EFFECTIVENESS OF WEBQUEST-BASED LEARNING APPROACH ON JUNIOR SECONDARY SCHOOL STUDENTS' PERFORMANCE IN COMPUTER SCIENCE

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Abstract
The academic performance of students is paramount to every stakeholder and all efforts had been geared towards the integration of modern technologies into the teaching and learning process. This study investigated the effectiveness of using WebQuest to teach Computer Science. The study adopted an experimental design for the research. The population was the junior secondary school one (1) students in Suleja Local Government Area of Niger State. 150 students participated in the study. A multi-stage sampling procedures which involved a convenience and a purposive random sampling techniques was adopted to select the participants and classify them into control and experimental groups. The WebQuest Based Learning Package (WBLP) was used as treatment instrument and Computer Science Performance Test (CSPT) was used as test instrument. The research instruments were validated by experts in system programming, educational technology, educational measurement and evaluation. Using a test-retest technique, the reliability coefficients of Computer Science Performance Test (CSPT) and Score Sheet (SSH) were 0.85 and 0.79 respectively. The participants were tested and scored. The scores were analysed and the findings revealed that there was a statistical difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method. It was also discovered that the female participants had a better mean gain score than their male counterparts. The null hypotheses were tested using ANCOVA at 0.05 level of significance and the findings indicated that there was a significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method. Based on these findings, some recommendations were made which include: government should provide financial support to assist the school in procuring facilities such as computers, WebQuest software towards the enhancement of students' academic performance in Computer Science.

Keywords: Effectiveness, WebQuest, Learning, Approach, Students, Performance and Computer Science

Introduction

Education remains a fundamental pillar for national development through acquisition of various skills in schools' subjects. There are numerous subjects and courses introduced into the educational system in Nigeria. The subjects are introduced for specific educational goals. One of the subjects is the Computer Science. Computer Science is a science subject that deals with theory, design, development, and application of computers and computational systems to solve specific problems. The specific areas of Computer Science include networks, artificial intelligence, security, vision and graphics, database systems, programming languages, theory of computing, numerical analysis, software engineering, biometric and bioinformatics. The Computer Science students can develop capacities towards identifying and solving problems. The trend of technological development across the globe is fundamentally rooted in Computer Science. Among the benefits of Computer Science are high level of job opportunities, problem-solving capabilities, and acquisition of technological skills. It is on these benefits that the Computer Science was introduced into the secondary school curriculum (Maloney, 2005).

Curriculum refers to all the academic contents designed for a specific course or program. According to Shao-Wen (2012), curriculum is a fundamental way of achieving specific educational goals and objectives. The teachers are the major players in the curriculum implementation of any school programme. This fact was entrenched in the National Policy on Education that no education system may rise above the quality of its teachers (FGN, 2004). As a matter of fact, poor teachers cannot deliver instructions effectively. This simply means that effective teaching would lead to effective learning. If secondary schools' teachers fail in their primary responsibilities of teaching, the students become failure and there would be a failed nation.

The challenges encountered by the teachers in the curriculum implementation of Computer Science at the secondary school level include non-availability of qualified teachers, lack of instructional materials, poor remuneration for the teachers, crowded classrooms, poor selection of teaching methods and lack of constant trainings on teaching profession, to mention a few (Emmanuel & Olusegun, 2015). The adverse effects of these challenges are poor teaching, poor student's assimilation, and poor academic performance in Computer Science. Interestingly, the aforementioned challenges can be tackled with the integration of various technologies in the teaching and learning of Computer Science. One of such technologies is the WebQuest.

The introduction of modern technology such as WebQuest in secondary schools clearly changes the way education is conducted and pave the way for a new educational approach, where students are expected to play more active than before (Drew & Leigh, 2009). Recently, efforts had been made by the educators and researchers to create interactive learning platforms for the learners that would enhance learning experiences and improve learning outcomes. A WebQuest is a specific, motivation and technology-based learning experience where learners acquire relevant knowledge from the Web or the Internet. WebQuest is a unique platform for learning specific subject matter from the Web. Significantly, the learning experiences are designed and developed by experts in fields of endeavour. According to Attwell and Battle (2012), WebQuest technology holds considerable promises for effective learning and teaching of Computer Science among the students and the teachers. WebQuests are wonderful approaches to capturing students' imagination and allowing exploration of ideas in a guided, meaningful manner.

