# AWARENESS AND PREPAREDNESS FOR THE ADOPTION OF QR CODES FOR INFORMATION RETRIEVAL SYSTEMS IN UNIVERSITY LIBRARIES IN KWARA STATE, NIGERIA

**BY**

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## Abstract

University libraries play an essential role in higher institutions by providing access to diverse information resources that support teaching, learning and research. As digital technologies increasingly shape library service delivery, Quick Response (QR) codes present a cost-effective tool for enhancing information retrieval. Despite global adoption, limited research exists on the preparedness of Nigerian university libraries particularly in Kwara State, Nigeria, to implement QR code technologies. This study examines librarians' awareness and preparedness for QR code adoption in university libraries across Kwara State, Nigeria. A descriptive survey research design was adopted, involving 56 librarians from nine universities. Total enumerative sampling was employed, with data gathered through structured questionnaires. Data were analysed using descriptive statistics (means, frequencies) and inferential statistics (t-tests and ANOVA). The study revealed that librarians demonstrated a moderate level of awareness (mean = 26.40) but low preparedness (mean = 18.72) for QR code deployment. Awareness was significantly influenced by gender and educational qualification, with male librarians and those holding Ph.D. degrees exhibiting higher awareness. Preparedness varied significantly with qualification but showed no significant differences based on gender or years of experience. The study reveals disconnect between awareness and preparedness, highlights the strategic gap that may impede effective adoption of QR codes in library services in Kwara State. It concludes that while baseline awareness exists, practical preparedness is insufficient. The study recommends targeted professional development initiatives such as training programmes, workshops and institutional support to enhance librarians' competencies and promote integration of QR code technologies in Nigerian academic libraries.

**Keywords:** Adoption, Awareness, Preparedness, QR Code, University Libraries

## Introduction

University libraries play a central role in supporting teaching, learning, and research through the effective organisation and retrieval of information resources. At the core of this function is the information retrieval (IR) system, which enables users to locate relevant information efficiently from large and diverse collections (Mariano & Singh, 2024). Information retrieval involves the processes and technologies used to organise, search, and access information based on users' needs, and it remains fundamental to the effectiveness of academic library services (Tang *et al.*, 2023). The continuous evolution of library technologies has reshaped information retrieval practices, particularly with the transition from print-based collections to digital and hybrid library environments. Advances in

search algorithms, indexing techniques, and machine learning have enhanced the precision and relevance of retrieval systems, allowing libraries to meet users' growing expectations for timely and seamless access to information (Sonkusale *et al.*, 2023; Chakraborty & Chakraborty, 2023).

In response to these developments, academic libraries increasingly integrate digital tools that improve access to electronic resources and optimise information retrieval services. One such tool is Quick Response (QR) code technology, which enables users to retrieve digital information instantly using mobile devices. QR codes are two-dimensional barcodes capable of storing and linking users to a wide range of digital content, including catalogues, databases, and institutional repositories (Chang, 2014; Parabhoi & Dey, 2025). In library settings, QR codes support efficient information access and align with the principle of saving the reader's time, as emphasised in Ranganathan's fourth law of library science (Aramide & Oguntimehin, 2024). Their growing relevance is further reinforced by the widespread use of smartphones among students and researchers, making QR codes a practical tool for enhancing information retrieval in university libraries (Mashat, 2024). Despite their potential, the adoption of QR codes in university libraries depends largely on librarians' awareness and preparedness. Awareness refers to librarians' knowledge and understanding of QR code technology and its applications in library services, while preparedness encompasses the availability of ICT infrastructure, technical competence, institutional support, and funding necessary for effective implementation (Ogbomo & Okuonghae, 2019). Studies indicate that although there is a general awareness of QR codes among librarians, limited depth of understanding and inadequate infrastructural support often constrain their practical use in information retrieval systems (Ogbomo & Ishioma, 2023).

