Digital Libraries and Personalised Learning Experiences of Final Year Economics Education Students in Public Universities in Lagos State, Nigeria

Abidat Oluwashola Mohammed[1*] & Oluwaseun Adeola Abiodun-Asanre[2]

[1]Department of Language, Arts and Social Science Education, Faculty of Education, Lagos State University, Ojo, Lagos State, Nigeria; Email: **abidat.mohammed@lasu.edu.ng;**
ORCID ID: https://orcid.org/0000-0001-8797-3726*

[2]Fatiu Ademola Akesode Library, Lagos State University, Ojo, Lagos State, Nigeria; Email: oluwaseun.abiodun-asanre@lasu.edu.ng;
ORCID ID: https://orcid.org/0000-0001-5518-2516

This study examined the influence of educational tools in digital libraries on the personalized learning experiences of final year economics education students in public universities in Lagos State, Nigeria. A descriptive research design was employed, with the use of questionnaire tagged Digital Libraries and Personalized Learning Experiences of Students Questionnaire (DLPLESQ) as instrument of data collection. A total of 212 final year economics education students were selected for the study using snowball sampling technique. Descriptive statistics such as frequency distribution, percentage, mean, and standard deviation were used to provide answers to research questions. Additionally, inferential statistics in form of regression analysis was used to test the relevant hypothesis. The findings revealed that digital library tools have a significant positive impact on students' personalized learning experiences of students (β_1 = 2.002; P<0.05). The study also demonstrated that that final year Economics education students are "Not Aware" of the resources in digital libraries in public universities in Lagos State Nigeria. Out of the 13 digital library resources listed, sampled students seem to be "Aware" of only three resources which are "Google Scholar", "Oxford Academic" and "Research4life". Furthermore, the study showed that final year Economics education students make use of the digital library resources "Monthly". Based on these findings, the study recommended strategies to enhance the utilization of digital libraries, such as improving access to devices and internet connectivity, providing training programs to enhance digital literacy skills, and integrating digital library resources into the economics education curriculum.

Keywords: Digital libraries, economics education, personalised learning, public universities

Introduction

In recent years, there has been a significant shift in the way education is delivered, particularly in higher education institutions. With the rapid advancement of technology, traditional learning methods are being augmented or replaced by digital platforms and personalized learning experiences (Adakawa et

al., 2021). This shift has been particularly notable in the field of education, where students are increasingly relying on digital resources to enhance their learning. Especially for students of Economics education, a course which requires access to a wide range of scholarly resources, including academic journals, research papers, economic data, and statistical analyses. Akpojotor (2016) averred that digital library tools provide students with convenient and immediate access to these resources, enabling them to stay updated with the latest research, theories, and methodologies in the field. Moreover, digital libraries offer search functionalities that allow students to efficiently locate relevant materials, saving time and effort in their research process. In the words of , the availability of online databases and digital resources also expands the scope of students' exploration, enabling them to explore interdisciplinary connections and perspectives.

Digital library tools provide the necessary infrastructure to enhance the study of economics education, fostering a deeper understanding of economic concepts and facilitating critical analysis and research in the field. A digital library is a collection of digital objects that can include text, visual material, audiomaterial, and video material, stored as electronic media formats, along with means for organizing, storing, and retrieving the files and media contained in the library collection (Popoola & Adedokun, 2023). Digital libraries have become increasingly important in the educational landscape. They offer students access to a wide range of digital resources, including e-books, scholarly articles, research papers, and multimedia content relevant to their field of study (Niqresh, 2019). These resources are available online, allowing students to conveniently access them from anywhere and at any time. Digital libraries often offer search features and organizational tools that facilitate efficient information retrieval and management. By utilizing these resources, students can enhance their understanding of different topics, gain exposure to contemporary research, and access supplementary materials that enrich their learning experience (Stolyarov,2021).

Personalised learning experiences, on the other hand, focus on tailoring education to the individual needs, preferences, and pace of each student. By leveraging technology and innovative instructional approaches, personalised learning enables students to engage with content that aligns with their interests, strengths, and learning styles (Tsybulsky 2020). This approach empowers students to take ownership of their learning journey, fosters critical thinking skills, and encourages self-directed learning. A useful learning activity that supports important personalised, emotional, and cognitive learning experiences is provided by digital libraries, which further personalised learning.

While there may be studies exploring digital libraries and personalized learning experiences in general or in other disciplines, there seems to be dearth of research specifically addressing the needs and experiences of final-year Economics education students in public universities in Lagos State. On this premise, this study focuses specifically on final-year Economics education students in public universities in Lagos State and aims to examine the impact of digital libraries and personalized learning on their educational journey. In summary, this study transforms economics education: lecturers refine

teaching with digital tools, students gain knowledge autonomy and skills for future success, and the study underscores learning innovation and advocates positive change in education.

Problem Statement

The study aims to address the seemingly lack of comprehensive understanding and assessment of the role of digital libraries in facilitating personalized learning experiences for final year Economics education students in public universities in Lagos State, Nigeria. Despite the availability of digital resources, it remains unclear how students are utilizing digital libraries and whether these resources effectively support their individual needs, interests, and learning styles. Additionally, the extent to which personalized learning experiences are integrated into the final year curriculum and the impact of digital library tools on students' academic performance and career readiness in the field of economics education are not well-explored. Therefore, there is a pressing need to investigate the current state of digital libraries and their potential for enhancing personalized learning experiences in order to inform educational practices, policy-making, and the future development of digital resources in public universities in Lagos State.

