# OPTIMIZING DIGITAL LIBRARY RESOURCES ENGAGEMENT: THE ROLE OF ACCESS METHODS AND INTERFACE DESIGN IN PRIVATE UNIVERSITIES IN SOUTH-WEST, NIGERIA

**By**
**Prof. 'Bunmi Gabriel ALEGBELEYE**
alegbeleyeg@babcock.edu.ng
Department of Information Resources Management,
Babcock University, Ilishan-Remo, Ogun State

**Chidi Deborah SEGUN-ADENIRAN**
segunadeniranchidi@gmail.com
Covenant University, Ota, Ogun State

**Dr. Ruth OWOLABI**
owolabir@babcock.edu.ng
Department of Information Resources Management,
Babcock University, Ilishan-Remo, Ogun State

**Abstract**
*This study investigated the influence of access methods and interface design on the use of digital library resources by undergraduates in private universities in South-West, Nigeria. The specific objectives were to examine the individual effect of access methods, assess the influence of interface design, and determine their joint contribution to students' utilization of digital library resources. A descriptive survey design was adopted, and data were collected from 343 penultimate and final-year students across selected institutions. Regression analysis was employed to test three hypotheses guiding the study. The results showed that access methods exerted a significant positive influence on use ($R^2 = 0.024$, Adj. $R^2 = 0.022$, $F = 8.550$, $p < 0.05$), explaining 2.4% of the variance. Interface design demonstrated a stronger positive effect ($R^2 = 0.037$, Adj. $R^2 = 0.034$, $F = 12.993$, $p < 0.05$), accounting for 3.7% of the variance. When combined, access methods were not statistically significant ($B = 0.435$, $p = 0.170$), but interface design retained its influence ($B = 0.806$, $p = 0.013$). The overall model was significant ($R^2 = 0.042$, $F = 7.458$, $p < 0.05$), suggesting that together, access methods and interface design explain a small but meaningful proportion of the variance in usage. The study concludes that optimizing both variables, with particular attention to interface design, can enhance students' engagement with digital library resources*

**Keywords:** e-Learning platforms, Accessibility features, Single Sign-On, User experience, Intuitive navigation

## Introduction

Digital Library Resources have become integral to academic life, offering undergraduates swift and convenient access to scholarly materials beyond the limitations or constraint of physical libraries. The present Virtual or Digital age is characterized by increase in information and knowledge being created, stored and accessed predominantly in electronic formats (Fari et al., 2023; Ike et al., 2023). It is safe to say that the current group of undergraduates are not digital immigrants, hence, they have grown up immersed in digital technologies, making them quite dependent on digital library resources for learning and research (Berens & Noorda, 2023). As a result of this, it is only necessary that these digital library resources are perceived rightly and friendly by these users as these could affect the level of use and the quality of output churned out by the university because the quality of a university's output hinges significantly on the resources within its library (Linh & Tu, 2020).

In contemporary academic environments, digital resources have become an indispensable component of library services, serving diverse categories of users, particularly undergraduates. For this group, digital library resources extend beyond convenience; they function as critical tools for a variety of academic tasks. Students engage with these resources to conduct literature reviews, monitor emerging trends and developments, reinforce lecture content, and broaden their comprehension of subject matter (Daramola, 2022). Moreover, digital library resources play a pivotal role in supporting coursework by facilitating assignment writing, project development and examination preparation. The gamut of materials available in digital collections is wide-ranging, encompassing e-journals, research reports, electronic financial documents, reference works, e-books and curated online databases; all of which contribute significantly to the academic success of undergraduate learners.

In Nigeria, studies have revealed that undergraduates in private universities show relatively low engagement with digital library resources, despite their availability (Igbinovia & Odelami, 2022). This underutilization is linked to several recurring challenges, including limited ICT proficiency, inadequate digital literacy training and infrastructural deficits such as unreliable internet connectivity and unstable power supply (Esievo & Obaro, 2020; Adenariwo, 2022). These barriers restrict students' ability to fully harness the benefits of digital libraries for academic and research purposes. Beyond infrastructural and skill-related issues, the digital library resources platforms themselves may often contribute to the problem. Weaknesses in interface design, such as poor navigation, lack of intuitiveness and limited user support, discourage sustained use of digital resources (Demir & Parraci, 2018).