In the Nigerian university library context, challenges such as insufficient ICT facilities, limited technical expertise, and funding constraints continue to affect the integration of emerging technologies (Maduewesi, 2024). These limitations contribute to low levels of institutional preparedness, thereby impeding the effective adoption of QR codes, despite their capacity to enhance access to digital resources, improve user engagement, and support efficient information dissemination (Sethy & Dadhich, 2023). Nevertheless, evidence suggests that librarians show a positive disposition towards QR code adoption, recognising its potential to improve service delivery and operational efficiency (Michael, 2020; Ogbomo & Ishioma, 2023). Given the increasing importance of QR code technology in academic library information retrieval systems, there is a need to assess the awareness and preparedness of librarians for its adoption. Training programmes, workshops, and institutional support have been identified as critical factors in equipping librarians with the skills required to implement digital technologies effectively (Paul *et al.*, 2024). This study, therefore, examines the level of awareness and preparedness of university librarians in Kwara State, Nigeria, for the adoption of QR codes as tools for enhancing information retrieval systems and improving academic library services.

Furthemore, University libraries are expected to provide efficient and timely access to information resources through modern information retrieval systems that align with users' digital behaviours. In recent years, the increasing reliance on mobile technologies by students and academic staff has created a demand for library services that support instant and seamless access to digital resources. QR code technology offers a practical means of meeting this demand by enabling quick access to catalogues, databases, and other library services. However, based on the authors' observations and professional interactions within university libraries in Kwara State, the use of QR codes as tools for information retrieval remains minimal and largely unexplored. Despite ongoing investments in library automation and digital resources, many university libraries in the study area continue to rely on conventional access methods that do not fully exploit available mobile technologies. This situation suggests possible gaps in librarians'

awareness of QR code applications and their preparedness to integrate the technology into existing information retrieval systems. In practice, the absence or limited use of QR codes in library spaces, catalogues, and service points raises concerns about whether librarians possess the necessary knowledge, skills, and institutional support required for effective adoption.

Evidently, Odunlade and Ojo (2023) established that disparities in ICT infrastructure, staff training, and organisational readiness across universities in Kwara State appear to influence the extent to which emerging technologies are embraced in library operations. Also, Owate (2024) submitted that without adequate awareness and preparedness among librarians, the potential of QR codes to enhance information retrieval, improve user experience, and optimise service delivery may remain unrealised. Hence, it is pertinent to establish the significant difference in the librarians' awareness and significant difference of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on gender, qualification and working experience. These observed challenges highlight a practical problem facing university libraries in the study area and underscore the need for a systematic investigation into librarians' awareness and preparedness for adopting QR code technology in information retrieval systems.

**Literature Riview**

The QR Code system has evolved over time from being a technology for the automotive industry to being a genuine information storage and sharing tool for libraries. The system represents an improvement on the barcodes or the standard UPC barcodes. The QR Code technology has a fast readability and great storage capacity which is not found in regular barcodes. The technology has the ability to manage documents, track time and products, identify item, and aid marketing. QR Codes can be read with smartphones by using its cameras. To use the QR Code (also known as 2D codes or mobile codes), the user must have a smartphone and must download a free app (application) in order to read the QR code, although some phones have one preinstalled (Erkan, 2021). Due to the dynamic and flexible nature of QR Codes, virtually any kind of data (such as alphanumeric, byte/binary, numeric, date, kanji and integer) can be stored in it. The processor locates the three distinctive squares at the corners of the image, and normalizes image size, orientation, and angle of viewing, with the aid of a smaller square near the fourth corner. The small dots are then converted to binary numbers and validity checked with an error-correcting code (Nandru & Chendragiri, 2024).

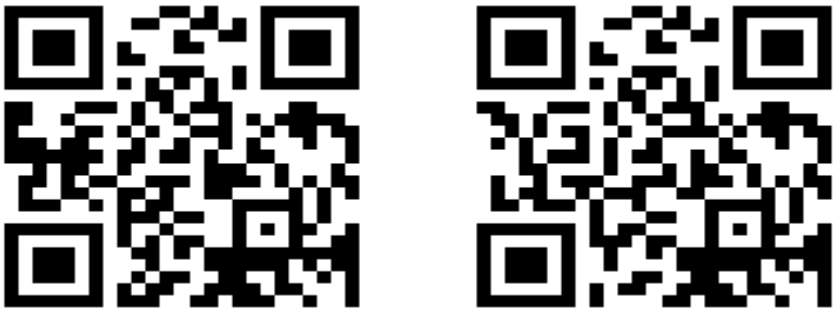

**Figure 1 reflects the example of a QR code for Plain Text and Phone number respectively.**

Quick Response (QR) codes are a type of two-dimensional barcode designed to facilitate seamless access to digital information via mobile devices through a process known as mobile tagging. Kenton (2018) defines QR codes

