

UTILIZATION OF DIGITAL RESOURCES FOR OPTIMIZATION OF STUDENTS' LEARNING OUTCOMES IN RIVERS STATE UNIVERSITIES

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ABSTRACT: This study investigated utilization of digital resources for optimization of students' learning outcomes in Rivers State Universities. Three objectives, three research questions and three hypotheses guided the study. The study adopted descriptive survey research design. The population of this study was 43,771 consisting of 2,153 lecturers and 20,939 students from Rivers State University and 778 lecturers and 19,901 students from Ignatius Ajuru University. The sample size of 396 consisting of 53 lecturers and 150 students from Rivers State University and 43 lecturers and 150 students from Ignatius Ajuru University was derived using Taro Yamane's formula and stratified random sampling technique. The instrument of the study was a self-developed questionnaire titled: "Digital Resources for Optimizing Students' Learning Outcomes Questionnaire" which was face and content validated by two experts in Measurement and Evaluation and Department of Educational Management. Cronbach Alpha was used to establish the reliability of the instrument which yielded reliability indexes of .74, .77 and .70. Mean and standard deviation were used to answer the research questions while z-test was used in testing the formulated null hypotheses at .05 level of significance. Findings of the study revealed that to a high extent utilization of digital resources such as e-books, online journals and multimedia content optimize students' learning outcomes in Rivers State Universities. Based on the findings, it was recommended among others that school management should organize regular workshops and training sessions to equip students and lecturers with the necessary digital skills to effectively utilize e-books so as to enhance students' engagements with digital resources.

Keywords: Digital Resources, E-books, Online Journals, Multimedia Contents, Learning Outcomes.

Reference to this paper should be made as follows:

Amie-Ogan, O. T., & Soli, R. (2025). Utilization of digital resources for optimization of students' learning outcomes in Rivers State universities. *International Journal of Leadership, Quality Education and African Development*, 2(1), 122-135.

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INTRODUCTION

The 21st century education comes with unprecedented opportunities for enhancing teaching and learning activities. Since ancient times, teaching and learning have adopted the traditional instructional method where education is imparted within the walls of classrooms to a group of students. The advent of digital resources has redefined traditional pedagogical approaches and the overall educational experience for both lecturers and students (Adeyemo in Amadi & Urho, 2022). Educational institutions all over the world have recognized the important role digital

resources play in the teaching and learning environment. It is in line with this that, digital resources are currently being incorporated into the Nigerian educational system, offering the potential to revolutionize teaching methods and enhancing the learning experience for students (Adedokun-Shittu & Shittu, 2020). In Rivers State universities, where student populations are rapidly increasing and the demand for quality education is high, digital resources present an opportunity to optimize learning outcomes by overcoming challenges associated with traditional instructional methods. The quest for educational development now makes it imperative for the utilization of digital resources in higher education to transform teaching and learning, foster an interactive and flexible learning environment that enhances students' learning outcomes.

The utilization of digital resources in optimizing students' learning outcomes is closely linked to the concept of blended learning, where both online and face-to-face methods are integrated to enhance learning experience, increase flexibility and improve students' engagement. Research has shown that students who engage with digital resources tend to perform better than those who rely solely on traditional classroom teaching (Means, Bakia & Murphy, 2019). This is because digital resources allow students to learn at their own pace, revisit complex concepts and access diverse perspectives beyond what is offered in conventional lectures. Nevertheless, disparities in access to digital resources remain a significant issue, particularly in Nigerian universities where socio-economic factors play a crucial role in students' ability to utilize digital technologies effectively (Eze et al., 2020). In Rivers State, where there is a mix of public and private universities, the availability of digital infrastructure varies, potentially affecting the degree to which students benefit from digital learning resources. Moreover, the impact of digital resources on learning outcomes is influenced by students' attitudes, motivation and access to digital devices. The aim of integrating digital resources into teaching and learning process allows for the delivery of customized and collaborative content, recommendations and feedback, providing students with a tailored learning experience that improve their learning outcomes.