Furthermore, the way students perceive digital library platforms, alongside the accessibility of the methods provided for reaching these resources, significantly shapes how often and how effectively they are utilized. When access methods are straightforward, require minimal technical effort and integrate smoothly with students' study routines, adoption rates tend to be higher. Conversely, complicated log-in procedures, multiple authentication steps, or rigid access restrictions can discourage repeated use. Research shows that undergraduates are more inclined to engage with digital libraries that are designed to be simple, seamless and adaptable

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to their academic needs, as such systems reduce barriers and create a sense of efficiency and convenience in the learning process (Esievo & Obaro, 2020; Adenariwo, 2022).

Access methods and interface design are critical factors that can significantly shape the extent to which undergraduates in private universities in South-West Nigeria engage with digital library resources. In this context, access methods refer to the means or options available for students to connect with digital library resources. These may include web browsers, mobile applications, specialized software or authentication mechanisms such as single sign-on, reduced sign-on, or even open access without authentication (Carter & Hanson, 2022). Examining which access methods students prefer and the reasons behind such choices, provides valuable insights into their expectations, convenience needs and prevailing technology trends. Importantly, students' preferences for access methods are not uniform; rather, they vary depending on factors such as ease of use, device compatibility, accessibility and individual study habits.

Similarly, interface design simply explains the outlook and visual design of the user interface for accessing these digital library resources (Sharma & Tiwari, 2021). The outlook of the user interface could be a preference for the undergraduate library user when utilizing the digital library resource. The preferred user interface of a user could affect the level of satisfaction gotten from using the digital library resources. User interface elements include layout, navigation menus, colour schemes, and typography; all these can affect user engagement and satisfaction. Against this backdrop, it becomes evident that the mere availability of digital library resources does not automatically translate into effective utilization. Instead, critical determinants of engagement could be influenced by the access methods, which define the pathways through which students enter and retrieve resources and the interface design, which explains how intuitive, navigable and user-friendly the platforms appear to users (Syamala et al.,2025). Together, these elements serve as pivotal factors shaping both the frequency and quality of undergraduates' interactions with digital library resources, underscoring the need for thoughtful design and implementation to maximize their educational value.

## Statement of the Problem

Undergraduates in this digital age often referred to as digital natives, belong to a generation that has grown up immersed in technology and are therefore predisposed to engaging with electronic and online resources for academic and non-academic purposes. This reality makes the provision of Digital Library Resources in universities both timely and indispensable. However, the mere availability of these resources does not automatically translate into maximal or effective use. Studies have shown that many students, though comfortable with digital technologies, still underutilize institutional digital libraries, preferring alternative online sources that are often less credible.

A key reason for this underutilization lies in the neglect of access methods and interface design in many institutional digital library platforms. When students encounter cumbersome access procedures, slow responsiveness, or poorly designed interfaces, their willingness to return to and consistently use these resources tend to diminish (Poorva, 2024). This scenario presents a clear paradox where university management channel substantial resources into acquiring and

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maintaining digital library resources for undergraduates who, as digital natives, are both ready and inclined to use them. Yet, the absence of user-friendly access methods and intuitive interface design limits their adoption, thereby preventing these resources from achieving their intended purpose. Consequently, the result is low usage, unfriendly user experiences and a waste of substantial financial and technological investments; an issue made more critical in developing countries where budgetary allocations for library systems are already limited (Adamu et al., 2023; Bentil et al., 2021).

**Literature Review**
The use of Digital Library Resources by undergraduates is greatly shaped by varying user preferences including preferences like the preferred access method, interface design, personalization features, etc. Methods of access such as access to resources via single sign on, password restrictions or other authentication systems can either make engagement easier or create barriers depending on how convenient and reliable they are. In the same way, the interface design, which includes the layout, navigation and overall ease of use of the digital library, has a strong influence on user experience and satisfaction. Access methods and interface design therefore serve as important factors that determine how well students are able to interact with and benefit from digital library resources in their learning and research.