as a form of barcode that encodes data in a matrix format, allowing digital devices to interpret and retrieve embedded information. These codes have gained significant traction in marketing and advertising, where they are utilised to track product details, enhance customer engagement, and streamline business operations. Their primary function was to enable quick scanning and information retrieval in production environments, reducing inefficiencies associated with traditional barcoding systems. Over time, their use has expanded into diverse sectors, including retail, healthcare, education, and public services. Kumar *et al.* (2014) further elaborate on the functionality of QR codes, noting that they can encode various types of digital content, such as website URLs, text-based information, multimedia files, and interactive applications. This versatility makes them an invaluable tool for businesses and consumers alike.

Compared to conventional barcodes, QR codes offer several advantages, making them a superior alternative for encoding and retrieving information. Notably, they can store a significantly larger volume of data and support four primary encoding formats: alphanumeric, numeric, binary, and Kanji (Kumar *et al.*, 2014). This multi-format compatibility enhances their adaptability across multiple industries. In manufacturing, for instance, QR codes are widely employed to monitor production batches, ensure quality control, and provide instant access to detailed product specifications. Additionally, in the retail sector, businesses leverage QR codes to facilitate contactless payments, improve inventory management, and offer personalised consumer experiences through interactive marketing strategies. Beyond commercial applications, QR codes have also proven beneficial in non-profit and public service contexts. For example, in healthcare, QR codes are increasingly being used for patient identification, electronic health records, and medication tracking (Parabhoi *et al.*, 2017). In the education sector, they serve as an innovative tool to bridge the gap between traditional and digital learning by providing students with quick access to supplementary materials, interactive exercises, and multimedia resources. Furthermore, governmental institutions employ QR codes for streamlining administrative processes, facilitating access to public services, and disseminating important information to citizens. Smith and Patel (2020) highlighted that the integration of QR codes in academic libraries has significantly enhanced user engagement and accessibility to digital resources. Their study, conducted across three universities in the United Kingdom, found that embedding QR codes within library catalogues enabled students to efficiently access e-books, research articles, and multimedia materials. The researchers further noted that the success of QR code adoption depended largely on institutional support, with libraries implementing structured training programmes for staff and users reporting higher engagement and utilisation rates. However, challenges such as limited awareness among older patrons, inconsistencies in device compatibility, and occasional technical malfunctions were identified as barriers to widespread adoption. These findings underscore the importance of targeted awareness campaigns, user education initiatives, and investment in technological infrastructure to optimise the implementation of QR codes in academic library services.

Brown *et al.* (2019) examined the effectiveness of awareness campaigns in fostering QR code usage within public libraries. Their study involved a six-month initiative in Manchester that incorporated posters, workshops, and social media promotions to enhance user engagement. The findings revealed a 35% increase in QR code scans following the campaign, with the highest adoption rates observed among younger users aged 18-35. The researchers emphasised that clear, step-by-step instructions, coupled with incentives such as discounts on library memberships, significantly contributed to increased participation. However, they also underscored the necessity for sustained engagement strategies beyond the initial promotional period to prevent a decline in user interest. This suggests that libraries should implement long-term digital literacy programmes, periodic refreshers on QR code applications, and

interactive engagement techniques to ensure continued usage and integration of QR code technology in library services.

Taylor and Roberts (2021) conducted a comprehensive investigation into the challenges faced by libraries in implementing QR codes as part of their broader digital transformation strategies. Employing a mixed-methods approach, which included semi-structured interviews with library managers and focus group discussions with library users, the researchers identified several critical barriers impeding the seamless integration of QR codes into library services. Among these, technological illiteracy emerged as a key concern, particularly affecting older patrons and individuals from underserved communities who lacked familiarity with digital tools. This issue was further exacerbated by widespread apprehensions about data privacy, as users expressed concerns regarding the potential misuse of personal information associated with QR code interactions. Additionally, inconsistent Internet connectivity, particularly in certain regions, further limited access, rendering QR codes unreliable or inaccessible for some users. To mitigate these challenges, Taylor and Roberts (2021) proposed a multi-faceted strategy focusing on education, transparency, and collaboration. They advocated for targeted digital literacy training tailored to different user demographics, ensuring that both library staff and patrons acquire the necessary skills to use QR codes effectively. Furthermore, the researchers emphasised the importance of transparent privacy policies to build trust among users. Clearly communicating how data is collected, stored, and utilised can help alleviate concerns and foster user confidence in QR code technology. In addition, they underscored the need for collaborations with local governments and private stakeholders to improve technological infrastructure, such as expanding broadband access in rural and disadvantaged areas.

