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Evaluating the Effectiveness of Internet Library Resources on Students' Achievement in Physics

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Abstract

Because the face-to-face form of learning was temporarily suspended at the start of the pandemic, the way learners learned prior to the appearance of coronavirus 2019 (Covid-19) was severely impacted. When the pandemic was at its worst, most developed countries switched to online education, while most developing countries' schools were shut down entirely. A lack of web resources in those developing countries was one of the reasons for this. Internet library resources have been found to have the potential to improve teaching and learning, according to the literature. However, no empirical research has been done in Nigeria to examine the impact of internet library resources on the achievement of grade three students in Physics. As a result, this study was necessitated. A quantitative research strategy drove this study, which used a simple repeated measures research design. The study included 53 senior secondary two physics students who were chosen at random from secondary schools in Igbo-Eze North Local Government Area. Data were collected using a Physics Achievement Test (PAT) that had been face and content validated as well as trial tested. The internal consistency dependability of the PAT items was .88. Mixed design repeated analysis of variance was used to analyze the data. It was discovered that learners' exposure to electronic library materials had a substantial impact ($p < .05$) on their Physics achievement. As a result, it was suggested that secondary school students should be given enough exposure to internet library resources.

Keywords: Achievement, Effectiveness, Internet library resources, Physics

Introduction

Prior to the appearance of coronavirus 2019, the temporary suspension of face-to-face schooling during the pandemic had a huge impact on how learners learned (Covid-19). Most wealthier countries shifted to online schooling when the pandemic was at its worst, while most developing countries' schools were shut down completely. One of the reasons behind this was a shortage of

web resources in those impoverished countries. The use of internet library resources has been shown to have the potential to improve teaching and learning in the literature (Ugwuanyi, 2022). The fast spread of information communication and technology in the twenty-first century has changed and influenced human learning (Kwangmuang et al., 2021). To represent today's society, the learning management model must be modernized (Kwangmuang et al., 2021). Due to the rapid development of electronic publication, libraries are not only getting reading materials such as printed books and magazines, but also providing for access to a wide range of learning resources in electronic form. The web's resources and use as a tool are changing people's lives and education. While the World Wide Web was originally designed to deliver information and resources to users via push applications, the expansion of Web 2.0, as well as the proliferation of open source and shared use concepts, has switched the focus to user-generated content and applications for sharing (Baskar, 2017).

As a result, electronic resources have become extremely popular. E-Resources make up a significant portion of the global literature. E-books, E-journals, Databases, CDs/DVDs, E-conference proceedings, E-Reports, E-Maps, E-Pictures/Photographs, E-Newspaper, Internet/Websites -Listservs, Newsgroups, Subject Gateways, USENET, and other e-resources are just a few examples (Baskar, 2017). Teaching and learning have become more efficient, faster, and fun as a result of digital technology (Baskar, 2017). As technology has improved, libraries have been pushed to expand their collections (Baskar, 2017). It is becoming more customary to digitize print sources. Living in the era of multidisciplinary technology has resulted in a plethora of e-books and other innovations on the market (Korat et al., 2014). Academics commonly use e-resources as a source of information. Around the world, textbooks are being phased out of educational institutions (Almekhlafi, 2021). Electronic resources had a greater impact on learners'

learning than on adults' learning, according to previous study (Almekhlafi, 2021). Electronic resources aided low and moderate scorers in improving their grades (Chen et al., 2020). Almost all students considered digital literacy to be a need for personal and academic communication and information gathering. At various levels, e-books can help with word meaning acquisition.

The e-book exercise showed a significant long-term vocabulary effect (Shamir et al., 2018). Learners in both learning groups improved their overall emerging literacy skills after being exposed to technological materials (Shamir & Korat, 2008). Many studies have found that using e-books or other electronic versions of stories might cause youngsters to become distracted from the plot, particularly if they can interact with the screen or play games inside the text. According to a study, learners quickly grew familiar with e-books and enjoyed the technology (Jones et al., 2011). The results showed a difference in academic achievement between the pre- and post-test for the experimental group, suggesting the practical effect of using digital storytelling in teaching scientific themes (Shemy, 2020). According to the study's findings, learners who learnt statistics utilizing interactive electronic tools fared better academically than those who acquired statistics in the traditional manner (Lim et al., 2020). Electronic books had a considerable impact on learners' progress in basic science (Ugwuanyi, 2022).

