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THE ROLE OF DIGITAL LEARNING PLATFORMS IN FACILITATING INQUIRY-BASED LEARNING: A SYSTEMATIC LITERATURE REVIEW

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Abstrak
Penelitian ini bertujuan untuk mengkaji secara sistematis peran platform pembelajaran digital dalam memfasilitasi pembelajaran berbasis inkuiri di berbagai konteks pendidikan. Pembelajaran berbasis inkuiri merupakan pembelajaran yang menstimulasi peserta didik untuk aktif mengeksplorasi, merumuskan pertanyaan, menyelidiki, dan merefleksi dalam proses membangun pengetahuan. Seiring berkembangnya teknologi, platform pembelajaran digital telah menjadi sarana potensial dalam mendukung penerapan pembelajaran inkuiri di berbagai jenjang pendidikan. Metode *Systematic Literature Review* (SLR) model PRISMA digunakan untuk mengidentifikasi, menganalisis, dan mensintesis temuan dari artikel ilmiah yang dipublikasikan dalam lima tahun terakhir. Data dikumpulkan menggunakan aplikasi Harzing's Publish or perish (PoP) melalui pencarian dari basis data google scholar dan crossref. Hasil kajian menunjukkan bahwa platform pembelajaran digital memainkan peran penting dalam mendukung penerapan pembelajaran inkuiri melalui penyediaan akses ke sumber daya terbuka, fasilitas kolaboratif, umpan balik otomatis, dan aktivitas pembelajaran yang terstruktur secara digital. Beberapa fitur seperti Learning Management System (LMS), simulasi interaktif, dan alat kolaboratif daring terbukti efektif dalam meningkatkan keterlibatan dan kemandirian belajar siswa.

Kata Kunci: Pembelajaran Berbasis Inkuiri; Platform Pembelajaran Digital; Fasilitas

Abstract
This study aims to systematically examine the role of digital learning platforms in facilitating inquiry-based learning in various educational contexts. Inquiry-based learning is learning that stimulates students to actively explore, formulate questions, investigate, and reflect in the process of building knowledge. As technology advances, digital learning platforms have become a potential tool in supporting the implementation of inquiry learning at various levels of education. The Systematic Literature Review (SLR) method, PRISMA model, was used to identify, analyze, and synthesize findings from scientific articles published in the last five years. Data were collected using Harzing's Publish or Perish (PoP) application through searches of Google Scholar and Crossref databases. The results of the study indicate that digital learning platforms play a significant role in supporting the implementation of inquiry learning by providing access to open resources, collaborative facilities, automated feedback, and digitally structured learning activities. Several features such as Learning Management Systems (LMS), interactive simulations, and online collaborative tools have proven effective in increasing student engagement and learning independence.

Keyword*: Inquiry Based Learning; Digital Learning Platform; Facilitating*

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INTRODUCTION

The utilization of technology in learning activities in the current digital era has become an integral part of educational transformation across various levels. This transformation is not merely a change in tools, but also involves a shift in paradigms in how learning processes are understood and implemented. Along with the advancement of technology, various digital learning platforms have emerged, enabling students to access materials online, participate in virtual classes, engage in forum discussions, and receive real-time feedback from educators. In addition, this development opens opportunities to introduce more innovative learning methods, such as inquiry-based learning.

Inquiry-based learning is an approach that emphasizes the process of exploration and discovery by students through questioning, conducting investigations, and actively constructing knowledge, similar to the methods used by scientists in research (Hinostroza et al., 2024). According to Arshad, Bazilah & Ishak, Nor & Zaharudin (2024), inquiry-based learning adopts a constructivist approach in education that emphasizes active student engagement through three main elements: questioning, exploration, and conclusion. In this process, teachers pose questions to students, students carry out exploratory activities to find answers, and then draw conclusions based on their findings (Pedaste et al., 2015). This approach aims to develop students' analytical, creative, and innovative thinking skills, which are essential in the current digital era. Furthermore, inquiry-based learning helps students develop independent critical thinking skills, in contrast to conventional models that primarily emphasize lectures and discussions (Islami & Hadi Soekamto, 2022).

Research conducted by Hwang & Chen (2017) shows that inquiry-based learning design involving game elements through digital platforms not only improves students' learning achievement but also motivates them to engage more actively in the learning process. This indicates that integrating technology into inquiry-based learning can create a more enjoyable and effective learning experience. Digital platforms play an important role in transforming learning media into digital forms that can be accessed online by students. This allows students to access learning materials anytime and anywhere through digital classrooms, thereby supporting flexibility and effectiveness in learning. Moreover, digital platforms such as Moodle facilitate interaction between teachers and students and support various learning models such as online learning, blended learning, and flipped classrooms, which are highly relevant in today's digital era (Sari & Mawardi, 2022).