Objectives

i. Examine the level of awareness of final year economics education students of the resources in the digital library in public universities in Lagos State, Nigeria

ii. Assess the frequency of usage of the resources in the digital library for research purposes by final year economics education students in public universities in Lagos State, Nigeria

iii. Find out if there are any challenges faced by final year economics education students of public universities in Lagos State in accessing and navigating digital library tools.

iv. Assess the influence of frequency of usage of the resources in the digital library on personalised learning experiences of final year economics education students in public universities in Lagos State, Nigeria

Research Questions

a. What is the level of awareness of final year economics education students of the resources in the digital library in public universities in Lagos State, Nigeria?

b. What is the frequency of usage of the resources in the digital library for research purposes by final year economics education students in public universities in Lagos State, Nigeria?

c. Are there any challenges faced by final year economics education students of public universities in Lagos State in accessing and navigating digital library tools?

Hypothesis

H_{01}: Frequency of usage of digital libraries resources does not have any significant influence on personalised learning experiences of final year economics education students in public universities

in Lagos State.

Literature Review

This section explores the various scholarly works which showed the current understanding of digital libraries and their role in facilitating personalized learning experiences among final year Economics education students. By synthesizing and analysing previous studies, theories, and best practices, this literature review establishes a foundation for the research, identify research gaps, and guide the investigation into the utilisation and influence of digital library resources on the educational landscape in Lagos State's public universities.

Theoretical Framework

The study is anchored on Technology Acceptance Model for the digital library resources and Constructivism Theory for personalised learning experiences.

Fred Davis introduced the Technology Acceptance Model (TAM) in 1986 as a means to understand users' acceptance of information systems or technologies. TAM offers valuable insights into students' acceptance and utilization of digital libraries, which are technology-driven educational tools. By examining factors like perceived usefulness and ease of use, this theory sheds light on how these aspects can impact students' adoption and utilization of digital library resources for personalized learning (Davis, 1989).

Constructivism emphasizes the active process of knowledge construction by learners as they interact with the learning environment (Devi, 2019). Jean Piaget (1896–1988) is widely recognized as the founding figure of the constructivist perspective on learning. This theory can be utilized to investigate how personalized learning experiences, facilitated by digital libraries, empower final-year Economics education students to independently build their understanding of economic concepts and theories.

Review of Empirical Studies

Students' Awareness of Digital Libraries in Public Universities in Nigeria

It is vital for students to be aware of and utilize electronic information resources to access necessary information and stay informed. Proficiency in information and communication technologies (ICTs) is crucial for effectively navigating these resources, which are accessible through telecommunication channels (Akpojotor, 2016). A study conducted by Quadri et al. (2014) uncovered a low level of awareness among students in public universities in Ogun State regarding the resources available in digital libraries. The study indicated that many students were unfamiliar with the available resources and struggled to utilize them effectively, likely due to a lack of orientation and training on how to make use of digital library resources.

Similarly, Yebowaah and Plockey (2018) conducted a study that also highlighted a low level of awareness among students regarding the resources available in digital libraries. The study indicated

that students were unaware of various digital library resources such as e-books, e-journals, and databases. This lack of awareness can be attributed to insufficient promotion and marketing of the digital library resources. Furthermore, in their study, Okiki and Ireko (2022) examined the extent of awareness and usage of digital educational databases among final year students in private universities located in southwest Nigeria. The results indicated that the final year students displayed a high level of awareness and utilization of digital educational databases. The primary reasons cited by these students for using digital educational databases included completing assignments, academic purposes/coursework, consulting reference sources, accessing research materials, and preparing seminar presentations and project materials. The study also revealed a significant correlation between demographic factors, access to resources, and the utilization of digital databases among final-year students. Based on these findings, the study recommended that libraries acquire more digital educational databases instead of print versions. Furthermore, libraries should enhance their awareness and orientation campaigns to familiarize students with digital educational databases.

Students' Usage of Digital Libraries in Public Universities in Nigeria

Several research studies have examined the utilization of digital libraries by students in public universities in Nigeria. These empirical investigations have delved into different facets of digital library usage, such as the types of resources accessed, the frequency of usage, and the challenges encountered by students. The findings from these studies consistently indicate a limited level of awareness and utilization of digital libraries among students. The underlying causes for this situation can be attributed to various factors, including insufficient infrastructure, inadequate funding, inadequate training for both students and staff, and a lack of policies that encourage the utilization of digital libraries (Akpojotor, 2016; Okiki& Ireko 2022; Bana et al., 2019).

In a study conducted by Daramola (2016), the perceptions of undergraduate students at the Federal University of Technology, Akure regarding the use of e-resources in the library were examined. The study findings indicated the primary motivations for utilizing e-resources were for assignments and research purposes. Among the e-resources, e-journals, e-books, and e-magazines were most commonly accessed by the students. While the students held positive perceptions of the e-resources, the most significant challenge they faced was a lack of sufficient computers in the e-library. Based on the study's findings, it was recommended that efforts be made to encourage female students to utilize e-resources similar to their male counterparts. Furthermore, an increase in the number of computers in the library was suggested to meet the students' needs effectively.

According to a study conducted by Bana et al (2019), students predominantly utilized digital libraries for research-related objectives, with a particular focus on accessing academic journals and e-books. Nearly half of the undergraduate students surveyed rated their proficiency in using e-resources as high. The study's findings emphasized the significance of carefully selecting and offering appropriate e-resources and services to cater to students' needs across various subject areas within the university.

Additionally, another study highlighted those postgraduate students demonstrated higher usage of e-resources compared to their undergraduate counterparts. It was observed that access to reliable internet played a crucial role in influencing the level of e-resource utilization among students (Edem & Egbe, 2016).

A more recent study by Popoola and Adedokun (2023) revealed a significant relationship among the use of electronic library resources by the respondents and computer self-efficacy, computer anxiety and cognitive skills. Computer self-efficacy, computer anxiety, and cognitive skills individually and jointly had a significant influence on the use of electronic library resources of the respondents. The study therefore recommended that, library management in the tertiary institution should give due consideration to computer self-efficacy, computer anxiety, and cognitive skills of the respondents when planning to enhance their use of electronic library resources among others.

Overall, these studies suggest that while digital libraries are becoming increasingly important for students in Nigerian public universities, there are still significant challenges that need to be addressed in order to ensure that all students can access and use these resources effectively.

