EFFECT OF SCHOOLOGY ELECTRONIC LEARNING PLATFORM ON COMPUTER SCIENCE STUDENTS' ACADEMIC ACHIEVEMENT IN NORTH-CENTRAL UNIVERSITIES, NIGERIA

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Abstract
The study determined the effect of Schoology electronic learning platform on computer science students' academic achievement in North-Central Universities, Nigeria. Employed for the study was a nonrandomized pre-test, post-test control group quasi-experimental design. Two research questions and two corresponding null hypotheses guided the study. Purposive sampling technique was used to select two Universities from North-central, Nigeria who formed the experimental and control groups. A sample of one hundred and forty (145) year two students (92 males and females 53) were used. Computer Web Design Achievement Test (CWDAT) which is a test instrument was validated by experts in Computer Science and Educational Technology and used for data collection. CWDAT was pilot-tested using split-half method and a reliability coefficient 0.79 was obtained using SPSS. Analysis of Variance was used to analyse the data gathered and was tested at 0.05 level of significance. The study revealed that students who were taught using schoology ELP had improved academic achievement more than students taught using traditional method and the result was found to be statistically significant ($F_{(1,144)} = 14.185$ $p< 0.05$). The study further revealed that there was no gender influence in the academic achievement of male and female students who were taught using schoology ELP as no significant difference was found ($F_{(1,74)} = .020$, $p> 0.05$). The researcher recommended that Nigerian Universities adopt the use of schoology ELP into teaching.

Keywords: Computer science, Schoology electronic learning platform, Academic achievement

Introduction

The world is constantly evolving and in the past decade or two, teaching has also evolved significantly to affect both opportunities and challenges in the educational system and in the world at large. Teaching can simply be seen as a way of transferring information or knowledge that is worthwhile on expected learners. According to Smith (2015), it is an interaction that exist between teachers and learners, whereby, teachers are expected to educate learners on set objectives while the students on the other hand are expected to optimize the knowledge gained by conducting themselves within the acceptable standards of the society. In recent times, the expectations of a child as regards to his education has evolved drastically in the sense that educational system around the world, including Nigeria is now faced with formidable challenges such as integrating the curriculum with 21st century learning skills, utilization of time in a scarce resource, among others which tasks the conventional strategies employed in teaching (Ayo, 2011). Therefore, fresh approaches are constantly needed in order to provide a child with an education, which is relevant to the needs of the modern information-based society through the use of technology.

Technology has become very essential in education. This is as a result of the role it plays towards the creation of innovative teaching and learning strategies to the delivery of

instruction as the need of learners cannot be met by the use of traditional method of teaching alone (Winthrop *et al*., 2016). According to Eassey (2018), through the use of technology, the progress of students can be tracked towards mastery and their learning assessed. In essence, the use of technology can make it easier for teachers to design meaningful learning experience for students. Moreover, technology tools are inexhaustible and dynamic, and as a result of this dynamism, there has been a proliferation of Information and Communication Technologies (ICTs) witnessed in the field of education (Brown, 2011).

ICTs is no longer considered as just a support tool for teaching but has become a necessary requirement within the educational setting. Hence, more teachers and other users from several educational Institutions around the world carry out numerous activities using educational platforms in their classes both synchronously and synchronously. Technology has become necessary as countries and organizations around the world continue to devise means of gaining a competitive edge over the others. This advancement led to the availability of the internet which in turn gave rise to the use of electronic learning (EL), as a teaching and learning approach. The concept of electronic learning can be described as education that takes place basically over the internet. Broadly defined, electronic learning can be defined as an electronic administration and delivery of learning opportunities that is supported via computer network and web-based technologies (Zhang, 2013). It is also a learning system that is based on formalized teaching that is facilitated through the use of electronic learning platforms (Coleman, 2019).

Electronic learning platforms (ELPs), which are significantly facilitating teaching and learning processes are catalyzing the pedagogical shift in the educational sector by way of reversing the shift from top-down lecturing and passive students to a more collaborative approach, which allow teachers and students to co-create the learning process (Anderson & Dron, 2011). In order words, students can readily register to attend online classes and at the same time obtain instructional materials from multiple sources over the internet or from institutions who organize learning programmes electronically using cloud-based technologies. Essentially, instructional materials obtained or created can be stored on the cloud through a secure electronic platform, which can as well be remotely accessed by other people or students who have registered and are approved users of the same platform. This implies that contents can be derived from variety of sources and from user's preferred devices. This offers teachers and students an opportunity to have a paperless classroom from anywhere around the world (Brhanu & Mulugeta, 2015). There are so many kinds of cloud-based electronic learning platforms and a typical example which is of this study's focus is Schoology ELP.