Moodle is a Learning Management System (LMS) platform in web-based form and represents the Web 2.0 generation, with its main feature being customization for various online learning needs. Numerous studies have examined this LMS platform in various learning contexts. It provides a wide range of features that can be tailored to designed learning scenarios, including session management, quizzes, discussion forums, and formative evaluations conducted in each session. These comprehensive features provide stronger support for designing and implementing inquiry-based learning compared to its predecessor, zunal.com, which offers a platform for web-based inquiry learning known as WebQuest.

WebQuest is a form of inquiry-based learning that utilizes Internet resources by incorporating website links to support the learning process (Soepriyanto, 2018). The WebQuest platform used in inquiry-based learning is http://zunal.com, which provides facilities that facilitate safe information exploration guided by educators (Soepriyanto et al., 2018). Empirical evidence from Soepriyanto et al. (2019) indicates that WebQuest influences Lower Order Thinking Skills (LOTS) and performs better than conventional learning. However, this platform remains a static website, not an LMS, and does not belong to the Web 2.0 generation, as it lacks online discussion forums and offers limited features. Despite these limitations, it served as a pioneer in web-based inquiry learning as a digital learning platform at that time.

Digital learning platforms are primarily utilized in the conceptualization and investigation phases to access information, guide activities, and support data collection. However, their use remains limited in the orientation and conclusion phases, and is absent in the discussion phase (Hinostroza et al., 2024). According to Alshammary & Alhalafawy (2023), the use of digital platforms can enhance student learning outcomes by providing broader access to information resources and interactive learning tools. These platforms enable students to explore various resources, including instructional videos, simulations, and discussion forums, thereby enriching their learning experience.

Interactive digital learning platforms offer a variety of tools and resources that support teaching and learning processes, particularly in inquiry-based learning. This review aims to explore the role of digital learning platforms, especially the utilization of Learning Management Systems (LMS), in facilitating inquiry-based learning. The goal is to identify research gaps or observe trends over a certain period and within specific themes.

METHOD

The method used in this study was a systematic literature review based on the PRISMA 2020 model guidelines (Page et al., 2021) in order to answer the research questions. This study reviewed previous research related to the role or usefulness of digital learning platforms in facilitating inquiry-based learning. The literature search was conducted using the Harzing's Publish or Perish application with data sources from Google Scholar and Crossref. The keywords used consisted of several English terms, namely "Inquiry Learning and Digital Platform Learning" OR "IBL and Digital Platform." The literature search covered a one-decade period, from 2015 to 2025. The selection of previous research articles was based on the following criteria.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Journal must be indexed by at least Sinta 3.	Journal index lower than Sinta 3.
Published between 2015 and 2025.	Published before 2025.
Related to IBL and Digital Learning Platforms.	Not related to IBL and Digital Learning Platforms.
Article is a peer-reviewed journal.	Article is not a peer-reviewed journal.
Written in English or Indonesian.	Text is not written in English or Indonesian
Empirical research.	Not empirical research.

The search results using Publish or Perish (PoP), with sources from Google Scholar, Crossref, and Scopus, initially yielded 110 articles selected based on title, abstract, and full-text screening. To facilitate a more structured selection process, the study utilized EndNote X9. Subsequently, coding, data extraction, and analysis were conducted manually by identifying relevant information and organizing the results into a spreadsheet.

The complete article selection process is presented in Figure 1. Using Publish or Perish (PoP) and referring to the criteria outlined in Table 1, 20 articles categorized as non-peer-reviewed journals were excluded, leaving 90 articles for further screening. Additional exclusion criteria, including "not relevant to inquiry-based learning (IBL)," "not relevant to digital learning platforms," and "not empirical research," resulted in the removal of 53 articles. From the remaining 37 articles, 2 duplicate entries were removed, resulting in 35 articles. The eligibility of the articles was then determined based on the criterion that the journals must be ranked above SINTA 3. Ultimately, after completing the selection process, 17 articles were included for the final analysis.