Challenges Faced by Students in Accessing and Navigating Digital Library Tools

Challenges faced by students in using digital libraries include poor internet connectivity, inadequate training on how to use digital library resources effectively, and limited access to up-to-date resources (Igbo et al., 2022). However, another study found that students who received training on how to use digital library resources were more likely to use them effectively (Bana et al., 2019). Afolabi and Uhomoibi (2017) identified various challenges faced by students, including financial constraints, cultural factors, and issues related to data management and record-keeping. The study proposed the development and implementation of diverse business models to address the needs of the education sector effectively. Additionally, it emphasized the importance of recognizing established practices in traditional education systems, which may require revisions to accommodate changes associated with e-learning. These revisions, however, are not overly complex and can be adequately considered and accommodated. The study emphasized the need to maintain accreditation and standards for learning outcomes, regardless of the variations in delivery methods. E-learning was found to streamline the curriculum and enhance the reputation of educational institutions. To fully realize the potential of e-learning, it is crucial to make appropriate investments at the right level and at the appropriate time.

Recognizing the Significance of Digital Libraries and Personalized Learning Experiences for Students

Understanding the significance of digital libraries and personalized learning experiences for students is of utmost importance. Scholars such as Arapi (2016), Ajuwon and Oshiname (2018), Adakawa and Musa (2021), and Egielewa et al. (2022) have emphasized the multitude of benefits associated with these educational resources. Digital libraries provide flexible learning opportunities that allow students

to participate from any location, while their accessibility on various search engines ensures ease of use. The learner-centered approach of digital libraries enables students to progress at their own pace, and the availability of online resources 24/7 ensures uninterrupted access to information. Moreover, Tsybulsky (2020) observed that digital libraries offer cost-effective solutions by providing a wealth of resources at a fraction of the cost of traditional learning materials. Additionally, collaborative learning is facilitated through these platforms, allowing participants to interact and engage with one another. The availability of multimedia content and simulations further enhances the learning experience, and the scalability of digital libraries allows content to be accessed by audiences of any size. Overall, recognizing and harnessing the potential of digital libraries and personalized learning experiences can greatly benefit students and transform the educational landscape.

In a subsequent investigation, Afolabi and Uhomoibi (2017) discovered that 72% of British students utilizing digital libraries demonstrated a higher level of ease in comprehension, whereas only 58% of Nigerian students experienced the same level of ease. Several authors have conducted research on students' perception of digital libraries as active participants. However, according to Linjawi and Alfadda (2018), prior knowledge of information and communication technologies (ICT) and access to a reliable internet connection contribute to an enhanced personal learning experience for users of digital libraries. Furthermore, Afolabi and Uhomoibhi (2017) proposed that challenges faced by institutions include a lack of electricity, insufficient bandwidth, and connectivity issues.

Summary of Literature Review

The study draws from the Technology Acceptance Model to explore the acceptance of digital library resources and employs the Constructivism Theory to understand personalized learning experiences. It investigates students' awareness of digital libraries in Nigerian public universities, their usage patterns, challenges encountered in accessing and navigating these resources, and highlights the importance of digital libraries and personalized learning experiences for students.

This research bridges a gap in the literature by examining the relationship between digital library tools' acceptance and personalized learning experiences among final year economics education students in public universities in Lagos State, Nigeria. While previous studies have explored digital libraries and learning experiences individually, this study uniquely combines these elements to provide a comprehensive understanding of how digital library tools impact personalized learning in a specific academic context.

Methodology

For this study, a descriptive survey design was utilized. The selection of this particular design was deemed suitable as it allows the researcher to effectively depict the characteristics of the participants without introducing any interference or manipulation to the variables.

The target population used in the study consisted of all the final year Economics education students in public universities in Lagos State, Nigeria. The population consisted of 268 students selected from three public universities in Lagos State who offer Economics Education – Lagos State University of Education (LASUED), Lagos State University (LASU) and University of Lagos (UNILAG) (145 students from LASUED, 60 students form LASU, and 63 students from UNILAG). The sample for the study consisted of 212 students calculated using Slovin's formula (106 students from LASUED, 52 students form LASU, and 54 students from UNILAG). The sampled students were selected using snow ball sampling technique.

Data instruments

Primary data was obtained through the use of a self-constructed questionnaire titled – "Digital Library and Personalized Learning Experiences of Students Questionnaire". The questionnaire consisted of 31 items, spread within five sections. Section one consisted of the demographic data of the students such as gender and institution; Section two consisted of 13 items on level of awareness of digital library resources, section three, 1 item on usage, measured on scale of six frequencies, section four, 12 items on personalised learning experiences and section five, 5 items on challenges faced by student. The questionnaire was validated using content and face validity type and subjected to reliability test using Split-Half coefficient.

TABLE 1: RELIABILITY STATISTIC S

Cronbach's Alpha	Part 1	Value	.863
		No of Items	16[a]
	Part 2	Value	.831
		No of Items	15[b]
	Total No of Items		31
Correlation Between Forms			.554
Spearman-Brown Coefficient	Equal Length		.713
	Unequal Length		.714
Guttman Split-Half Coefficient			.708

Source: Fieldwork, 2023

The reliability statistics gave an alpha value of 0.86 and 0.83 for the first and second half of the instrument respectively. This result showed that the instrument is reliable (Morgan et al, 2019).

Procedure

The instruments were ad ministered to the 212 sampled students of public universities in Lagos state using google forms, sent through the head of class in each of the three universities sampled. However, only 201 forms were retrieved and all found to be valid.

Data Analysis

The collected data underwent analysis employing descriptive statistics, which were utilized to present the demographic information through frequency counts and percentages. Additionally, mean, and standard deviation were employed to address the research questions. Inferential statistics used is simple linear regression to test hypotheses 1 and 2 at a significance level of 0.05.