Schoology ELP has a user interface similar to Facebook and can be described as a virtual learning environment that is used to create, manage and share academic contents (Sarrab *et al*., 2016). Schoology ELP is a web-based platform that encourages collaboration among learners and give students and teachers 24 hours' access to instructional materials and information via the internet (Schoology, 2014). The platform also allows a teacher to build-in educational content online where students can also learn and share. That is to say, students can get reading materials, collaborate through the platform's discussion board and submit assignments to the teacher electronically (Sicat, 2015). While Schoology can be accessed using their website www.schoology.com, it is also compatible with Internet Explorer, Firefox, Google Chrome and Safari using any computer system. Similarly, Schoology offers free mobile applications through smartphones such as iOS, androids among others (Schoology, 2015), thereby, enabling the students to learn anywhere and anytime. On schoology ELP, students have their profile page with their personal information and are able to share information and ideas as well as hold discussion forum with the aid of the diverse features incorporated in the platform such as courses, group discussion, personal message, bulletin boards quiz, analytics

and attendance, that support the learning process and promotes students' interactivity and academic achievement (Jiménez-Olmedo, 2018).

Moreover, academic achievement entails good grades which is reflective in students' learning activities and not far away from the knowledge or skills they are able to acquire over a period of time. Students' academic achievement can be improved through proper teaching plan, however, Jack and Lin (2017), lamented that one problem that usually occurs in learning is the ineffectiveness of the pedagogical approach which could slow down learning and minimize learning achievement. For this reason, teachers are in constant need to design or adopt new learning strategy that would sharpen students learning abilities and increase their attention and interest to acquire knowledge and increase their academic achievement. According to Eftimie, (2013), modern learning innovations can change the old paradigm of traditional method of teaching to new ones where teaching methods can be developed to ascertain students' knowledge concretely and principally by exploring the changes that have occurred in their learning individually or part of a group. This also implies that students in the four walls of the educational system need to be conversant with the use of modern technologies in order to adequately use it. Faced with this reality, computer education then becomes basically crucial for all and sundry as modern technology advance, thus, leading most countries around the world and indeed Nigeria to introduce the study of computer science in their educational system from primary through to tertiary institutions in order to explore the opportunities it brings to the full.

Computer Science can be defined as the study of practices and principles that buttress the modelling and understanding of computation, and the development of applications in computer systems (Garcia & Al-Safadi, 2014). The need for computer science as a discipline has grown and this is because computers has become more integrated into every day-to-day lives as technology continue to advance. The teaching of computer science courses according to Suleiman (2012), provides students with the knowledge and skills that allow them to understand the current computer technology software or applications and that includes electronic learning platforms.

Tretinjak, and Tretinjak, (2017) opined that the electronic learning platform has become a powerful tool for extension schools, for consulting companies who specialize in staffing and training as well as for other establishments or institutions seeking uninterrupted and continued education of staff or members. The impact of electronic learning platforms according to Tigowati *et al*. (2017), was originally felt mostly outside of traditional education institutions, however the relevant roles it played are now felt which is dramatically changing how learning takes place in recent times. For this reason, the educational sector and indeed Higher Institutions should not be unrelated to these changes as it boosts the role of students as active participants in the teaching-learning process.

The study of Tegegne (2014), however was not in agreement with the effectiveness of ELPs. The study by Tegegne (2014) determined the effect of electronic learning on the academic performance of Mathematics students in fundamental concepts of algebra course. While the study was a quasi-experimental design, the population of the study was 144 students. The data collected was analyzed using descriptive and inferential statistics. At pre-test the result obtained showed a mean score of the experimental and control groups to be 21.61(SD=7.731) and 18.63 (SD=5.873) respectively. Whereas, the T-test result revealed the mean scores of the experimental and control group to be 22.36 and 22.80 respectively at P=0.724, which indicated no significant difference between the students taught using ELP and those taught using traditional method. Tegegne (2014) posited that lack of basic knowledge and skills to

handle technology on the part of the experimental group could have contributed to the result obtained.

Among the studies that showed the effectiveness of ELPs is that of Sari *et al*. (2020), who studied the effect of schoology online cooperative learning achievement. The result obtained from the study showed that there was a significant difference at 0.05 level of significance in the mean scores of student taught using schoology and those taught using traditional method. The experimental group had a higher achievement score of 4.240 which was higher than the scores of the control group at 2.129.

