant difference in the mean attitude of male and female students taught database concept using ELSP and lecture method. There is no difference in the interaction of group and sex on both achievement and attitude of students taught database using ELSP and lecture method.

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