Ajayi and Taiwo (2008) opined that one of the fundamental platforms for teaching and learning of Computer Science effectively is WebQuest. A Webquest is an integration of special computer program (software) and the Web-based technologies to acquire relevant knowledge in a specified field of study. A WebQuest is an inquiry-oriented lesson format in which most or all the information that learners work with comes from the web. These can be created using various programs, including a simple word processing document that includes links to websites (Drew & Leigh, 2009).

According to Sunal and Haas (2008), WebQuests are problem-solving activities for students that incorporate the Internet, computer-based materials, and other available resources. In Computer Science education, WebQuests provide the opportunity for students to actively engage in learning by connecting their interests with various content areas. With increased accessibility to information via the Internet, students are able to collect large volumes of information on a specific topic. According to Lopez (2006), the advantages of WebQuests to the students and teachers of Computer Science include: encourages learners to interact with information-based Internet resources; motivates learners and teachers towards teaching and learning processes, improves teachers' and learners' imagination and accommodates learners' diverse learning needs among others. The limitations of WebQuests usage in

schools, according to Lopez (2006) in developing countries include: poor connectivity; limited number of computers for schools; resource links readability often too high; technical skills requirements to create WebQuest and lack of power supply (electricity) to mention but a few.

However, the study of Adel (2015) on the effectiveness of using WebQuest to teach Computer Science to middle school students in Saudi Arabia indicated that the students taught by the WebQuest had higher scores as compared to those in the group taught by the traditional approach, but the difference was not statistically significant. In Adel (2015), there was no report on the difference between female and male students' performance when taught using WebQuest. This research attempted to find the difference between male and female students' performance when taught Computer Science using WebQuest. Certainly, the application of WebQuest to deliver instructions to the students would improve learning experiences and produce higher academic performance in the nearest future.

Okwuduba, Offiah and Madichie (2018) carried out a study on the effects of computer simulation on academic achievement of students in chemistry. It was discovered that computer simulation was more effective in improving students' achievement in chemistry than lecture method, and the male students performed better than their female counterparts.

Statement of the Problem

According to Rozema (2011), causes of poor academic performance in Computer Science among secondary schools students were collapsed infrastructures (physical building); poor teachers' methods of teaching; poor classroom management; lack of conducive learning environment; peer group influence and non-availability of computers for study and research. Also, the teachers' poor selection of teaching methods had been reported to have a negative impact on the learning outcomes of students Rozema (2011). Akinola, Olanrewaju and Oyenuga (2015) reported students' poor academic performance in programming as a topic in Computer Science. Also, Ndirika (2013) and Ekene (2017) pointed out the poor academic performance of students in Computer Science. The poor academic performance recorded could enhance poor acquisition of computational related subjects which overall affect the technological development of a nation.

In the existing study of Adel (2015), there was no information on the difference in scores between female and male students taught using WebQuest. In addition, there was no investigation on the difference in scores between public and private schools WebQuest-based learning in Gülbahar, Madran and Kalelioglu (2010), James (2011), Subramaniam (2012), Alias, DeWitt and Siraj (2014). This research furthermore attempted to bridge the gaps in the aforementioned studies.

The study of Yildirim, Ozden and Aksu (2011) was a comparison between public and private schools WebQuest learning of Social Studies. Since the contents of Social Studies are not the same as Computer Science, it is essential to investigate if there is any difference between public and private schools WebQuest-based learning in Computer Science. In an attempt to provide solutions to the teaching problems that had affected learning outcomes, therefore, there is a need to ascertain the effectiveness of WebQuest approach in Nigeria on learning outcomes of students before it can be generally adopted as an effective tool for learning.

Objectives of the Study

The aim of this study was to investigate the effectiveness of using WebQuest to teach Computer Science in junior secondary schools, Suleja Local Government of Niger State. Specifically, the objectives were to:

(i) find out the difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method;
(ii) examine the difference in the performance of male and female students taught Computer Science using WebQuest;
(iii) observe the difference in the performance of public and private schools' students taught Computer Science using WebQuest.

