



Integrating Information Behavior and Digital Technology in the Development of User-Centered Library Services

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ABSTRACT

This study aims to analyze the integration of information behavior and digital technology in the development of user-centered library services. The study responds to the growing need for academic libraries to provide digital services that are not only technologically available, but also aligned with users' real information-seeking behavior, academic needs, and service experiences. A qualitative approach with a case study design was used. The research was conducted at the Library of Universitas Islam Bandung from September 2025 to November 2025. Data were collected through semi-structured interviews, non-participant observation, and document analysis involving 18 informants, consisting of 12 students, 3 lecturers, and 3 librarians selected through purposive sampling and limited snowball sampling. The data were analyzed using thematic analysis. The findings reveal four main themes: changing patterns of information seeking, barriers in accessing digital library services, the mediating role of librarians, and the need for personalized and responsive service design. The study shows that digital library services become more meaningful when technology is supported by clear guidance, librarian assistance, user-friendly interfaces, and service models that reflect users' academic practices. This study contributes to information behavior and user-centered library service theory by emphasizing the importance of user experience in digital transformation. The findings also imply that university libraries need to develop inclusive, adaptive, and feedback-based digital services to improve access to scholarly information.



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1. Introduction

Libraries have entered a period in which information services must respond to rapid changes in user behavior, digital access, and academic communication. Users no longer depend only on printed collections or face-to-face reference services. They search for information through online catalogues, institutional repositories, e-journals, e-books, academic databases, discovery tools, and mobile-based services. This shift has changed the role of libraries from collection-centered

institutions into user-centered information environments. In the global context, digital transformation has encouraged libraries to redesign services based on accessibility, usability, personalization, and user experience. Lu and Li (2025) show that digital transformation in college libraries depends not only on technological readiness, but also on readers' intention to adopt digital services. Riady et al. (2025) also found that digital library use, user satisfaction, and perceived net benefits are shaped by perceived usefulness, system quality, and user experience in the Indonesian higher education context. These studies indicate that technology alone cannot improve library services unless it reflects how users actually seek, evaluate, and use information.

In Indonesia, university libraries continue to adapt to digital service models due to changes in student learning habits, academic research practices, and institutional demands for online information access. Students increasingly use search engines, digital repositories, subscribed databases, and open-access platforms to support coursework and research. However, this shift does not automatically produce effective information behavior. Many users still experience difficulty in selecting credible sources, formulating search keywords, accessing subscribed databases, and understanding digital library interfaces. Septiandi et al. (2025) found that digital library services influenced user behavior at the Unisba Library, especially in relation to access patterns, service expectations, and the need for more responsive digital support. Prabowo et al. (2024) also showed that the use of library e-resources can strengthen students' information literacy self-efficacy when learning activities guide them to interact with digital sources in a structured way. These findings show that user-centered library services require a deeper understanding of user behavior, not only the provision of digital platforms.

The main problem in the field is the gap between digital service development and the lived experience of users. Many libraries have provided online catalogues, digital collections, and reference channels, but users do not always experience these services as simple, inclusive, or meaningful. Some users prefer general search engines because they consider library systems too complex. Others use digital library services only when lecturers require them to access academic sources. This situation shows that user behavior is shaped by habits, confidence, digital literacy, academic pressure, and previous experience with information systems. Hoeber et al. (2022) explain that information seeking in academic digital libraries involves search strategies, interaction patterns, and user judgments that differ across tasks. Gordon et al. (2020) also found that academic information-seeking behavior is influenced by disciplinary practices, source preferences, and perceptions of credibility. Therefore, library service development must integrate digital technology with the social and cognitive processes that shape information behavior.

This issue is important because libraries play a strategic role in education, social inclusion, and knowledge culture. In higher education, libraries support independent learning, research productivity, academic literacy, and equitable access to scholarly information. From a social perspective, user-centered digital library services can reduce access barriers for students with different levels of digital skills, economic backgrounds, and academic needs. From a cultural perspective, digital libraries mediate new reading habits, research practices, and knowledge-sharing patterns. Seale et al. (2022) argue that library user experience should not be treated as a neutral technical matter because it is connected to access, power, embodiment, and institutional context. This argument is relevant for Indonesian academic libraries, where digital transformation must consider not only system efficiency but also user diversity, service equity, and the role of librarians as information mediators.

Previous studies have discussed digital library adoption, user satisfaction, cloud-based library services, semantic digital libraries, digital transformation, and library user experience. Rafique et al. (2021) examined students' continuous use of academic library applications, while Xu and Du (2022) analyzed undergraduate students' intention to use university digital libraries through the information system success model. Kayode et al. (2020) studied ease of use and user-friendliness in cloud-based academic library services. Shahzad and Khan (2023) reviewed factors affecting

the adoption of integrated semantic digital libraries. However, many of these studies used technology acceptance, system success, or quantitative satisfaction perspectives. Fewer studies have explored how users give meaning to digital library services, how librarians interpret user behavior, and how these experiences shape the development of user-centered services. This gap shows the need for a qualitative study that can reveal processes, meanings, experiences, and service practices that may not appear clearly in survey-based studies.