Students' learning outcomes refers to the desired learning objectives or standard that students are expected to achieve. Students' learning outcome have been articulated to include the ability of students to understand content taught in a clear and understandable manner, been able to have appropriate, relevant and timely communication with the instructor, ability to acquire theoretical and practical knowledge, and the ability to think critically. When students meet the expectation of a learning programme, then such students are said to have positive learning outcome, while the reverse is the case when students' expectations are not met. According to Biggs and Tang (2019), effective learning outcomes are those that are aligned with teaching activities and assessment methods, a principle that applies equally to digital learning environments. Digital resources can potentially optimize students' learning outcomes by providing personalized learning experiences, facilitating active engagement with content, enabling collaborative learning and offering immediate feedback mechanisms (Ezeama & Jaja, 2023).

Digital resources refer to technology-based materials, tools or platforms that can be used to facilitate teaching and learning processes. Ng'ambi and Bozalek (2021) defined digital resources as electronic instructional materials that facilitate learning through various digital formats, including web-based platforms, multimedia tools and online repositories. Similarly, Okebukola (2020) described digital resources as technological innovations that support educational activities by enhancing content delivery, fostering collaboration and expanding access to information. Selwyn (2021) opined that digital resources are designed to facilitate the

acquisition, storage, retrieval and distribution of educational content, thereby enabling learners to access information beyond the limitations of traditional print materials. These resources play a crucial role in modern education by offering flexible, personalized and student-centered learning experiences that cater to different learning styles and paces. Bates (2022) asserted that digital resources enable students to engage in self-directed learning, collaborate with peers across different locations and develop digital literacy skills that are essential for academic and professional success. The availability of digital resources has significantly transformed pedagogical practices, shifting from teacher-centered approaches to more student-centered models where learners take an active role in constructing knowledge. Parveen and Ramzan (2024) asserted that today's children are highly accustomed to using electronic gadgets, and the utilization of digital resources can capture their interest and increase their involvement. Students can download necessary information and upload their content which enhance their engagement in learning. According to Nwezeh and Shabi (2021), these digital resources include e-books, online journals, digital libraries, learning management systems, educational software, online databases, multimedia content, virtual laboratories and various web-based applications.

E-books have become a crucial digital resource in modern education, significantly enhancing students' learning outcomes by providing accessibility and personalized learning experiences. As higher education institutions increasingly integrate technology into their curriculum, e-books have emerged as a preferred alternative to traditional print textbooks, offering students a flexible and efficient way to engage with academic contents. Unlike printed materials, e-books provide various features such as search functions and adaptive learning tools, all of which contribute to deeper comprehension and improved learning outcomes (Johnson & Buck, 2022). One of the most significant advantages of e-books in optimizing students' learning outcomes is their accessibility and portability. Traditional textbooks are often expensive, bulky and sometimes difficult to obtain, particularly for students in resource-constrained environments. E-books, on the other hand, can be accessed on multiple devices, including laptops, tablets and smartphones, allowing students to study anytime and anywhere. This flexibility enables students to engage with learning materials beyond the classroom, reinforcing their understanding of concepts through continuous exposure (Nguyen & Benson, 2021). Furthermore, e-books eliminate geographical and financial barriers by providing open-access educational resources, ensuring that all students, regardless of their socioeconomic status, have access to high-quality learning materials. Unlike static printed texts, e-books incorporate interactive features such as hyperlinks, embedded videos and quizzes that cater for diverse learning styles and enhance students' comprehension (Garcia & Lopez, 2023).

A study by Alghamdi and Rahman (2023) found that students who use interactive e-books demonstrate greater engagement and retention of information compared to those using traditional textbooks. They further stated that the ability to interact with content, such as clicking on definitions, watching explanatory videos, or completing practice exercises, transform passive reading into an active learning experience, thereby improving students' ability to internalize and apply knowledge. Research by Singh and Patel (2022) suggested that students who engage with e-books experience higher learning outcomes, as the content adjusts to their learning pace and provides instant feedback. The ability to revisit challenging sections, receive explanations based on individual performance and track learning fosters self-directed learning, making students more independent and proactive in their studies. According to Martin and Taylor (2021), e-books allow students to search for keywords, quickly navigate chapters and access related academic sources through embedded links. Students who utilize e-books demonstrate improved analytical

skills because they engage with multiple sources, compare viewpoints and develop well-rounded arguments. The instant access to a vast pool of scholarly content encourages deeper exploration of topics, ultimately enhancing students' academic writing and research capabilities.

