

EVALUATING QR CODE- BASED INTERVENTION TO ENHANCE VISIBILITY AND ACCESSIBILITY OF ACADEMIC DIGITAL LIBRARY SERVICES: EVIDENCE FROM AN INDONESIAN UNIVERSITY

Larasati Zuhro Nur Faizah Surya Putri^{1*}, Nanang Hermawan², Idzhari Rahman³

^{1,3}Universitas Cenderawasih, Indonesia

² Universitas Negeri Makassar, Indonesia

*Larasati Zuhro email: larasatizuhro@gmail.com

ABSTRACT

Digital library services have developed into a fundamental component of academic information systems, enabling students to access academic resources beyond the previous physical boundaries of libraries. Regrettably, the availability of digital platforms does not necessarily guarantee both their visibility and utilization. Most higher education institutions, digital library services remain underused because students are unaware of available access points and resources. To address this challenge, the library of Universitas Cenderawasih implemented Titik Baca Quick Response (QR) codes at strategic faculty as a low-cost technological intervention designed to simplify direct access to the digital library services through mobile devices.

This study assesses the effectiveness of QR code-based access points in enhancing the visibility and accessibility of academic digital library services. A quantitative descriptive approach was applied through a survey involving undergraduate students from multiple faculties at Universitas Cenderawasih. The study examined students' awareness of digital library services, exposure to, utilization behavior of QR Code, and patterns of digital library usage. Descriptive statistical analysis was conducted to pinpoint trends in service awareness and access among university students.

Institutional records show that digital library visits increased from 102 visits during the pre-implementation period to 711 following the initial QR Code deployment. However, expanding QR Code locations across faculties resulted in only 444 visits, it points out that wider deployment alone did not sustain digital library utilization. These findings suggest that QR Code deployment should be integrated with user engagement strategies rather than implemented as a stand-alone technological solution.

Keywords: Digital Library, QR Code, Academic Information Systems, Service Visibility, Information Access, Higher Education.

1. INTRODUCTION

Digital transformation has induced higher education to broaden their facility to accommodate to the technology demands accordingly to provide high support for learning, research, and community services. The significant transformation form is advancement digital library transformation and conceive a can be accessed and timeless access of scholarly resources. Digital libraries are built not only for digital collections preservation but also as academic information systems which are groundwork of effective exploration, management, and utilization of knowledge (Matthews & Block, 2019).

As digital library services continue to advance, research attention is no longer focused merely on providing technological infrastructure and electronic collections, but also on how these services can be effectively discovered and retrieved by information seekers. In the contemporary digitalized higher education ecosystem, the mere existence of information systems and digital resources does not automatically ensure that students will seamlessly navigate the student to access these services. Research conducted by OCLC indicates that one of the main challenges facing academic libraries today is escalating the visibility and accessibility of digital resources to align with users' readily to diverse information seeking behavior (Malpas et al., 2024). Thus, the challenges faced by libraries are no longer in providing digital services but also extend to ensuring that the services provided are discoverable among users' information seeking journey.

In this regard, various technological innovations have broadened to strengthen the connection between the physical library and its digital services. One of widely used is Quick Response (QR) Code technology, which allows users to access digital information resources directly over mobile devices. The Cenderawasih University Library has deployed QR codes at various strategic locations on each faculty as means of retrieving digital library services. Information services and expand students' access to electronic academic resources. This strategy is part of the library's endeavor to improve the accessibility of digital information services and expand student's access to electronic academic resources. This situation increases questions about efficaciousness of QR codes as a point of access to academic resources in order to support the use of digital library services.

In particular, this study assesses student's awareness of digital library services, their engagement with QR codes installed by the Cenderawasih University library, and their patterns of using digital library services access via QR codes. The results of this study are expected to deliver a practical insight for library administrators in designing more effective and sustainable strategies to improve access to technology based of university digital library.

2. LITERATURE REVIEW

Several studies show that QR codes have the prospect as a bridge and medium that eases interaction between physical and digital resources. Dey et al. (2025) mention that QR code can enhance access to academic library services. Zakyyah et al. (2025) also agreed that QR Code

helped Rumah Edukasi as an education center in Bondowoso increase literacy level of the people. Aryasi, Samosir, and Sa'diah (2024) discovered that website-based library services supported by QR codes can perform a convenience, speed, and efficiency in retrieving information for library users. The deployment of QR code technology allows users to access various library services through a single access point scanned utilizing a smartphone. However, the findings signify that QR code can be a practical solution for enhancing the accessibility of digital library services. Furthermore, smartphones have become a staple and are now very common in academic settings.