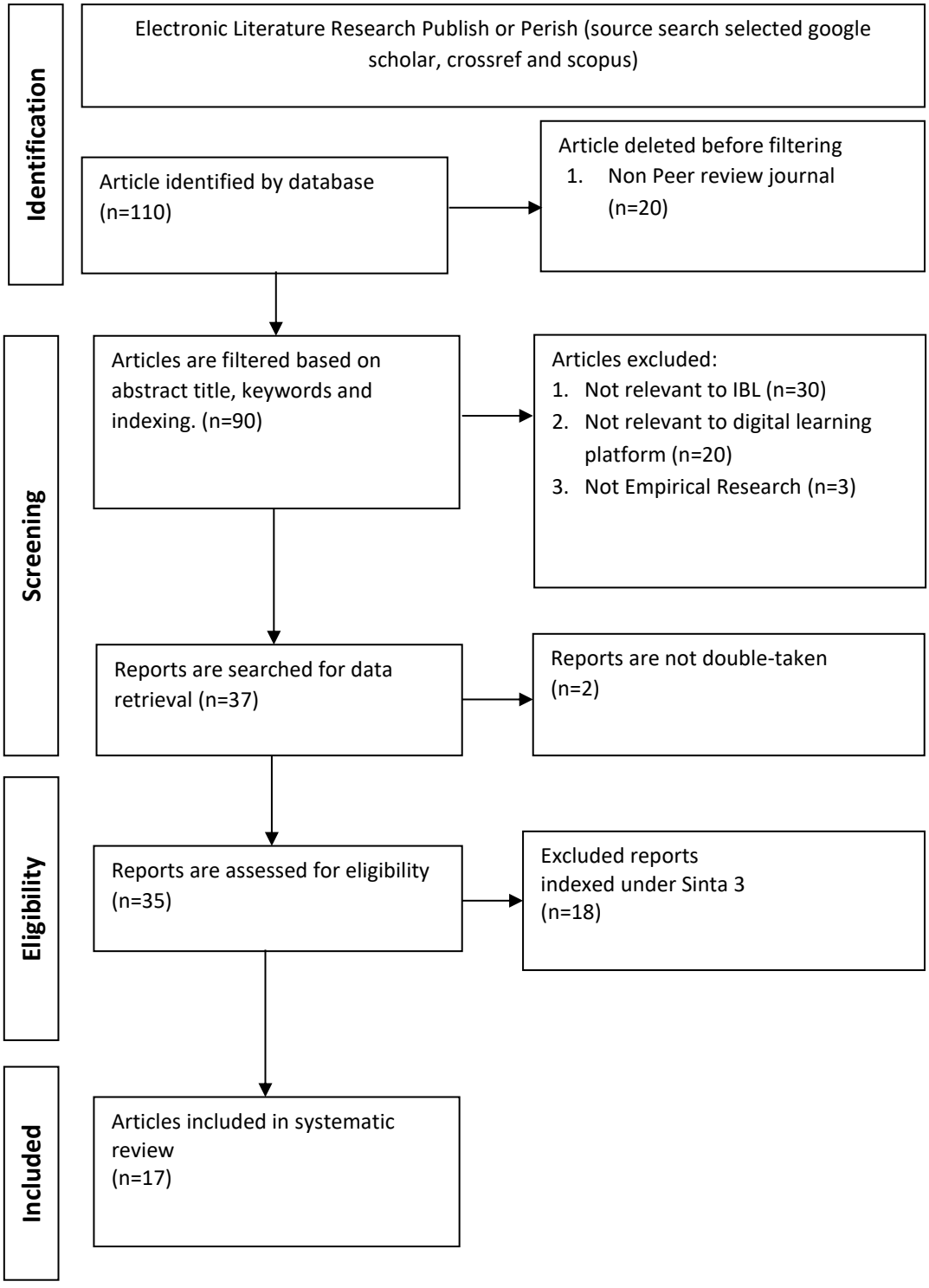

Figure 1. Article Selection Process Based on PRISMA

RESULT

The selection process resulted in 17 articles that were examined in depth regarding digital learning platforms that had been previously studied. In general, almost all articles mentioned the digital learning platforms used, with only two articles not clearly specifying the product names. In addition, the findings of these studies did not present clear empirical evidence, but could still be utilized as a form of theoretical review. Table 2 presents the results of the review of studies on the use of digital learning platforms.