Access methods simply refers to the diverse channels and authentication procedures that are made available for digital ibrary resource user to interact effectively with the available resources and also retrieve needed information. Digital library resources users can display preference for access to resources via single sign on access, via open access, or even access with the use of their mobile devices. All these preferred access methods vary from one user to another. Bazaz and Khaligue (2016) explained single sign on as an access method to be a form of access control method which allows the user to login once and then provides access to multiple resources after successful login without having to go through the stress of logging in again. The use of SSO access frees the digital library resources user form the stress of authenticating when attempting to use every single digital library resource. Trevino (2024) also asserted that single sign on is a form of password less authentication that enables users to acess multiple systems and apps with just one set of login credentials thereby eliminating the stress user experience trying to remember multiple login credentials thereby enhancing usage levels.

Similarly, Lokesh and Dilip (2020) noted that single sign on process of access is very convenient because the undergraduate need only one set of credentials to access all the digital library resources instead of multiple credentials which may make the process of access cumbersome and herculean. Single Sign On reduces the barriers students often face when navigating multiple platforms within a digital library system. Instead of remembering several passwords or repeatedly authenticating on different databases, students can access all resources through a single login, which creates a smoother and more efficient user experience. This streamlined process not only saves time but also minimizes frustration and simplifies access, thereby encouraging more frequent use of digital library resources (Mattigiri et al.,

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2025). By removing the distractions and obstacles associated with multiple logins, SSO ensures that users can concentrate on their primary goal of retrieving and applying information for academic purposes. In this way, SSO serves as both a convenience and a motivator, making digital libraries more attractive and user-centered.

Trevino (2024) highlighted key advantages of using single sign on as access method, noting that it reduces the stress associated with password resets, enhances security and streamlines the overall authentication process. These advantages are particularly significant in the context of digital library resources where ease of access directly influences patterns of use. By combining stronger security with a simplified authentication process, single sign on not only safeguards information systems but also promotes a more user-friendly environment that supports continuous engagement with digital resources.

It is pertinent to note that some undergraduate users could also prefer to access resourcs that are in open access domain, freeing them the stress of authenticating before access and utilization. Open access digital library resources have also emerged as a preferred access method for many users of digital library resources. Unlike controlled authentication systems, open access eliminates the need for login credentials altogether, thereby allowing students to freely consult resources without restrictions (Gurav & Nagarkar, 2023). This ease of entry not only removes technical barriers but also widens participation, particularly for users who may be discouraged by cumbersome login requirements. However, while it greatly enhances convenience and promotes wider use, open access also raises important considerations regarding content security and resource management. The balance between unrestricted access and the need for controlled authentication therefore becomes central to how effectively digital libraries can serve their diverse user communities.

A well-designed user-friendly interface is another critical factor that shapes the use of digital library resources, as it directly influences the ease with which users navigate and interact with the system. Features such as clear layout, logical organization of content, intuitive navigation menus and visually appealing displays can significantly enhance user satisfaction and encourage repeated use (Al-Emadi et al., 2021). Conversely, poorly structured or cluttered interfaces may frustrate students and discourage them from engaging with available resources. Indrak and Pokorna (2021) emphasized that digital library resources play a transformative role in improving information accessibility for a wide range of users, including those with disabilities. Digital library platforms can incorporate assistive technologies that make content usable by individuals with varying needs. Features such as screen readers, text-to-speech applications and adjustable font sizes enable students with visual impairments to engage with academic materials more effectively. Similarly, customizable interfaces and keyboard navigation tools reduce barriers for users with auditory or motor challenges, thereby ensuring that the digital library is inclusive and responsive to diverse user populations (Yustika & Iswati, 2020). By embedding these accessibility features into their design, digital libraries not only comply with universal design principles but also demonstrate a commitment to equity in information access, thereby expanding the scope of who can fully benefit from digital academic resources.

