

FOSTERING DIGITAL LITERACY THROUGH GLAM COLLABORATION: THE STRATEGIC ROLE OF LIBRARIES IN EDUCATIONAL TRANSFORMATION

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Abstract

GLAM (Galleries, Libraries, Archives, and Museums) collaboration is increasingly promoted as a strategy to address digital literacy challenges in education. However, existing studies tend to be descriptive and techno-centric, often assuming the leadership role of libraries without sufficient critical or empirical examination. This study aims to analyze how libraries are positioned within GLAM collaboration and to assess their contribution to digital literacy development in educational contexts. Using a Systematic Literature Review guided by the PRISMA protocol, this study analyzes 17 peer-reviewed articles published between 2013 and 2024. The findings identify five dominant themes, showing that libraries are frequently positioned as GLAM coordinators due to their digital infrastructure and knowledge management expertise. Nevertheless, claims of library leadership are largely normative and depend on specific socio-technical and institutional conditions. The novelty of this study lies in reconceptualizing libraries as socio-technical mediators rather than hierarchical leaders. It demonstrates that digital literacy is strengthened not merely through access to digital collections, but through curation, pedagogical mediation, and institutional collaboration.

Keywords: GLAM, digital literacy, libraries, collaboration, higher education

INTRODUCTION

Digital transformation has brought fundamental changes in the information produced, accessed, and interpreted in the education system globally. Digital literacy is no longer understood as a mere technical skill, but rather as a set of critical competencies that include the ability to evaluate information, reflective thinking, curation of knowledge, and understand the social and cultural context of digital information. In Indonesia, the challenges of digital literacy are becoming increasingly complex as the national digital literacy index is still moderate and the risk of disinformation and inequality of access to digital knowledge increases. This condition shows that strengthening digital literacy requires an institutional and cultural approach that

goes beyond technological solutions, by involving a knowledge ecosystem that is able to provide authentic, contextual, and sustainable learning resources.(UNESCO, 2018)(Ameliah, Negara, & Rahmawati, 2021)

Within this framework, the Galleries, Libraries, Archives, and Museums (GLAM) has strategic potential as a custodian as well as a provider of cultural knowledge heritage that is relevant in digital learning. A number of studies confirm that convergence GLAM able to increase public access, support cross-disciplinary learning, and articulate learning experiences through multimodal primary sources. However, most of the literature still places integration (Zorich, Waibel, & Erway, 2008)GLAM in the technical realm, such as system interoperability, collection digitization, and development linked open data (Peponakis, 2016) &. The study explicitly discusses the role of institutional leadership, especially libraries in coordinating collaboration (Massari & Peroni, 2025)GLAM for pedagogical purposes and strengthening digital literacy which is still relatively limited, especially in the context of higher education in Indonesia. In addition, several national studies such as Pratiwi, Suprihatin, & Setiawan (2019) and Kristiana & Fauzi (2022) tend to separate discussions GLAM from digital literacy, or placing libraries as collections managers, not as strategic actors of educational transformation.

Based on these gaps, this study positions libraries as strategic leadership actors in GLAM collaborations that function as mediators between cultural heritage, digital technology, and critical learning. Through the Systematic Literature Review (SLR) approach, this study aims to analyze how the scientific literature positions the role of libraries in leading the GLAM collaboration, how the collaboration contributes to strengthening digital literacy as a transformational competency of education in the 21st century, and what sociotechnical challenges affect its implementation. By synthesizing thematic findings from previous research, this article offers a conceptual contribution in the form of an analytical framework that places libraries as the coordination center of the GLAM ecosystem and as the main driver of authentic, multimodal, and cross-disciplinary source-based digital literacy. This framework is expected to inform academic discourse and become a strategic reference for the development of GLAM collaborative policies and practices in educational transformation, especially in higher education.

RESEARCH METHOD

This study uses the Systematic Literature Review (SLR) to comprehensively analyze the strategic role of libraries in collaboration GLAM in order to strengthen digital literacy in the context of educational transformation. This SLR method was chosen because it allows for the synthesis of knowledge in a systematic, transparent, and replicable manner from relevant previous studies (Kitchenham & Charters, 2007; Snyder, 2019). This aims to improve methodological accuracy and validity of results, this study adopts a protocol Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISM) .(Page, Mckenzie, Bossuyt, & Boutron, 2021)

Literature searches were conducted on major scientific databases, namely oogle Scholar, Scopus, ScienceDirect, DOAJ, and JSTOR, to ensure multidisciplinary coverage and publication quality. The keywords used include a combination of terms such as "GLAM collaboration", "libraries and digital literacy", "GLAM and education", "digital literacy in higher education", and "libraries as knowledge hubs". Searches were limited to English and Indonesian articles

published between 2013-2024 to ensure relevance to the latest developments in digital literacy and educational transformation.

