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Web-Based Instruction and Students' Familiarity and Performance in Computer Education in Faculty of Education, University of Port Harcourt

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ABSTRACT

The study investigated web-based instruction as an innovative approach in teaching computer in education in faculty of education, university of Port Harcourt using the World Wide Web. In other to ascertain Students familiarity and performance using web-based instruction, the study employed a quasi-experimental design using achievement pre-test and post-test for students' performance and also a pretest- and post-test questionnaire to investigate their level of familiarization. The population of the study was the entire U2018 final year students taking computer in education course in Faculty of education which is about 817 students. Purposive sampling technique was used to select the department used to carry out the study using intact class as the sample size. The instruments for the study was questionnaire and achievement test. The instruments were validated by my supervisors and other experts in the field. The reliability of the instruments was done using test-retest method which had a coefficient of 0.73 and 0.83. The data was analyzed using mean and standard deviation for the research questions. A range mean of 2.50 was used as the interpretative norm that determined its level of acceptance or rejection. On the other hand, the hypotheses Postulated were analyzed ANCOVA and ANOVA at a 0.05 significance level. Analyses of data revealed that web-based instruction has positive impact on students' performance and students are already familiar with web-based instruction this is in agreement with what Marc Prensky(2001) said, calling this learners "Digital Natives' . Based on the findings, recommendations were made among others: teachers should balance their lesson to be more of asynchronous to increase students' performance. Also develop course content following the ASSURE model and Richard Mayer's multimedia principle when designing the web instruction.

Keywords: Web-Based instruction (WBI), Technology, Performance, familiarity

Introduction

The world is now more connected thanks to information technology, which has also accelerated the pace of technical development (Divéki, 2018). Or, to put it another way, the educational landscape has been significantly impacted by the rapidly emerging information technology. Innovative educational programs that give students engaging and interactive learning settings outside of the traditional classroom have been created as a result of technology innovation and integration in the classroom. Students who feel negatively affected by conventional teaching methods are more driven to study since learning is more adaptive than ever. Modern educational institutions are replacing traditional teaching methods with more effective ones, yet some still incorporate them into their curricula. These teaching techniques include computer-based learning (CBL), web-based instruction (WBI), and mobile learning. According to (Thamrin, Suriaman, & Maghfirah, 2019), technological advancements in education have demonstrated that learning is not merely limited to the classroom. Students need to become familiar with a range of learning styles in order to study well (Gros et al, 2012). According to earlier studies, chances for student interaction are necessary to influence their learning results (Zacharis, 2015). Using Web-based instruction as a flexible learning medium that can enhance learning processes and offer the ability to satisfy the demands of 21st-century students in diverse locations is one technique to boost learning flexibility. The argument that education should move in the direction of the learners rather than the other way around is advanced by Ray (2012) who claims that web-based instruction can satisfy the stated demand for flexibility in terms of pace, place, and face. Individually, students favour online education over traditional instruction, which some academics have previously classified as "teacher-centered" (Abedi, Keshmirshekan, & Namaziandost, 2019; Zhang X. et al, 2019; Ding & Zhang, 2018). It is clear that those involved in the educational system are embracing web-based instruction more and more because of its adaptability and flexibility. When participating in a virtual classroom, students could feel a feeling of camaraderie. Students' interest in learning and appreciation of intellectual exchange both rise is as a result of web-based learning. On the other hand, because of its adaptability and interactivity, web-based teaching does meet up to students' expectations in the twenty-first century. The expectations that students have on a personal level demands that vary depending on the application were not taken into account when traditional learning approaches were designed. The same cause causes the same effect, according to Bozkurt (2018), who claims that traditional educational institutions typically adopt this notion of causality. Student demand for web-based learning quickly rose as more benefits were revealed. Web-based instruction gives students access to a variety of academic possibilities. Interactions, relationships, performances, and success serve as examples of this. Students' communication skills, as well as their engagement, participation, and involvement in a variety of educational activities, gain from web-based instruction (Serdyukov & Serdyukova,

2012). In conclusion, the availability of information technology resources as well as institutional and governmental commitment to interactive and successful education in the twenty-first century is fueling the development of web-based instruction approaches. Both developed and developing nations are experiencing this development.

Web-based instruction is an innovative approach for delivering instruction to a remote audience, using the World Wide Web as the instructional delivery medium (Khan, 1997). Web-based instruction is available to the entire organization at any time and from any location. Trainees can access the course materials whenever they want, whether they are at home, at work, or even on the go through a learning management system. They can also communicate with one another in both large and small groups using electronic communication tools like discussion lists and e-mail. Khan (2001) described eight dimensional Frameworks for web based instruction. These dimensions are pedagogical, technological, Evaluation, Management, Resource support, interface design, institutional and Ethical.