**Research Hypotheses**

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

**$HO_1$:** There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on gender.

**$HO_2$:** There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on gender.

**$HO_3$:** There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on qualification.

**$HO_4$:** There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on qualification.

**$HO_5$:** There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on working experience.

**$HO_6$:** There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on working experience.

**Methodology**

This study adopted a descriptive survey research design, which is appropriate for systematically examining existing conditions, behaviors, and perceptions within a specified population (Merriam, 2025). Given the study's focus on awareness and preparedness for the adoption of Quick Response (QR) codes for information retrieval systems in university libraries in Kwara State, Nigeria, this design provides a robust framework for observing phenomena as

they occur naturally, without manipulation of variables. The target population of this study is 56 librarians drawn from nine universities namely: University of Ilorin (UNILORIN) (25), Kwara State University (KWASU), Malete (10), Al-Hikmah University, Ilorin (5), Landmark University, Omu-Aran (7), Summit University, Offa (2), Ojaja University, Eiyekorin (2), Thomas Adewumi University, Oko-Irese (2), Ahman Pategi University, Patigi (2), and Muhammad Kamalud-deen University, Ilorin (1). Owing to the manageable size of the population, a total enumeration was adopted to allow full participation of all respondents. Data were analysed using descriptive and inferential statistics. Percentage was used to describe demographic characteristics of the respondents Mean cumulative was employed to address research questions one and two, while t-tests were used to test hypotheses one and two. Hypotheses three to six were analysed using one-way ANOVA. These analytical tools were chosen for their appropriateness in examining the relationships and differences among the variables studied.

## Results and Discussion

### Respondents' Demographic Data

This section describes the demographic features of the respondents concerning their gender, age, educational qualification and working experience using percentages as reported in Table 1.

**Table 1: Demographic characteristics of the respondents**

| **Gender** | Frequency | Percentage (%) |
|---|---|---|
| Male | 31 | 55.4 |
| Female | 25 | 44.6 |
| Total | 56 | 100 |
| | | |
| **Age** | Frequency | Percentage (%) |
| 20-30 years | 4 | 7.1 |
| 31-40 years | 28 | 50.0 |
| 41-50 years | 18 | 32.1 |
| 51-60 years | 4 | 7.1 |
| 61 years and above | 2 | 3.7 |
| Total | 56 | 100 |
| | | |
| **Educational qualifications** | Frequency | Percentage (%) |
| B.Sc/BLIS/B.Ed | 28 | 50.0 |
| MLS/M.Sc/M.Ed | 25 | 44.6 |
| Ph.D. | 3 | 5.4 |
| Total | 56 | 100 |
| | | |
| **Working experience** | Frequency | Percentage (%) |
| 1-5 years | 11 | 19.6 |
| 6-10 years | 25 | 44.6 |
| 11-15 years | 10 | 17.9 |
| 16-20 years | 5 | 8.9 |
| 21 years and above | 5 | 8.9 |
| Total | 56 | 100 |

Table 1 describes the demographic characteristics of the respondents including gender, age, educational qualifications and working experience. The gender distribution of respondents indicates that 31 (55.4%) were males,

while 25 (44.6%) were females. The table also reveals that 28 (50.0%), were between the ages of 31-40 years, followed by 18 (32.1%) within 41-50 years, while 4 (7.1%), fell within 20-30 years and 51-60 years only 2 (3.7%) were 61 years and above. In addition, 28 (50.0%) held a B.Sc./BLIS/B.Ed., 25 (44.6%) were Master's degree (MLS/M.Sc./M.Ed.), while 3 (5.4%) possessed Ph.D. In the same vein, 25 (44.6%), had 6-10 years of experience, followed by 11 (19.6%) with 1-5 years of experience, 10 (17.9%) had 11-15 years of experience, while 5 (8.9%) had 16-20 years of experience and 5 (8.9%) were 21 years and above working experience.