FINDINGS AND DISCUSSIONS

Demographic Data of the Respondents

Table 2 showed the frequency distribution of the demographic variables of final year Economics education in Lagos State public universities. It revealed more female, 137(68.2%) to male, 64(31.8%) students. The result agrees with Daramola (2016) who found more female than male students in Federal University of Technology, Akure. The table also revealed that 52 (25.9%) are LASU students, 99 (49.3%) are LASUED students and the remaining 50 (24.9%) are UNILAG students.

TABLE 1: DISTRIBUTION OF FINAL YEAR ECONOMICS EDUCATION STUDENTS

Demographic Variable		Frequency (n)	Percentage (%)
Gender	Male	64	31.8
	Female	137	68.2
	Total	201	100
Institution	LASU	52	25.9
	LASUED	99	49.3
	UNILAG	50	24.9
	Total	201	100

Source: Fieldwork, 2023

Level of Awareness the Resources in the Digital Library

Research Question One: What is the level of awareness of final year Economics education students of the resources in the digital library in public universities in Lagos State, Nigeria?

TABLE 1: STUDENTS' LEVEL OF AWARENESS O F THE DIGITAL LIBRAR Y RESOURCE

Items	VA	A	NA	Mean	SD	Decision
JSTOR	99 (49.3%)	63 (31.3%)	39 (19.4%)	1.70	.775	Not Aware
Google Scholar	38 (18.9%)	103 (51.2%)	60 (29.9%)	2.11	.691	Aware
Project MUSE	78 (38.8%)	83 (41.3%)	40 (19.9%)	1.81	.744	Not Aware
Sciencedirect	74 (36.8%)	81 (40.3%)	46 (22.9%)	1.86	.762	Not Aware
ProQuest	75 (37.3%)	84 (41.8%)	42 (20.9%)	1.84	.747	Not Aware
Springer Link	97 (48.3%)	74 (36.8%)	30 (14.9%)	1.67	.723	Not Aware
Oxford Academic	41 (20.4%)	81 (40.3%)	79 (39.3%)	2.19	.751	Aware
Willy Online Library	73 (36.3%)	90 (44.8%)	38 (18.9%)	1.83	.724	Not Aware
EBSCOhost	114 (56.7%)	63 (31.3%)	24 (11.9%)	1.55	.699	Not Aware
ACM Digital Library	84 (41.8%)	84 (41.8%)	33 (16.4%)	1.75	.721	Not Aware
Research4life	60 (29.9%)	78 (38.8%)	63 (31.3%)	2.01	.784	Aware
Heinonline	109 (54.2%)	64 (31.8%)	28 (13.9%)	1.60	.722	Not Aware
LexisNexis	109 (54.2%)	65 (32.3%)	27 (13.4%)	1.59	.716	Not Aware

Criterion Mean = 2.00; Weighted Mean = 1.81; Std. Dev = .74; Overall Decision = Not Aware

Key: VA = (Very Aware); A = (Aware); NA = (Not Aware); SD = Standard Deviation, Mean Threshold: If the mean is 0.000-1.999 = Not Aware; 2.000-2.499 = Aware; 2.500-3.000 = Very Aware

Source: Fieldwork, 2023

Table 3 showed that final year Economics education students are "Not Aware" of the resources in digital libraries in public universities in Lagos State Nigeria, as revealed by the weighted mean of 1.81 and Std Dev = .74. Out of the 13 digital library resources listed, students seem to be "Aware" of only three resources which are "Google Scholar", "Oxford Academic" and "Research4life". This result negates the findings of Okiki and Ireko (2022), which revealed that the final year students displayed a high level of awareness of digital educational databases in their school libraries.

Frequency of Usage of the Resources in the Digital Library for Research Purposes
Research Question Two: What is the frequency of usage of the resources in the digital library for research purposes by final year economics education students in public universities in Lagos State, Nigeria?

TABLE 1: STUDENTS' FREQUENCY OF USAGE OF THE DIGITAL LIBRARY RESOURCES

How often do you make use of the Digital Library Resources?

Items	Frequency	Mean	Std. Dev.	C. Mean	Decision
Daily	25 (12.4%)	3.93	1.583	3.5	Good
Weekly	11 (5.5%)				
Monthly	41 (20.4%)				
Once per semester	34 (16.9%)				
Once per session	56 (27.9%)				
Not applicable	34 (16.9%)				

Key: Std. Dev. = (Standard Deviation); C. Mean = (Criterion Mean)

Mean Threshold: If the mean is 0.000-1.499 = Not Applicable (Very Poor); 1.500-2.499 =

Once per session (Poor); 2.500-3.499 = Once per semester (Fair); 3.500 to 4.499 =

Monthly (Good); 4.500 to 5.499 Weekly (Very Good); 5.500 – 6.000 Daily (Excellent)

Source: Fieldwork, 2023

Table 4 showed that final year Economics education students make use of the digital library resources "Monthly" which is "Good" as shown by weighted mean of 3.93 and Std. Dev of 1.58. About 167 out of 201 sampled students which represent 83.1%, make use of digital library resources while the remaining 16.9% of them do not make use of the library. The outcomes of this result are similar to the submission of Bana et al. (2019), whose research work observed high proficiency in the use of e-resources in the library on nearly half of the undergraduate students surveyed.

Challenges Faced Students Accessing and Navigating Digital Library Tools

Research Question Three: Are there any challenges faced by final year economics education students of public universities in Lagos State in accessing and navigating digital library tools?