Based on the foregoing, it may be concluded that electronic library materials are valuable resources for boosting learners' achievement in science and the arts. It's worth noting that the majority of studies on this topic have focused on numeracy and literacy, with only a few studies on physics topics. As a result, there was a gap in the literature, which this study attempted to fill. As a result, the impact of internet library resources on students' achievement in physics was investigated in this study.

Hypothesis

A lone hypothesis tested at 5% probability level was formulated for the study

H₀₁: There is no significant effect of internet library resources on pupils' achievement in basic science.

Methods

Research Paradigm, Approach, and Design

This study was conducted using a postpositivist research paradigm. This is owing to the fact that the research findings were derived via hypothesis testing. As a result, because the participants' features were quantified and presented objectively, a quantitative research approach was adopted. A basic repeated measures research design based on this technique guided the experiment. This method is based on multiple measurements of the dependent measure before and after treatment at various test times. This design has adopted by Ugwuanyi et al., 2020; Ugwuanyi et al., 2021; Onyishi et al., 2021.

Participants

A total of 53 senior secondary two physics students were chosen at random from secondary schools in the Igbo-Eze North Local Government Area for the study. On purpose, this sample was collected from five primary schools in the Igbo-Eze North Local Government Area. The researcher was able to sample just students in schools with information and communication technology (ICT) capabilities since the sampling was purposeful.

Measure

The data was gathered using a physics achievement test (PAT) that the researchers devised. There were 30 multiple-choice questions with four options: A, B, C, and D, with only one

correct answer. These PAT items were generated using SS 2 physics curriculum. Each correct answer was worth two points, for a total of 60 points and a minimum score of 0.

Validation and Reliability

The PAT was suitably content and face validated prior to trial testing. The Table of Specification was used to ensure that the content of PAT was correct. Face validation was then completed by two physics education specialists and one measurement and assessment expert. These experts provided important feedback on the PAT, including the items' language, appropriateness for the learners' skill level, and relevance to the research goal, among other factors. The comments of the validators were then used to make adjustments to the PAT.

After it was face validated, the modified PAT was trial tested on 20 primary 3 learners who were not part of the study. The data were subjected to Kuder-Richardson's formula 20 reliability estimate to determine the internal consistency dependability of the PAT items, which provided a reliability index of 0.88.

Ethical Consideration Statement

The study's conduct was approved by the University of Nigeria's research ethics committee. In addition, prior to the start of the study, the participants and their professors were given informed permission forms. These forms were correctly filled out and signed by the parties involved.

Experimental Procedure

One week before the start of the treatment, two rounds of pre-testing were conducted. The researchers were able to obtain the study's baseline data as a result of this. The experimental sessions began after that. Learners were exposed to the utilization of internet library resources while learning about Physics concepts. Wave concepts, current electricity, and wave-particle duality are only a few of the topics covered by internet library resources. The students were taught

those concepts by exposing them to a variety of internet library resources that featured similar concepts. This exposure was repeated for a total of four weeks. At each session, students were encouraged to ask questions about the subjects they didn't understand. At the end of the treatment, the participants were given the reshuffled PAT for the first posttest. One week following the first posttest, the second posttest was administered. Following that, in preparation for data analysis, the numerous measurement scores before and after the exposure were grouped and cleaned.

Data Analysis

The achievement scores of learners before and after their exposure to the treatment condition were depicted using a Bar chart. The data were analysed using a mixed design repeated measures analysis of variance to answer the research question and test the hypothesis. The mean was used to answer the study question, and the hypothesis was tested using simple repeated analysis of variance at 5% probability levels.