Research Questions

The following research questions guided the study:

(i) What is the difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method?
(ii) What is the difference in the performance of male and female students taught Computer Science using WebQuest?
(iii) What is the difference in the performance of public and private schools' students taught Computer Science using WebQuest?

Hypotheses

The following null hypotheses were postulated as a follow-up of the research questions:

H_{O1}: There is no significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method;
H_{O2}: There is no significant difference in the mean performance score of male and female students taught Computer Science using WebQuest;
H_{O3}: There is no significant difference in the mean performance score of public and private schools' students taught Computer Science using WebQuest.

Methodology

An experimental research design was adopted for this study. Creswell (2014) described an experimental design as "when one group obtains a treatment and the other group does not, the experimenter can isolate whether it is the treatment and not other factors that influence the outcome". This study used two groups, namely experimental group (WebQuest Based Learning, WBL) and control group (Conventional Learning Method, CLM). The control group was taught Computer Science using conventional lecture method and the experimental group was taught using WebQuests. In this study, the main independent variable was the categorical variable, methods (WBL and CLM) while the dependent variable was the continuous variable, students' achievement (scores). This research attempted to investigate the effect of independent variables on the dependent variable and gender as moderating variable.

The pre-test involved administering a test before the experiment while the post-test involved administering a test at the end of the experiment for results comparison between the experimental group and control group. In order to determine the baseline performance, the researcher with the help of computer teachers, commenced the study by first measuring the general performance of the participants of the study on a selected topic in Computer Science with a set of questions (Computer Science Performance Test, CSPT). The results of the pre-test were recorded on a data collection sheet (Score Sheet, SSH) and kept for comparison at the end of the experiment.

Secondly, the control and experimental groups were taught the same topic in Computer Science, where pre-test questions were selected, for two weeks under a closed supervision of the researcher who is a computer teacher with over five years teaching experience. The same teachers taught the same topic to both groups. This was to ascertain that the teachers' years of teaching experience did not affect the students' performance rather the place of instruction methods (either conventional lecture or WebQuest). The two groups were provided with a post-test after two weeks of instructions. The results of the post-test were recorded on a data collection sheet as carried out during the pre-test. The comparison was carried out to compare how the performance of both the control group and experimental group changed from pre-test to post-test after being taught either with WebQuest method or conventional lecture method. This helped in making conclusions on the effectiveness of using WebQuest to teach Computer Science in junior secondary schools, Suleja Local Government of Niger State. Since the same teacher taught the two groups, the research study design (experimental) used was considered appropriate to conduct the research.

The population of the study comprised of all the Junior Secondary School One (JSS 1) students in Suleja Local Government Area of Niger State. The JSS 1 students were considered for the study because this is the first and foundational class in secondary school education which requires effective learning towards excellent academic performance as students promote from one class to other and the subject Computer Science was chosen because of its concept meant for JSS 1 for technological acquisition. There is likelihood of obtaining poor results after final examination in JSS 3 when there is poor academic performance at the JSS 1 level. Shashaani (2015) reported that poor instruction delivery negatively affected the academic performance of JSS 1 than JSS 2 and 3 students.

This study adopted a multi-stage sampling procedures. Firstly, a convenience sampling technique was adopted to select ten (10) public and five (5) private secondary schools on the basis of ten (10) participants per school. The public schools' participants were more than the private schools' participants in this study because of higher population of students in the public schools. The participants were labelled "PuS" (as public) and "PrS" (as private) to indicate the participants' schools. According to Hamed (2016), a convenience sampling is a non-random sampling method that involves selecting participants because they are often readily and easily available for investigation. Secondly, a purposive random sampling was used to select 75 male and 75 female students for this study. Therefore, a total of one hundred and fifty (150) JSS 1 respondent constituted the sample.

In selecting the participants into the control and experimental groups needed for the study, the JSS 1 students were assembled and briefed on the objectives of this research. Papers were cut into pieces and differently labelled "Control" and "Experimental". There were 75 papers for each group in the box. The papers were mixed and filled in a box for each student to pick a group. With this approach, the participants were successfully grouped into 75 participants in both groups.