Based on this gap, this study aims to analyze the integration of information behavior and digital technology in the development of user-centered library services. The study focuses on three main issues: users' experiences in accessing digital library services, librarians' strategies in understanding user needs, and the service development process that connects digital technology with user behavior. Theoretically, this study contributes to information behavior studies, user-centered library service theory, and digital library transformation discourse. Practically, the findings can help university libraries design digital services that are more accessible, responsive, inclusive, and aligned with real user needs. A qualitative approach is used because this study seeks to understand meaning, experience, interaction, and context rather than measure variables statistically.

2. Materials and Methods

This study used a qualitative approach with a case study design. The case study design was selected because the study focused on a specific institutional context and aimed to understand how information behavior and digital technology were integrated in the development of user-centered library services. This design allowed the researcher to examine user experiences, librarian practices, digital service workflows, and institutional conditions in a natural setting. A qualitative case study was considered appropriate because the research questions required an in-depth explanation of processes, meanings, and interactions that could not be fully captured through numerical measurement.

The research was conducted at the Library of Universitas Islam Bandung, Bandung, West Java, Indonesia. The location was selected because the library has developed digital services, including an online public access catalogue, access to electronic resources, digital reference support, institutional repository services, and online information channels for users. The research was conducted from September 2025 to November 2025. This period allowed the researcher to observe library service activities during an active academic semester, when students and lecturers used library resources for learning, teaching, and research activities.

The participants consisted of 18 informants, including 12 students, 3 lecturers, and 3 librarians. Students were selected because they represented the main users of digital library services. Lecturers were included because they used library resources for teaching, research, and academic supervision. Librarians were involved because they managed services, assisted users, and understood the institutional process behind digital service development. The student participants had to meet three criteria: they were active students, they had used digital library services at least twice during the semester, and they had experience searching for academic information through the library system or electronic resources. Lecturer participants had to have experience using digital sources for teaching or research. Librarian participants had to be directly involved in user services, digital services, or information literacy support.

The study used purposive sampling because the researcher needed participants who had direct experience with the phenomenon under investigation. Snowball sampling was also used in a limited way when initial participants recommended other users who had relevant experiences, such as students who often used digital collections or users who had faced access difficulties. The number of participants was not determined to achieve statistical representation. Instead, it was based on the richness, relevance, and saturation of the data. Data collection stopped when the

interviews no longer produced substantially new themes related to user behavior, digital access, and user-centered service development.

Data were collected through semi-structured interviews, non-participant observation, and document analysis. Semi-structured interviews were used to explore users' experiences in searching for information, their perceptions of digital library services, their difficulties in accessing resources, and their expectations for service improvement. Interviews with librarians focused on service planning, user assistance, digital service management, and challenges in responding to user needs. Non-participant observation was conducted to examine how users interacted with library spaces, service desks, digital access points, and online service channels. Document analysis was carried out by reviewing library service guidelines, digital service information, user guides, website content, repository pages, and internal service documents that were accessible to the researcher.

The main research instrument was the researcher. Supporting instruments included an interview guide, an observation sheet, and a document review checklist. The interview guide covered three areas: information behavior, digital service experience, and user-centered service development. Questions were open-ended to allow participants to explain their experiences in their own words. The observation sheet focused on user interaction with services, librarian-user communication, access points, and visible barriers in service use. The document review checklist helped the researcher identify how the library described its services, guided users, and communicated digital access procedures.

Data validity was strengthened through source triangulation, method triangulation, member checking, and an audit trail. Source triangulation was conducted by comparing information from students, lecturers, and librarians. Method triangulation was carried out by comparing interview data, observation notes, and documents. Member checking was conducted by asking selected participants to review summaries of their interview results so that the researcher could confirm whether the interpretation reflected their intended meaning. An audit trail was maintained by documenting interview transcripts, observation notes, coding decisions, category development, and analytical memos. These procedures were used to improve credibility, dependability, and transparency in the research process.

The data were analyzed using thematic analysis. The analysis followed several stages: familiarizing with the data, generating initial codes, grouping codes into categories, developing themes, reviewing themes, and writing the interpretation. The coding process focused on patterns related to search behavior, digital access barriers, user expectations, librarian support, service usability, and personalization needs. The analysis was also informed by the interactive logic of qualitative data analysis, which involved data condensation, data display, and conclusion drawing. The final themes were developed by connecting participants' narratives with the research focus and relevant literature. This process enabled the researcher to explain not only what users experienced, but also how their experiences shaped the need for more user-centered digital library services.