A study by Alabi *et al*, (2020) investigated the effects of ILIAS online learning platform on students' achievement in educational technology among universities in Nigeria. Two null hypotheses were tested with a sample size of 338 second year students. Quasi-experimental research design was also used. The data collected was analyzed using mean and standard deviation while ANOVA was used to test the two null hypotheses that were formulated. The findings of the study revealed that students taught using ILIAS electronic learning platform had a higher mean achievement scores than students taught using traditional method ($F_{(1, 337)} = 2078.128$, $p < 0.05$) which was statistically significant. The study also revealed that there was no significant difference in the mean achievement scores of male and female students taught Educational Technology using ILIAS learning platform ($F_{(1, 174)} = 0.428$, $p > 0.05$).

Statement of the Research Problem

The essence of teaching computer science concepts in Nigerian Universities is to ensure that students become prepared and efficient in a technologically-driven society (Al-Ammary, 2012). In essence, the quality and quantity of computer education received by undergraduates should be geared towards developing future computer scientists who are proficiently and professionally inclined. However, conventional method of teaching is more widespread in most Universities in Nigeria, and is often teacher-centered (Idogho, 2014). This method of teaching not only give room for root learning which lacks thoughtful understanding and leading to reduced academic achievement as a result of students' inactive participation in the classroom but also cripple students' creative expressions to either make meaningful contributions to what was taught or connect with frameworks that would engage them to think critically and explore opportunities. As a consequence, this reduces their chances to become efficient, let alone become relevant in their field of study.

To address this setback, exploring technologically inclined approaches which promotes activity that is enduring is crucial. Examples of such technology tool is Schoology electronic platform. Schoology is a web-based platform that allow students self-study, communicate with their teachers, access digital materials that are otherwise inaccessible in a conventional classroom, submit assignment and comment on other students' assignments. Apart from schoology ELP, other strategies have been used and the poor achievement has persisted. Schoology ELP when introduced, may allow students to collaborate with their peers, obtain prompt feedback from their teachers, independently repeat and master instructional materials and improve their academic achievement.

Moreover, teaching web design requires hands-on practical and this may be facilitated through multimedia tools that are well embedded in Schoology electronic platform, thereby providing them with an active learning atmosphere. Hence, this study determined the effect of Schoology electronic learning platform on computer science students' academic achievement in North-central Universities, Nigeria.

Aim and Objectives of the Study

The aim of the study was to determine the effect of Schoology electronic learning platform on computer science students' academic achievement in North-Central, Universities, Nigeria. Specifically, the objectives of this study were to;

(i) Determine the academic achievement of students taught computer web design concepts using Schoology ELP and Lecture method.
(ii) Determine the influence of gender on students' academic achievement in computer web design concepts when taught using Schoology electronic platform.

Research Questions

(i) What are the mean achievement scores of students taught computer web design concepts using Schoology ELP and Lecture method?
(ii) Is there any difference in the mean achievement scores of male and female students taught computer web design concepts using Schoology ELP?

Research Hypotheses

HO_1: There is no significant difference in the achievement scores of students taught computer web design concepts using Schoology ELP and Lecture method.
HO_2: There is no significant difference in the achievement scores of male and female students' taught computer web design concepts using Schoology ELP.

Research Methodology

The research design adopted for this research was a non-randomized pre-test, post-test control group of the quasi experimental design. This design was adopted to allow the researcher conduct the study in the sampled schools without randomization that may interfere with the students' academic activities. The sample size of the study was made up of all one hundred and forty-five (145) 200 level computer science students from two schools (75 and 70 each) who were selected using purposive sampling method. These students were made up of 92 male and 53 female students and were selected because the concept taught fell under their syllabus. Using simple random sampling the two groups were assigned into experimental group and control group.

The study adopted schoology ELP as treatment instrument and Computer Web Design Achievement Test (CWDAT) as test instrument for data collection. The interface of Schoology ELP was modified by the researcher to reflect the concept of web design concepts that was taught to the students. The researcher invited the students into the platform through a code sent to their email addresses for them to be part of the online class. The activities that took place in the platform include the delivery of lessons on web design to the students virtually in addition to extra links relating to web design concepts to keep them engaged after each lesson. Other activities were discussion forums by students and teachers on topics covered, attendance, updates, and monitoring of students' participation and activities on the platform. The test instrument was developed by the researcher and contained 50 item multiple choice questions. The items were planned to meet the instructional objectives of the study and has two parts; sections A and B. While section A contain items that collect the personal data of the students, section B gathered information on student's achievement that was centered on the web design concepts taught. The instrument was validated by three experts from Computer Science Department and one expert from Educational Technology Department and in a single administration, CWDAT was pilot-tested and a reliability coefficient of 0.79 was obtained using split-half method using SPSS version 20. The result showed that the instrument was reliable. The study lasted for a period of ten weeks and while students in the experimental group were taught computer web design concepts using schoology electronic learning platform, students in the control group were taught same concepts using traditional teaching

method. Mean and standard deviation was used to answer the research questions. The Analysis of Variance (ANOVA) was used at 0.05 level of significance to test the null hypotheses. The data was analyzed using statistical package for social sciences (SPSS), version 23.00.