There were two research instruments used for the study. The treatment instrument (WebQuest Based Learning Package, WBLP) and the test instrument (Computer Science Performance Test, CSPT). The treatment instrument, WBLP was developed by the researcher with the assistance of professionals such as system programmer, the instructional designers. A C# programming language was used to develop the package with other applications such Microsoft PowerPoint 2013, Microsoft Word 2013, Notepad, Microsoft Visual C# 2010 Express, and Google Chrome. The package was presented to computer programmers and educational technology experts for validation. The contents of the

package were validated by the Computer Science specialists. The package had a topic selected from Computer Science and was subdivided into ten lessons which ran for two weeks. There were three control buttons in WBLP for specific functions. These buttons were Registration, Lessons and Quit.

The teachers were requested to develop 20 objective test questions for the participants from the selected topic in Computer Science. The question was titled "Computer Science Performance Test, CSPT" and score sheet, SSH were used for the assessment. There were 4 options provided as answers but only one was made correct. Each participant was expected to choose one correct answer and leave three wrong answers. The score sheets were marked "AnA" and "AnB" for the pre-test and post-test questions respectively.

A copy of CSPT and SSH were presented to the experts in Educational Measurement and Evaluation for observation and modification. After taking the concerns of the experts, the contents of the CSPT and SSH were modified as instructed, and it was returned for the content and predictive validity. Ellen (2015) stated that a predictive validity measures the extent to which a future level of a variable can be predicted from a current measurement and content validity deals with the experiment that provides adequate coverage of the subject being studied.

In addition, a test-retest method was used to determine the reliability coefficient of the test instrument and score sheet. The teachers and students of Government Secondary School (GSS), Suleja, Niger State were used as pilot sample. The copies of the CSPT and SSH were administered to the pilot sample on two different occasions at three (3) weeks interval. A reliability coefficient of 0.85 was obtained for the test instrument, CSPT and 0.79 for the score sheet, SSH from the analysis and these statistical values were considered reliable hence suitable for use in this research.

A correctly answered question had 1 mark. 150 copies of the CSPT were produced for pre-test and post-test. The CSPT and SSH were distributed to each participant before the commencement of the experiment. The participants were assembled at the Comprehensive Science Secondary School, Suleja for the research and to use the treatment instrument (WebQuest Based Learning Package, WBLP) installed in the computers. The score sheets at the pre-test stage were collected, collated, marked, recorded and kept for further analysis. The same type of CSPT and SSH were also distributed to the participants in both the control and experimental groups after the experiment. The score sheets at the post-test stage were collected, collated, marked, recorded and kept for comparison with the scores in the pre-test stage. For a correct answer to a question, there was a mark.

Since there were 20 objective test questions for a participant and 1 mark for a correctly answered question, the maximum obtainable mark was 20. The data collected were analysed by using mean and standard deviations statistical tools to answer the research questions while Analysis of covariance (ANCOVA) statistical analysis was used to test the three null hypotheses postulated for the study at 0.05 level of significance. These analyses were performed with the aid of the Statistical Package of Social Science (SPSS) software.

Results

The four (4) research questions used for this study were answered and presented as follows:

Research Question One: What is the difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method?

Table 1: Mean and standard deviation of students' performance in Computer Science using WebQuest and conventional lecture method

Group		Pre-Score	Post-Score	Difference
Control	Mean	3.83	6.35	2.52
	Std. Deviation	2.02	2.07	
Experimental	Mean	4.31	14.32	10.01
	Std. Deviation	1.17	4.03	7.49

Table 1 shows that the scores of the participants in both experimental and control groups were relatively equivalent at the initial stage (pre-test) with means of 3.83 and 4.31 respectively and graphically illustrated in Figure 1. However, in the post-test, the experimental (WebQuest based learning) group had a mean of 14.32 while the mean of the control group (conventional lecture method) was 6.35. The table further shows that there was statistical difference in the scores of students in the experimental group for the pre-test and post-test with a difference of 10.01. Likewise, a statistical difference of 2.52 was recorded between pre-test and post-test scores in control group. Since the final score of 14.32 was greater than the initial score of 4.31 at the post-test, this implies that WebQuest was effective in learning Computer Science. Therefore, there was a statistical difference of 7.49 in the performance scores of students taught Computer Science using WebQuest and conventional lecture method.