TABLE: CHALLENGES FACED BY FINAL YEAR ECONOMICS EDUCATION STUDENTS IN ACCESSING AND NAVIGATING DIGITAL LIBRARY TOOLS

Items	SD	D	A	SA	Mean	Std. Dev	Decision
Lack of training or support on how to effectively use the digital library	4 (2.0%)	36 (17.9%)	90 (44.8%)	71 (35.3%)	3.13	.773	Agree
Difficulty finding relevant resources	5 (2.5%)	49 (24.4%)	100 (49.8%)	47 (23.4%)	2.94	.759	Agree
Difficulty navigating the library's interface	6 (3.0%)	36 (17.9%)	95 (47.3%)	64 (31.8%)	3.08	.783	Agree
Slow loading times of the digital tools in the library	9 (4.5%)	39 (19.4%	95 (47.3%)	58 (28.9%)	3.00	.815	Agree
Limited access to certain digital resources	4 (2.0%)	38 (18.9%)	85 (42.3%)	74 (36.8%)	3.14	.788	Agree

Criterion Mean = 2.50; Weighted Mean = 3.06; Std. Dev = .78; Overall Decision = Agree
Key: SD = Strongly Disagree; D = Disagree; A = Agree; SA = Strongly Agree; Std. Dev. = (Standard Deviation)
Mean Threshold: If the mean is 0.000-1.499 = Strongly Disagree; 1.500-2.499 = Disagree; 2.500-3.499 = Agree; 3.500 to 4.000 = Strongly Agree;

Source: Fieldwork, 2023

Table 5 showed that students face challenges in accessing and navigating digital library tools, which ranges from lack of support on the use of library tools to limited access to some digital resources as revealed by weighted mean 3.06 and Std. Dev 0.78. This is in consonance with the findings of Igbo et al. (2022) where it was revealed that challenges faced by students in using digital libraries include poor internet connectivity, inadequate training on how to use digital library resources effectively, and limited access to up-to-date resources.

Digital Libraries Influence on Personalised Learning Experiences

H_{01}: Digital libraries do not have any significant influence on personalised learning experiences of final year economics education students in public universities in Lagos State

Table 1: Simplelinear regression analysis coefficients digital libraries influence on personalised learning experiences

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	Beta		
(Constant)	30.494	1.25		27.101	.000
Frequency of use of the Digital Library Resources	2.002	.266	471	7.536	.000

a. Dependent Variable: Personalised Learning Experiences

Source: Fieldwork, 2023

The findings from *Table 6* illustrate the outcome of regression analysis conducted on final year Economics education students. It examined the influence of the frequency of using digital library resources on personalized learning experiences. The results indicated that the intercept coefficient (β) is 30.494, accompanied by a standard error of 1.25, a t-statistic of 27.101, and a p-value of 0.000. Similarly, the slope coefficient (β), representing the impact of the frequency of digital library resource usage on personalized learning experiences, is 2.002, with a standard error of 0.266, a t-statistic of 7.536, and a p-value of 0.000. It is worth noting that the slope coefficient (β) is positive, suggesting a positive influence of digital library resource usage frequency on personalized learning experiences. Consequently, the hypothesis is rejected. This result agrees with the submission of Tsybulsky (2020) that the availability of multimedia content and simulations enhances the learning experience, and the scalability of digital libraries allows content to be accessed by audiences of any size.

CONCLUSION

This study investigated the influence of educational tools in digital libraries on the personalized learning experiences of final year economics education students in public universities in Lagos State, Nigeria. The findings herein empower lecturers to enhance economics education through digital libraries, elevating teaching quality by integrating tools, fostering self-directed learning, critical thinking, and research skills, and enriching the educational experience with dynamic learning environments and diverse assessment techniques. For economics education students, leveraging digital libraries enhances learning, deepens understanding, hones digital literacy, offers autonomy in pace, and empowers advocacy for improved access and integration, shaping education positively. It was concluded from the study that there are more female to male students in public universities in Lagos State. It also showed that final year Economics education students are "Not Aware" of the resources in digital libraries in public universities in Lagos State Nigeria. Out of the 13 digital library resources

listed, students seem to be "Aware" of only three resources which are "Google Scholar", "Oxford Academic" and "Research4life". Furthermore, the study showed that final year Economics education students make use of the digital library resources "Monthly" which is "Good". About 167 out of 201 sampled students which represent 83.1%, make use of digital library resources while the remaining 16.9% of them do not make use of the library. While students are also found to be facing some challenges in accessing and navigating digital library tools, which ranges from lack of support on the use of library tools to limited access to some digital resources. Finally, the study concluded that there is a positive influence of digital library resource usage frequency on personalized learning experiences of final year Economics education students in public universities in Lagos State, Nigeria.

Recommendations

Based on the findings of the study, the following recommendations were considered imperative; Public universities in Lagos State should take steps to raise awareness among final year Economics education students about the available resources in digital libraries. This can be achieved through targeted communication campaigns, workshops, and orientation sessions. Efforts should be made to expand the range of digital library resources available to students. While three resources were found to be well-known among students, it is crucial to diversify and provide access to a wider array of educational tools and databases relevant to their field of study. Recognizing that students face challenges in accessing and navigating digital library tools, universities should offer comprehensive support and training programs. This can include workshops, online tutorials, and assistance from librarians or technical staff to ensure students are well-equipped to utilize the available resources effectively. Regular assessment of students' usage patterns, feedback, and challenges related to digital library resources is crucial. Public universities should establish mechanisms to collect and analyse this data to identify areas for improvement, refine strategies, and ensure the evolving needs of students are met effectively.

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Assessment of Water Reticulation System of Forest Hill Estate, Jericho, Ibadan, Oyo State

Ibraheem Olaoluwa, Azeez[1], Ogechukwu Emmanuel, **Odor**[2] **&** Babajide Sunday, **Aseyan**[3]

1. Department of Architecture Lead City University Ibadan,
2. Department of Architecture Lead City University Ibadan, Odoremmanuel@yahoo.com
3. Department of Architecture Lead City University Ibadan, aseyan.babajide@lcu.edu.ng

Abstract

Rapid urbanization and growth in population has caused rapid increase in demand for water and its attendant distribution systems (DS) challenges is on the increase. Water distribution systems (Reticulation) are systems which usually contains interrelating modules such as pumps, pipes, valves, pumps, reservoirs and tanks and are a result of combined efforts of engineers and scientists. The reliability of WDS is dependent on system configuration, design, pressure and flow through the systems elements.The study was conducted to examine the water reticulation system in Forest Hill Estate, Jericho GRA, Ibadan. Forest Hill Estate was selected as the area of study because in spite of many water reticulation system projects invested at the area, accessibility to clean water is inadequate.