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Empirically, Al-Emadi et al. (2021) investigated the relationship between the user-friendliness of the system and level of satisfaction by the users. The findings of the study revealed that the Pearson correlation coefficient value of 0.76 showed a strong positive relationship, meaning that as the interface of a system becomes more user-friendly, the level of satisfaction among users rises significantly. This suggests that features such as intuitive navigation, logical organization of content, linking resources with the Learning Management systems (LMS) and visually appealing design directly contribute to students' overall satisfaction with the system. A user-friendly interface minimizes frustration and cognitive load, thereby allowing users to concentrate on information retrieval rather than on overcoming design barriers. Consequently, the finding reinforces the argument that effective interface design is not just an aesthetic consideration but a critical determinant of how frequently and effectively students will use digital library resources.

Umar et al. (2024) investigated the integration of library services into the Learning Management System (LMS) at the National Open University of Nigeria. The study reported mean scores of 3.61 for improved access to academic materials and 3.60 for enhanced research ability, both accompanied by low standard deviations (.530 and .532), which indicate a strong level of agreement among respondents. These findings suggest that students widely recognize the value of embedding digital library resources directly into the LMS, as such integration reduces access barriers and encourages greater engagement with library content in the context of their coursework. The results further underscore the strong relationship between LMS integration and positive student outcomes, highlighting the need for digital library interfaces that are not only interoperable but also user-centered, in order to effectively support learning, research, and overall academic success.

Symala et al. (2025) examined the impact of interface design factors on user experience in some digital learning platforms. The findings of the study revealed that several interface design elements such as visual appeal, content organization and functionality play a decisive role in shaping user experience on e-learning platforms, with visual and interface design receiving mean scores below 3.0, signaling areas of dissatisfaction. The low ratings were linked to poor color schemes, cluttered layouts, inadequate icons and weak integration of interactive features, all of which negatively affected the level of use of the resources. These findings emphasize that when design features are poorly executed, learners encounter frustration and disengagement, ultimately reducing their willingness to use the digital library resources. A well-structured, visually engaging and interactive interface promotes smoother navigation and encourages more consistent engagement with digital resources, thereby highlighting the pivotal role of design in enhancing user satisfaction and maximizing resource utilization.

Masrek et al. (2018) conducted a study on user engagement with digital libraries and the satisfaction levels of Information Management students at Universiti Teknologi, Malaysia. The study found that the design and development of the digital library interface played a critical role in shaping user experiences. Specifically, a well-developed interface was shown to stimulate user curiosity, thereby encouraging exploration and deeper interaction with the

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system. This heightened level of engagement was strongly linked to increased satisfaction, as students reported that using an attractive, intuitive and responsive interface made their learning and research activities more enjoyable and less stressful. In essence, when the digital library resource design interface is not only functional but also aesthetically appealing and interactive, it transforms routine access into a pleasurable experience, thereby fostering sustained engagement and repeated use of the resources. Banu et al. (2024) examined online library interfaces and functionality preferences on library users in Bangladesh. The finding of the study showed that interaction ($\beta = 0.612$, $p < 0.001$) and accessibility ($\beta = 0.822$, $p < 0.001$) significantly predicted behavioral engagement highlights the crucial role of user-friendly features and inclusive interface design in shaping how students use digital library resources. When systems are designed to encourage interaction through intuitive navigation, responsive menus and engaging content displays, students are more likely to remain actively involved. At the same time, accessibility features such as adjustable font sizes, screen reader compatibility and keyboard navigation reduce barriers and ensure that resources are usable by a wider range of learners. Together, these design qualities foster a learning environment where students not only access digital library resources more easily but also engage with them more consistently and meaningfully, leading to higher satisfaction and sustained use of digital library resources.

**Objectives of the Study**
1.        Determine the influence of access methods on use of digital library resources by undergraduates in private universities in South-West, Nigeria.
2.        Determine the influence of interface design on the use of digital library resources by undergraduates in private universities in South-West, Nigeria.

**Hypothesis**
H01:    Access methods have no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria
H02:    Interface design has no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria
H03:    Access methods and interface design have no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria

**Methodology**
This study employed a descriptive survey research design. The population comprised 35,971 penultimate and final-year undergraduates enrolled in thirty-four private universities across South-West Nigeria. A multistage sampling procedure was used. This technique was employed because the population is quite large and this technique allows the researcher break the population into smaller manageable groups. The technique also enhances representativeness of the sample thereby reducing bias.

