

Transforming digital literacy services through virtual reading rooms

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ABSTRACT

Background: The development of digital technology and changes in information access patterns encourage libraries in educational institutions to transform literacy services into digital forms, one of which is the virtual reading room, an alternative reading service, such as Universitas Terbuka (UT)'s digital library. **Purpose:** This study aimed to analyze the transformation of digital literacy services through virtual reading rooms in supporting information access, utilization of digital sources, and user digital literacy practices. **Methods:** This research used a qualitative case study approach. Data were obtained through observations of the virtual reading room platform and in-depth interviews with two management representatives, one active user tutor, and eight UT student representatives from various service areas. Interview data were analyzed to answer research questions. **Results:** Findings indicated that Virtual Reading Rooms had transformed libraries from physical reading and discussion spaces into digital services accessible beyond spatial and temporal constraints. This transformation expanded access to integrated academic resources that supported students' daily learning activities. Findings also revealed that tutors and students continued to face challenges related to disparities in digital competency, the ability to use digital resources, and unequal digital infrastructure across regions. Additionally, challenges remained in service management and long-term sustainability. **Conclusion:** Virtual reading rooms are a relevant and strategic form of digital literacy service transformation to address the need for information access in the digital era. **Implications:** These findings offer practical guidance for libraries and educational institutions for developing adaptive, sustainable digital literacy services, and are expected to contribute to the literature on digitalization and libraries' digital transformation.

Keywords: Digital literacy; Digital library; Library services; Service transformation; Virtual reading room

INTRODUCTION

Researchers observed that previous studies focused on the development of service technology, service utilization, and the improvement of digital literacy among a limited number of users (Noprina et al.,

2024; Rahmadhani & Aulia, 2025; Yuli, 2024). Consequently, a gap remains, with limited research on virtual reading rooms as integrated digital literacy services encompassing organizational strategy, user experience, and continuing education goals.

The digital services offered through virtual reading rooms are highly relevant to distance education. Unlike conventional education, distance education relies on digital infrastructure as part of its governance, teaching, and learning processes, including access to information and reference searches. Students in distance education institutions are required to engage in the learning process independently, using digital resources to support autonomous learning. Access to information and digital services is a key element of learning services (Chen & Patel, 2022; Copur-Gencturk et al., 2022; Putra et al., 2024)

Universitas Terbuka (UT), as a leading distance learning institution in Indonesia, provides services to geographically dispersed students with diverse educational backgrounds and access to technology. Universitas Terbuka has developed a Virtual Reading Room as part of its digital literacy services. This service aims to expand access to information and support independent learning, particularly through digital modules and self-paced practice exercises. Challenges related to digital literacy, infrastructure, content management, and sustainability remain evident (Ridlwani et al., 2025; Sanusi et al., 2024; Wahhaj et al., 2025).

Universitas Terbuka (UT), as a pioneer in distance learning in Indonesia, has implemented various innovations to enhance its educational delivery. One significant development is the integration of virtual classes and mobile learning systems. Virtual classes at UT use deep learning-based facial recognition for automatic attendance, addressing issues such as human error and unauthorized access to attendance links. This system

includes a well-designed database, user interface, and learning engine, ensuring effective implementation in virtual environments (Nursantika & Piantari, 2024). Additionally, UT has embraced mobile learning since 2013, enabling students to access services such as course registration, tuition payment, digital libraries, and online tutorials via mobile devices. These phased developments—spanning infrastructure preparation, content creation, and program delivery—have allowed students to study flexibly, regardless of their location or device (Padmo et al., 2017). These advancements demonstrate UT's commitment to leveraging technology for accessible and efficient education.

Based on various studies, digital literacy has become a crucial element in supporting the learning process in the modern era, especially amid the digital transformation accelerated by the pandemic. Universitas Terbuka (UT) in Indonesia, as a pioneer in distance education, has integrated online learning systems that include registration, digital materials, synchronous and asynchronous academic services, and online proctored exams, serving as a model for other universities in Indonesia (Draojat et al., 2023).