Table 2. Findings on the Role of Digital Learning Platforms in Inquiry-Based Learning

Authors	Platform	Temuan
C. M. Chen et al., (2022)	Digital Humanities Research Platform (DHRP-MLCLW)	The platform plays a role in supporting inquiry-based learning in history subjects. This platform helps students conduct historical investigations in a more systematic way.
Song & Wen, (2018)	various apps on BYOD (Bring Your Own Device)	The application provides various affordances that support a seamless and personalized student learning process.
Gillet et al., (2017)	Cloud ecosystem with online labs	Personalization and the exploration of learning spaces integrated with various applications and supporting tools, such as Gravity Force Lab, assist students in understanding scientific concepts through structured inquiry phases.
Csachová, (2020)	Web GIS	It increases student and teacher engagement.
Prayogi et al., (2023)	-	The integration of inquiry-based learning with ethnoscience is carried out dynamically, thereby supporting distance learning and providing learning resources that are engaging and relevant to local cultural contexts, making learning more authentic and meaningful.
Ruliyani Febriyanti, Hamsi Mansur, (2023)	Kahoot	It combines materials with simulation questions and video features that facilitate understanding without requiring abstract thinking.
Kanharin and Chatwattana (2024)	Metaverse, IBL, GBL	The elements of this platform are highly appropriate for supporting the development of problem-solving skills, digital literacy, and empathy.
Sari & Mawardi, (2022)	Moodle	Moodle facilitates a flipped classroom through guided inquiry learning stages conducted online, starting from orientation, exploration, concept formation, application, to closure.
Cui et al.,(2022)	Web-Based Environment	This platform provides multiple representations, inquiry maps, and non-linear guidance that assist students in the inquiry process.
Hinostroza et al., (2024)	(LMS)	Learning Management Systems (LMS) are used to support phases such as orientation, conceptualization, and organization of ideas.
H. C. Chen et al., (2023)	Go-Lab	It designs Inquiry Learning Spaces (ILS) that integrate online laboratories and applications such as hypothesis tools, tables, observation, conclusion, and reporting.
Islami & Hadi Soekamto, (2022)	Quizzizz	The use of gamification-based Quizizz makes students more participative and actively engaged in the learning process, while also increasing intrinsic motivation and creativity.
Onyema, Edeh & Anthonia, Udeze & Deborah, Edeh. (2019)	(Mobile technologies)	It has an important role in improving the effectiveness of inquiry-based learning by enabling teachers to provide real-time guidance and responses to students' questions and findings during the inquiry process.
Siregar & Mawardi, (2022)	Moodle FGIL	Moodle for flipped learning facilitates teachers in delivering lessons and materials and also makes it easier for students.
Vedi et al., (2022)	-	It allows students to present inquiry projects online, which supports self-directed learning, the development of leadership skills, teamwork, and creativity.
Carreon & Smith, (2022)	AR	In the context of Biology learning, AR helps students think analytically, creatively, and innovatively by providing visualization of complex concepts.
Arshad, B., Ishak, N. A., & Zaharudin, R. (2024)	AR	It provides an immersive and interactive learning experience. AR enables students to interact with digital content projected into the real environment.

DISCUSSION

Digital platforms play an important role in the learning process by transforming learning media into digital forms that can be accessed online by students. This allows students to access learning materials anytime and anywhere through digital classrooms, thereby supporting flexibility and effectiveness in learning (Sari & Mawardi, 2022).

A number of studies indicate that digital platforms play a central role in facilitating inquiry-based learning by providing access to various learning resources, interactive tools, and research-supporting features. Chen, Chang, & Chen (2022) introduced DHRP-MLCLW, which enriches history learning experiences through PCCDT tools and facilitates systematic historical investigation. Cui, Zhao, & Zhang (2022) and H. C. Chen et al. (2023) highlight the importance of web-based environments such as Go-Lab, which provide tools for each stage of the inquiry process—from hypothesis formulation to reporting.

These studies further strengthen the role of digital platforms in supporting student engagement and autonomy during the investigation phase in inquiry-based learning. Digital learning platforms can provide step-by-step guidance throughout the investigation process, such as through electronic mapping during field activities or virtual assistants in virtual reality experiments, allowing students to regulate and choose the level of challenge they wish to face independently.

In addition, technology in digital platforms enables students to access information extensively through databases or relevant videos, as well as to collect data in various formats such as text, photos, and videos, which enrich their learning experience. The use of multimedia also helps students focus on formulating questions and scientific arguments, while enhancing reflection and self-confidence in learning. All of these aspects encourage students to become more active and independent in their investigation processes.

Furthermore, digital platforms not only present content in inquiry-based learning but also enhance student engagement and motivation through gamification features and visual elements. Ruliyani Febriyanti & Hamsi Mansur (2023) and Islami & Soekamto (2022) show that the use of Kahoot and Quizizz increases active participation through gamified formats and interactive visual content delivery. Vedi, Dulloo, & Singh (2022) add that online project presentations support the development of leadership, teamwork, and creativity.