3. Results and Discussions

The findings of this study show that the integration of information behavior and digital technology in library services was shaped by users' daily academic needs, their digital habits, and the ability of librarians to translate these needs into more responsive services. Based on interviews, observations, and document analysis, four main themes emerged: changing patterns of information seeking, barriers in accessing digital library services, the mediating role of librarians, and the need for more personalized and user-centered digital services. These themes indicate that digital library development cannot be understood only as a technical process. It also involves social interaction, user confidence, information literacy, and institutional support.

The first theme concerns the changing pattern of information-seeking behavior among students and lecturers. Most student participants stated that they usually began their search for academic information through search engines before using the library system. They considered search engines faster and more familiar, although they admitted that the quality of sources was not always reliable. One student explained, "I usually search on Google first because it is easier. After that, I check the library website when I need journal articles for assignments." This statement shows that the digital library was not always the first access point for scholarly information. Users tended to combine informal digital habits with formal academic requirements. Lecturers showed a different pattern. They were more familiar with journal databases and institutional repositories, but they still expected the library to provide clearer access guidance and more stable digital services.

The second theme relates to access barriers and usability problems in digital library services. Several participants experienced difficulty when using the online catalogue, accessing subscribed databases, or finding full-text academic sources. These difficulties were not always caused by the absence of digital resources. In many cases, users did not fully understand how to use the available services. One participant stated, "The library has many digital sources, but I do not always know which one to open or how to search properly." Observation data supported this finding. Some users asked librarians for help after failing to locate sources through the online system. This condition indicates that digital access does not automatically create effective information access. Users need clear instructions, simple interfaces, and continuous guidance.

The third theme highlights the role of librarians as mediators between users and digital information systems. Librarians did not only provide technical assistance. They also helped users formulate keywords, identify credible sources, access databases, and understand citation practices. One librarian explained, "Many users come because they cannot find journal articles. Usually, the problem is not the database, but the search strategy." This finding shows that librarians function as information educators in the digital service environment. Their role becomes more important because users often have access to many digital sources but lack the skills to evaluate and use them effectively. The librarian's role also connects technology with human support, which is central to user-centered service development.

The fourth theme concerns the need for personalization and more responsive service design. Participants expected digital library services to be easier to navigate, more integrated, and more relevant to their academic needs. Students wanted short guides, search tutorials, direct links to frequently used resources, and online help channels. Lecturers expected subject-based information services, updated access to academic databases, and support for research activities. One lecturer stated, "The library should not only provide access. It should also recommend sources based on research fields." This statement reflects a shift from passive digital service provision to proactive and personalized information support. Documentation analysis also showed that some service guides existed, but they were not always visible or written in a user-friendly format.

The findings also show that user-centered library services require attention to social and cultural contexts. Students' information behavior was influenced by habits formed through everyday digital media use. They expected library systems to be as simple as commercial search platforms. At the same time, academic culture required them to use credible, peer-reviewed, and institutionally recognized sources. This created tension between convenience and credibility. Users wanted speed and simplicity, while academic standards required accuracy and depth. The library became an important space where these two demands could be negotiated through better digital design and librarian support.

Overall, the results indicate that the integration of information behavior and digital technology should be developed through an understanding of real user experience. The study found that digital library services became more meaningful when users could connect technology with their

academic tasks, when librarians provided contextual assistance, and when service design reflected actual user needs. The development of user-centered library services therefore requires more than system availability. It requires continuous interpretation of user behavior, institutional commitment, and a service culture that values accessibility, guidance, and personalization.

Discussion

The findings support the view that digital transformation in libraries depends on the relationship between technology, user behavior, and service experience. Lu and Li (2025) argue that the success of digital transformation in college libraries is strongly influenced by users' intention to adopt digital services. The present study extends this argument by showing that user intention is shaped by practical experience, perceived ease of use, trust in sources, and the availability of librarian support. Users may recognize the value of digital library services, but they will not use them consistently if the system feels difficult, fragmented, or disconnected from their academic routines.

The finding that users often begin their searches through general search engines is consistent with Gordon et al. (2020), who found that academic information-seeking behavior is shaped by user habits, disciplinary context, and perceptions of convenience. It also aligns with Hoeber et al. (2022), who explain that users in academic digital libraries apply different search strategies depending on task complexity. In this study, students used search engines because they were familiar and fast, while lecturers tended to use more formal academic databases. This difference shows that information behavior is not uniform. User-centered library services must therefore recognize different levels of experience, information literacy, and academic purpose among users.

The barriers found in this study also confirm previous research on digital library usability and system quality. Riady et al. (2025) found that user satisfaction and the perceived benefits of digital library use are influenced by system quality and ease of use. Rafique et al. (2021) also showed that students' continuous use of academic library applications depends on whether the application supports their needs effectively. The present study adds a qualitative explanation to these findings. Users did not reject digital library services because they lacked value. They faced difficulty because they did not always understand how to access, navigate, or apply the available resources. This means that digital service success depends on both system design and user guidance.