The majority of previous studies focused on the implementation of QR code technology or the general level of digital service usage. There is still limited paucity of literature that specifically evaluates the role of QR codes as a mechanism for escalating the visibility of services and access to digital libraries in higher education settings. Building upon this background, this study aims to evaluate the role of QR codes in enhancing the visibility of and access to Cenderawasih University digital library services.

3. METHODS

This study implemented a quantitative descriptive method to evaluate effectiveness of QR code deployment in improving the visibility and accessibility of Cenderawasih university's digital library services. This study centered on four variables: digital library awareness, QR Code utilization, digital library utilization, and institutional digital library visits. Rather than evaluating casual relationships, this study implicitly assumes that expanding QR code access points might improve students' awareness and facilitate access to digital library services. The evaluation synthesized two complementary sources of data: institutional visitation records, which objectively describe users' access behavior, and questionnaire responses, which capture students' perceptions of digital library awareness and QR code utilization.

The study drew upon secondary data obtained from Cenderawasih University Library, consisting of digital library visitation statistics from 2018 to 2026. To ensure fair comparability, only visitation records during February-July (even semester) period were analyzed. The data were classified into three implementation phases of QR Code: pre-QR Code implementation in 2018 to 2022, initial QR Code implementation within the university library in 2023, and expanded QR Code deployment through Reading Points (Titik Baca) and Reading Corner (Sudut Baca) across all strategic spot on Cenderawasih University faculties in 2026. Primary data were gathered through a web survey distributed to 200 undergraduate students using a five-point likers scale from 1 "strongly disagree" to 5 "strongly agree" (Saunders et al., 2023).

Institutional visitation data were summarized descriptively using monthly frequencies, and percentage changes to compare digital library usage based on the three implementation phases of QR Code. Questionnaire data were synthesized using descriptive statistics. Instrument validity was tested using Pearson's Product-Moment Correlation, while reliability was evaluated using Cronbach's Alpha, with coefficients above 0.70 and it considered acceptable (Hair et al., 2022). The findings from both data were unified through descriptive interpretation

to evaluate the efficacy of QR Code deployment to enhance digital library access while acknowledging that other factors, such as students' information seeking behavior and preferences for alternative digital platforms may also influence QR Code utilization.

4. RESULTS AND DISCUSSION

The data gathered from Cenderawasih University shows significant difference level of accessing QR Code since the expand deployment. The first QR Code installation in 2023 resulted in a substantial increase in digital library visitation, based on institutional data. This finding supports previous studies reporting that QR Codes can simplify access to academic information resources through mobile devices (Dey et al., 2025; Aryasi et al., 2024). Yet, the introduction of QR Codes via Reading Points (Titik Baca) and Reading Corners (Sudut Baca) in 2026 did not result an increase in the use of Cenderawasih University digital libraries as shown in the table below.

Table 1. Total Implementation phases of QR Code

No	Criteria	Total
1	Pre-QR Code implementation (2018-2022)	102
2	Initial QR Code implementation within the university library (2023)	711
3	Expanded QR Code deployment through Reading Points (Titik Baca) and Reading Corner (Sudut Baca) (2026).	444

The fluctuation result in each year before QR codes deployment and the afterward periods show raise of digital library access, on the other hand, the expanded deployment did not show any significant visits as shown in the figure below. Since this study was conducted in June, there is no July's data available.

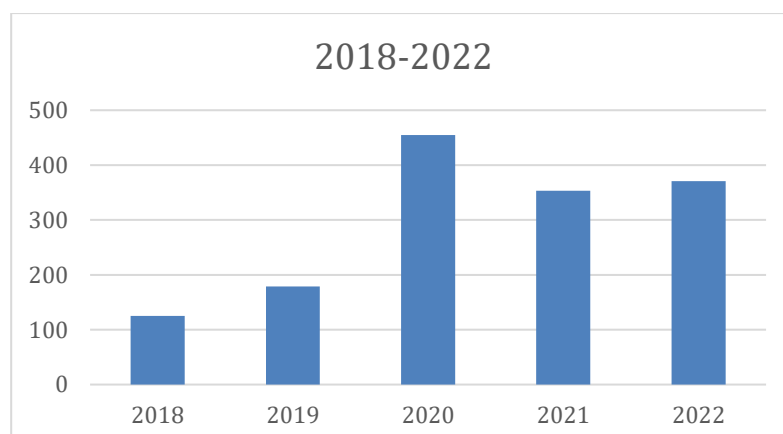


Figure 1. Pre-QR Code implementation (2018-2022)

