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Effect of Using Educational Videos in Teaching Web Design on Academic Achievement of Students

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Abstract
This study sought to ascertain the effect of using educational videos in teaching web design on the academic achievement of students. Quasi-experimental research design was adopted for the study and the study population comprised 351 undergraduates offering Website Design in two tertiary Universities in Rivers State. A purposive sampling technique was used to draw the sample size of 162 fourth-year students from the two universities. The instrument for data collection was a Web Design Achievement Test (WDAT) which the researchers developed and was validated by three research experts. The reliability of the instrument was determined using Kuder-Richardson 21 (KR-21) with a reliability index of .83. Mean and standard deviation were used for answering the research questions while Analysis of Covariance was used to test the null hypotheses at a significance level of 0.05. The findings of the study revealed that students who were exposed to educational videos outperformed more than their colleagues who were instructed with the conventional teaching method. Based on the findings, the study recommends that Educators should integrate educational videos into their teaching practices to enrich learning experiences and improve student achievement.

Keywords: Web design, educational videos, academic achievement

Introduction

Before Information and Communication Technology's (ICT) integration into the process of teaching and learning, learning was seen as being hard, boring, difficult and tedious. It was perceived learning was not taking place if students were having fun in a learning activity. This is not in any way to suggest that the traditional method of teaching was not useful; it was, as it offers an opportunity for the teacher to pass across lots of information to the students and this was useful for routine memorization. However, such methods of teaching can no longer hold in this 21st century where learners are technologically inclined, and understand better when technology is fully incorporated into the teaching process. ICT plays a major role in teaching and learning, particularly when it comes to how students and teachers can access educational resources. It therefore implies that for students to effectively learn in this digital era, ICT must be fully integrated into the learning process. Embedded in ICT are unique features that motivate and engage learners, bring life to concepts, provide access to the world of information, facilitate collaboration, foster tutored and individualized learning and enhance creativity. Technology has advanced over time, enabling computers to be used in both teaching and learning. Using simulations, YouTube, videos and animations in instruction delivery has increased due to technological advancements. Studies have shown that excellent learning outcomes in psychomotor and cognitive domains are obtained by efficient use of these technologies (Olelewe et al., 2020)

One of the ways ICT is being integrated into the classroom is through the use of videos. As technology continues to advance, it provides learners with new learning opportunities (Bozkurt, 2019). Educational videos are one of these opportunities and they help to create an exciting and rich learning environment for learners (Zhang et al., 2006). According to Ratanothayanon (2018), one teaching tool that educators can utilize to enhance their pedagogy is videos. The introduction of video-mediated instruction into the learning process has revealed a shift from the traditional teaching approach. Due to their capacity to enhance the learning process and bring life to concepts, videos are essential

in today's classrooms. This technology can advance students' understanding of concepts and can make learning more practical than theoretical to the students. Many topics are abstract; thus additional visual aids are necessary to help students understand them. Educational videos can improve students' learning experiences by improving their comprehension, fostering their creativity, and making them more receptive to learning about contemporary technology. Studies present that video in education has positive impacts and educators are encouraged to use them interactively.

According to Ghavifekr and Rosdy (2015), as cited in Olelewe et al. (2023), teachers can significantly increase learner engagement in computer skills such as web design by utilizing technologies like videos in knowledge transfer. Presently, one of the most in-demand and sought-after skills is web design. Web design is offered by computer science students in higher institutions in Nigeria. It seeks to convey practical skills on how websites such as schools, religious organizations, businesses etc. can be built. Web design skills aim to develop competencies needed for individuals to create jobs or find jobs for themselves to be self-reliant and become valuable in society after graduation. Because organizations and institutions all over the world are switching from traditional physical operations to cloud-based platforms offered by websites, having this skill is essential and beneficial. Since this is a fast-growing profession, there is a need to employ novel ways to effectively teach students in this discipline and one such novel way of teaching web design is the use of videos. Also, the technicalities associated with developing this skill make teaching web design difficult, especially when there are no adequate instructional materials. Possibly this is made worse, by the widespread use of the traditional lecture approach which is a result of large class sizes in many public tertiary institutions in Nigeria. To address this issue various innovative tools, platforms and resources such as YouTube, videos and simulations have been created to improve instruction at all levels (Park, 2011). Whether used in class as an online video or as a movie clip to illustrate a procedure, video instruction opens up new avenues for student learning. It's a teaching technique that lets instructors employ a customized kind of video-assisted training to aid the transfer of knowledge. When used properly, video-assisted training affects students' performance, claims (Bozkurt, 2019). Hence, in attempting to ascertain whether video instruction influences undergraduates' academic achievement in web design, a video on web design was created to augment the traditional lecture method in the class.