Various studies in the reviewed articles indicate that digital platforms contribute significantly to the success of inquiry-based learning. Technology not only functions as a supporting tool but also as a driver of pedagogical innovation that enables inquiry-based learning to be more effective, as elaborated below.

Digital learning platforms allow students to learn according to their individual needs, pace, and learning styles. In the context of inquiry-based learning, technology supports personalization by providing access to diverse and adaptive learning resources. Platforms such as BYOD and web-based environments (Song & Wen, 2018; Cui et al., 2022) enable students to choose media and methods that best suit their learning styles. Inquiry mapping features and non-linear guidance encourage students to follow unique learning pathways according to their interests and abilities. Gamification-based personalized evaluation, such as Quizizz and Kahoot, provides immediate feedback that can be adjusted to students' cognitive levels (Islami & Soekamto, 2022; Febriyanti & Mansur, 2023). With this approach, students are no longer passive objects of learning but active and autonomous participants.

Technology in digital learning platforms creates more dynamic learning environments through the integration of multimedia elements and virtual reality, such as Augmented Reality (AR), which brings digital content into the real world. As shown by Carreon & Smith (2022) and Arshad et al. (2024), this allows visualization of abstract and complex concepts in a more concrete manner. Metaverse and game-based learning provide deeper learning experiences through avatars and virtual world simulations (Kanharin & Chatwattana, 2024). Online laboratories and digital simulations, such as Gravity Force Lab, help students understand scientific concepts by allowing them to conduct

virtual experiments (Gillet et al., 2017). This interactivity transforms learning into a more meaningful and in-depth experience, facilitating conceptual understanding and real-world application.

Digital learning platforms also support the integration of local contexts, culture, or real-world phenomena into inquiry-based learning processes. Ethnoscience-based platforms enable teachers to connect science materials with local cultural values (Prayogi et al., 2023). The use of Web GIS in geography encourages students to analyze real data such as age pyramids or population projections in specific regions (Csachová, 2020). AR and location-based mobile applications can be used for virtual field observations in historical, biological, or socio-cultural contexts. Context-based learning makes the learning process more relevant and applicable, thereby increasing student engagement and retention.

Digital learning platforms provide frameworks that enable inquiry processes to be conducted systematically, both online and in hybrid settings. LMS platforms such as Moodle and Go-Lab allow the organization of inquiry learning stages, including orientation, exploration, hypothesis development, experimentation, and reflection (Sari & Mawardi, 2022; Chen et al., 2023). Learning Management Systems (LMS) also help teachers monitor student progress and provide timely support (Hinostroza et al., 2024). Mobile learning and cloud-based tools enable continuous access to learning resources and real-time teacher guidance (Onyema et al., 2019). This digital structure supports flexibility while maintaining the continuity of scientific thinking processes, which are central to the inquiry approach.

By optimally utilizing the potential of technology in digital learning platforms, teachers and students can implement inquiry-based learning that is more effective, engaging, and meaningful. Research shows that the combination of teacher support and platform support significantly improves students' inquiry skills, motivation, and knowledge integration abilities (Guo et al., 2023). Teachers play a crucial role in providing personalized feedback, interpreting learning objectives, and building emotional connections with students, which cannot be fully replaced by digital platforms.

The combination of autonomy support and structural support in inquiry learning environments facilitated by digital platforms is essential. Digital platforms function as media that provide scaffolding, exploration maps, and non-linear guidance to support students in conducting inquiry independently. However, for inquiry learning to be effective, clear structural support is required in the form of learning objectives, feedback, and teacher guidance to reduce cognitive load and prevent students from learning without direction.

CONCLUSION

Overall, digital learning platforms enrich the inquiry-based learning process, particularly in the investigation and conceptualization stages; however, further development is still needed to enable their optimal use across all phases of learning. The role of digital learning platforms in inquiry-based learning includes seven main functions: guiding the inquiry learning process to be more structured, representing the phenomena being investigated through simulations or visualizations, serving as a source of access to learning content, functioning as a tool for collecting data during the investigation process, assisting in organizing ideas and information, facilitating the sharing of ideas and information among learners, and providing feedback both automatically and from teachers or peers. These digital platforms are utilized to enhance each stage of inquiry-based learning, especially in the investigation and conceptualization phases, thereby increasing student engagement and understanding.

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