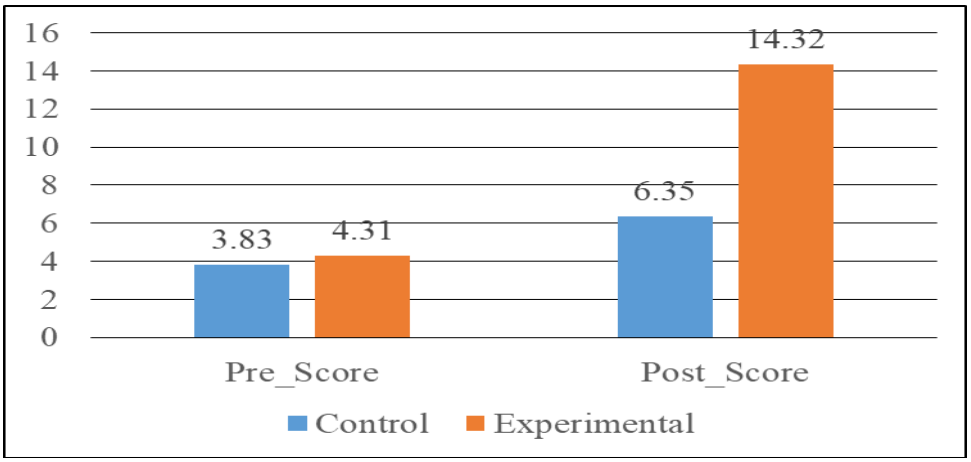

Figure 1: Students' performance using WebQuest and conventional lecture method

Research Question Two: What is the difference in the performance of male and female students taught Computer Science using WebQuest?

Table 2: Mean gain scores between male and female students using WebQuest

Gender	Pre_Score		Post_Score		Mean gain score
	$\overline{X}$	SD	$\overline{X}$	SD	
Male	4.58	2.35	7.69	2.38	3.11
Female	4.04	2.23	10.45	3.57	6.41

Table 2 shows the mean gain scores of male and female participants using WebQuest to learn Computer Science and graphically illustrated in Figure 2. The table further indicates that both male and female participants had improved performance in post-test with mean gain scores of 3.11 and 6.41 respectively. However, the female participants had a better

mean gain score than their male counterparts. Therefore, there was a statistical difference in the performance of male and female students taught Computer Science using WebQuest.

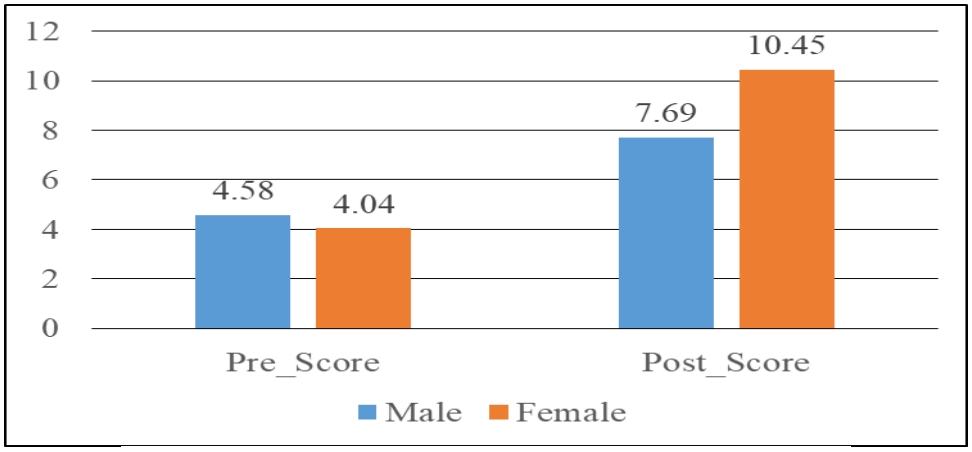

Figure 2: Students' performance based on gender

Research Question Three: What is the difference in the performance of public and private schools' students taught Computer Science using WebQuest?