Stage 1: The first stage of the multistage sampling technique was the use of simple random sampling technique to select three out of the six states because this is a good representation from the total of six states in the South-West, Nigeria. The states which are Lagos, Ogun and

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Ondo were randomly selected from the six states in the region, producing a sub-population of 21,508 students (See Table 1)

**Table 1: List of universities and undergraduates in the three states selected**

| S/N | | Private universities/States | | Population |
|---|---|---|---|---|
| | | **LAGOS** | | |
| 1 | 1st | Anchor University, Ayobo Lagos State | 2016 | 244 |
| 2 | 2nd | Augustine University, Ilara Epe, Lagos State | 2015 | 248 |
| 3 | 1st | Caleb University, Lagos | 2007 | 3615 |
| 4 | 2nd | Eko University of Medical and Health Sciences Ijanikin, Lagos | 2017 | 38 |
| 5 | 1st | Trinity University, Yaba, Lagos State | 2019 | 262 |
| | | **OGUN** | | |
| 6 | 2nd | Babcock University, Ilishan-Remo | 1999 | 5,746 |
| 7 | 1st | Bells University of Technology, Ota | 2005 | 1,575 |
| 8 | 2nd | Chrisland University, Abeokuta | 2015 | 493 |
| 9 | 1st | Christopher University, Mowe | 2015 | 62 |
| 10 | 2nd | Covenant University, Ota | 2002 | 2825 |
| 11 | 1st | Crawford University, Igbesa | 2005 | 1246 |
| 12 | 2nd | Crescent University, Abeokuta | 2005 | 1200 |
| 13 | 1st | Hallmark University, Ijebi Itele | 2015 | 79 |
| 14 | 2nd | Mcpherson University, Seriki Sotayo, Ajebo | 2012 | 197 |
| 15 | 1st | Mountain Top University, Makogi Oba | 2015 | 827 |
| | | **ONDO** | | |
| 16 | 2nd | Achievers University, Owo | 2007 | 1260 |
| 17 | 1st | Elizade University, Ilara-Mokin | 2012 | 998 |
| 18 | 2nd | Wesley University, Ondo | 2007 | 593 |
| | | | | **21,508** |

**Sources: National Universities Commission Website (2024); Registry offices at the various universities; Nigerian Universities System Statistical Digest**

Stage 2: The private universities within the chosen states were alphabetically arranged and systematic sampling (selecting every second institution) yielded nine universities with a combined population of 12,600 students (See Table 2). The goal of this systematic sampling was to ensure a representative subset of universities without bias and ensuring a manageable

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sample from each state.

Stage 3: Proportional allocation ensured that the sample was fairly distributed across the selected institutions. Drawing from the Taro Yammane formula for determining sample size, a sample size of 396 was used (See Table 2)