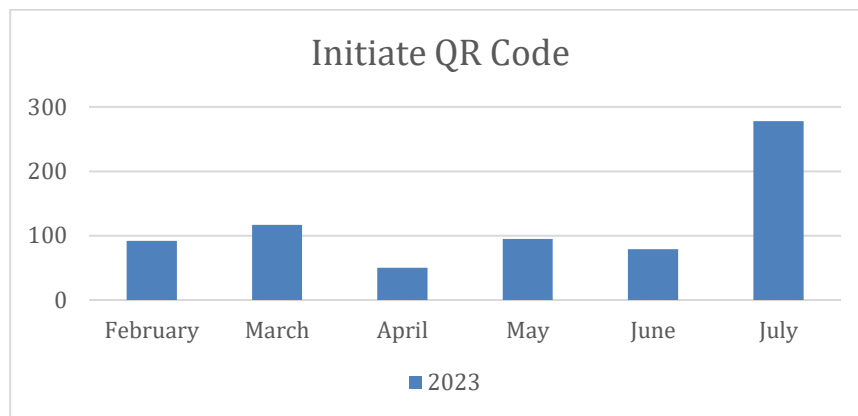
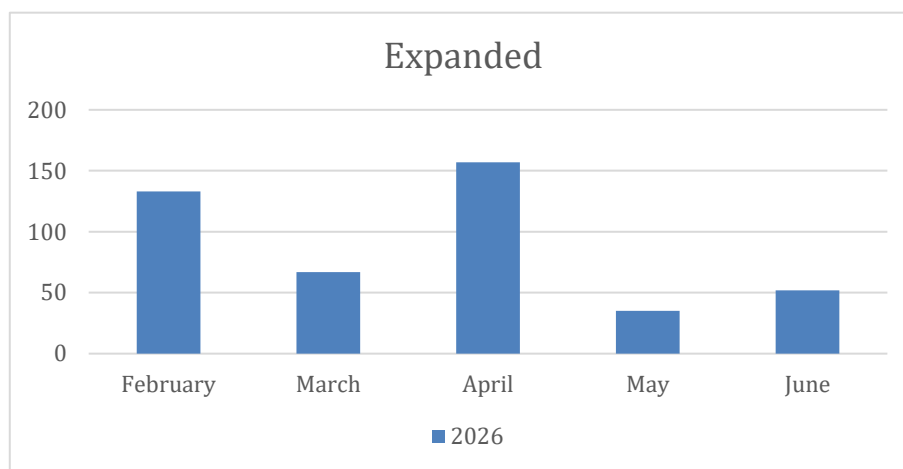


Figure 2. Initiate QR Code implementation (2023)



Based on the chart above, we can see that the digital library visits decreased in comparison to the first deployment period, despite QR Codes becoming more assessable across Cenderawasih University faculties. Conclusions are corroborated by questionnaire data gathered from 200 active undergraduate Cenderawasih University students enrolled in the second, fourth, and sixth semesters. However, only 35.1% of respondents said they had ever utilized QR Codes, while 64.9% mentioned that they had never access QR Codes offered by Cenderawasih University library.

Saya pernah mengakses QR Code digital library UNCEN yang terpasang di Fakultas

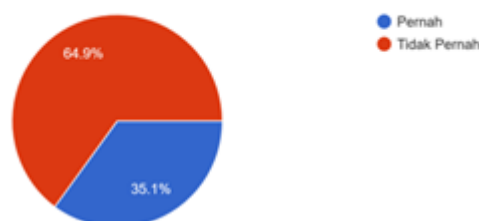


Figure 3. QR Code utilization

Most of student who had utilized the QR Code concurred that they are already familiar accessing Cenderawasih University digital library to seek journals and e-books. In a different vein, the majority of respondents concurred that broad internet sources like Google and artificial Intelligence programs are easier to use for finishing task rather than academic resources from Cenderawasih University digital library as shown in the chart below.

Saya menggunakan jurnal atau e-book melalui digital library Universitas Cenderawasih untuk mengerjakan tugas perkuliahan.

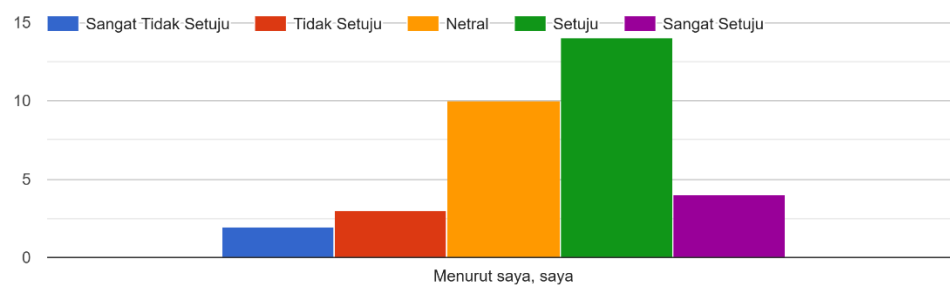


Figure 4. Digital Library utilization

Sayamerasa lebih mudah menggunakan sumber dari internet biasa (Google dan AI) dari pada sumber ilmiah (jurnal, buku) yang disediakan...aru Uncen untuk menyelesaikan tugas perkuliahan.