Table 3: Mean gain scores between public and private schools' students using WebQuest

School	Pre-Score		Post-Score		Mean gain score
	$\bar{X}$	SD	$\bar{X}$	SD	
Public	4.49	2.27	7.05	2.31	2.56
Private	4.13	2.20	11.09	3.62	6.96

Table 3 shows the mean gain scores of public and private schools' participants using WebQuest to learn Computer Science and graphically illustrated in Figure 3. The table further indicates that both public and private schools' participants had improved performance in post-test with mean gain scores of 2.56 and 6.96 respectively. However, the private schools' participants had a better mean gain score than their public schools' counterparts. Therefore, there was a statistical difference in the performance of public and private schools' students taught Computer Science using WebQuest.

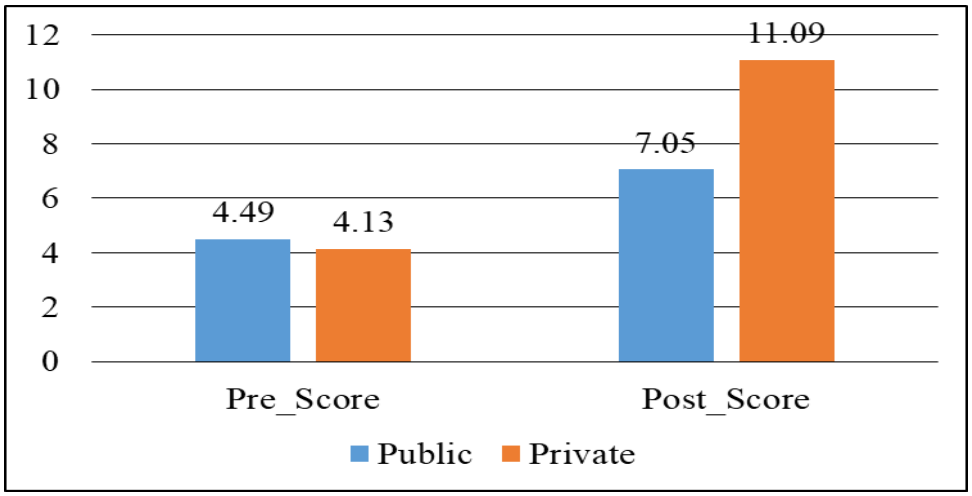

Figure 3: Students' performance based on school

Testing of Research Hypotheses
The stated null hypotheses were subjected to test as follow at 0.05 level of significance.

Hypothesis One: There is no significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method

Table 4: ANCOVA post-test on experimental (WBL) and control (CLM) groups

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4143.796[a]	2	2071.898	204.629	0.000
Intercept	1865.579	1	1865.579	184.252	0.000
Pretest (Covariate)	14.670	1	14.670	1.449	0.231
(Main Effect) Treatment	4127.065	1	4127.065	407.605	0.001
Error	1488.397	147	10.125		
Total	17981.000	150			
Corrected Total	5632.193	149			

a. R Squared = 0.736 (Adjusted R Squared = 0.732)

Table 4 indicates that the computed F-ratio for the main effect of the WebQuest Based Learning on the mean achievement of JS 1 students was 407.605 which was significant at P-value of 0.001 (p-value 0.001 < 0.05). This leads to the rejection of the null hypothesis of no significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method. Conclusively, there was a significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method.

Hypothesis Two: There is no significant difference in the mean performance score of male and female students taught Computer Science using WebQuest

Table 5: ANCOVA post-test on male and female students in experimental (WBL) group

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	287.354[a]	2	143.677	3.952	0.021
Intercept	1628.174	1	1628.174	44.780	0.000
Pretest (Covariate)	1.694	1	1.694	0.047	0.829
(Main Effect) Gender	270.622	1	270.622	7.443	0.007
Error	5344.840	147	36.359		
Total	17981.000	150			
Corrected Total	5632.193	149			

a. R Squared = 0.051 (Adjusted R Squared = 0.038)

Table 5 indicates that the computed F-ratio for male and female students taught using WBL was 7.443 which was significant at P-value of 0.007 (p-value 0.007 < 0.05). This leads to the rejection of the null hypothesis of no significant difference in the mean performance score of male and female students taught Computer Science using WebQuest. This implies that there was significant difference in the mean performance score of male and female students taught Computer Science using WebQuest.