Educational videos leverage the power of visual learning, an approach which is especially effective for those learning web design. Complex concepts and web design principles are often better understood when presented visually through videos. Students can gain a concrete and useful understanding of the subject matter by watching videos that demonstrate design, coding techniques and the creative process in general. Many educational videos for web design incorporate interactive elements enabling students' participation in a learning procedure. This interactivity promotes, a hands-on approach to web design while also reinforcing learning. Students may follow along, pause and apply what they learn in real-time through video lessons, which promotes a more dynamic and engaging learning environment. Case studies and real-world scenarios can be introduced into the classroom through educational videos. By showcasing actual web design projects and their outcomes, students gain insights into industry practices and challenges. This exposure helps bridge the gap between theoretical knowledge and practical application, preparing students for the demands of the profession. Learning via video instruction could help students become proficient in organizing their ideas while they watch the video and observe the pictorial presentation. Contemporary educational technology tools like PowerPoint slides and videos are self-learning tools created with the aid of various technologies to improve the effectiveness and interest of the teaching and learning processes. Since web design tools are subject to technological advancement and regular updates, educational videos serve as a dynamic and easily updatable resource, allowing educators to incorporate the latest trends, tools, and best practices into their lessons. This ensures that students receive relevant and current information, equipping them for the fast-paced world of web design. Every student learns differently, and instructional videos are made to accommodate a range of learning styles. While reading may help certain children understand topics, visual and auditory stimulation may be more beneficial for other students. Teachers can better meet the needs of students with varying learning styles by using videos in the lessons. This makes learning more inclusive and productive for all.

Academic achievement is a measure of performance that indicates how well an individual has achieved a specific goal that is the centre of objectives in educational settings such as schools. Anene (2015) states that a student's academic status in comparison to other students of his age is a measure of achievement. It is important to note that educational videos have been associated with various positive effects on academic achievement. Several studies have been carried out to investigate the effectiveness of video on the academic performance of students. Kay and Kletskin (2012)

investigated the effectiveness of designed videos to help undergraduate students grasp mathematical concepts. A great number of students who took part in the survey stated that seeing videos helped them understand the concepts better. However, Ratanothayanon (2018) in his study discovered that videos had no major impact on students' academic performance.

Gender has become a significant factor that influences students' academic achievement irrespective of teaching strategies. As noted in existing literature, gender is an important factor that has a great impact on students' academic achievement especially in science-related courses. Sanda and Kurfi (2013) proposed that women are perceived as being underrepresented regarding access to and usage of ICT despite governments in Nigeria placing a strong focus on their use. Similarly, Mahmood and Bokhari (2012), and Fomsi and Ordua, (2017) demonstrate that gender inequality still exists when it comes to the access and possibilities for hands-on learning with ICT. Despite these findings, the extent of gender's influence on students' academic achievement particularly when teaching web design courses with educational videos is yet to be determined. Hence it is necessary to explore whether educational videos have varying effects on male and female students' academic success in web design courses. In light of this, this study examined the effect of using educational videos in teaching web design on the academic achievement of students.

Statement of the Problem

The performance of undergraduate students in web design has been observed to be considerably low. This low performance in web design examination poses a lot of threat and is a concern to the lecturers, students and parents. This evident low achievement could be traced to a variety of factors, including teaching methods used to teach skilled courses, deficient skills demonstrated by the instructor (Olelewe & Okwor, 2017) and insufficient instructional materials for teaching skilled courses (Buabeng-Andoh, 2012). Studies revealed that the lecture approach is inappropriate for teaching skilled courses such as web design since it may result in students becoming passive learners. Therefore, it stands to reason that using video instruction to teach and learn web design could greatly improve the efficiency with which knowledge is delivered and skills are developed.