The study specifically sought to determine the water reticulation system as well as the process of maintenance and the challenges affecting the water supply. The study was qualitative research with the use of structured interview and observation to elicit information from the residents of Forest Hill Estate. The study revealed that, despite the huge investment homeowners made water reticulation system within the estate, in-demand failure in water supply during a dry season period of the year, why some household dug deep wells, it was discovered that deep wells are in close proximity to each other's thus, the reason for failure. Nevertheless, the study therefore recommends that there is need for qualified professionals and contractors with water reticulation system experience to take up the design and maintenance of the water reticulation system as well as need for artificial intelligence and smart systems projects monitoring for water reticulation system in the area.

Keywords: Projects, water reticulation, sustainability, factors, maintenance

Introduction

The availability and quality of the water constitutes an essential component of life. More than 3 billion inhabitants are projected to be living in water stressed nations by 2025 and 14 countries slipping from water stress to scarcity (HDR, 2007). Combined with shifts induced by climate change, significantly disproportionate allocation of freshwater resources is now worse with respect to issues connected with sanitation and water-related problems (World Bank, 2010). Developing countries face a huge problem on how to supply their residents with healthy potable water. As the population in urban and rural areas increases, the demand for water is growing rapidly (Akpor, &Muchie, 2011).

Following this crisis, several stakeholders around the World have joined efforts to address the problem. For example, the World Bank has engaged 142 countries in lending for water (IEG, 2009). 579 projects (31%) of the top 10 of those countries accounted for 56% of the overall world bank's water infrastructure contribution (IEG, 2009). Lending for water increased by over 50 percent from 1997 to 2007(IEG, 2009). Water reticulation systems are water distribution networks which have to collect water and then treated before distributing to the consumer (Hydro Serv, 2016).

The supply of sufficient water quality and quantity was one of the most critical issues in the history of mankind. Many ancient civilizations were founded close bodies of water. The pressure to satisfy user demands also increased with rising populations. People began distributing water to their cities from other areas. For example, the Romans constructed aqueducts to provide their cities with water from distant sources. The water system currently comprises an infrastructure for water collection, treatment, storage and distribution (Adeosun, 2014) Despite the worldwide Millennium Development Goals that achieved clean water by 2015, close to 50% of states in Nigeria could not meet the aim and the sluggish speed of Nigeria's progress in this search may likely not achieve the 2030 sustainable development objective.

The ongoing issue in Nigeria is not the absence of proposals and innovative technologies, nor the absence of infrastructure growth policies, but lack of continuity in enforcing regulations with poor and

low applicability of emerging technology and technical structures without impairing project efficiency. Presently, materials required in water reticulation projects have changed over time with new developed software designed in achieving best results on activities involved in water reticulation for timely project delivery but having desirable outputs that can stand the test of time is yet to be achieved. Coming back to the issue project delivery of water reticulation projects, it is pertinent to note that in Oyo State, the existing water network within Ibadan is old and most pipelines have exceeded their design lifecycle. It comprises of stainless steel, cast-iron, polyvinyl chloride (PVC) and asbestos cement pipe. However, residents have explored the option of creating a private water reticulation system in their housing unit for their personal domestic uses.

Nowadays, water systems are commonly delivered through an infrastructure that consists of pipes which are typically constructed from materials such as plastic, metal or even concrete. The system is built and prepared by town planners, municipal architects and contractors to find out all the specifics of the network before installation. A water reticulation system allows water to pass from the source to the user. An additional factor for preparing and constructing the system is considering the volume of water needed. The water is powered by energy and must conquer any opposition it faces as it switches heights or elevations. This research work focuses on analyzing the water reticulation system in an estate of 50 housing units or more using Forest Hill estate, Jericho, Ibadan as case study.

The aim of this paper is to analyze the water supply, distribution and sanitation in Forest Hill Estate, Jericho, Ibadan, achieving this aim the following objectives have been postulated

1. To investigate the various type of water reticulation system available in Forest Hill Estate, Jericho, Ibadan.

2. To examine the water distribution and effectiveness in meeting the demand of the residents of Forest Hill Estate, Jericho, Ibadan.

Literature Review

Water Management and Distribution

A water distribution system is a part of water supply network with components that carry potable water from a centralized treatment plant or wells to consumers to satisfy residential, commercial, industrial and firefighting requirements.

Water distribution network is the term for the portion of a water distribution system up to the service points of bulk water consumers or demand nodes where many consumers are lumped together.[Bhave et al., 2019] The World Health Organization (WHO) uses the term water transmission system for a network of pipes, generally in a tree-like structure, that is used to convey water from water treatment plants to service reservoirs, and uses the term water distribution system for a network of pipes that generally has a loop structure to supply water from the service reservoirs and balancing reservoirs to consumers.[WHO 2014]

A number of studies have examined the issue of sustainable water resources from the perspective of management effectiveness. For instance, Gbadegesin and Olorunfemi (2009) carried out a review of the Nigerian national policy framework for water resource management and emphasized the need for a change from a supply management approach to a demand management approach, which has the advantage of focusing on end-users and so bring more people centered. Ademiluyi and Odugebsan (2008) argued that community action in water supply production and maintenance rarely works without government presence and/or NGO support.