Inclusion criteria include: (1) peer-reviewed journal articles; (2) studies that explicitly discuss GLAM, libraries, digital literacy, or digital education; (3) the context of formal or informal education, especially higher education; and (4) articles that present relevant empirical findings, conceptual frameworks, or policy studies. The exclusion criteria include: (1) non-scientific articles (opinions, editorials, popular reports); (2) publications that do not discuss the relationship between GLAM/library and digital literacy; and (3) articles with full text that are not accessible.

The article selection process is carried out through several stages according to the PRISMA flow, namely identification, screening, feasibility assessment, and final inclusion. In the initial stage, all articles obtained from the database are compiled and duplicates are removed. Furthermore, screening is conducted by title and abstract to assess suitability with the focus of the research. Articles that pass this stage are then reviewed through full-text reading ((Page, Mckenzie, Bossuyt, & Boutron, 2021)full-text review) to ensure compliance with inclusion criteria. From the entire process, as many as 17 articles were declared to meet the criteria and analyzed further. To increase the credibility of the findings, each selected article was evaluated for quality using assessment criteria adapted from Critical Appraisal Skills Programme (CASP), including the clarity of the research objectives, the accuracy of the methodology, the consistency of the analysis, and the relevance of the findings to the research topic. Articles with low methodological quality or irrelevant findings are eliminated at this stage.

Data analysis was carried out using a thematic synthesis approach, which is grouping and synthesizing the main findings of the selected articles into conceptual themes (Snyder, 2019). This process resulted in five main themes that reflect the dominant pattern in the literature, namely: the urgency of GLAM integration in digital education, the strategic role of libraries as a link for GLAM, GLAM's contribution to digital literacy, collaborative models in learning, and sociotechnical challenges of implementation. This approach allows for a deeper understanding of the relationship between library leadership, GLAM collaboration, and digital literacy strengthening. By adopting the PRISMA protocol and systematic analysis stages, this research method is expected to have a high level of transparency and reproducibility, while providing a strong methodological foundation for the interpretation of the findings and research implications.

RESULT AND DISCUSSION

Based on the results of a systematic analysis of 17 scientific articles published between 2013 and 2024, this study succeeded in identifying five main findings that comprehensively addressed the initial hypothesis regarding the strategic role of libraries in leading GLAM collaborations to strengthen digital literacy in the context of educational transformation. These findings consistently show that libraries not only function as a repository of information, but also as a key actor capable of initiating and managing integration efforts between GLAM institutions. This integration is crucial in today's digital education era, where access to diverse and curated resources is needed. The results of this study not only confirm the initial hypothesis, but also provide an in-depth picture of how synergy between GLAM units, with libraries as its axis, can significantly increase the digital literacy capacity of the academic community and support a more dynamic and adaptive learning ecosystem.

The five findings are presented in thematic themes that form a coherent narrative. First, the urgency of integrating GLAM in digital education highlights the urgent need for an integrated information ecosystem to support modern project-based and interdisciplinary learning. Second, the role of librarians and libraries as a liaison between GLAM entities emphasizes the excellence of libraries in metadata management, repository system design, and the use of linked open data technology, as well as the role of librarians as knowledge managers who are able to curate cross-media digital collections. Third, GLAM's contribution to strengthening digital literacy discusses how access to integrated collections and rich narrative contexts can improve users' ability to search, evaluate, and utilize information effectively. Fourth, a collaborative model in learning that outlines the various forms of collaboration that can be implemented between GLAM units to create a richer and more contextual learning experience. Fifth, in relation to the implementation challenges at the technical and structural levels, it can be recognized that obstacles may arise, such as institutional fragmentation and differences in scientific traditions, while underlining the importance of sociotechnical approaches and transformative leadership to overcome these constraints.

The Urgency of GLAM Integration in Digital Education

Most of the articles reviewed (14 of 17) affirm that GLAM integration has significant potential in enriching the digital learning ecosystem through the provision of authentic, multimodal, and cross-disciplinary resources. This narrative is consistent with the findings of Zorich, Waibel, and Erway (2008) and Wellington (2013) who emphasize that GLAM convergence is able to bridge the gap between cultural and educational institutions. However, critical analysis shows that many studies stop at the level of conceptual and technical argumentation, with the implicit assumption that the integration of collections automatically results in positive pedagogical impacts.