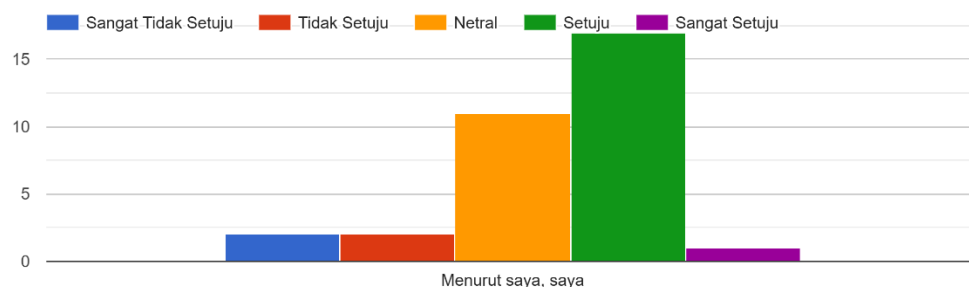


Figure 4. Digital Library utilization

These results reveal that students' inclination to engage with the provided QR Codes of Cenderawasih University digital library access represents the primary barrier, rather than any deficiency of both technical skills and facilities provided by the Cenderawasih University. The data demonstrates that extending QR Code sites alone does not inevitably improve digital library visits. Instead, students continue to rely on familiar digital platforms for academic information seeking. It also determines that user behavior remains more relevant element that physical access availability. Therefore, QR Code deployment should be combined with a larger

engagement method, including digital literacy teaching, classroom-based promotion, and other possibly methods. In other words, QR Codes successfully facilitate access for students who choose to use the service, but they do not necessarily influence students' decisions regarding where they search for academic information. However, from an information systems perspective, this study indicated that technological changes should be supplemented by behavioral and service promotion techniques to promote sustainable adoption of academic digital library services.

5. CONCLUSION AND LIMITATION

This study evaluated the implementation of QR Code-based access as a strategy to improve the visibility and accessibility of digital library services at Universitas Cenderawasih. The findings indicate that QR Code implementation contributed to improving access during its initial deployment by providing a more direct connection between students and the university digital library. However, the subsequent expansion of QR Code deployment through Reading Points and Reading Corners across university faculties did not result in a corresponding increase in digital library utilization. Survey findings further suggest that although students generally recognize the existence of the digital library, QR Codes have not yet become a primary access mechanism for obtaining academic information. Instead, many students continue to rely on alternative digital platforms such as search engines and AI-based tools.

These results imply that students' willingness to use the offered QR codes to access the digital library is the main obstacle rather than their ability to use it. The data demonstrates that extending QR Code sites alone does not inevitably improve digital library consumption. Instead, students continue to rely on familiar digital platforms for academic information seeking, demonstrating that user behavior remains a more relevant element than physical access availability. Therefore, QR Code implementation should be combined with larger user engagement methods, including digital literacy teaching, classroom-based promotion, academic orientation, and collaboration with faculty members. From an information systems perspective, this study illustrates that technological changes should be supplemented by behavioral and service promotion techniques to promote sustainable adoption of academic digital library services. These findings imply that improving the physical availability of digital access points alone is insufficient to change users' information-seeking behavior. Consequently, QR Code implementation should be complemented by broader strategies that strengthen service visibility, user engagement, and information literacy. This study contributes to the growing discussion on academic information systems by demonstrating that technological accessibility should be evaluated together with users' behavioral responses to digital library services.

This study has several limitations. First, the analysis was limited to digital library visitation records during the February–July academic period to ensure consistency across observation years; therefore, the findings may not represent annual utilization patterns. Second, the evaluation focused on a single public university, which may limit the generalizability of the findings to other higher education institutions with different technological infrastructures or user characteristics. Third, the expanded QR Code initiative through Reading Points and

Reading Corners had only recently been implemented when the study was conducted, meaning that the findings reflect the early stage of the program rather than its long-term effectiveness. In addition, this study employed descriptive analysis and did not examine causal relationships between QR Code implementation and digital library utilization. Future research is therefore recommended to investigate the behavioral factors influencing students' adoption of digital library services, to evaluate the long-term impact of QR Code implementation using longitudinal or quasi-experimental designs, and to examine how QR Codes can be integrated with digital literacy programs, academic learning activities, and emerging technologies such as artificial intelligence to enhance the utilization of academic digital library services.

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