Hypothesis Three: There is no significant difference in the mean performance score of public and private schools' students taught Computer Science using WebQuest

Table 6: ANCOVA post-test on public and private schools' students' performance in experimental (WBL) group

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	614.000[a]	2	307.000	8.993	0.000
Intercept	1657.208	1	1657.208	48.545	0.000
Pretest (Covariate)	1.940	1	1.940	0.057	0.812
(Main Effect) School	597.269	1	597.269	17.496	0.002
Error	5018.193	147	34.137		
Total	17981.000	150			
Corrected Total	5632.193	149			

a. R Squared = 0.109 (Adjusted R Squared = 0.097)

Table 6 indicates that the computed F-ratio for public and private schools' students taught using WBL was 17.496 which was significant at P-value of 0.002 (p-value 0.000 < 0.05). This leads to the rejection of the null hypothesis of no significant difference in the mean performance score of public and private schools' students taught Computer Science using WebQuest. This implies that there was significant difference in the mean performance score of public and private schools' students taught Computer Science using WebQuest.

Discussion

The first research question was on the difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method. The finding revealed that there was a statistical difference in the performance scores of students taught Computer Science using WebQuest and conventional lecture method. This finding pointed out that the learning of Computer Science among the junior secondary schools' students was effective. This finding further supported Adel (2015) that recorded higher scores for middle school students that used WebQuest to learn Computer Science in Saudi Arabia.

The second research question dealt with the difference in the performance of male and female students taught Computer Science using WebQuest. The analysis of the students' performance showed that the female students had a higher mean gain score in Computer Science than the male students. This result was contrary to Okwuduba, Offiah and Madichie (2018) who found that the mean achievement score of the male students was higher than the mean achievement score of the female students taught chemistry using computer simulations.

The analysis of the third research question revealed that the performance scores of public and private schools' students relatively similar at the pre-test. However, the private schools' students had improved scores at the post-test. This implied that there was a statistical difference in the performance of public and private schools' students taught Computer Science using WebQuest. These results were similar to Yildirim, Ozden and Aksu (2011) that indicated better performance of private schools' students than public schools' students in Social Studies.

Conclusion

This research revealed that there was a statistical difference in the performance of students taught Computer Science using WebQuest and conventional lecture method. It was discovered that teaching of Computer Science using WebQuest Based Learning method made the students to perform better. In using the WBL, the male participants performed than the female counterparts and there was a statistical difference in the performance of public and private schools' students taught Computer Science using WebQuest. The results

from the testing of the postulated hypotheses revealed that there was a significant difference in the mean performance score of students taught Computer Science using WebQuest and conventional lecture method, there was significant difference in the mean performance score of male and female students taught Computer Science using WebQuest and there was significant difference in the mean performance score of public and private schools' students taught Computer Science using WebQuest.

The findings of this research have strong implications for teaching and learning of Computer Science in Nigeria using WebQuest Based Learning (WBL) techniques. The fundamental implication of these findings was that WBL made students' performance better than the conventional lecture methid. Furthermore, the findings provided valuable empirical reports which would be useful as literature for scholarly investigations.

Recommendations

Based on the findings of the study, the following recommendations hereby made:

i. Financial support should be provided to assist the school in procuring facilities such WebQuest software and computers for the learners that would enhance effective utilization of WebQuest in the learning process.
ii. Technical support should be provided for the effective usage of WebQuest in teaching and learning of Computer Science.
iii. Adequate infrastructures should be provided in schools to facilitate the use of WebQuest in teaching and learning Computer Science.
iv. Computer Science teachers should integrate WebQuest technology into teaching towards the enhancement of students' academic performance.
v. Workshops and seminars on the relationship of WebQuest and students' academic performance should be provided to the students and the teachers.