Additionally, the development of a digital literacy instrument encompassing eight aspects, including basic literacy, technological skills, and global awareness, has proven to be valid and reliable for evaluating students' digital literacy proficiency (Widiaty et al., 2019). Other innovations, such as the Virtual Reading Room (VRR) for learning batik in vocational schools, demonstrate how technology can enhance accessibility and learning experiences through interactive

digital media. Furthermore, digital transformation is also applied in tutor training at universities, such as the development of a gamified virtual escape room to enhance critical thinking and collaboration skills (Pippig & Hänsel, 2025). All of these indicate that digital literacy not only supports educational continuity but also expands access, enhances skills, and prepares individuals to meet the demands of an ever-evolving job market (Edmonds & Johal, 2026).

Against this backdrop, this study aims to explore the transformation of digital literacy services through the Virtual Reading Room at Universitas Terbuka (UT). It explores how the service supports access to user information, digital literacy practices, and independent learning processes. Through this study, researchers also identify implementation challenges and provide empirical evidence on how the virtual reading room functions as part of the transformation of digital literacy services in a distance learning environment.

RESEARCH METHODS

This research used a qualitative approach with a case study design to examine and uncover the transformation of digital services through the Virtual Reading Room at Universitas Terbuka (UT). The case study design was used to uncover contemporary phenomena related to the interaction among digital services, institutional practices, and user experiences (Creswell & Creswell, 2018; Creswell, 2014; Yin, 2017). The Virtual Reading Room was chosen as a case study because it represented the digital library services of a higher education institution, such as Universitas Terbuka (UT), that support digital literacy, information access, and independent learning within the distance

education concept implemented for its academic community. Data were obtained through in-depth interviews, digital observations, and digital documentation. The in-depth interviews involved two Virtual Reading Room administrators, one tutor representative who actively uses the Virtual Reading Room, and eight students who actively use it in their learning. The student group informants were group leaders from the classes of 2023, 2024, and 2025 from the western, central, and eastern regions. Informants were selected based on their experience using the Virtual Reading Room service. Data were collected from January 2026 to March 2026. All interviews were audio-recorded and transcribed verbatim for analysis. To complement the interview and observation data, relevant institutional documents, including service guidelines, operational policies, and digital content documentation, were also analyzed (Denzin & Lincoln, 2009).

Data were analyzed using thematic analysis following the framework proposed by (Braun & Clarke 2006). Thematic analysis was tailored to the research objectives. The analysis began with interview transcripts, observation notes, and documentary materials to better understand the data. The researchers then coded the interview data to sort and align it with the research objectives, enabling it to answer the research questions. The researchers used triangulation of sources and methods to validate the data.

RESULT AND DISCUSSION

Research findings from digital observations and interviews indicate that Universitas Terbuka's (UT) Virtual Reading Room has become an integral component of digital literacy services within the learning support system. It provides online

modules, various references and supporting books beyond the course modules, and continuous learning activities, including online practice exams, which can be used by lecturers, tutors, and students in the distance learning format provided by UT.

The researchers believe that the Virtual Reading Room is not merely an additional facility within the Universitas Terbuka library's digital services but also part of the infrastructure that supports students' access to academic resources in a distance learning environment, as well as broader access to information and more efficient user interaction. This is reinforced by the management's statement that:

"The Virtual Reading Room is a digital library space formally provided so that both lecturers and students can access information and modules effectively and without service time limits, distance, or geographic constraints" (Manager 1, interviewed, January 25, 2026).

From these interviews, the researchers found that the Virtual Reading Room was formally integrated into supporting the distance learning services provided by Universitas Terbuka. UT's distance learning services enable students to participate in learning without geographical constraints, supported by digital facilities. Interviews with users indicate that the Virtual Reading Room is used when students, lecturers, and tutors cannot access information or course references that are not available as physical modules in the library. "We use the Virtual Reading Room when we cannot get course modules" (Student 2, Interviewed, January 26, 2026). A similar sentiment was echoed by a tutor who stated,

"The Virtual Reading Room helps us provide online modules when we run out of physical modules or have not received them yet, even though classes have already started" (Tutor 1, interviewed, January 25, 2026).

In addition to providing lecture support services, the Virtual Reading Room, one of the library's digital services, has transformed service patterns and operations. According to the interviews, the management is not only responsible for converting physical modules or teaching materials into digital format, but also strives to provide references and monitor the service to ensure it remains usable and runs smoothly.