Results

Table 1

Mean analysis of the scores of the learners at pretests and posttests

Time	N	Mean	Std. Deviation
Pretest 1	53	12.09	4.89
Pretest 2	53	12.78	6.78
Posttest 1	53	46.22	10.21
Posttest 2	53	48.43	9.22

Table 1 showed that the mean achievement scores of the learners at pretests 1 and 2 are ($M = 12.09$, $SD = 4.89$) and ($M = 12.78$, $SD = 6.78$) while at posttests 1 and 2, their mean achievements are ($M = 46.22$, $SD = 10.21$) and ($M = 48.43$, $SD = 9.22$).

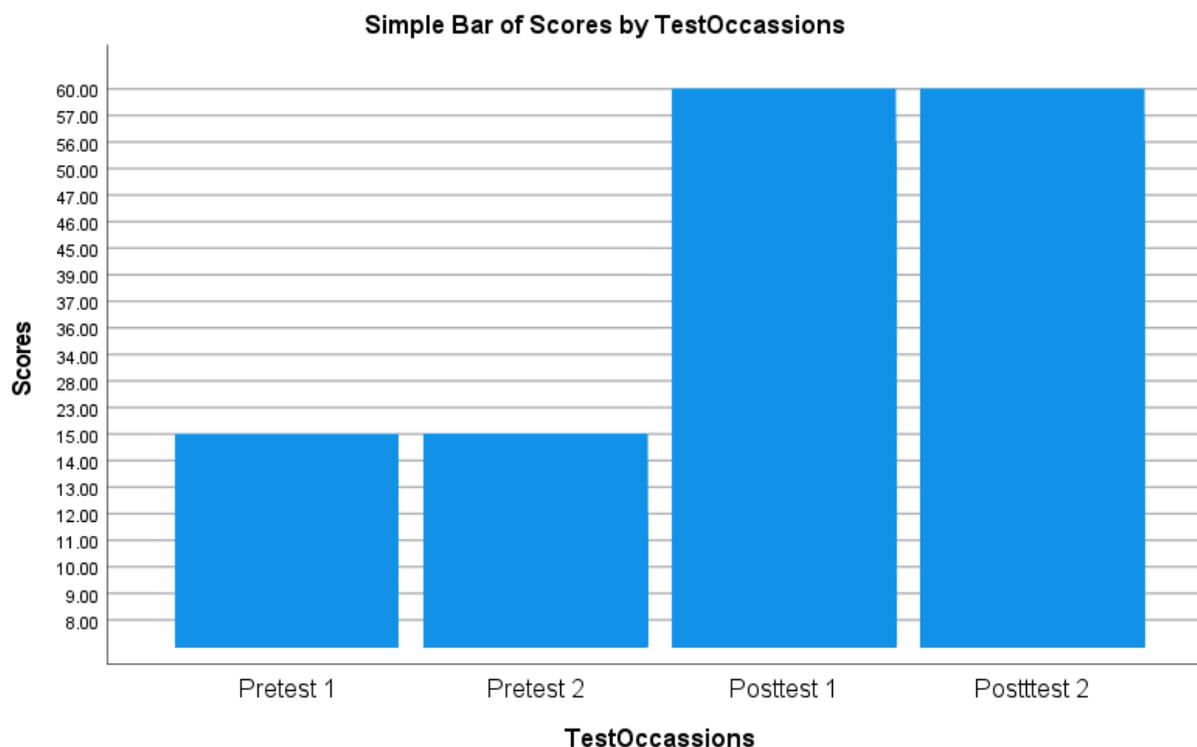


Figure 1: Bar chart representation of the scores of learners before and after exposure to internet library resources

Figure 1 showed that the highest score attained by the learners at pretests 1 and 2 is 15.00 while after exposure to internet library resources their score at posttests 1 and 2 stood at 60.00.