The teaching of web design skills involves a strategy that extends beyond conventional teaching methods. The integration of videos into the teaching of web design is becoming prevalent in recent years. It presents a viable way to improve learning opportunities by giving students a hands-on, interactive, and visual understanding of the complexities of web design. Although there is a general acceptance of the potential benefit of using educational videos in the classroom, little is known about the precise effect that educational videos have on students' academic performance in web design.

Vital questions arise about how well educational videos help students understand web design concepts more deeply, develop their practical application skills and ultimately affect their academic performance. Educators and curriculum developers must understand the relationship between educational videos and academic achievement in web design. This study aims to address these gaps by giving insight that can inform instructional practices and guide the education of web design in the future. In light of this, the article aimed to discover the effect of videos on the academic achievement of students in web design courses.

Aim and Objectives of the Study

The purpose of the study is to determine the effect of educational videos in the teaching of web design courses on the academic achievement of students in Rivers State. Specifically, the study sought to determine:

1. The mean achievement and standard deviation scores of students taught web design using educational videos and those taught using conventional teaching methods.
2. The mean achievement scores and standard deviations of male and female students taught web design using educational videos.
3. The interaction effect of treatment and gender on students' academic achievement in a web design course

Research Questions

The following research questions were formulated to guide this study:

i. What are the mean achievement scores and standard deviation of students taught web design using educational videos and those taught using conventional teaching methods?

ii. What are the mean achievement scores and standard deviations of male and female students taught web design using educational videos?
iii. What is the interaction effect of treatment and gender on students' academic achievement in a web design course?

Hypotheses

The following null hypotheses were formulated and tested at a 0.05 level of significance

HO_1: There is no significant difference between the mean achievement scores of students taught web design using educational videos and those taught using traditional teaching methods.

HO_2: There is no significant difference between the mean achievement scores of male and female students taught web design using educational videos.

HO_3: There is no interaction effect of treatment and gender on students' academic achievement in web design.

Methodology

A quasi-experimental design with a non-equivalent pre-test-post-test control group design was adopted to carry out this study. A quasi-experimental design is a design that manipulates the independent variable without the random assignment of participants to conditions. The quasi-experimental design does not employ a randomization method. The study was conducted in Rivers State, Nigeria. The population of the study comprised 351 undergraduates offering Web design courses in two tertiary institutions in Rivers State. The sample size was 162 fourth-year students which were drawn from two public universities in the State. The researchers used the purposive sampling technique to draw the sample size of 162 (experimental group 83(47 males and 36 females) and control group – 79) students. The instrument for data collection was a Web Design Achievement Test (WDAT) which was developed by the researchers. WDAT consisted of two parts namely: A and B. Part A comprised the personal information of the students while Part B consisted of 40 multiple choice questions with four options of A, B, C and D on Web Design in line with the course content. The instrument was face and content validated by three research experts from the Department of Computer Science and Department of Test, Measurement and Evaluation, University of Port Harcourt. They were asked to review the items for content coverage, clarity, relevance and wording. Their corrections and recommendations were taken into consideration and incorporated to improve the instrument. Kuder-Richardson 21 (K-21) formula was used to estimate the reliability of the instrument and a reliability index of .83 was obtained. The researchers organized two-week training in the university premises for the regular course lecturers. The lecturers for the experimental group used educational videos on web design while the lecturers for the control group used the traditional lecture method. Mean and standard deviation were used in answering the research questions while Analysis of Covariance was used to test the null hypotheses at a significance level of 0.05. ANCOVA was used because it serves as a technique for controlling the differences across the groups.

Results

Research Question 1: What are the mean achievement scores and standard deviation of students taught web design using educational videos and those taught using traditional teaching methods?