Some studies, particularly those that focus on system interoperability and metadata management such as those in Peponakis (2016) and Massari & Peroni (2025), emphasize the efficiency of access rather than the transformation of learning practices. On the contrary, Padilla et al. (2019) show that without a clear pedagogical framework, GLAM integration risks reducing cultural collections to mere digital data. These findings suggest that the urgency of GLAM integration cannot be separated from how the collection is mediated in the context of education, thus reinforcing the argument that institutional leadership is a determining factor in bridging technology and pedagogy.

Library as a GLAM Strategic Liaison

Of the 17 articles analyzed, 12 articles explicitly highlight the strategic position of libraries as a liaison between GLAM entities, especially because of the readiness of digital infrastructure, expertise in metadata management, and the role of librarians as knowledge managers (Gilliland, 2016; Padilla et al., 2019). In several articles, these findings have been used to assert that libraries have the potential to be the main coordinators of GLAM collaborations. However, a critical reading of the literature shows that these claims are often presented normatively and do not consider power relations between institutions.

Several empirical studies in Indonesia have revealed the existence of institutional fragmentation and organizational resistance that limit the leadership role of libraries (Pratiwi et al., 2019; Fadhli et al., 2024). Using the sociotechnical systems perspective of Trist & Bamforth (1951) and Bostrom (1977), the findings of this study confirm that library leadership is not

inherent, but rather is formed through coordination skills, institutional legitimacy, and cross-actor trust. Thus, libraries are more appropriately understood as sociotechnical mediators rather than hierarchical leaders in the GLAM ecosystem.

GLAM's Contribution to Strengthening Digital Literacy

Digital literacy in the modern era has developed far beyond just technical capabilities in accessing information through digital devices. As emphasized by UNESCO (2018), AJ (2012), and Peponakis (2016), digital literacy encompasses a wider and more crucial spectrum of abilities, namely the ability to think critically to analyze information, the ability to assess the quality of information from various online sources, and the ability to contextualize knowledge in the ever-changing digital world. This makes a digitally capable individual also able to understand information biases, identify credible sources, and place pieces of information in a heavier narrative. GLAM institutions have a significant role in this, as they provide collections and content rich in authentic historical, cultural, and visual contexts. These resources, ranging from primary archives, art archives, to rare notes, are more effective in developing digital literacy competencies in a more in-depth and reflective manner. Thus, interacting directly with these materials, encourages users to think critically, analyze evidence, and understand how information is shaped and represented over time.

GLAM's role in strengthening digital literacy is becoming increasingly vital and urgent in the university environment. This is because students are faced with a sea of digital information and are required to not only be able to access data, but also to carefully evaluate various types of data and digital artifacts in the process of learning and research. The integrated GLAM collection provides a unique platform for students to practice these skills. There are several examples where a history student can compare a contemporary news report with an original newspaper from an archive, or an art student can analyze a digital interpretation of a work of art by looking at the details of a high-resolution copy from a museum. Interaction with these authentic sources forces students to question, analyze, and synthesize information, thus encouraging the development of high-level digital literacy skills that go far beyond simple keyword searches. Thus, GLAM is not only a repository of knowledge, but also a living laboratory for the development of digital literacy skills that are essential for academic and professional success in the 21st century.

GLAM's Collaborative Model in Learning

The literature shows diverse models of GLAM collaboration in learning, including experiential learning, digital curation, and artifact-based narratives (Bachman, 2010; Padilla et al., 2019). International studies generally feature a collaboration model that is structurally integrated in the curriculum, while studies in Indonesia are still project-based and fragmented (Kristiana & Fauzi, 2022). This difference indicates a gap in policy and institutional capacity that affects the sustainability of collaboration.

In this context, libraries are often positioned as boundary spanners that bridge the interests of cultural institutions and pedagogical needs. However, the literature also shows that these roles are vulnerable to role overload if not supported by adequate policies and resources. This confirms that library leadership is contextual and relies on structural support, not a universal solution for GLAM integration.

Implementing Challenges: Technology and Organization

The latest findings confirm that the challenges of implementing GLAM collaboration are sociotechnical, including system fragmentation, differences in metadata standards, and limitations in human resource digital competencies (Padilla et al., 2019). In line with sociotechnical systems theory (Trist & Bamforth, 1951; Bostrom, 1977), these results show that the success of GLAM collaboration cannot be achieved through technology alone. Library leadership in this context should be understood as an adaptive practice that involves managing organizational change, negotiating across professions, and aligning educational goals.