References

Adel, R. A. (2015). Effectiveness of using WebQuest to teach computer science to middle school students in Saudi Arabia. An unpublished Master's Thesis submitted to the State University of New York at Fredonia Fredonia, New York.

Ajayi, A., & Taiwo, K. (2008). A system approach towards remediation of academic failure in Nigerian schools. *Nigeria Journal of Educational Psychology*, 3(1), 28-35.

Akinola, K. E., Olanrewaju, G. O., & Oyenuga, A. Y. (2015). Improvement strategies for computer science students' academic performance in programming skill. *American Journal of Computer Science and Information Engineering*, 2(5), 45-50.

Alias, N., DeWitt, D., & Siraj, S. (2014). An evaluation of gas law WebQuest based on active learning style in a secondary school in Malaysia. *Eurasia Journal of Mathematics, Science & Technology Education,* 10(3), 175-184.

Attwell, P., & Battle, J. (2012). Web learning and school performance. *The Information Society,* 2(1), 1-10.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* Los Angeles: SAGE Publications.

Drew, P., & Leigh A. (2009). Developing higher-order thinking skills through WebQuests. *Journal of Computing in Teacher Education*, 26(1), 29-34.

Ekene, V. E. (2017). Factors affecting the performance of computer students in secondary schools. An unpublished bachelor degree project submitted to science education department, faculty of education, Chukwuemeka Odumegwu, Ojukwu University, Uli, Anambra State.

Ellen, D. A. (2015). Validity and reliability in social science research. *Education Research and Perspectives*, 38(1), 105-123.

Emmanuel, F. B., & Olusegun, O. B. (2015). Impediments on the implementation of computer science education curriculum in public secondary schools in Osun State Nigeria. *Asia Pacific Journal of Education, Arts and Sciences*, 2(4), 12-17.

Federal Republic of Nigeria (2004). *National Policy on Education.* Abuja, Nigerian Educational Research and Development Council.

Gülbahar, Y., Madran, R. O., & Kalelioglu, F. (2010). Development and evaluation of an interactive webquest environment: Web macerasi. *Educational Technology and Society*, 13(3), 139–150.

Hamed, T. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *International Journal of Academic Research in Management*, 5(2), 18-27.

James, C. J. (2011). A comparison of student perceptions in traditional and online classes. *Academic Exchange Quarterly*, 5(4), 38-96.

Lopez, G. (2006). The effect of WebQuests on students' achievement and attitude in computer science. *Journal of Interactive Learning Research*, 17(2), 121-22.

Maloney, M. (2005). Changing instructional practices through technology training: WebQuest. *The Journal of Education*, 19(5), 40-42.

Ndirika, M. C. (2013). Game-based learning: A panacea for better attitude and academic achievement in basic science. *Journal of Educational and Social Research*, 3(8), 91-97.

Okwuduba, E. N., Offiah, F. C., & Madichie, C. J. (2018). Effect of computer simulations on secondary school students' academic achievement in chemistry in Anambra State. *Asian Journal of Education and Training*, 4(4), 284-289.

Rozema, R. (2011). Heart of darkness. WebQuest: Using technology to social studies. Retrieved on 30th December, 2014 from http://www.edrs.com/WebQuest/hod/.

Shao-Wen, S. (2012). The various concepts of curriculum and the factors involved in curricula-making. *Journal of Language Teaching and Research*, 3(1), 153-158.

Shashaani, K. (2015). The effectiveness of computer applications: A meta-analysis. *Journal of Research on Computing in Education, 28*, 52-67.

Subramaniam, K. (2012). How Webquests can enhance science learning principles in the classroom. *A Journal of Educational Strategies, Issues and Ideas*, 85(6), 237-242.

Sunal, G., & Haas, H. (2008). Using WebQuests to scaffold higher order thinking. *Social Studies and the Young Learner*, 16, 13–16.

Yildirim, Z. Y., Ozden, M., & Aksu, M. (2011). Comparison of public schools and private schools WebQuest-based learning of social studies. *Journal of Educational Research.* 4(4), 125-132.