**Hypothesis Testing**

***$H_{O1}$:*** **There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on gender**.

**Table 2:** Independent t-test showing Difference in Librarians' Awareness of QR Codes for Information Retrieval in University Libraries in Kwara State, Nigeria, Based on Gender

| Variables | NO | Mean | Std. Dev. | Df | Cal. t-value | Tab. t-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|---|
| Male | 31 | 29.8714 | 2.20014 | | | | | |
| | | | | 54 | 3.86 | 1.674 | 0.00 | S |
| Female | 25 | 21.2286 | 3.66426 | | | | | |

P < 0.05

Table 2 shows a significant difference in librarians' awareness of QR codes for information retrieval in university libraries in Kwara State based on gender ($p < 0.05$). Male librarians recorded a higher mean awareness score (M = 29.87) than female librarians (M = 21.23). From the findings tested, the hypothesis one finding implies that there is a significant difference between males and females in the awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria. This is in line with the work of Taqi *et al.* (2024) which showed that there was a clear distinction between female and male users in the library, suggested the need to create awareness in the technological application in the library.

**$H_{O2}$: There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on gender.**

**Table 3:** Independent t-test showing Difference in Librarians' Preparedness of QR Codes for Information Retrieval in University Libraries in Kwara State, Nigeria, Based on Gender

| Variables | NO | Mean | Std. Dev. | Df | Cal. t-value | Tab. t-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|---|
| Male | 31 | 28.6521 | 1. 18226 | | | | | |
| | | | | 54 | 0.968 | 1.674 | 0.07 | NS |
| Female | 25 | 27.7826 | 1. 98314 | | | | | |

P > 0.05

Table 3 indicated there is no significant difference in librarians' preparedness for adopting QR codes for information retrieval in university libraries in Kwara State based on gender ($p > 0.05$). Although male librarians recorded a slightly higher mean preparedness score (M = 28.65) than females (M = 27.78), the difference was not statistically significant.

Hypothesis two findings show no significant difference between males and females in the awareness of QR codes for information retrieval in university libraries in Kwara State. This finding is in agreement with the work D'Souza (2024) which reveals that there is a statistically significant difference in the awareness and adoption of AI technologies based on gender Karnataka libraries. However, the finding contradicts the work of Erakman and Akin (2024) which argued that female university librarians in Turkey prioritise continuous learning and in-service training, while male librarians prefer self-directed training and personal development.

**$H_{O3}$: There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on qualification.**

**Table 4:** One-Way ANOVA Showing Difference in the Librarians' Awareness of QR Codes for Information Retrieval in University Libraries in Kwara State Based on Qualification

| Sources of Variance | Sum of Square | Df | Mean Square | Cal. F-value | Tab. F-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|
| **Between Groups** | 35.20 | 2 | 17.60 | | | | |
| **Within Groups** | 139.92 | 53 | 2.64 | 6.67 | 3.15 | 0.00 | S |
| **Total** | 175.12 | 55 | | | | | |

**P < 0.05**

Table 4 shows a significant difference in librarians' awareness of QR codes for information retrieval in university libraries in Kwara State based on educational qualification ($F(2,53) = 6.67$, $p < 0.05$). This indicates that awareness levels varied significantly among librarians with Bachelor's, Master's, and Ph.D. qualifications. The findings of Hypothesis Three indicate a significant difference in librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on their qualifications. This suggests that librarians with higher or specialized qualifications may possess greater familiarity or training in emerging technologies like QR codes. These findings align with those of Fransica and Omorodion (2019), who identified a relationship between users' access to QR code readers and the successful deployment of QR code technologies in libraries. They also highlighted challenges such as limited availability of QR code readers for all users and a general lack of awareness, both of which impact the adoption of such technologies. Consequently, this study reinforces the idea that professional qualification plays a key role in the readiness and capacity of librarians to integrate QR codes into library services.