"Our job is not just to upload documents, but also to monitor and verify that each document is still accessible, open, and readable, ensuring users remain comfortable, and to identify any issues and promptly address them" (Manager 2, interviewed, January 25, 2026).

Interview results indicate that service managers are no longer solely responsible for managing reference collections of books and modules, but are also transforming into digital content curators, platform maintenance, and online support services. Therefore, digital competence is not only essential for students as users, but is also increasingly required for managers who directly interact with the digital content provided in the virtual reading room.

The Virtual Reading Room's unlimited operating hours allow students to search for reading materials tailored to their learning needs without visiting the library in person. This allows students to access reading materials anytime,

anywhere, as long as they have an internet connection. "The Virtual Reading Room makes things easier for us, especially for those of us who work. We can access reading materials at a time that suits us" (Student 4, Interviewed, January 25, 2026).

Another student respondent echoed this sentiment, stating that,

"We no longer need to go to the library; we can simply log in to the Virtual Reading Room portal using our account and find the books we need" (Student 1, interviewed, January 25, 2026).

In addition to providing more flexible service access, researchers found that the Virtual Reading Room allows users to access course materials, search for references, prepare assignments, and support independent study. This was echoed by a student user who stated,

"For assignments, looking at RBV is simpler than carrying modules everywhere, which is more complicated" (Student 2, interviewed, January 25, 2026).

"I prefer reading in the Virtual Reading Room because it can be accessed via mobile phone, making it more practical for finding references and study materials" (Student 6, interviewed, January 25, 2026)

Besides the convenience of the service provided through the Virtual Reading Room, researchers identified various challenges and obstacles that service users still face, particularly internet connectivity, device availability, and digital skills. This is reinforced by students' statements that the main obstacle to using the Virtual Reading Room was the internet network, especially

for students in rural areas and other regions where network and internet infrastructure remains limited.

Data analysis indicates that the Virtual Reading Room is used and has become an important source of information for Universitas Terbuka students. Based on the interviews, researchers found that students accessed Virtual Reading to obtain course materials, digital modules, e-books, and several academic references for use in lectures, assignments, and final scientific papers.

Researchers observed that students' ease of use of the service was supported by the availability of all literacy, information, and reference needs in a single platform. The availability of various digital resources in the Virtual Reading Room allows users to find information relevant to a range of courses and learning activities. Several informants reported that the Virtual Reading Room was used throughout the semester, not just during exam periods or assignment deadlines.

Student user informants reported that information searches were sometimes hampered by a lack of relevant data storage information that met their needs. Several informants stated that they must identify multiple data sources to obtain references that meet their needs. Data updates, course name changes, curriculum changes, and additions to collections based on the latest printing year are the main reasons students, as primary users, must repeatedly identify and modify search terms to find relevant material, especially when working on course assignments.

"Sometimes there are courses with almost identical names, so we have to check each one to make sure the one we are opening is the right one" (Student 6, interviewed, January 25, 2026).

Participatory observation during reference searches revealed that many references were out of date, contained errors, or could not be fully opened. This obstacle then required students to actively participate in reviewing information so that the staff could resolve the problem promptly. The interviews also revealed that students sometimes encountered incomplete data, such as citation data and reference completeness, which required them to read and review the contents of the digital books they found. Other informants reported that they sometimes encountered similar reference names, requiring them to review abstracts, summaries, and keywords to determine whether the sources they found in the virtual reading room met their needs for completeness of references and citations in their assignments. As mentioned above, several informants reported difficulties searching for information through the Virtual Reading Room platform.

Based on the interviews and participant observation, the researchers found that these difficulties included finding references, identifying relevant search results, and understanding existing features. The researchers found that user informants had varying experiences navigating the provided collections and retrieving digital resources. Therefore, the process of determining relevant references requires a process of content identification. Several informants stated that when they encountered difficulties or when a reference could not be opened or accessed, they reported them directly to the administrators via the platform's discussion forums. This suggests that students, in addition to users, play an active role in maintaining service quality.

These findings indicate that students

use the Virtual Reading Room to access information and search for relevant references for assignments and supporting materials for lectures. The Virtual Reading Room's role in this regard facilitates students' learning, especially during distance learning. However, based on the findings, students, in addition to being beneficiaries, also actively participate in maintaining service quality by directly reporting any obstacles or difficulties they encounter to the administrators.