**Table 2: Proportionate distribution of undergraduates in South-West, Nigeria**

| S/N | Private Universities | Total population | Sample Proportion (%) | Sample size used |
|---|---|---|---|---|
| | **LAGOS** | | | |
| 1 | Augustine University | 248 | $\frac{248}{12,600}$ X $\frac{100}{1}$ = 2% | $\frac{248}{12600}$ x $\frac{396}{1}$ = 8 |
| 2 | Eko University of Medical and Health Sciences Ijanikin, Lagos | 38 | $\frac{38}{12,600}$ X $\frac{100}{1}$ = 1% | $\frac{38}{12600}$ x $\frac{396}{1}$ = 1 |
| | **OGUN** | | | |
| 3 | Babcock University, Ilishan-Remo | 5,746 | $\frac{5,746}{12,600}$ X $\frac{100}{}$ = 45% | $\frac{5746}{12600}$ x $\frac{396}{1}$ = 180 |
| 4 | Chrisland University, Abeokuta | 493 | $\frac{493}{12,600}$ X $\frac{100}{1}$ = 3% | $\frac{493}{12600}$ x $\frac{396}{1}$ = 15 |
| 5 | Covenant University, Ota | 2825 | $\frac{2,825}{12,600}$ X $\frac{100}{1}$ = 22% | $\frac{2825}{12600}$ x $\frac{396}{1}$ = 89 |
| 6 | Crescent University, Abeokuta | 1200 | $\frac{1,200}{12,600}$ X $\frac{100}{1}$ = 10% | $\frac{1200}{12600}$ x $\frac{396}{1}$ = 38 |
| 7 | McPherson University, Seriki Sotayo, Ajebo | 197 | $\frac{197}{12,600}$ X $\frac{100}{1}$ = 2% | $\frac{197}{12600}$ x $\frac{396}{1}$ = 6 |
| | **ONDO** | | | |
| 8 | Achievers University, Owo | 1260 | $\frac{1260}{12,600}$ X $\frac{100}{1}$ = 10% | $\frac{1260}{12600}$ x $\frac{396}{1}$ = 40 |
| 9 | Wesley University, Ondo | 593 | $\frac{593}{12,600}$ X $\frac{100}{1}$ = 5% | $\frac{593}{12600}$ x $\frac{396}{1}$ = 1 9 |
| | **GRAND TOTAL** | **12600** | | **396** |

**Sources: National Universities Commission Website (2024); Registry offices at the various universities; Nigerian Universities System Statistical Digest**

In total, 396 copies of questionnaires were administered, out of which 343 were duly completed and returned, representing a valid response rate of 86.6%. Data were analyzed using both descriptive and inferential statistical such as percentages, frequencies, standard deviation and regression were used to analyze collected data.

**Results and discussions**

Descriptive statistics of frequencies and percentages were used for the demographic characteristics of the respondents and the results are shown below.

**Objective 1**: Determine the influence of access methods and the use of digital library resources by undergraduates in private universities in South-West, Nigeria.

**Table 3: Access Methods and Use of Digital Library Resources by Undergraduates**

| | SA | A | D | SD | Mean($\bar{x}$) | Std.Dev |
|---|---|---|---|---|---|---|
| **Access Methods** | | | | | | |
| I prefer to access resources that are compatible with my mobile device | 174 (50.73%) | 120 (35.01%) | 26 (7.61%) | 23 (6.72%) | 3.30 | 0.62 |
| I prefer to access resources that are open access | 145 (42.30%) | 154 (44.89%) | 30 (8.70%) | 14 (4.10%) | 3.25 | 0.71 |
| I prefer to access resources that need single sign-ons | 104 (30.31%) | 185 (53.90%) | 41 (12.01%) | 13 (3.83%) | 3.11 | 0.96 |
| I prefer to access resources without a password restriction | 103 (30.00%) | 127 (37.01%) | 80 (23.30%) | 33 (9.60%) | 2.87 | 1.27 |
| **Weighted Mean** | | | | | **3.13** | **0.89** |

**Source: Researcher's Field Survey 2025**

**Decision Rule:** If mean is 1.0 to 1.74 = Strongly Disagree (Very low); 1.75 to 2.49 = Disagree (Low); 2.50 to 3.24 = Agree (High); 3.25 to 4.0 = Strongly Agree (Very high).

**Criterion Mean =** 2.5

From the results shown in Table 3 above, access methods increase the level of use of digital library resources. The findings reveal that access methods influence the use of digital library resources and this is shown with the grand mean score of 3.12(Std Dev= 0.89), which is above the criterion mean. However, the respondents showed the strongest preference for mobile compatible resources (Mean=3.30, Std Dev=0.62) and open access resources (Mean=3.25, Std Dev=0.71), suggesting that ease of access and mobility are key considerations. Access methods requiring single sign-on authentication was also high (Mean=3.11, Std Dev=0.96), indicating the value placed on simplified login processes. Its pertinent to observe, that the respondents were less favorable toward resources without password restrictions (Mean=2.87, Std Dev=1.27), reflecting mixed perceptions regarding unrestricted access.