**Table 5: Sheffee Post Hoc Test Showing where the Significant Difference Lies**

| Scoring Level | N | Subset for alpha = 0.05 | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| B.Sc/BLIS/B.Ed | 22 | 15.19823 | | |
| MLS/M.Sc/M.Ed | 23 | | 22.7857 | |

| | | | | |
|---|---|---|---|---|
| Ph.D. | 11 | | | 33.6667 |
| Sig. | | 1.000 | 1.000 | 1.000 |

Table 5 indicates that librarians with Ph.D. qualifications recorded the highest level of awareness of QR codes for information retrieval, followed by those with Master's degrees, while librarians with Bachelor's degrees had the lowest awareness levels. The findings from Hypothesis Four reveal a significant difference in librarians' preparedness to use QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on their qualifications. This suggests that the level of academic or professional qualification influences how well-equipped librarians are to implement and manage QR code technologies. This result aligns with the assertion of Ahmad and Rafiq (2022), who reported significant differences across groups in terms of technological preparedness. Despite this, the study observed an overall passive level of preparedness among librarians for digital preservation initiatives, indicating a broader need for targeted training and capacity building to support effective digital integration in library services.

**$HO_4$: There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on qualification.**

**Table 6:** One-Way ANOVA Showing Difference in the Librarians' Preparedness of QR Codes for Information Retrieval in University Libraries in Kwara State Based on Qualification

| Sources of Variance | Sum of Square | Df | Mean Square | Cal. F-value | Tab. F-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|
| **Between Groups** | 39.68 | 2 | 19.84 | | | | |
| **Within Groups** | 143.63 | 53 | 2.71 | 7.32 | 3.15 | 0.00 | S |
| **Total** | 183.31 | 55 | | | | | |

**P < 0.05**

Table 6 shows a significant difference in librarians' preparedness for adopting QR codes for information retrieval in university libraries in Kwara State based on educational qualification ($F(2,53) = 7.32$, $p < 0.05$). Hypothesis Five findings reveal that there is no significant difference in librarians' awareness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on working experience. This finding is in agreement with Ogbomo and Okuonghae (2019) which found that many librarians lacked knowledge on creating QR codes and were unfamiliar with the software required for their generation. This finding suggests that QR code technology has not been widely adopted or integrated into library services across various regions.

**Table 7: Sheffee Post Hoc Test Showing where the Significant Difference Lies**

| Scoring Level | N | Subset for alpha = 0.05 | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| B.Sc/BLIS/B.Ed | 22 | 14. 98123 | | |
| MLS/M.Sc/M.Ed | 23 | | 23.14857 | |
| Ph.D. | 11 | | | 32.87628 |
| Sig. | | 1.000 | 1.000 | 1.000 |

Table 7 indicates that librarians with Ph.D. qualifications recorded the highest preparedness for adopting QR codes for information retrieval (M = 32.88), followed by those with Master's degrees (M = 23.15), while librarians with Bachelor's degrees recorded the lowest preparedness levels (M = 14.98). The findings of Hypothesis Six indicate that there is no significant difference in librarians' preparedness to use QR codes for information retrieval in university libraries in Kwara State based on their years of working experience. This suggests that preparedness for adopting QR code technology is not necessarily influenced by how long a librarian has been in the profession, but may instead be linked to factors such as exposure to digital tools, training opportunities, or institutional support. These findings align with those of Ogbomo and Ishioma (2023), who observed a generally low level of awareness of QR codes among librarians. Nonetheless, their study also noted a substantial willingness among librarians to embrace the technology, largely due to its perceived cost-effectiveness and user-friendliness. This indicates a latent potential for adoption that could be activated through targeted awareness campaigns and training programs, rather than relying solely on years of service or experience. Thus, fostering a culture of continuous professional development and innovation may be more critical than tenure in enhancing digital preparedness.

**$HO_5$: There is no significant difference in the librarians' awareness of QR codes for information retrieval in university libraries in Kwara State based on working experience**

**Table 8:** One-Way ANOVA Showing Difference in the Librarians' Awareness of QR Codes for Information Retrieval in University Libraries in Kwara State Based on Working Experience

| Sources of Variance | Sum of Square | Df | Mean Square | Cal. F-value | Tab. F-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|
| **Between Groups** | 10.94 | 2 | 5.47 | | | | |
| **Within Groups** | 98.58 | 53 | 1.86 | 2.94 | 3.15 | 0.08 | NS |
| **Total** | 109.52 | 55 | | | | | |

**P > 0.05**

Table 8 shows no significant difference in librarians' awareness of QR codes for information retrieval in university libraries in Kwara State based on working experience ($F(2,53) = 2.94$, $p > 0.05$). The result of HO5 revealed that working experience did not significantly influence librarians' awareness of QR codes for information retrieval in university libraries in Kwara State. This finding suggests that awareness of QR code technology cuts across librarians regardless of their years of professional experience. The implication is that exposure to QR codes is likely driven more by general technological diffusion, institutional practices, and professional training opportunities than by length of service. This finding aligns with the view that emerging library technologies are increasingly encountered through everyday digital environments and professional interactions rather than accumulated work experience alone (Fransica & Omorodion, 2019; Ogbomo & Ishioma, 2023). It also reflects the growing ubiquity of QR codes in academic and non-academic contexts, which may account for comparable awareness levels among librarians at different career stages (Chang, 2014; Sethy & Dadhich, 2023).