The authors promote the notion of all stakeholders' ownership of water projects to ensure sustainability. Durham et al (2002) present the implementation of this notion in their account of an Integrated Water Resource Management (IWRM) project in Kwa Zulu-Natal region of South Africa. The project involved the participation of the government (providing legislation and regulation), NGOs (specializing in community liaison and education) and a private water provider which supplied water and financed the project. The paper presents the IWRM system as one that could also be economically beneficial to communities. Nwakwoala (2011) advocates the principles of a single community borehole to replace the system of a borehole per household. He advocated for the utilization of boreholes as sources of drinking water only, while household sourced for water for other domestic use elsewhere. He also advocated for the payment of water charges for water sourced from the borehole as a means for preventing wastage.

Components of Water Distribution System

A water distribution system consists of pipelines, storage facilities, pumps, and other accessories. Pipelines laid within publicright of waycalled water mains are used to transport water within a distribution system. Large diameter water mains called primary feeders are used to connect between water treatment plants and service areas. Secondary feeders are connected between primary feeders and distributors. Distributors are water mains that are located near the water users, which also supply water to individualfire hydrants. A service line is a small diameter pipe used to connect from a water main through a smalltapto awater meterat user's location. There is a service valve (also known as curb stop) on the service line located near streetcurbto shut off water to the user's location.

Storage facilities, or distribution reservoirs, provide clean drinking water storage (after required water treatment process) to ensure the system has enough water to service in response to fluctuating demands (service reservoirs), or to equalize the operating pressure (balancing reservoirs). They can also be temporarily used to serve firefighting demands during a power outage. The following are types of distribution reservoirs:

- Underground storage reservoir or covered finished water reservoir: An underground storage facility or large ground-excavated reservoir that is fully covered. The walls and the bottom of these reservoirs may be lined with impermeable materials to prevent ground

water intrusion.

- Uncovered finished water reservoir: A large ground-excavated reservoir that has adequate measures or lining to preventsurface water runoffand ground water intrusion but does not have a top cover. This type of reservoir is less desirable as the water will not be further treated before distribution and is susceptible to contaminants such as bird waste, animal and human activities,algal bloom, and airborne deposition.

- Surface reservoir (also known as ground storage tank and ground storage reservoir): A storage facility built on the ground with the wall lined with concrete,shotcrete, asphalt, or membrane. A surface reservoir is usually covered to prevent contamination. They are typically located in high elevation areas that have enoughhydraulic headfor distribution. When a surface reservoir at ground level cannot provide a sufficient hydraulic head to the distribution system, booster pumps will be required.

- Water tower(also known as elevated surface reservoir): An elevated water tank. A few common types are spheroid elevated storage tank, a steel spheroid tank on top of a small-diameter steel column; composite elevated storage tank, a steel tank on a largediameter concrete column; and hydropillar elevated storage tanks, a steel tank on a large-diameter steel column. The space within the large column below the water tank can be used for other purposes such as multi-story office space and storage space. A main concern for using water towers in the water distribution system is the aesthetic of the area.

- Standpipe: A water tank that is a combination of ground storage tank and water tower. It is slightly different from an elevated water tower in that the standpipe allows water storage from the ground level to the top of the tank. The bottom storage area is called supporting storage, and the upper part which would be at the similar height of an elevated water tower is called useful storage.

- Sump: This is a contingency water storage facility that is not used to distribute water directly. It is typically built underground in a circular shape with a dome top above ground. The water from a sump will be pumped to a service reservoir when it is needed.

Storage facilities are typically located at the centre of the service locations. Being at the central location reduces the length of the water mains to the services locations. This reduces the friction loss when water is transported over a water main.

Maintenance of Water Distribution System

Internal corrosion control: Water quality deteriorate due to corrosion of metal pipe surfaces and connections in distribution systems. Pipe corrosion shows in water as color, taste and odor, any of which may cause health concerns. Health issues relate to releases of trace metals such as lead, copper or cadmium into the water. Lead exposure can cause delays in physical and mental development in

children. Long term exposure to copper may cause liver and kidney damage. High or long-term exposure of cadmium may cause damage to various organs. Corrosion of iron pipes causes rusty or red water. Corrosion of zinc and iron pipes can cause metallic taste. Various techniques can be used to control internal corrosion, for example, pH level adjustment, adjustment of carbonate and calcium to create calcium carbonateas pipe surface coating, and applying a corrosion inhibitor. For example, phosphate products that form films over pipe surfaces is a type of corrosion inhibitor. This reduces the chance of leaching of trace metals from the pipe materials into the water.

Hydrant flushing: Hydrant flushing is the scheduled release of water from fire hydrants or special flushing hydrants to purge iron and other mineral deposits from a water main. Another benefit of using fire hydrants for water main flushing is to test whether water is supplied to fire hydrants at adequate pressure for fire fighting. During hydrant flushing, consumers may notice rust colour in their water as iron and mineral deposits are stirred up in the process.

Water main renewals

After water mains are in service for a long time, there will be deterioration in structural, water quality, and hydraulic performance. Structural deterioration may be caused by many factors. Metal-based pipes develop internal and external corrosion, causing the pipe walls to thin or degrade. They can eventually leak or burst. Cement-based pipes are subject to cement matrix and reinforced steel deterioration. All pipes are subject to joint failures. Water quality deterioration includes scaling, sedimentation, and biofilm formation. Scaling is the formation of hard deposits on the interior wall of pipes. This can be a by-product of pipe corrosion combined with calcium in the water, which is called tuberculation. Sedimentation is when solids settle within the pipes, usually at recesses between scaling build-ups. When there is a change in the velocity of water flow (such as sudden use of a fire hydrant), the settled solids will be stirred up, causing water to be discolored. Biofilms can develop in highly scaled and thus rough-surfaced pipes where bacteria are allowed to grow, as the higher the roughness of the interior wall, the harder it is for disinfectant to kill the bacteria on the surface of the pipe wall. Hydraulic deterioration that affects pressures and flows can be a result of other deterioration that obstructs the water flow.

When it is time for water main renewal, there are many considerations in choosing the method of renewal. This can be open-trench replacement or one of the pipeline rehabilitation methods. A few pipeline rehabilitation methods arepipe bursting, slip lining, and pipe lining.