Overall, the results of this study show that the claim of library leadership in GLAM collaboration can only be empirically justified when the library functions as a sociotechnical mediator and facilitator of critical learning. These findings shift the GLAM discourse from a technocentric approach to a more reflective and pedagogical understanding, and affirm that GLAM-based educational transformation requires relational, contextual, and digital literacy-oriented institutional leadership as a transformational competence.

Theoretical Contributions and Implications

This research provides a theoretical contribution by enriching the GLAM collaborative discourse through the integration between digital literacy theory and sociotechnical system perspectives. Different from previous literature that tends to be technocentric and descriptive, this study shows that the effectiveness of GLAM collaboration is not determined solely by technological interoperability or digital collection integration, but rather by the configuration of social relations, institutional legitimacy, and knowledge mediation mechanisms run by key actors in the ecosystem. By placing libraries as socio-technical mediators rather than hierarchical leaders, this study corrects normative claims in previous GLAM studies that assumed library leadership as an inherent condition.

The second theoretical contribution lies in the reinterpretation of digital literacy in the context of GLAM. The findings of this study confirm that digital literacy does not develop automatically through increased access to digital collections, but through institutionally mediated curation, interpretation, and critical reflection processes. Thus, digital literacy is positioned as an epistemic practice that relies on pedagogical design and the role of knowledge actors, rather than just individual competencies. This perspective expands UNESCO's (2018) digital literacy framework by emphasizing the institutional and collaborative dimensions in the knowledge ecosystem.

Practically, the findings of this study have implications for the design of GLAM collaboration policies and strategies, especially in the context of developing countries such as Indonesia. This study shows that libraries can play a strategic leadership role only when supported by cross-sectoral policies, strengthening human resource capacity, and clarity of role sharing between GLAM institutions. Without these prerequisites, leadership demands have the potential to burden the library and weaken the sustainability of collaboration. Therefore, the main implication of this study is not a normative invitation for libraries to "lead", but evidence-based recommendations regarding the structural and sociotechnical conditions that allow such leadership to be carried out effectively.

Thus, there are 17 articles that have been studied, for the development of research results on digital literacy that grow through GLAM. The following is explained the journal articles found including the research title, author name, research method, and research results used in the table below:

Tabel 1. Article System Literature Review

Article Title	Author Name	Research Methods	Research Results
Implementation of the GLAM Concept at the Karno Proclamation Library	Kristiana & Fauzi (2022)	Qualitative descriptive	Libraries can manage cultural collections and archives as part of GLAM
Digital Convergence and Memory Information Systems	Mukhlis & Laugu (2023)	Case study	The development of SIMEMORI shows the potential of integrating gallery, archive, and library collections in one system
HERITRACE: Semantic Data Editor for Heritage Institutions	Massari & Peroni (2025)	System development	HERITRACE supports linked data-based cultural heritage data tracking
Creating Collaborative Learning Environments	Bachman (2010)	Kajian literature	Collaboration between GLAM strengthens experiential learning
Always Already Computational: Collections as Data	Padilla et al. (2019)	Sociotechnical analysis	GLAM integration needs to be supported by policies, human resources, and open systems
What is Digital Literacy?	AJ (2012)	Studies theoritis	Digital literacy includes critical understanding, ethics, and evaluation of information
Global Framework for Digital Literacy Skills	UNESCO (2018)	Policy analysis	Digital literacy is an essential competency of the 21st century
Digital Transformation Assessment of the National Gallery of Indonesia	Sari & Wijayanti (2023)	Descriptive survey	Digital transformation needs policy support and human resource capacity
Libraries' Metadata as Data in the Era of the Semantic Web	Peponakis (2016)	Modeling repositories	Library metadata can be developed for GLAM
Beyond the Silos of the LAMs	Zorich, Waibel, & Erway (2008)	Research report	LAM synergy (GLAM) is important for the integration of cultural knowledge
Buildign GLAMour: Converging Practice Between GLAM Entities	Wellington (2013)	Descriptive studies	GLAM integration practices bridge cultural and educational institutions
Analysis of the Application of the GLAM Concept in Karno Library	Pratiwi et al. (2019)	Qualitative descriptive	GLAM can be developed in local collection management
Opportunities and Challenges of the Tanah Datar Library Service	Fadhli et al. (2024)	Qualitative studies	The obstacles to GLAM implementation are in the structure and human resources
Conceptualizing 21st-Century Archives	Gilliand (2016)	Kajian theoritis	Library ready to become an open system-based GLAM link
MIS Problems and Failures: A Socio-	Bostrom (1977)	Sociotechnical studies	The success of digital systems depends on technology and society