**Objective 2:** Determine the influence of interface design on the use of digital library resources by undergraduates in private universities in South-West, Nigeria

**Table 4: Interface Design and the use of Digital Library Resources**

| | SA | A | D | SD | Mean ($\bar{x}$) | Std.Dev |
|---|---|---|---|---|---|---|

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| Interface Design | | | | | | |
|---|---|---|---|---|---|---|
| I like to use resources with positive accessibility features (font size, color, keyboard navigation) | 136 (39.70%) | 149 (43.41%) | 24 (7.01%) | 34 (9.90%) | 3.13 | 0.69 |
| I prefer interfaces that allow using resources from multiple databases with a single sign on | 128 (37.31%) | 140 (40.80%) | 43 (12.50%) | 32 (9.32%) | 3.06 | 0.91 |
| I prefer resource platforms that are integrated with learning management Tools | 114 (33.17%) | 153 (44.62%) | 52 (15.22%) | 24 (7.01%) | 3.04 | 0.78 |
| I prefer interacting with resources that allow for searching different kinds of resources within the same interface | 73 (21.30%) | 100 (29.21%) | 85 (24.77%) | 85 (24.80%) | 2.47 | 1.21 |
| **Weighted Mean** | | | | | **2.92** | **0.90** |

**Source: Researcher's Field Survey 2025**

**Decision Rule:** If mean is 1.0 to 1.74 = Strongly Disagree (Very low); 1.75 to 2.49 = Disagree (Low); 2.50 to 3.24 = Agree (High); 3.25 to 4.0 = Strongly Agree (Very high).

**Criterion Mean =** 2.5

From the results shown in Table 4 above, interface design increases the level of use of digital library resources. The findings reveal that interface design affects the use of digital library resources and this is shown with the grand mean score of 2.92(Std Dev= 0.90), which is above the criterion mean. High mean scores for accessibility features (Mean=3.13, Std Dev=0.69), single sign-on across databases (Mean=3.06, Std Dev=0.91) an integration with learning, management systems (Mean=3.04, Std Dev=0.78) show that interfaces that are accessible, seamless and well-integrated encourage greater use of digital library resources. However, the lower mean score for interfaces that allow searching multiple resources types within the same interface (Mean=2.47, Std Dev=1.21) implies that complex interface structures may hinder effective use.

**Hypothesis**

**Hypothesis One:** Access methods have no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria.

**Table 5: Influence of access methods on use of digital library resources by undergraduates in private universities in South-West, Nigeria**

| Coefficients |
|---|

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 55.903 | 3.625 | | 15.423 | .000 |
| | Access Method | .816 | .279 | .156 | 2.924 | .004 |
| Dependent Variable: Use of Digital Library Resources | | | | | | |
| R = .156; R² = .024; Adj R² = .022; F =8.550; p < 0.05 | | | | | | |

Table 5 presents regression analysis showing the influence of access methods on the use of digital library resources by undergraduates in private universities in South-West, Nigeria. The results indicate that access methods have a significant positive influence on the use of digital library resources, with an unstandardized coefficient of 0.816, t-value of 2.924, and a p-value of 0.004, which is below the 0.05 significance level. The model explains about 2.4% of the total variation in the use of digital library resources and at the same time significant at 5% level ($R^2$ = 0.024, Adj. $R^2$ = 0.022, F = 8.550, $p < 0.05$). The above indicated that undergraduates with better access methods are more likely to use digital library resources effectively. Therefore, the null hypothesis is rejected, as access methods significantly influence the use of digital library resources. Gumel et al. (2024) reinforced this finding, highlighting that Nigerian undergraduates are more inclined toward digital libraries that integrate active e-learning platforms, provide multiple access channels such as mobile applications and remote portals and ensure simplified login procedures.