Another digital resource for optimizing students' learning outcomes is online journals. As higher education institutions embrace digital transformation, online journals serve as an essential tool for students to engage with current knowledge, develop research skills and contribute to academic discourse. Unlike traditional print journals, online journals offer instant access to a vast repository of scholarly materials, enabling students to stay informed about the latest developments in their respective fields (Smith & Johnson, 2022). Online journals optimize learning outcomes by providing students with access to credible and up-to-date academic literature which contain rigorously reviewed studies conducted by experts in various disciplines. This ensures that students engage with authoritative and well-substantiated information, which is crucial for academic success. According to Brown and Taylor (2021), students who regularly use online journals demonstrate higher levels of academic improvement because they base their assignments and research projects on verifiable evidence rather than unreliable sources. The accessibility of online journals also allow students to explore diverse perspectives, compare different research findings and develop a more comprehensive understanding of their subjects. In addition to providing reliable content, online journals contribute to the development of critical thinking skills. Engaging with scholarly articles requires students to analyze methodologies, evaluate arguments and synthesize information from multiple sources (Patel & Wang, 2023). This process encourages deeper cognitive engagement and enhances students' ability to assess the validity of research findings.

A study by Williams and Carter (2023), found that students who frequently read online journals exhibit stronger analytical and evaluative skills, as they learn to distinguish between well-supported arguments and weakly substantiated claims. Students develop the ability to question assumptions, challenge existing knowledge and contribute meaningfully to scholarly discussions, all of which are essential for academic and professional success through critically engaging with academic literature. Online journals also play a crucial role in improving students' academic writing skills. Through studying articles from reputable journals, students gain exposure to well-structured arguments, formal writing styles and proper referencing techniques (Roberts & Green, 2021). Research by Martinez and Lee (2022) suggested that students who regularly read and cite journal articles in their work produce higher-quality essays and research papers compared to those who rely solely on textbooks or informal online sources. It was reiterated that exposure to scholarly writing enhances students' ability to construct logical arguments, use evidence effectively and present ideas in a clear and professional manner. Furthermore, online journals enhance research efficiency and academic productivity by providing advanced search and digital tools that facilitate information retrieval. Unlike traditional print journals, which require extensive time and effort to locate relevant articles, online journals allow students to search for specific keywords, filter results by publication date and access full-text articles within seconds (Kim & Nelson, 2022). This ease of access significantly accelerates the research process, enabling students to gather and analyze information more efficiently. The ability to quickly locate and synthesize relevant literature enhances students' ability to construct well-informed arguments and contribute to academic discussions.

Multimedia content is another essential digital resource which significantly optimize students' learning outcomes by integrating multiple forms of media such as videos, animations,

audio recordings, simulations and interactive graphics. These elements collectively create an immersive learning environment that fosters engagement, improves comprehension and enhances knowledge retention (Okebukola, 2020). Mayer (2021) asserted that multimedia content presents information in dynamic ways, enabling students to grasp complex concepts more effectively and retain information for longer periods. One of the most critical advantages of multimedia content is its ability to accommodate various learning styles. According to Fleming and Mills (2019), students process information differently, with some preferring visual representations, others benefiting from auditory explanations and some learning best through hands-on interaction. Multimedia content integrates these modes by combining text with images, videos and audio, ensuring that learners with different preferences can engage with the material in ways that suit their cognitive strengths (Mayer & Moreno, 2021). For example, a short documentary-style video be used in profiling a real-time example of school undergoing strategic planning. This gives students a contextual understanding of the theoretical concepts. This multimodal approach enhances comprehension and makes learning more inclusive for a diverse student population (Clark & Mayer, 2020).