In other to achieve this innovative approach, the researcher will adopt a model like ASSURE Model to develop course content on computer in education course, following Mayer's Multimedia principle to design an instructional video for the learners, that ill Engage and motivate them thereby increasing their performance. This study will focus on Computer Education students in Faculty of Education, University of Port Harcourt.

Statement of problem

According to Marc Prensky (2001) a person who has grown up in this information Era is called "Digital natives." These individuals are more receptive to participating in online education and training activities. Web-based instruction, in the opinion of Ray (2012), can ostensibly meet the demand for flexibility in terms of pace, place, and face. According to Zhang et al. (2018), students prefer web-based learning courses to traditional learning techniques. However, this innovative approach of instruction differs from conventional methods in the way it is put together. Technology has made it possible for individuals to learn at their own pace, irrespective of their locations and schedules because of web. As we all know, learning is no longer limited to the four walls of a school. Web Based Instruction can either be synchronous or Asynchronous but for this study, the researcher will focus on the Asynchronous aspect of web Based, where Learning can occur at different time depending on the learners schedule and pace. The problem with this type of learning lies in the designing of the instructional package, it has to be systematically designed following a model like ASSURE Model and also Richard Mayer's principle of multimedia in other to motivate, engage and increase learners' performance.

Aim and Objectives of the Study

The aim of this study is to investigate the familiarity and performance level of Computer Education students in web-based instruction.

In this research study the objectives are as follows:

- To investigate the extent to which students are familiar with web based instruction
- To ascertain the Performance level of students using web based instruction

Research Questions

The Research questions for this study are as follows:

1. Are the students' familiar with web-based instruction?
2. What is the effect of web-based instruction on students' performance in Computer Education?

Hypotheses

The Hypotheses for this study are as follows:

1. there is no significance difference in the familiarization of web-based instruction
2. web based instruction does not have significant effect on students' performance in Computer Education

Related Literature Review

Richard Mayer provides his considerable study on the optimal methods for organizing multimedia content to foster learning in his ground-breaking book Multimedia Learning. His research, the outcome of various tests, is condensed into 12 principles, which taken together constitute what he refers to as the "cognitive theory of multimedia learning" (Mayer, 2009). The cognitive theory of multimedia learning states that students attempt to draw meaningful connections between words and visuals, which lead to a higher level of learning than they would have received from just words or just images. According to cognitive theory of multimedia learning, one of the key objectives of multimedia training is to help the learner to create a cohesive mental picture of the material being given.

Higher Secondary Learners' Effectiveness towards Web Based Instruction (WBI) on Chemistry

Sudha & Amutha 2015 carried out a study on higher secondary learners' effectiveness towards web based instruction on chemistry.

Because of the flexibility and convenience of web-based training, it is critical to address the challenges that have a negative influence on retention and success in this setting. Based on the perspectives of people who have generated effective web-based content, generate principles of effective asynchronous web-based materials specifically appropriate for secondary level pupils. In science, and notably in chemistry, the invention and design of an instructional technique for effective use of web-based learning is common. Web-based training is better suited as a supplement to the learning process. WBI makes learning more exciting and relevant for kids by providing them with a multimodal experience. The usage of WBI has been stressed as the paradigm change from student-centered to learner-centered education has occurred. To complete classroom academic activities, students must employ a number of learning styles. WBI assists students, teachers, and institutions in improving the whole learning process. The authorities must prioritize the integration of technology and pedagogical approaches. Blackboard's web-based training was perfectly matched to the students' demands. Learners' perspectives on online learning have provided useful insights on how to integrate the teachers' goals with the learners' needs when learning in a Web-based instructional environment. The p urpose of this paper is to determine the effectiveness of web-based chemistry training for higher secondary students. In this work, an experimental method was used. The samples were separated into two groups: control and experimental. The control group received traditional education, while the experimental group received web-based instruction. Both groups were given a pre-test and a post-test. The study's findings show that there is no significant mean difference between pre-test and post-test scores taught by traditional methods, but there is a significant mean difference between pre-test and post-test scores taught by web-based instructional methods because they provide students with a multisensory experience.