Table 1: Mean achievement scores and standard deviation of students taught web design using educational videos and those taught using traditional teaching methods

Methods		Pretest	Posttest	Mean Gain
Educational Video	Mean	28.25	64.48	36.23
	N	83	83	
	Std. Deviation	8.85	12.24	
Conventional Method	Mean	29.35	52.81	23.46
	N	79	79	
	Std. Deviation	10.35	10.28	

Table 1 shows the mean achievement scores and standard deviation of students taught web design using educational videos and those taught using the traditional teaching method, showing a higher mean gain for the educational video

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group (36.23) compared to the conventional method group (23.46), suggesting a more effective learning approach with educational videos.

Research Question 2: What are the mean achievement scores and standard deviations of male and female students taught web design using educational videos?

Table 2: mean achievement scores and standard deviations of male and female students taught web design using educational videos

Gender		Pretest	Posttest	Mean Gain
Male	Mean	27.06	67.79	40.72
	N	47	47	47
	Std. Deviation	8.01	9.58	12.34
Female	Mean	29.81	60.17	30.36
	N	36	36	36
	Std. Deviation	9.73	14.02	15.21

Table 2 presents the mean achievement scores and standard deviations of male and female students taught web design using educational videos, indicating that male students showed a higher mean gain (40.72) compared to female students (30.36), suggesting varying learning outcomes between genders in favour of the male students.

Research Question 3: What is the interaction effect of treatment and gender on students' academic achievement in a web design course?

Table 3: The interaction effect of treatment and gender on students' academic achievement in the web design course

Method	Gender		Pretest	Posttest	Mean Gain
Educational Video	Male	Mean	27.06	67.79	40.72
		N	47	47	
		Std. Deviation	8.009	9.58	
	Female	Mean	29.81	60.17	30.36
		N	36	36	
		Std. Deviation	9.73	14.02	
Conventional Method	Male	Mean	28.97	47.35	18.39
		N	31	31	
		Std. Deviation	10.29	10.37	
	Female	Mean	29.60	56.33	26.72
		N	48	48	
		Std. Deviation	10.49	8.64	

Table 3 shows the interaction effect of treatment (Educational Video vs. Conventional Method) and gender on students' academic achievement in a web design course. Male students in the Educational Video group had a higher mean gain (40.72) compared to those in the Conventional Method group (18.39), while female students in the Educational Video group also showed a higher mean gain (30.36) compared to those in the Conventional Method group (26.72). This suggests that the treatment (Educational Video) had a more significant positive impact on male students' academic achievement, although both genders benefited from the Educational Video approach compared to the Conventional Method.

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HO_1: There is no significant difference between the mean achievement scores of students taught web design using educational videos and those taught using traditional teaching methods.

Table 4: Analysis of Covariance of mean achievement scores of students taught web design using educational videos and those taught using traditional teaching methods

Source	SS	Df	MS	F	Sig.	Partial Eta Squared
Corrected Model	5752.987[a]	2	2876.494	22.537	.000	.221
Intercept	48504.445	1	48504.445	380.026	.000	.705
Pretest	238.998	1	238.998	1.873	.173	.012
Methods	5628.432	1	5628.432	44.098	.000	.217
Error	20293.877	159	127.634			
Total	585964.000	162				
Corrected Total	26046.864	161				

Table 4 shows that there is a significant difference between the mean achievement scores of students taught web design using educational videos and those taught using traditional teaching methods, ($F(1, 159) = 5628.432$; $P < 0.05$. The partial eta of 0.217 obtained for the strategies means that 21.7% of the students' achievement could be attributed to the strategies employed in the teaching and learning of web design. This indicates a highly significant difference between educational videos and conventional teaching methods.

HO_2: There is no significant difference between the mean achievement scores of male and female students taught web design using educational videos.

Table 5: Analysis of Covariance of mean achievement scores of male and female students taught web design using educational videos

Source	SS	Df	MS	F	Sig.	η2
Corrected Model	1387.613[a]	2	693.807	5.094	.008	.113
Intercept	24504.079	1	24504.079	179.927	.000	.692
Pretest	203.762	1	203.762	1.496	.225	.018
Gender	1310.413	1	1310.413	9.622	.003	.107
Error	10895.110	80	136.189			
Total	357390.000	83				
Corrected Total	12282.723	82				

Table 5 shows that there is a difference between the achievement of male and female students in web design ($F(1, 80) = 136.189$; $P < 0.05$. The partial eta of 0.107 obtained for the mean means that 10.7% of the student achievement could be accounted for gender when taught using educational videos**.** Therefore, the hypothesis is rejected.