The role of librarians as information mediators is one of the most important findings of this study. Digital transformation does not reduce the relevance of librarians. Instead, it changes their role from collection managers to learning facilitators, digital guides, and information literacy supporters. This finding is consistent with Atanda et al. (2021), who emphasize the importance of professional competence and positive attitudes among library personnel in supporting digital services. It also relates to Prabowo et al. (2024), who show that the use of library e-resources can improve students' information literacy self-efficacy when supported by structured learning activities. In this study, librarians helped users bridge the gap between access and understanding. This role is essential because users need not only information sources, but also the ability to use those sources critically.

The study also confirms the importance of personalization in digital library development. Marzuki et al. (2025) highlight that user behavior and personalization are central issues in digital library research. The present findings show that users expect services that respond to their academic fields, learning needs, and preferred access patterns. A general digital service model is no longer sufficient for diverse academic users. Students need simple instructions and direct access to learning resources, while lecturers need subject-based information support and research-oriented services. This indicates that user-centered services should move from a one-size-fits-all model toward segmented, adaptive, and context-sensitive service design.

From a theoretical perspective, the findings strengthen the relevance of information behavior theory in digital library studies. User behavior is not limited to searching for information. It includes recognizing needs, choosing access channels, evaluating credibility, asking for assistance, and using information for academic purposes. The study also supports user-centered service theory because it shows that service quality must be evaluated from the user's lived experience, not only from institutional indicators such as collection size, database availability, or website features. Seale et al. (2022) argue that library user experience should be understood critically because it is connected to access, power, and institutional context. This study confirms that digital library experience is shaped by unequal skills, different academic needs, and varying levels of confidence in using technology.

The findings offer practical implications for university libraries. First, libraries need to simplify digital access points by integrating catalogues, repositories, databases, and help services into a more coherent interface. Second, libraries should provide short and practical user guides, such as video tutorials, search examples, and frequently asked questions. Third, librarians should strengthen information literacy programs that focus on real academic tasks, such as finding journal articles, evaluating sources, and managing references. Fourth, libraries should develop subject-based services that match user groups and academic disciplines. These steps can help libraries move from technology-centered digitalization toward user-centered service transformation.

The study also shows that documentation and communication strategies matter. Some digital services already existed, but users did not always know where to find them or how to use them. This means that service visibility is part of user experience. Libraries need to communicate services through channels that users actually use, such as learning management systems, academic orientation sessions, social media, and direct collaboration with lecturers. Digital service development should not stop at creating platforms. It should include continuous promotion, user education, and feedback-based improvement.

This study contributes a contextual perspective from an Indonesian university library. Many previous studies on digital libraries focus on technology acceptance, user satisfaction, or system success. This study adds insight into how users narrate their experiences and how librarians respond to those experiences in daily service practices. The findings show that the development of user-centered library services requires a relational process between users, librarians, technology, and institutional policy. This perspective is relevant for SINTA-accredited academic discourse because it connects local library practice with broader debates on digital transformation, information behavior, and inclusive access to scholarly information.

Future research can expand this study by comparing several university libraries with different levels of digital maturity. Further studies may also examine specific user groups, such as first-year students, postgraduate students, lecturers, or distance learners. Quantitative follow-up research can test the relationship between digital literacy, perceived ease of use, librarian support, and user satisfaction. Mixed-methods research may also provide a broader explanation by combining statistical patterns with qualitative user narratives. These future studies can deepen understanding of how digital library services can become more inclusive, adaptive, and aligned with users' academic behavior.

4. Conclusions

This study concludes that the development of user-centered library services requires a strong integration between information behavior and digital technology. The findings show that users do not access digital library services only through formal systems, but through habits, academic needs, digital confidence, and perceptions of convenience. Students often begin their searches through familiar digital platforms before using library systems, while lecturers tend to expect more structured access to scholarly resources. Librarians play a central role as mediators who

help users formulate search strategies, evaluate sources, and connect digital tools with academic tasks. These findings confirm that digital library transformation is not only a matter of system availability, but also a process of understanding user experience, service interaction, and information literacy needs.

The study contributes theoretically to the discussion of information behavior and user-centered library services by showing that digital access must be interpreted through users' lived experiences. Practically, the findings suggest that university libraries need to simplify digital access points, improve service visibility, provide practical search guidance, strengthen information literacy programs, and develop more personalized academic support. At the policy level, library digital transformation should be supported by institutional strategies that prioritize inclusive access, user feedback, librarian competence, and continuous service evaluation. Future research may compare several university libraries with different levels of digital maturity or use a mixed-methods design to examine the relationship between digital literacy, librarian support, system usability, and user satisfaction.

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