Efficiency and Effectiveness Index of Web-Based Instruction Blended Learning in the Basic Design Course of Undergraduate Student

Liamthaiso, Pumipuntu & Kayapard (2011) carried out a study on efficiency and effectiveness index of web based instruction blended learning in the basic design course of undergraduate students The goal of this study was to create a web-based instruction blended learning design to demonstrate an undergraduate student's performance on an 80/80 basis, to determine the effectiveness index of the web-based instruction blended learning on the development of undergraduate students, to compare the academic achievement of students before and after the test, and finally to study the students' satisfaction and improvement towards learning. The sample for this study consisted of 30 undergraduate students majoring in New Media at Mahasarakham University's Faculty of Informatics. The 30 students were chosen from the students' basic design semester 2 academic years 2010 using a purposive sample technique. This study's contents included web-based education, blended learning, achievement exams, and satisfaction questionnaires. Statistics were used to examine data, such as calculating an average and standard deviation. The results of the test (t-test dependent) showed that internet lessons combined with process optimization represented 87.52% and effective results represented 85.23%, indicating that a combination of web-based lessons was effective (E1/E2) at an index academic achievement score of 0.71, 87.52/85.23. The pupils were statistically significant at the 0.01 level, and they were quite satisfied with their learning from web-based lessons. To assess efficiency and efficacy, this study employs a web-based instruction blended learning session. Students were quite satisfied with what they learned in this class, and it can be said that this strategy can be utilized to train students to reach their goals on their own.

Tseng & Chen (2020) looked into how web-based teaching affected the learning outcomes of education and training in the service sector during COVID-19. The three categories into which the study variables are divided in the research framework are independent variable, dependent variable, and moderating variable. Learning performance is the dependent variable, learning motivation and attitude are the independent factors, and the various teaching modalities are the moderating factors. Each variable is rated on a 7-point Likert scale. Demographics, learning performance, learning attitude, and learning motivation are the four main sections of the questionnaire for this study. In 1993, Pintrich, Smith, Garcia, and McKeachie developed the learning incentive variable, which has eight parts in all. The scale developed by Liaw and Huang (2011) served as the basis for the five items that make up the learning attitude variable. The Bloom's taxonomy served as the basis for the six-question learning performance variable, which was developed in 1956 by Engelahar, Frust, Hill, and Krathwohl. Once computer-assisted learning, web-based teaching, and video instruction had achieved their peak, the learners were permitted to complete practice tasks remotely. The learning performance scale was used to evaluate the training's effectiveness.

In order to be ready for the COVID-19 pandemic's consequences in 2020, businesses all around the world have converted to remote operations and stopped employing employees locally. Online learning is also used to deliver training and education in some businesses. In addition to presenting fresh difficulties for conventional education and training, web-based teaching platforms provide a variety of knowledge sources and application channels for corporate education and training. Three alternative teaching modalities were incorporated in the research design: online instruction, computer-assisted learning, and video tutorials. Participants in the study were employees in the service sector. The study of learning motivation, attitude, and performance is then carried out in an integrated comparison utilizing ANOVA and stepwise regression. The findings demonstrated that teacher service employees online considerably increased their capacity for learning.

Research Methodology

This study used a quasi-experimental design with pretest and posttests for its two groups, one receiving standard teaching as the control group and the other receiving web-based instruction. According to Nwankwo (2007), a quasi-experimental study is one in which some threats to validity cannot be adequately managed due to circumstances linked with the study that cannot be avoided. The researcher designed an instructional package using the

ASSURE Model and Richard Mayer principle of multimedia which as only tested on the experimental group. The population of this study consisted of all final year students' of U2018 session in the Faculty of Education taking computer education course. Purposive sampling technique was used to select the department to be used in carrying out the study. Intact class was used from two options in Education management department which served as the sample size. The instruments used were questionnaire and achievement test which was validated by experts in the field of measurement and evaluation. Test-retest method was used to obtain a reliability coefficient of 0.73 and 0.83. Pre-test and post test was administered to the control and treatment group. The post test was administered after a period of two weeks and analyzed. Research questions were analyzed using mean and Standard deviation. Hypotheses were tested using ANCOVA, and ANOVA at 0.05 significant level.

ANALYSIS AND INTERPRETATION

Research question 1: Are the students familiar with web based instruction?

Table 1.1 Mean and standard deviation analysis showing the familiarization level of students with web based instruction

Lev of Familiarization	N	Mean	Std. D
High	50	34.0200	3.23558
Moderate	13	26.6154	1.32530
Low	3	15.6667	2.30940

Table 4:1 displays the results of the students' knowledge of web-based instruction. The table displays the mean and standard deviation for each of the three familiarity levels—high, moderate, and low.

In the first level, there are 50 research participants, indicating a high degree of familiarity. The mean score for this group is 34.02, while the standard deviation is 3.24. As a result of the responses being closely clustered around the mean score, it can be concluded that the majority of participants in this group are quite at ease with web-based instruction. Overall study findings indicate that web-based learning is well known to most undergraduate education students.