Traditional instructional materials, such as printed textbooks often fail to capture students' attention, leading to passive learning and reduced knowledge retention. Multimedia content, such as educational videos and interactive simulations, create a more engaging and stimulating learning experience (Wang et al., 2022). In addition to improving comprehension, multimedia content support active learning by encouraging students to participate in interactive exercises and problem-solving activities. Unlike traditional passive learning approaches, where students passively absorb information, multimedia content promotes active engagement by requiring learners to interact with digital elements. This interactivity do not only reinforce learning but also fosters a sense of curiosity and exploration, which are essential for academic growth.

Multimedia content also supports collaboration and knowledge sharing among students by enabling digital interaction and communication. Online learning platforms that incorporate multimedia tools, such as discussion fora, video conferencing and collaborative document editing, allow students to engage in group discussions, share insights and work on projects together. Research by Wang et al. (2022) suggested that students who actively participate in multimedia-based collaborative learning environments demonstrate improved problem-solving skills and higher levels of engagement compared to those who study in isolation. When students leverage digital resources for collaboration, they tend to benefit from diverse perspectives and collective knowledge, ultimately enhancing their learning outcomes. Another key benefit of multimedia content is its ability to facilitate personalized learning experiences. Multimedia content allow students to learn at their own speed. Video lectures, for example, enable learners to pause, rewind or rewatch sections to reinforce understanding. Interactive modules provide immediate feedback, allowing students to identify knowledge gaps and focus on areas that require further study. According to Pashler, McDaniel, Rohrer and Bjork (2021), self-paced multimedia learning leads to better academic outcomes because students can tailor their study approaches to match their individual needs. This level of personalization ensures that each learner can progress at an optimal pace, ultimately improving knowledge acquisition and retention.

Statement of the Problem

In the view of Parveen and Razman (2024), today's children are highly accustomed to using electronic gadgets and that the utilization of digital resources could capture their interest and increase their involvement in learning. Such digital resources include: e-books, online journals, digital libraries, learning management systems, educational software, online databases, multimedia contents, virtual laboratories and various web-based application (Nweze & Shabi, 2021). To this end the utilization of digital resources in higher education has become increasingly significant in enhancing students' learning outcomes. Universities worldwide have integrated digital resources to improve knowledge acquisition, engagement and learning outcomes. Digital resources allow students to learn at their own pace, revisit complex concepts and access diverse perspectives beyond what is offered in conventional lectures. Additionally, digital resources are intended to enhance learning flexibility, promote self-directed learning and improve comprehension but their effectiveness is largely dependent on students' ability to navigate digital platforms efficiently. This therefore, has drawn attention on the utilization of digital resources to improve the effectiveness of instructions in the class, motivate students' participation and enhance learning outcomes.

However, despite the recognized benefits of digital resources, their effective utilization remains a challenge in many Nigerian universities, including those in Rivers State. While some students and lecturers actively engage with digital resources, others struggle due to insufficient access to technological devices, poor power supply and inadequate training on digital resource usage. Furthermore, factors such as inadequate infrastructure, limited digital literacy, poor internet connectivity and lack of institutional support hinder the full adoption of digital resources, potentially affecting students' learning outcomes. In spite of the challenges in the use of digital resources, the 21st century learning environment demands their use for students' engagement in learning. Hence, the study investigated the extent to which the various digital resources have been optimally used to achieve students' learning outcomes in Rivers State Universities.

Purpose of the Study

The purpose of the study was to investigate utilization of digital resources for optimization of students' learning outcomes in Rivers State Universities. Specifically, the study sought to:

- Examine the extent to which utilization of e-books as digital resource optimize students' learning outcomes in Rivers State Universities.
- Determine the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities.
- Ascertain the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities.

Research Questions

- To what extent does utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities?

- To what extent does utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities?
- To what extent does utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities?

Hypotheses

- There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities.
- There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities.
- There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities.