Methodology

Study Area

Ibadan, the capital of Oyo state is the third largest city by population in Nigeria with a total population of 3,649,000 as at 2021. It lies between longitude $3^0 5$ East of the Greenwich Meridian and latitude $7^0 2$

North of the Equator and covers a total land area of 3,123.30 km^2 (Onyemesim, Sridhar and Coker 2017). Ibadan is made up of eleven (11) local governments with 5 of them namely Ibadan North, Ibadan South-West, Ibadan North East, Ibadan South-West and Ibadan North West located within the metropolis. Ibadan metropolis has high relative humidity and experience two major seasons namely rain (March October) and dry season (November- February) (Olarewaju, Tilakasiri, & Bello, 2018). Ibadan metropolis has a tropical climate with a relative annual rainfall of 1200mm to 1500mm (Wahab & A., 2018). However, Ibadan North West was selected for this study being one of the local governments within Ibadan metropolis with a good number of gated estates.

Material and Methods

This study adopts the descriptive design approach. Primary and secondary data were collected for this study. The primary source of the data collected was through naturalistic observation that is a direct observation within the study area. Random and purposive sampling methods were employed. Adopting random sampling, Ibadan North West was selected from the five LGA within Ibadan metropolis. Thereafter, Foerst Hill Estate were purposively selected been among the finest gated estates with the LGA. The Estate comprise of 58 housing units, while the nature and conditions of water reticulation systems within the estate were critically observed with pictures, and interviews of notable home owners. The data collected were descriptively analyzed and presented.

Findings and Discussions

The water reticulation system in Forest Hill Estate is a reticulation system serving each housing unit individually for their domestic uses. The estate comprises of fifty-eight (58) individual housing units. From the survey carried out, it was discovered that all fifty-eight (58) housing units have a borehole system of water supply. Forty-five (45) of which have a water tower storage system, thirteen (13) houses have the storage tanks on a concrete slab in their roof structures and one (1) housing unit has a borehole system and a hand-dug well water. However, all housing units in the estate have an individual water reticulation system for their domestic uses. The borehole system is a water supply that generates water from the ground, channeled into a storage system before distribution to various outlets. The borehole system is power by electricity.

Plate 1: Steel water tower with steel storage tank system

Furthermore, an interview was done with at least one resident from each housing unit to determine the type of water reticulation system, the effectiveness of the system, usage and the maintenance carried out on the water reticulation system. From the interview carried out for the purpose of this study, the forty (45) housing units with a water tower storage system have adequate water pressure supplied in and within the housing unit for their domestic uses. The thirteen (13) housing units with their water storage system in the roof structures or on a concrete tower were experiencing some water supply challenges over time due to the height of the water storage as water must be able to conquer the change in variation of heights and elevations to supply water adequately from the storage to their end users.

Plate 2: Steel water tower with plastic storage tank system.

Moreover, it was observed there were weed, plants and shrubs growing on the concrete slab due to weather conditions, wind and dust. The growth of these plants was starting to cause cracks in the concrete slab, hence, the concrete slab was starting to lose its strength and become weak. Some residents responded that they carry out a periodic maintenance to remove these herbs and plants to avoid cracks whilst others have changed the location of their water storage tanks. It was also discovered that these water storage tanks in the roof structures was starting to leak into the spaces under the roof as water would always find its way around. This is as a result of the water storage tank being full and the concrete slab losing its damp-proof membrane due to lack of poor maintenance.

Plate 3: Concrete slab and plastic water storage system showing the shrubs growing.

In addition, three (3) housing units have explored the option of using a steel water tower and water storage system and have more effective water supply in various parts of the houses and also curbing the detrimental effects of plant growth on concrete water tower slabs. All housing units conduct a yearly maintenance of the water reticulation system which involves changing the broken or leaking water pipes and taps and flushing the reticulation system due to rust. Also, the storage tanks are washed and disinfected with chlorine to provide clean and quality water for various domestic uses within the housing units.

In conclusion, unlike in some other parts of the city whereby the government is responsible for the water supply, distribution and maintenance of the water reticulation system of the area, residents of Forest Hill Estate have a fairly good maintenance policy for their individual water reticulation system.

Plate 4: Other storage system within the Estate

Plate 5: Water storage tank systems in the Estate.

Conclusions

Since the 1960s, most of the water reticulation system in Nigeria has focused on challenging problems due to the lack of proper maintenance as well as inadequate or functional design of the system by qualified professionals related to the field. However, the are many factors outside the control of

management which could determine the success or failure of a project especially a water reticulation project. In the literature, these factors are referred to as critical success/failure factors and only a few studies have been done to assess, clarify or analyze these factors. Most of the early studies in the area focused on other projects but no water reticulation projects.

Furthermore, Success is desired in everyday life, in business activities and in projects. Given the high rate of projects that fail reaching their objectives or creating the wanted effects, researchesthat approach the topic of success bring positive inputs both to literature and to practice. Relating literature reviews with studies that capture the realities of business environments increase the usefulness of the results. The study reveals that there are direct which affects water reticulation project.

Recommendations

The following recommendations were drawn from the findings of the study:

1. The increasing rate of water reticulation system failure in Forest Hill Estate should be addressed in order to achieve reliable supply of safe and clean water to individual housing units for various domestic uses. The estate management should make sure that capacity building for project management to the housing unit and water user association members become sustainable process for attainment of water reticulation system sustainability.

2. The water reticulation system for each housing unit in Forest hill estate should be properly designed by qualified project professionals to avoid the detrimental effects of an inadequate water reticulation system.

3. Regular maintenance of water reticulation system is very important in achieving sustainability. Regular maintenance of the water reticulation system in Forest Hill Estate should be facilitated by water board maintenance workers and technicians.

4. There is need to incorporate Artificial Intelligence and smart systems project monitoring to water reticulation projects in the area.

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