**Hypothesis Two:** Interface design have no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria

**Table 6: Regression analysis showing influence of interphase design on use of digital library resources by undergraduates in private universities in South-West, Nigeria**

| Coefficients | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 52.715 | 3.830 | | 13.764 | .000 |
| | Interface Design | 1.020 | .283 | .192 | 3.605 | .000 |
| a. Dependent Variable: Use of Digital Library Resources | | | | | | |
| R = .192; R² = .037; Adj R² = .034; F =12.993; p < 0.05 | | | | | | |

Table 6 presents regression analysis showing the influence of interphase design on the use of digital library resources by undergraduates in private universities in South-West, Nigeria. The results show that interphase design has a significant positive influence on the use of digital library resources, with an unstandardized coefficient of 1.020, t-value of 3.605, and a p-value of 0.000, which is below the 0.05 significance level. The model accounts for a significant portion of the total variance in usage ($R^2$ = 0.037, Adj. $R^2$ = 0.034, F = 12.993, $p < 0.05$), indicating that better interphase design enhances students' use of digital library resources.

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Therefore, the null hypothesis is rejected, as interphase design significantly influences the use of digital library resources. This finding is corroborated Symala et al. (2025) emphasing that interface design features like visual appeal and content organization affects level of use and engagement of students with digital library resources.

**Hypothesis Three**: Access methods and interface design have no significant influence on use of digital library resources by undergraduates in private universities in South-West, Nigeria.

**Table 7: Regression analysis showing influence of access methods and interface design on use of digital library resources by undergraduates in private universities**

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | |
| Model | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 50.005 | 4.303 | | 11.620 | .000 |
| | Access Method | .435 | .316 | .083 | 1.375 | .170 |
| | Interface Design | .806 | .323 | .151 | 2.497 | .013 |
| a. Dependent Variable: Use of Digital Library Resources R = .205; $R^2$ = .042; Adj $R^2$ = .036; F =7.458; p < 0.05 | | | | | | |

Table 4 presents regression analysis showing the influence of access methods and interface design on the use of digital library resources by undergraduates in private universities in South-West, Nigeria. The results indicate that while access methods do not significantly influence use (B = 0.435, t = 1.375, p = 0.170), interface design exerts a significant positive effect (B = 0.806, t = 2.497, p = 0.013). The overall model is statistically significant, with $R^2$ = 0.042, Adj. $R^2$ = 0.036, F = 7.458, p < 0.05, suggesting that, taken together, access methods and interface design explain a small but meaningful proportion of the variance in the use of digital library resources. Therefore, the null hypothesis is rejected, as access methods and interface design jointly have a significant influence on the use of digital library resources by undergraduates. It is therefore concluded that access methods and interface design, though accounting for a modest proportion of the variance, exert a statistically significant influence on undergraduates' utilization of digital library resources, underscoring the need for university management to prioritize these factors in digital library development.

**Conclusion**
Access methods and interface design are vital in the heightened use of digital library resources, as they significantly influence how undergraduates interact with and benefit from such platforms. Although their contribution to the overall variance is modest, the study demonstrates that together they exert a meaningful effect on students' level of engagement. Features such as multiple entry points, remote connectivity, simplified login processes and user-friendly interfaces enhance both ease of access and frequency of use. This highlights that the success of digital libraries is not determined solely by the availability of resources, but

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also by the efficiency of access methods and the quality of interface design. Consequently, improving these dimensions is essential for promoting greater adoption and effective utilization of digital library resources among undergraduates.

**Recommendations**

Based on the findings of this study, several recommendations are proposed to enhance the utilisation of digital library resources by undergraduates in private universities in South-West, Nigeria. The following recommendations are proposed from the findings of the study:

1. University administrators and librarians in South-West, Nigeria should prioritize the implementation of mobile-friendly platforms, open access options for their resources and single sign-on systems to reduce access barriers and increase the use of digital library resources

2. University libraries should adopt user-friendly, user centered resources interface designs for their resources that facilitate efficient information retrieval and enhance usability of digital library resources.

3. University libraries should establish continuous user feedback mechanisms to guide improvements in both the access methods employed in the library and the interface designs.

4. Libraries vendors should be selected based on interface simplicity and usability, not only the content availability, thereby encouraging product developers to prioritize effective interface design

5. The adoption of Single Sign-On (SSO) authentication is recommended to streamline access, reduce login barriers and promote more seamless use of digital library resources by undergraduates.

6. Digital libraries should implement user-friendly, well-structured and visually engaging interfaces that facilitate efficient information retrieval while improving overall user experience.

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