Technical Perspective			
Some Social and Psychological Consequences of the Longwall Method	Trist & Bamforth (1951)	Theory of Sociotechnology	Technology must be in line with the social structure of the organization
Libraries' Efforts in Building Reading Interest	Cahyani (2024)	Case study	Libraries play a role in building a literacy culture

CONCLUSION

This study confirms that GLAM collaboration has significant potential in strengthening digital literacy and supporting educational transformation, but this potential is not automatic or universal. Through the Systematic Literature Review, this study shows that the GLAM literature is still dominated by descriptive and technocentric approaches, with limited analysis of the institutional, pedagogical, and sociotechnical dynamics that influence collaborative practices. These findings make it clear that the success of GLAM collaborations is highly dependent on how technology, actors, and educational goals are aligned in specific contexts.

The results of the study also show that library leadership claims in the GLAM ecosystem need to be understood critically and contextually. Libraries do have advantages in terms of digital infrastructure and knowledge management competencies, but that leadership is not inherent. Instead, library leadership emerged as a relational practice that relied on institutional legitimacy, coordination skills, and trust across GLAM actors. Thus, libraries are more appropriately positioned as socio-technical mediators that bridge cultural heritage, digital technology, and pedagogical needs.

In addition, this study emphasizes that LAM's contribution to digital literacy cannot be reduced to expanding access to information. Digital literacy develops through an epistemic mediation process that involves curation, interpretation, and critical reflection on knowledge sources. In this context, the role of libraries becomes crucial as a facilitator of critical learning that directs users to understand the context, bias, and value of digital knowledge. Without this role, GLAM collaboration risks increasing the quantity of information without producing meaningful epistemic transformations.

In closing, this research contributes to the development of the GLAM analytical framework by shifting the focus from technical integration to sociotechnical and pedagogical understanding. These findings not only enrich theoretical studies of GLAM and digital literacy, but also provide a conceptual basis for the formulation of GLAM collaborative policies that are more reflective, sustainable, and contextual. Further research is suggested to test this framework through in-depth empirical studies at the institutional level to strengthen the evidence regarding leadership practices and knowledge mediation in the GLAM ecosystem.

SUGGESTION

Based on the findings and critical analysis in this study, several suggestions can be proposed for the development of GLAM collaborative studies and practices in the future. First, further research is suggested to go beyond conceptual approaches and literature-based by conducting in-depth empirical studies at the institutional level. Qualitative research based on case studies, organizational ethnography, or comparative institutional analysis it is necessary to contextually examine how the role of mediation and library leadership is actually exercised in

GLAM collaborations, including power dynamics, inter-profession resistance, and cross-institutional negotiation processes.

Second, future studies need to develop more operational empirical indicators to measure the contribution of GLAM collaboration to digital literacy. Most of the existing literature still assumes a positive relationship between access to digital collections and increased digital literacy without clear evaluation instruments. Therefore, further research is recommended to design an evaluation framework that links the use of GLAM collections to learning outcomes, critical thinking practices, and epistemic transformations of users, particularly in the context of higher education.

Third, in terms of practice and policy, the findings of this study suggest that strengthening the role of libraries in GLAM collaboration is not carried out through normative assignments alone, but through the provision of adequate structural support. This includes clear cross-sectoral policies, balanced role sharing between GLAM institutions, strengthening the capacity of human resources, and continuous investment in the curatorial and pedagogical competencies of librarians. Without this support, the demands of leadership have the potential to burden the library and weaken the sustainability of collaboration.

Fourth, further research is also recommended to explore non-Western and developing country contexts more systematically. The disparity between GLAM collaboration practices in developed countries and in contexts such as Indonesia suggests that collaboration models cannot be transferred directly without social, cultural, and institutional adaptation. Cross-border comparative studies will enrich understanding of the variation of leadership models, institutional capacity, and the role of libraries as sociotechnical mediators in various contexts.

Finally, from a theoretical perspective, future research can deepen the integration between digital literacy theory, critical learning theory, and sociotechnical systems approaches in the study of GLAM. This integration is important to avoid reducing GLAM collaboration to a purely technical issue, as well as to strengthen GLAM's position as a knowledge ecosystem that contributes substantively to educational transformation and critical thinking capacity development in the digital era.

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