**$HO_6$: There is no significant difference in the librarians' preparedness of QR codes for information retrieval in university libraries in Kwara State, Nigeria, based on working experience.**

**Table 9:** One-Way ANOVA Showing Difference in the Librarians' Preparedness of QR Codes for Information Retrieval in University Libraries in Kwara State, Nigeria, Based on Working Experience

| Sources of Variance | Sum of Square | Df | Mean Square | Cal. F-value | Tab. F-value | Sig. | Remarks |
|---|---|---|---|---|---|---|---|
| **Between Groups** | 9.44 | 2 | 4.72 | | | | |
| **Within Groups** | 93.28 | 53 | 1.76 | 2.68 | 3.15 | 0.08 | NS |
| **Total** | 102.72 | 55 | | | | | |

**P > 0.05**

Table 9 shows no significant difference in librarians' preparedness for adopting QR codes for information retrieval in university libraries in Kwara State based on working experience ($F(2,53) = 2.68$, $p > 0.05$). As shown above the result of HO6 showed that librarians' preparedness for adopting QR codes for information retrieval was not significantly influenced by working experience. This indicates that years of service did not translate into higher readiness to implement QR code technology in library operations. Preparedness for technology adoption often depends on access to ICT infrastructure, institutional support, and opportunities for capacity building rather than professional longevity (Ahmad & Rafiq, 2022; Moonasar, 2025). In this context, both early-career and experienced librarians may face similar institutional constraints, such as limited training programmes or inadequate technological facilities, which affect their readiness to deploy QR codes effectively. This finding is consistent with earlier studies which reported that preparedness for digital innovation in libraries is shaped more by organisational readiness and continuous professional development than by work experience alone (Tshabalala *et al.*, 2020; Kumar & Baba, 2024).

**Conclusion**

It could be concluded from the findings of this study that while there is a general awareness QR codes among librarians' universities in Kwara State, Nigeria, their level of preparedness for the adoption of this technology within library information retrieval systems remains relatively low. The findings revealed that, although many respondents recognised the potential of QR codes in enhancing access to electronic resources and improving user engagement, actual readiness' particularly in terms of technical infrastructure, staff training, and institutional support was lacking. Key challenges identified include limited ICT competencies, inadequate funding, and the absence of strategic implementation frameworks. To ensure the successful integration of QR code technology in university libraries across Kwara State, it is imperative to invest in capacity building, upgrade technological infrastructure, and foster organisational readiness. Addressing these areas will enable libraries to harness the benefits of QR technology, ultimately improving the accessibility and efficiency of their information services.

**Recommendations**

Based on findings, this study recommends that:

1. University library management should be organizing regular workshops and seminars to improve librarians' technical skills in QR code creation, integration, and management. This will enhance the librarians' skills in using QR codes for effective information retrieval.
2. University library management should organize QR code awareness campaigns aimed at sensitizing both librarians and library users to highlight the benefits of QR codes in information retrieval. This can be done by using posters, flyers, and social media campaigns within universities to demonstrate practical applications of QR codes.
3. University library management embed QR codes in catalogue entries, shelves, and signage to provide instant access to e-books, journals, and multimedia resources. This can be done by partnering with ICT experts, library associations, and tech companies to provide technical support and training.
4. University library management should design inclusive training programmes that address the needs of female librarians. This can be done by providing advanced training opportunities for librarians with lower qualifications to bridge the preparedness gap.
5. University library management should establish a QR code adoption task force within each university library to oversee implementation. This can be strengthened by conducting periodic assessments of librarians' awareness and preparedness to measure progress.
6. University library management should provide adequate ICT infrastructure (stable Internet, smartphones, QR code scanners, and software tools). This can be enhanced by allocating budgetary provisions for digital innovation projects, including QR code integration into catalogues, e-resources, and library signage.

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