Table 2

Repeated measures analysis of variance of the difference in the test occasions

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	63206.618	3	21068.873	812.518	.000	.940
	Greenhouse-Geisser	63206.618	1.697	37254.965	812.518	.000	.940
	Huynh-Feldt	63206.618	1.748	36163.823	812.518	.000	.940
	Lower-bound	63206.618	1.000	63206.618	812.518	.000	.940
Error (Time)	Sphericity Assumed	4045.132	156	25.930			
	Greenhouse-Geisser	4045.132	88.223	45.851			
	Huynh-Feldt	4045.132	90.885	44.508			
	Lower-bound	4045.132	52.000	77.791			

Table 2 revealed that internet library resources had significant impact on the achievement of learners in physics, $F(3, 156) = 812.518, p < .05, \eta_p^2 = .940$. This implies that the null hypothesis was rejected ($p < .05$). Moreover, the effect size of .940 indicates that 94% improvement in the achievement of learners in physics can be attributed to their exposure to internet library resources. The significant effect of time on the achievement of learners in physics is illustrated in Table 3.

Table 3

Post-Hoc pairwise comparison test for the significant difference in the test occasions

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
1	2	-.170	.215	.967	-.758	.418
	3	-35.434*	1.376	.000	-39.196	-31.672
	4	-37.642*	1.268	.000	-41.110	-34.173
2	1	.170	.215	.967	-.418	.758
	3	-35.264*	1.326	.000	-38.890	-31.638
	4	-37.472*	1.241	.000	-40.864	-34.079
3	1	35.434*	1.376	.000	31.672	39.196
	2	35.264*	1.326	.000	31.638	38.890
	4	-2.208	1.244	.401	-5.610	1.195
4	1	37.642*	1.268	.000	34.173	41.110
	2	37.472*	1.241	.000	34.079	40.864
	3	2.208	1.244	.401	-1.195	5.610

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Sidak.

Discussion of Results

The goal of this study was to see how internet library resources might affect students' physics achievement. Using a simple repeated measures design, it was discovered that internet library resources had a very high significant influence on learners' physics achievement, accounting for a 95.4 percent increase in their physics achievement. This result is highly desirable because the researchers' experiences during the intervention attest to the research's success. The intervention in this example allowed students to investigate physics principles utilizing a variety

of internet library resources in a safe environment. The students were closely supervised in this case to ensure that they had no access to materials other than those pertaining to basic science. Internet library resources facilitate the effective delivery of information to all types of users, promote collaborative research activities, encourage the generation and diffusion of knowledge using communication network tools, and encourage the use of communication network technologies (Dukper et al., 2019).

Recent empirical research have revealed that internet library resources have a major impact on student achievement. Teaching and learning have become more efficient, faster, and fun as a result of digital technology (Baskar, 2017). Previous studies on the impact of electronic resources on learning indicated that electronic resources had a greater impact on the learning of children than on the learning of adults (Almekhlafi, 2021). Electronic resources aided low and moderate scorers in improving their grades (Chen et al., 2020). Almost all students considered digital literacy to be a need for personal and academic communication and information gathering. At various levels, e-books can help with word meaning acquisition. The e-book exercise showed a significant long-term vocabulary effect (Shamir et al., 2018). Learners in both learning groups improved their overall emerging literacy skills after being exposed to technological materials (Shamir & Korat, 2008). Many studies have shown that using e-books or other electronic versions of stories can cause students to become distracted from the plot, particularly if they can interact with the screen and/or play games inside the text. According to a study, learners quickly grew familiar with e-books and enjoyed the technology (Jones et al., 2011). The results of a study revealed a difference in academic achievement for the experimental group between the pre- and post-test, demonstrating the usefulness of using digital storytelling in teaching scientific topics (Shemy, 2020). According to the study's findings, students who taught statistics utilizing interactive electronic tools fared

better academically than those who acquired statistics in the traditional manner (Lim et al., 2020).
Electronic books have a considerable impact on students' Physics achievement (Ugwuanyi, 2022).

Conclusion and Recommendation

Internet library resources had a very high significant influence on learners' achievement in physics, accounting for 95.4 percent improvement in physics achievement, according to this study. As a result, the researchers came to the conclusion that internet library resources had a considerable impact on learners' achievement in physics. It is therefore recommended that the secondary school board authority should provide teachers with enough access to internet library resources in order to facilitate the use of internet library resources in the teaching of physics and other relevant topics.

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