Based on the analysis of the interview and observation data, researchers found that the implementation of the Virtual Reading Room was accompanied by challenges that impacted user service. The interview results revealed that challenges were experienced not only by students and tutors, the service beneficiaries, but also by service administrators. The researchers observed that service users still face obstacles in searching for information, locating data collections, and utilizing the supporting technological infrastructure required to use the service. The researchers observed that although the Virtual Reading Room has become an integral part of the academic activities of Universitas Terbuka (UT) students, both students and tutors still encounter various obstacles, particularly technical ones, when accessing and using the digital literacy resources provided.

Differences in users' digital competency in using the service are among the inhibiting factors and challenges. The researchers found that UT's students were a diverse group spread across various regions. Students in urban areas who were more familiar with technology reported feeling comfortable using the Virtual Reading Room to search for information and use it as a supporting medium for learning. In contrast, students in rural areas

or those with limited internet infrastructure reported difficulties accessing and using the various main search features on the Virtual Reading Room platform. Furthermore, unstable internet connections sometimes meant they had to spend a long time finding appropriate and relevant references to support their learning.

"We feel helped by the Virtual Reading Room. Access is easy and more flexible, so when we are studying on the web, we no longer need to hold modules" (Student 5, interviewed, January 25, 2026).

A different statement was made by an informant in a rural area.

"An unstable internet connection sometimes becomes a hindrance, taking a long time, and we are still not used to using the RBV, making access difficult" (Student 3, interviewed, January 25, 2026).

Based on the interview excerpt above, the researchers observed that the utilization of information and reference access by Virtual Reading Room users depends on their competence and familiarity with digital library services. Furthermore, digital infrastructure plays a significant role in influencing service use, alongside competence.

These findings also reveal challenges facing digital collections and service management. The researchers observed that the biggest challenge in the Virtual Reading Room service lies with service management. Service managers are responsible for maintaining digital resources, organizing collections, updating content, and managing users' access. They also contribute to the literacy process for users unfamiliar with digital services.

Furthermore, the managers must be responsive to any user complaints regarding their data collection to ensure the service continues to operate smoothly.

"In addition to managing data collections, we also address student complaints, especially when data cannot be accessed, and provide immediate repairs. We also assist students who are having difficulty using the service. We provide easy-to-understand user tutorials so they can use it comfortably" (Manager 2, interviewed, January 25, 2026).

"We must continuously ensure that every collection can be opened and accessed, and that data updates are made simultaneously" (Manager 1, interviewed, January 25, 2026).

The interview excerpts illustrate the activities carried out by the service managers to maintain digital collections and support platform operations. Through these statements, the researchers observe the routine responsibilities carried out by the managers in collections' maintenance, resource management, and service administration.

The findings show that the challenges faced in digital library services through the Universitas Terbuka (UT) Virtual Reading Room, in the form of users' capabilities, service management, and technological infrastructure, are part of the implementation of the Virtual Reading Room that must be faced in the process of distance learning and digital transformation of library services.

The Virtual Reading Room has transformed how academic information is accessed and utilized within Universitas Terbuka's distance education system. This

transformation extends beyond the conversion of printed materials into digital formats. The Virtual Reading Room has become part of the institutional learning infrastructure that supports academic activities across geographically dispersed student populations. This finding supports digital library transformation theory, which argues that service transformation involves changes in organizational structures, service delivery mechanisms, and users' interactions with information rather than merely the adoption of new technologies (Garcia & Nguyen, 2023; Johnson & Tan, 2021). In the context of Universitas Terbuka, the transformation is reflected in the integration of digital resources into everyday learning activities and in the repositioning of library services as an essential component of distance learning support. These findings are consistent with previous studies showing that digital library initiatives increasingly require changes in service orientation, organizational workflows, and patterns of users' engagement within higher education institutions (Nurmala & Fadilah, 2022; Vitriana, 2024).