METHODS

The study adopted descriptive survey research design. The population of the study was 43,771 consisting of 2,153 lecturers and 20,939 students from Rivers State University and 778 lecturers and 19,901 students from Ignatius Ajuru University. The sample size of this study was 396 consisting of 53 lecturers and 150 students from Rivers State University and 43 lecturers and 150 students from Ignatius Ajuru University. Taro Yamane's formula was used to determine the sample size while stratified random sampling technique was adopted in sampling lecturers and students. The instrument for the study was a self-developed questionnaire titled: "Digital Resources for Optimizing Students' Learning Outcomes Questionnaire (DROSLOQ)" which was structured on a four point rating scale of Very High Extent (VHE) with 4 points, High Extent (HE) with 3 points, Low Extent (LE) with 2 points and Very Low Extent (VLE) with 1 point respectively. The instrument was face and content validated by two experts in Measurement and Evaluation and Department of Educational Management and tested for reliability using Cronbach Alpha statistics which yielded reliability indexes of 0.74, 0.77 and 0.70. Mean and standard deviation were used to answer the research questions with a criterion mean of 2.50. Items above 2.50 signified 'High Extent' as items below denoted 'Low Extent'. The hypotheses posed in the study were analyzed using z-test at 0.05 level of significance. Where the z-calculated value was above z-critical value of ± 1.96 , the hypothesis was rejected and below was accepted.

RESULTS

Research Question 1: To what extent does utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities?

Table 1: Mean and standard deviation ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education On The Extent To Which Utilization Of E-Books As A Digital Resource Optimize Students' Learning Outcomes in Rivers State universities

S/N	Questionnaire Items	RSU N=203			IAU N=193		
		Mean	SD	Decision	Mean	SD	Decision
1	E-books provide various features such as search functions and adaptive learning tools which may help increase students' deeper comprehension of topics	2.93	1.27	High Extent	3.07	0.82	High Extent
2	The flexibility of e-books enable students to engage with learning materials beyond the classroom, reinforcing their understanding of concepts through continuous exposure	3.98	0.87	High Extent	2.98	1.20	High Extent
3	E-books incorporate interactive features such as hyperlinks, embedded videos and quizzes which enhance students' comprehension	3.11	0.84	High Extent	3.10	0.83	High Extent
4	E-books gives students the ability to interact with content, such as clicking on definitions or watching explanatory videos, thereby improving students' ability to internalize and apply knowledge	2.83	1.03	High Extent	3.16	0.81	High Extent
5	The instant access to a vast pool of scholarly content in e-books encourages deeper exploration of topics which enhance students' academic writing	2.76	1.10	High Extent	2.94	1.07	High Extent
Grand Mean/SD		3.12	1.02	High Extent	3.05	0.95	High Extent

Data on Table 1 above for research question 1, revealed that, items 1, 2, 3, 4 and 5 had mean values of 2.93, 3.98, 3.11, 2.83 and 2.76 with standard deviation values of 1.27, 0.87, 0.84, 1.03 and 1.10 for lecturers and students in RSU and mean values of 3.07, 2.98, 3.10, 3.16 and 2.94 with standard deviation values of 0.82, 1.20, 0.83, 0.81 and 1.07 for lecturers and students in IAU. In summary, the result showed grand mean values of 3.12 and 3.05 which were above the criterion mean of 2.50, which indicated that, to a high extent, utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities.

Research Question 2: To what extent does utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities?

Table 2: Mean and Standard Deviation Ratings of Lecturers and Students in Rivers State University and Ignatius Ajuru University on the Extent to which Utilization of Online Journals as a Digital Resource Optimize Students' Learning Outcomes in Rivers State Universities

S/N	Questionnaire Items	RSU N=203			IAU N=193		
		Mean	SD	Decision	Mean	SD	Decision
6	Online journals offer instant access to a	3.18	0.99	High Extent	3.30	0.87	High Extent

	vast repository of scholarly materials, enabling students to stay informed about the latest developments in their respective fields						
7	Online journals allows students to compare different research findings which enable them develop a more comprehensive understanding of their subjects	3.11	0.93	High Extent	3.20	0.90	High Extent
8	Online journals provides students with access to credible and up-to-date academic literature which enhance students' ability to assess the validity of research findings	3.14	0.94	High Extent	2.95	0.94	High Extent
9	Through studying articles from online journals, students gain exposure to well-structured arguments, formal writing styles and proper referencing techniques	3.18	0.94	High Extent	3.30	0.93	High Extent
10	Online journals allow students to search for specific keywords, filter results by publication date and access full-text articles which enhance students' ability to construct well-informed arguments and contribute to academic discussions	3.23	0.91	High Extent	3.02	0.88	High Extent
Grand Mean/SD		3.17	0.94	High Extent	3.15	0.91	High Extent