Results

Results obtained from the analysis of pretest and posttest were presented using tables. The research questions were analyzed using mean and standard deviation while ANOVA was used to determine the significant difference among the groups.

Pretest Result of Experimental and Control Group

ANOVA comparison was carried to determine students' knowledge equivalence at the entry stage before the administration of treatment. The result is shown in table 1.

Table 1: ANOVA Result Comparing Pre-test Scores of Experimental Group and Control Group

Source of variations	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	62.977	1	62.977	2.390^{NS}	.124
Within Groups	3768.816	143	26.355		
Total	3831.793	144			

NS: Not Significant at 0.05

Table 1 shows the analysis of the pretest scores of experimental group and control group. The result showed no difference between the two groups ($F_{(1,144)} = 2.390$, $P > 0.05$). This implies that the two groups were not significantly different before treatment was administered, hence ANOVA was used to test the hypotheses generated from the research questions.

Research Question One: What are the mean achievement scores of students taught computer web design concepts using Schoology ELP and Lecture method?

Table 2: Pre-Test and Post-test Mean Achievement and Standard Deviation Scores of Experimental Group and Control Group

Group	N	Pre-test		Post-test		Mean gain
		$\bar{x}$	SD	$\bar{x}$	SD	
Experimental group	75	35.04	10.64	70.56	11.69	35.52
Control group	70	32.03	9.79	63.60	10.47	31.57

Table 2 shows the mean and standard deviation of experimental group 1 and control group at pre and post tests. At pre-test, experimental group had a mean score of 35.04 and standard deviation of 10.64 while control group had a mean score of 32.03 and a standard deviation of 9.79. At post-test, experimental group had a mean score 70.56 and standard deviation of 11.69 while control group had a mean score of 63.60 and standard deviation of 10.47. This leaves the experimental group with a mean gain of 35.52 and a mean difference of 31.57 for the control group. This result obtained from the table indicates that the experimental group had a higher mean gain in the achievement test when compared to the students in the control group.

Research Question Two: Is there any difference in the mean achievement scores of male and female students taught computer web design concepts using Schoology ELP?

Table 3: Mean Achievement and Standard Deviation Scores of Male and Female Students Taught Computer Web Design Concepts using Schoology ELP

Group	N	Pre-test		Post-test		Mean gain
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	48	33.17	10.08	70.42	11.13	37.25
Female	27	38.37	10.96	70.81	12.85	32.44

Table 3 shows that male group had a mean achievement score of 33.17 and standard deviation of 10.08 at pre-test and a mean achievement score of 70.42 and standard deviation of 11.13 at post-test which leaves the male students with a mean gain of 37.25. Conversely, the female group had a mean achievement score of 38.37 and a standard deviation of 10.96 at pre-test and a post-test mean achievement score of 70.81 and a standard deviation of 12.85 with a pre-test post-test mean gain of 32.44. With this result, it shows that the male students had a higher mean gain when compared to the female group. Testing the corresponding hypothesis determined whether there was a significant difference in the scores of the groups.

Research Hypotheses

HO¹: There is no significant difference in the mean achievement scores of students taught computer web design concepts using Schoology ELP and Lecture method.

Table 4: ANOVA Result Comparing Post-test Scores of Experimental Group and Control Group

Source of variations	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	438.480	1	438.480	14.185	.000*
Within Groups	4420.320	143	30.911		
Total	4858.800	144			

*: Significant at 0.05

Table 4 shows ANOVA result comparing the mean achievement scores of students taught computer web design concepts using schoology and lecture method. The table shows that there was a significant difference in the achievement scores of the two groups ($F_{(1,144)}$ = 14.185, $p < 0.05$). This implies that students in the experimental group performed better than student in the control group. Hence hypothesis one was rejected. The increased performance of the experimental group could be attributed to the interactive tools found in schoology ELPs that made them stay connected with the on-demand availability of resources that enabled them to complete tasks with groups, read conveniently at any time with reduced stress and increased self-paced ability among the students.