The study further demonstrates that the role of the Virtual Reading Room extends beyond providing access to information resources. Students used the platform to search for information, identify relevant materials, compare sources, and utilize academic resources for coursework and independent learning. These activities reflect key dimensions of digital literacy, including information retrieval, evaluation, and application (Malik, 2025; Ridzuan & Sahid, 2025). This finding is consistent with previous studies showing that digital library environments can facilitate the development of information-related competencies through regular interaction

with digital resources (Chen & Patel, 2022). However, the present study extends existing research by demonstrating how these literacy practices are embedded within the everyday learning experiences of distance education students. Rather than developing digital literacy through stand-alone training programs, students appeared to strengthen their information practices through continuous engagement with digital resources as they completed academic tasks. This suggests that virtual reading services function not only as information repositories but also as environments where digital literacy is enacted and reinforced through routine academic activities.

Another important finding concerns the relationship between access and digital literacy. Previous studies have frequently emphasized expanded access as one of the primary outcomes of digital library services (Garcia & Nguyen, 2023; Lee & Rodriguez, 2023). While the present study confirms the importance of access, the findings indicate that access alone does not determine how effectively students utilize digital resources. Students demonstrated different levels of engagement with available collections, search functions, and information sources despite using the same platform. This finding supports research suggesting that inequalities in digital environments increasingly emerge from differences in information practices and competencies rather than from physical access alone (Ridlwan et al., 2025; Sanusi et al., 2024). The results therefore reinforce the argument that digital literacy should be understood as a multidimensional capability involving the ability to locate, evaluate, organize, and apply information effectively. The educational value of digital library services is consequently shaped not

only by the availability of resources but also by users' capacity to transform information into meaningful academic knowledge.

The variation in users' experiences identified in this study also highlights the continuing importance of institutional support in digital literacy development. Although students regularly accessed the Virtual Reading Room, differences in search strategies, information selection, and resource utilization suggest that users do not engage with digital information environments in the same way. This observation aligns with studies emphasizing that digital literacy develops through a combination of technological access, learning experience, and guided interaction with information systems (Malik, 2025; Okechukwu et al., 2024). Consequently, the effectiveness of digital literacy services cannot be measured solely through indicators of system availability or collection size. Institutions must also consider how users develop the competencies required to navigate and utilize digital information effectively. In this regard, digital library services assume an educational role that extends beyond information provision to support users' engagement with academic knowledge resources.

The findings further reveal that the implementation of virtual reading services involves organizational and managerial dimensions that are often overlooked in discussions of digital transformation. The service managers were required to maintain digital collections, manage access mechanisms, monitor platform performance, and respond to users' needs. These responsibilities demonstrate that digital library transformation requires continuous organizational adaptation rather than a one-time technological

intervention. This finding is consistent with previous research highlighting the importance of institutional capacity, managerial readiness, and governance structures in sustaining digital services (Nurmala & Fadilah, 2022; Vitriana, 2024). The present study strengthens this argument by showing that the effectiveness of digital literacy services in distance education settings depends not only on technological systems but also on institutions' ability to maintain service quality, update digital resources, and respond to evolving user needs over time.

Infrastructure-related challenges identified in this study further illustrate the complexity of digital literacy service transformation. Issues related to internet connectivity, device availability, and platform performance continued to influence users' experiences despite the availability of digital resources. Similar challenges have been documented in studies examining the sustainability of digital library services and online learning environments (Ardyawin et al., 2025; Garcia & Nguyen, 2023). However, the findings suggest that these challenges should not be viewed solely as technical constraints. They directly influence how students participate in information-seeking activities, access academic resources, and engage with learning materials. This observation indicates that the effectiveness of digital literacy services remains closely connected to broader technological and institutional conditions that shape users' opportunities to participate in digital learning environments.

The findings suggest that the transformation of digital literacy services within distance higher education should be understood as a process that connects access, literacy practices, and institutional capacity. Existing discussions of digital

library transformation have largely emphasized technological adoption and expanded access as key indicators of service development (Garcia & Nguyen, 2023; Johnson & Tan, 2021). While these aspects remain important, the present study indicates that the educational value of virtual reading services is shaped by how users interact with digital information resources and by the institution's capacity to support those interactions. Access to digital collections creates learning opportunities, but the extent to which those opportunities are translated into meaningful academic engagement depends on users' ability to search for, evaluate, and utilize information effectively. At the same time, the sustainability of these services relies on continuous organizational support, technological maintenance, and the management of digital resources. Viewed from this perspective, the Virtual Reading Room is not merely a technological facility for delivering information. It functions as an educational infrastructure that mediates students' engagement with academic knowledge and supports the development of digital literacy within the broader ecosystem of distance education.