Data on Table 2 above for research question 2, revealed that, items 6, 7, 8, 9 and 10 had mean values of 3.18, 3.11, 3.14, 3.18 and 3.23 with standard deviation values of 0.99, 0.93, 0.94, 0.94 and 0.91 for lecturers and students in RSU and mean values of 3.30, 3.20, 2.95, 3.30 and 3.02 with standard deviation values of 0.87, 0.90, 0.94, 0.93 and 0.88 for lecturers and students in IAU. In summary, the result showed grand mean values of 3.17 and 3.15 which were above the criterion mean of 2.50, which indicated that, to a high extent, utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities.

Research Question 3: To what extent does utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities?

Table 3: Mean and standard deviation ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education on the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State universities

S/N	Questionnaire Items	RSU N=203			IAU N=193		
		Mean	SD	Decision	Mean	SD	Decision
11	Multimedia content integrate videos, animations, audio recordings and simulations which improves knowledge acquisition and retention	3.69	0.89	High Extent	3.65	0.87	High Extent
12	Multimedia content support active	3.20	1.33	High Extent	3.19	1.29	High Extent

	learning by encouraging students to participate in interactive exercises which enhance students engagement						
13	Multimedia content enable digital interaction and communication which allow students to engage in group discussions, share insights and work on projects together	3.02	0.68	High Extent	3.00	0.67	High Extent
14	Multimedia content allow students to learn at their own speed which enhance their critical thinking	3.09	0.78	High Extent	3.07	0.78	High Extent
15	Multimedia content such as video lectures enable students to pause, rewind or rewatch sections which reinforce their understanding of subject matter	3.03	0.75	High Extent	3.00	0.74	High Extent
Grand Mean/SD		3.21	0.89	High Extent	3.18	0.87	High Extent

Data on Table 3 above for research question 3, revealed that, items 11, 12, 13, 14 and 15 had mean values of 3.69, 3.20, 3.02, 3.09 and 3.03 with standard deviation values of 0.89, 1.33, 0.68, 0.78 and 0.75 for lecturers and students in RSU and mean values of 3.65, 3.19, 3.00, 3.07 and 3.00 with standard deviation values of 0.87, 1.29, 0.67, 0.78 for lecturers and students in IAU. In summary, the result showed grand mean values of 3.21 and 3.18 which were above the criterion mean of 2.50, which indicated that, to a high extent, utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities.

Hypothesis 1: There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education on the extent to which utilization of e-books as digital resource optimizes students' learning outcomes in Rivers State Universities.

Table 4: z-test analysis of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education on the extent to which utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State universities

Respondents	N	Mean	SD	Df	SL	z-cal.	z-crit.	Decision
RSU	203	3.12	1.02	394	0.05	0.70	±1.96	Accepted
IAUE	193	3.05	0.95					

Table 4 shows a summary of mean, standard deviation and z-test of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities. The z-test calculated value was 0.70 and the z-critical value was ±1.96, using 394 degree of freedom at 0.05 level of significance. Since the z-calculated value was less than the z-critical value of ±1.96, the null hypothesis was accepted. This implies no significant difference between the mean ratings of lecturers and students in Rivers State

University and Ignatius Ajuru University on the extent to which utilization of e-books as digital resources optimize students' learning outcomes in Rivers State Universities.

Hypothesis 2: There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities.

Table 5: z-test analysis of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State universities

Respondents	N	Mean	SD	Df	SL	z-cal.	z-crit.	Decision
RSU	203	3.17	0.94	394	0.05	0.22	± 1.96	Accepted
IAUE	193	3.15	0.91					

Table 5 shows a summary of mean, standard deviation and z-test of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities. The z-test calculated value was 0.22 and the z-critical value was ± 1.96 , using 394 degree of freedom at 0.05 level of significance. Since the z-calculated value was less than the z-critical value of ± 1.96 , the null hypothesis was accepted. This implies no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities.