HO_2: There is no significant difference in the mean achievement scores of male and female students' taught computer web design concepts using Schoology ELP

Table 5: ANOVA Result Comparing Post-test Scores of Male and Female Students

Source of variations	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.685	1	.685	.020*	.889
Within Groups	2530.435	73	34.663		
Total	2531.120	74			

*: Not Significant at 0.05

Table 5 shows ANOVA results comparing the mean achievement scores of male and female students taught computer web design concepts using schoology ELP. From the table, it was revealed that there was no statistical significant difference in the mean scores of the two groups ($F_{(1,74)} = .020$, $p > 0.05$). Hence hypothesis two was retained. This result could be attributed to the student's active participation in discussions on lessons taught, and exchange of opinions with their peers in order to process and acquire in-depth knowledge with no student left behind, thus, causing gender to have no significant influence on the students' academic performance.

Discussion of Findings

The finding of this study revealed in table 2 that there was a difference in the mean scores of students in the experimental group and control group. Experimental group obtained a mean score and standard deviation of 35.04 and 10.64 at pretest and a mean score and standard deviation of 70.56 and 11.69 at posttest. Conversely, control group had a mean and standard deviation of 32.03 and 9.79 at pretest and at posttest, a mean and standard deviation of 63.60 and 10.47. While the experimental group had a mean gain of 35. 52, control group had a mean gain of 32. 57. This result implies that there was a difference in the mean scores of the two groups. The result obtained after testing the corresponding hypothesis revealed in table 4 that there was a significant difference in the achievement scores of students taught computer web design concepts using schoology than those taught using lecture teaching method ($F_{(1,144)} = 14.185$, $p < 0.05$). This finding could be attributed to the increased opportunity of students in the experimental group to learn at their own pace and increase their interactivity using schoology ELP which engaged them and allowed them to complete tasks and read conveniently with the availability of diverse online resources that they had access to. This finding is in agreement with the finding of Sari *et al*. (2020) and Alabi *et al*, (2020) who carried out studies on effects of electronic learning platforms on students' academic achievement and had their studies revealing that electronic learning platforms improved the academic achievement of students in their studies.

The result obtained in this study showed that schoology electronic learning platform is an effective technological tool that helps to facilitate teaching processes through hands-on practical and multimedia tools to promoted the academic achievement of students when they collaborate with their peers virtually. This goes in line with Jiménez-Olmedo (2018), who opined that schoology ELP supports learning process and promotes students' interactivity and academic achievement. This is relevant to the objectives of this study as the academic achievement of students taught using schoology ELP performed better than students taught using of lecture method. In essence electronic learning platforms can improve students' passion to ask questions on different level of complexity that matches different tasks in targeted groups and while combining more investigative approaches to escalate their understanding of the learning concepts right before them (Enwere & Emeasoba, 2019).

The result obtained from the achievement scores of male and female students in table 5 showed that there was no significant difference in the achievement scores of students who were taught using schoology ELP ($F_{(1,74)} = .020$, $p > 0.05$). This implies that schoology ELP supported learning process which allowed students to review academic concepts irrespective of gender. In other words, gender had no influence on the achievement scores of male and female students taught using web design using schoology ELP. This result is in line with the findings of Alabi *et al*, (2020) who reported no gender significant difference in the mean achievement scores of students. The result obtained on gender is an indication that electronic learning platforms are gender friendly and provided students with an equal and favourable atmosphere to improve their academic achievement.

Conclusion

The results obtained from this study showed that Schoology ELP can enhance students' ability to acquire more knowledge by creating a fertile learning environment for students to improve their academic achievement through active participation more than lecture method. The outcome of this study have shown that schoology ELP is an effective pedagogical approach that is instrumental in enhancing student' academic performance. However, the result obtained by Tegegne (2014) was contrary to the findings of this study but was attributed to the students' lack of basic knowledge and skills in the use of technology. This implies that students' skill in the operational use of electronic learning platforms is vital to promote teaching activities using the platforms. It is therefore hoped that institutions responsible for impacting basic computer skills in students will not relent in carrying out their tasks so that the positive effects of electronic learning platforms can be fully utilized in order to help tackle the academic challenges of students by helping them improve their academic performances in computer science and other related subjects.

Recommendation

Based on the above findings which is relevant and has contributed to knowledge, it was recommended that Nigerian Universities adopt and integrate effectively the use of Schoology electronic learning platform into teaching activities in order to promote active learning and students' academic achievement.

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