CONCLUSION

The virtual reading rooms play a crucial role in expanding access to information by offering flexibility across time and space, enabling users to access learning resources without visiting the library, and eliminating geographical limitations. The virtual reading rooms serve as a platform for independent digital literacy practice for users, supported by learning facilities that enable users to establish their own learning strategies. The study also revealed several implementation challenges, including gaps in users' digital

literacy competencies, limited service management capacity, and institutional sustainability issues. This demonstrates that the transformation of digital literacy services is not simply a process of digitizing collections but rather a multidimensional change involving aspects of technology, pedagogy, and organizational governance. Further research is recommended to conduct cross-institutional benchmarking, integrate quantitative approaches to measure the impact of learning through virtual reading room facilities, and explore strategies to address the digital literacy gap and the sustainability of virtual reading room services.

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AUTHORS' CONTRIBUTIONS

All authors contributed to both the IN and AN processes.

CONFLICT OF INTEREST

The author(s) declare that there is no conflict of interest.

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REFERENCES

Ardyawin, I., Sugihartati, R., & Danugroho, A. (2025). The Role of Digital Technology in Transforming Academic Library Services: A

- Systematic Literature Review. *New Review of Academic Librarianship*, 31(4), 466–486.
<https://doi.org/10.1080/13614533.2025.2524806>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
<https://doi.org/10.1191/1478088706qp063oa>
- Chen, L., & Patel, N. (2022). Digital literacy development in higher education: Implications for library services. *The Internet and Higher Education*, 55(1).
<https://doi.org/10.1016/j.iheduc.2022.100803>
- Copur-Gencturk, Y., Thacker, I., & Cimpian, J. R. (2022). Teacher bias in the virtual classroom. *Computers and Education*, 191, 104627.
<https://doi.org/10.1016/j.compedu.2022.104627>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: qualitative, quantitative, and mixed methods approaches* (Fifth). Sage.
- Creswell, J. W. (2014). *Research design : qualitative, quantitative, and mixed methods approaches*. SAGE Publications Inc.
- Darojat, O., Idrus, O., & Ardiasih, L. S. (2013). Disruptive change and learning innovations: Challenges and opportunities for universitas terbuka. *Turkish Online Journal of Distance Education*, 24(3), 60-70.
<https://files.eric.ed.gov/fulltext/EJ1397456.pdf>
- Denzin, & Lincoln. (2009). *Handbook of Qualitative Research*. Pustaka Pelajar.
- Edmonds, O., & Johal, T. (2026). The digital library: redefining access and engagement at University of Wales Trinity St David, Birmingham. *Insights: the UKSG Journal*, 39(6), 1-7.
<https://doi.org/10.1629/uksg.733>
- Garcia, M., & Nguyen, L. (2023). Virtual reading spaces and literacy engagement among learners. *International Journal of Educational Technology in Higher Education*, 20(3), 45–62.
<https://doi.org/10.1186/s41239-023-00392-4>
- Johnson, R. T., & Tan, P. (2021). Transformation of library services in the digital era: A systematic review. *Journal of Librarianship and Information Science*, 53(2), 210–225.
<https://doi.org/10.1177/0961000620926293>
- Lee, S. H., & Rodriguez, J. (2023). Evaluating digital library platforms: A user experience perspective. *Online Information Review*, 47(5), 1120–1140.
<https://doi.org/10.1108/OIR-03-2022-0154>
- Malik, V. (2025). Evaluation of digital literacy as a factor influencing satisfaction with web-based library services. *International Journal of Advanced Academic Studies*, 7(3), 63–72.
<https://doi.org/10.33545/27068919.2025.v7.i3a.1546>
- Noprina, W., Handayani, D. F., Yuniarti, L., & Putri, S. A. (2024). Analisis Kebutuhan Pengembangan Ruang Baca Virtual Menggunakan G-Site untuk Keterampilan Membaca Mahasiswa. *Journal of Education Research*, 5(3), 2631–2636.
<https://doi.org/10.37985/jer.v5i3.1177>
- Nurmala, S., & Fadilah, N. (2022). Transformasi Perpustakaan Sekolah di Era Digital. *Jurnal Ilmu Informasi Dan Perpustakaan*, 8(1), 23–31.