Hypothesis 3: There is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of multimedia content as digital resource optimize students' learning outcomes in Rivers State Universities.

Table 6: z-test analysis of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University of Education on the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State universities

Respondents	N	Mean	SD	Df	SL	z-cal.	z-crit.	Decision
RSU	203	3.21	0.89	394	0.05	0.33	± 1.96	Accepted
IAU	193	3.18	0.87					

Table 6 shows a summary of mean, standard deviation and z-test of difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities. The z-test calculated value was 0.33 and the z-critical

value was ± 1.96 , using 394 degree of freedom at 0.05 level of significance. Since the z-calculated value was less than the z-critical value of ± 1.96 , the null hypothesis was accepted. This implies that there is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of multimedia content as digital resource optimizes students' learning outcomes in Rivers State Universities.

DISCUSSION OF FINDINGS

Findings on research question 1 on Table 1 revealed that, to a high extent, utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities with grand mean values of 3.12 and 3.05. Hypothesis 1 on Table 4 revealed no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of e-books as a digital resource optimize students' learning outcomes in Rivers State Universities with z-calculated value of 0.70 which was less than the z-critical value of ± 1.96 . These findings are in agreement with a study by Alghamdi and Rahman (2023), who found that, students who use interactive e-books demonstrate greater engagement and retention of information compared to those using traditional textbooks. These findings are also in tandem with the research by Singh and Patel (2022), who opined that, students who engage with e-books experience higher learning outcomes, as the content adjusts to their learning pace and provides instant feedback.

Findings on research question 2 on Table 2 showed that, to a high extent, utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities with grand mean values of 3.17 and 3.15. Again, information on hypothesis 2 on Table 5 revealed that, there is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of online journals as a digital resource optimize students' learning outcomes in Rivers State Universities with z-calculated value of 0.22 which was less than the z-critical value of ± 1.96 . These findings are in line with Brown and Taylor (2021), who asserted that, students who regularly use online journals demonstrate higher levels of academic improvement because they base their assignments and research projects on verifiable evidence, rather than unreliable sources. Also in support, a study by Williams and Carter (2023), found that, students who frequently read online journals exhibit stronger analytical and evaluative skills, as they learn to distinguish between well-supported arguments and weakly substantiated claims.

Findings on research question 3 on Table 3 showed that, to a high extent, utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities with grand mean values of 3.21 and 3.18. Again, findings on hypothesis 3 on Table 6 revealed that, there is no significant difference between the mean ratings of lecturers and students in Rivers State University and Ignatius Ajuru University on the extent to which utilization of multimedia content as a digital resource optimize students' learning outcomes in Rivers State Universities with z-calculated value of 0.33 which was less than the z-critical value of ± 1.96 . These findings corroborates with Mayer (2021), asserted that, multimedia content presents information in dynamic ways, enabling students to grasp complex concepts more effectively and retain information for longer periods. Also in support, Pashler, McDaniel, Rohrer and Bjork (2021), opined that, self-paced multimedia learning leads to better academic outcomes because students can tailor their study approaches to match their individual needs.

CONCLUSION

Based on the findings of the study, it was concluded that utilization of digital resources such as e-books, online journals and multimedia content optimize students' learning outcomes in Rivers State Universities to a high extent. Digital resources presents an opportunity to overcome challenges associated with traditional instructional methods thereby fostering the development of unique skills bordering on students' specific strengths and interests.

Recommendations

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

- School management should organize regular workshops and training sessions to equip students and lecturers with the necessary skills to effectively utilize e-books so as to enhance students' engagements with digital resources.
- Lecturers should create online and offline research discussion forums where students can collaborate, share journal articles and discuss research findings.
- Lecturers should incorporate videos, animations and interactive simulations into their teaching materials to make learning more engaging and effective to students.

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