Hypothesis 1: There is no significant difference in the familiarization of web based instruction

Table 1.2 One-way ANOVA analysis showing significant difference in the familiarization of web based instruction

Groups	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1376.367	2	688.184	79.592	.000
Within Groups	544.724	63	8.646		
Total	1921.091	65			

The familiarization with web-based instruction shows no discernible difference, which is the null hypothesis being examined in Table 4:2. The statistics show that the calculated F (2, 63) = 79.59, P.05, or p =.000, is statistically significant at the chosen alpha level of 0.05. As a result, there is a significant difference in how pupils adapt to online teaching. It is determined that there is a statistically significant difference in familiarization (high, moderate, and low) with web-based instruction and that the alternative is accepted and the null hypothesis that there is no statistically significant difference in familiarization with web-based instruction is rejected.

Research question 2: What is the effect of web based instruction on student's performance in computer Education?

Table 2.2 Mean and standard deviation analysis showing the effect Web based instruction on student's performance in computer Education

Treatment Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
Web Based Ins.	34	58.52	11.18	76.17	11.28	17.65
Control Grp	32	54.84	10.66	63.90	8.302	9.06

Table 2.2 displays the effects of web-based instruction on students' performance in computer Education. Experimental group that received web-based instruction and a control group that did not both participated in the test.

The results showed that the experimental group's pretest mean score was 58.52 with a standard deviation of 11.18. With some fluctuation in the scores within the group, this shows that the persons in the treatment group had a small baseline level of knowledge and abilities. After the web-based teaching, the posttest mean score increased to 76.17 with a standard deviation of 11.28. This signifies a significant improvement in performance, which is also reflected in the mean gain value of 17.65. This demonstrates how the participants' knowledge and skills in computer education were greatly improved by the web-based instruction.

The control group's pretest mean score was lower, coming in at 54.84 with a standard deviation of 10.66. This demonstrates that the starting level of knowledge and abilities in this group was lower than that of the treatment group, with significant range in scores within the group as well. After the instruction, the posttest mean score increased to 63.90, with a standard deviation of 8.302 following. The mean gain value of 9.06 indicates that the participants' performance did slightly improve as a result of the lesson, but the improvement was significantly less than that of the experimental group.

Therefore, based on these findings, it can be said that web-based instruction significantly improves students' computer education performance. The experimental group showed a substantial improvement in their performance compared to the control group.

Hypothesis 2: Web based instruction does not have significant effect on student's performance in computer Education.

Table 2.3 ANCOVA analyses showing significant effect of Web based instruction on student's performance in computer Education

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2571.619[a]	2	1285.809	12.961	.000	.292
Intercept	9384.013	1	9384.013	94.591	.000	.600
PRETEST	89.688	1	89.688	.904	.345	.014
GROUPS	2257.058	1	2257.058	22.751	.000	.265
Error	6249.972	63	99.206			
Total	334325.000	66				
Corrected Total	8821.591	65				

The results demonstrate that the groups' value of 2257.058 has a significant impact on performance with a partial eta squared of .265 (p.001). This demonstrates that the treatment group (web-based instruction) had significantly higher performance scores than the control group after correcting for the impact of pretest scores and other variables. It is feasible to infer from the results of the ANCOVA analysis that web-based instruction significantly influences students' performance in computer education and that the null hypothesis should be ignored. The effect size of .292 suggests that web-based instruction has a moderate to considerable effect on students' performance. This signifies that p =.000 is statistically significant at the specified alpha level of 0.05. F (1, 63) calculated = 22.75, P.05. As a result, the effectiveness of students' computer education is significantly impacted by Web-based instruction. The null hypothesis, according to which there is no statistically significant effect of Web-based instruction on students' performance in computer in Education, is rejected in favor of the alternative. This suggests that there is a statistically significant effect of Web-based instruction on students' performance in computer Education.

Conclusions

Based on the findings derived from this study, it can be said that web-based instruction has an impact to the engagement, motivation and performance of students. The study also reveals the importance of synchronous and asynchronous method of teaching in this present age, understanding the kind of learners we have now known as the 'Digital natives' so they can study or learn at their own pace and time using the internet. In conclusion, course designers should focus more on designing rich multimedia instructions with the right model like ASSURE and Richard Mayer multimedia principles in designing course content for the learners so as to keep their interest.

Recommendations

This study on the impact of web-based instruction on students' familiarity and performance in computer Education has shown that web-based instruction is, in fact, a cutting-edge technique of instruction that will improve students' performance. The suggestions are as follows:

1. Asynchronous methods of instruction delivery, which provide students the opportunity to learn at their own pace and convenience, should be given more attention by teachers.
2. Course designers should focus more on producing rich and captivating content to maintain online learners' interest.
3. When building courses for learners, course designers should work hand in hand with subject matter experts.
4. Teachers should encourage students to use application software like Google Classroom, Whatsapp, etc. for constant communication and instruction.
5. Instructors should provide students projects that will necessitate frequent internet use for independent research.
6. Teachers should assign students tasks and objectives that will enable them to study on their own time and at their own pace.

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