- <https://doi.org/10.20885/bpuui.v8i2.40822>
- Nursantika, D., & Piantari, E. (2024). Automatic presence design in virtual class using Convolution Neuron Network (CNN). *E3S Web of Conferences*, 483(03006). <https://doi.org/10.1051/e3sconf/202448303006>
- Okechukwu, N. N., Chinemerem, C. J., & Nnatu, A. U. (2024). Digital Literacy and Competencies in Library and Information Science Education Students in Nnamdi Azikiwe University Awka. *Indonesian Journal of Learning Education and Counseling*, 7(1), 39-51. <https://doi.org/10.31960/ijolec.v7i1.2750>
- Padmo, D., Belawati, T., Idrus, O., & Ardiasih, L. S. (2017). The state of practice of mobile learning in universitas terbuka indonesia. *Education in the Asia-Pacific Region*, 40(1), 173 - 190. https://doi.org/10.1007/978-981-10-4944-6_9
- Pippig, M., & Hänsel, S. (2025). Digital transformation process in tutor training: From face-to-face training to the virtual escape room for enhancing teaching competencies. *Proceedings of the International Conferences on Mobile Learning 2025 and Educational Technologies*, 3-11. <https://www.scopus.com/pages/publications/105003414690?origin=scopusAI>
- Putra, I. P. G. A., Adnyana, I. M. B., & Putri, D. R. (2024). Rancang Bangun Ruang Baca Digital Berbasis Web Pada Perpustakaan Desa Mengwi. *Jurnal Sutasoma*, 2(2), 105-113. <https://doi.org/10.58878/sutasoma.v2i2.286>
- Rahmadhani, N., & Aulia, D. P. (2025). Strategi literasi informasi dalam optimalisasi layanan perpustakaan digital. *Codex: Jurnal Ilmu Perpustakaan Dan Informasi*, 1(2), 48-53. <https://doi.org/10.62238/codex.v1i2.256>
- Ridlwani, M., Almaytasa, M., Lana, C., Muhammad, & Zulfahmi, N. (2025). Peran Perpustakaan Digital Dalam Pembelajaran Literasi Digital Siswa Sekolah Dasar. *Semantik: Jurnal Riset Ilmu Pendidikan, Bahasa Dan Budaya*, 3(1), 195-205. <https://doi.org/10.61132/semantik.v3i1.1400>
- Ridzuan, N. B. B., & Sahid, N. Z. (2025). Digital Literacy Skills and Academic-Library Engagement among Generation Z Students in Malaysian Higher Education. *International Journal of Research and Innovation in Social Science*, 9(10), 7643-7656. <https://doi.org/10.47772/ijriss.2025.910000623>
- Sanusi, H. P., Mustaqim, & Febriansyah. (2024). Pengaruh Transformasi Digital Library Terhadap Persepsi Pengguna Aplikasi E-Pustaka. *Tadbir Muwahhid*, 8(2), 185-203. <https://doi.org/10.30997/jtm.v8i2.15483>
- Vitriana, N. (2024). Transformasi perpustakaan di era digital native. *Librarium: Library and Information Science Journal*, 1(1), 59-69. <https://doi.org/10.53088/librarium.v1i1.693>
- Wahhaj, I. S., Anwar, R. K., & Rukmana, E. N. (2025). Peran Perpustakaan Digital dalam Proses Pembelajaran Digital Natives. *Media Pustakawan*, 32(1), 1-14.

- <https://doi.org/10.37014/medpus.v3i1.5349>
- Widiaty, I., Wahyudin, D., Abdullah, A. G., Riyana, C., & Mubaroq, S. R. (2019). Designing Virtual Reading Room (VRR Digi-Litikon) for learning batik in Vocational High Schools: Curriculum material improvement. *Journal of Physics: Conference Series*, 1402(7), 15-25. <https://doi.org/10.1088/1742-6596/1402/7/077047>
- Yin, R. K. (2017). *Case Study Research and Applications Design and Methods (SIXTH)*. SAGE Publications Inc.
- Yuli, N. K. R. (2024). Perspektif Electronic Book (E-Book) Dalam Pelayanan Perpustakaan Berbasis Digital. *Media Sains Informasi Dan Perpustakaan*, 4(2), 34-41. <https://doi.org/10.23887/msip.v4i2.4302>