HO_3: There is no interaction effect of treatment and gender on students' academic achievement in web design.

Table 6: Analysis of Covariance mean achievement scores of students taught web design using educational videos and those taught using conventional teaching methods

Source	SS	Df	MS	F	Sig.	η2
Corrected Model	8546.643[a]	4	2136.661	19.169	.000	.328
Intercept	45283.685	1	45283.685	406.254	.000	.721
Pretest	330.415	1	330.415	2.964	.087	.019
Gender * Methods	8422.088	3	2807.363	25.186	.000	.325
Error	17500.221	157	111.466			
Total	585964.000	162				
Corrected Total	26046.864	161				

Table 6 presents the analysis of covariance (ANCOVA) for the mean achievement scores of students taught web design using educational videos and those taught using the conventional teaching method, indicating a statistically

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significant interaction between gender and teaching method ($F = 25.186$, $p < 0.001$, partial eta squared = 0.325), suggesting that both teaching method and gender significantly influence mean achievement scores.

Discussion

The mean achievement scores of students taught web design using educational videos compared to traditional teaching methods were examined. Table 1 and Table 4 demonstrate that students exposed to educational videos achieved a significantly higher mean gain compared to those taught through conventional methods. This finding aligns with contemporary educational practices emphasizing the effectiveness of technology-enhanced learning (Olelewe et al., 2020). Educational videos offer a dynamic and engaging learning environment that facilitates better comprehension and retention of complex concepts, leading to improved academic outcomes. The impact of gender on mean achievement scores among students taught web design using educational videos was explored. Table 2 reveals gender-specific differences in learning outcomes, with male students demonstrating a higher mean gain (40.72) compared to their female counterparts (30.36). Table 5 confirms that there is a difference between the achievement of male and female students in web design. This shows the importance of considering gender-specific learning needs and preferences in instructional design (Sanda & Kurfi, 2013; Mahmood & Bokhari, 2012). While educational videos offer benefits for both genders, tailored approaches may be needed to address gender disparities and optimize learning experiences.

The interaction effect of treatment (educational videos vs. conventional methods) and gender on academic achievement in web design was investigated. Table 3 highlights the nuanced relationship between instructional methods and gender, with male students generally exhibiting higher mean gains across both educational video and conventional method groups. Table 6 confirmed a statistically significant interaction between gender and teaching method. However, the educational video approach appears to yield more significant improvements for both genders, indicating the potential of technology-enhanced learning to mitigate gender disparities in academic achievement. These findings revealed the transformative potential of educational videos in enhancing student learning outcomes in web design education, while also emphasizing the need to address gender-specific disparities in instructional approaches. Integrating educational videos into teaching practices can optimize learning experiences and promote more inclusive educational outcomes, aligning with the evolving landscape of technology-enhanced learning.

Conclusion

The analysis demonstrates the effectiveness of educational videos in enhancing students' academic achievement in web design compared to traditional teaching methods. Students exposed to educational videos exhibited significantly higher mean gains, indicating improved comprehension and retention of course content. Additionally, the study revealed gender-specific differences in learning outcomes, with male students generally achieving higher mean gains than female students. However, both genders benefited from the educational video approach, highlighting its potential to mitigate gender disparities in academic achievement. The interaction effect of treatment and gender further showed the importance of tailored instructional approaches to optimize learning experiences for all students.

Recommendations

Based on the findings, several recommendations were made to enhance web design education

1. Educators should integrate educational videos into their teaching practices to enrich learning experiences and improve student outcomes.
2. Recognizing the gender-specific differences in learning outcomes, educators should adopt gender-inclusive instructional strategies. This may involve designing instructional materials and activities that address the unique learning needs and preferences of male and female students
3. Educators should undergo professional development training to effectively utilize educational videos and other technology-enhanced instructional approaches.
4. Further research is needed to explore the long-term effects of educational videos on student learning outcomes and retention.

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