

Leveraging Learning Analytics To Analyze Student Engagement And Learning Outcomes In Digital-Based Islamic Religious Education

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Abstract

Digital-based Islamic Religious Education (IRE) provides opportunities to use learning activity data to understand student engagement and learning outcomes. However, high levels of digital activity do not necessarily indicate deep cognitive engagement or successful learning. This study aims to analyze the use of learning analytics to examine student engagement and learning outcomes in digital-based IRE. It employs a qualitative approach using the library research method. Data were obtained by reviewing relevant literature on learning analytics, student engagement, learning outcomes, and digital-based IRE, and were analyzed descriptively through the identification and synthesis of findings. The results indicate that learning analytics can be used to identify behavioral engagement through access to learning materials, task completion, and participation in assessments, as well as to examine cognitive engagement through students' understanding of learning materials and the quality of their responses. The use of these data can help educators identify learning difficulties, provide feedback, and determine appropriate instructional follow-up. Nevertheless, the relationship between engagement and learning outcomes must be interpreted cautiously because it is influenced by various factors. Digital activity data are also insufficient to assess all aspects of religious understanding and character development. This study concludes that learning analytics has the potential to support pedagogical decision-making in digital-based IRE, provided that data quality, privacy, and the learning context are taken into account.

Keywords: learning analytics, student engagement, learning outcomes, Islamic Religious Education, digital learning

INTRODUCTION

The development of digital technology has brought about changes in the implementation of Islamic Religious Education (IRE), ranging from the use of online learning platforms to the provision of digital learning materials and assessment tools (Al-Ulya et al., 2026). These changes generate learning data, including the frequency of access to learning materials, study duration, participation in learning activities, task completion, and assessment results. Such data can be used to understand student engagement and identify factors associated with learning outcomes (Fatmawati, 2026). One approach that enables the utilization of these data is *learning analytics*, defined as the collection, measurement, analysis, and reporting of data about learners to understand and optimize the learning process (Firdaus et al., 2023).

In digital-based Islamic Religious Education, student engagement cannot be adequately assessed solely on the basis of attendance or the frequency of platform access. Engagement also encompasses active participation, learning consistency, task completion, and interaction with learning materials (Habibi et al., 2025). Meanwhile, learning outcomes are not limited to the mastery of religious knowledge but also include conceptual understanding and the ability to apply the material being studied (Hamran et al., 2026). Therefore, learning data need to be analyzed comprehensively so that digital activities can be interpreted appropriately and linked to learning outcomes. For example, a high frequency of platform access does not necessarily indicate a good understanding of the learning materials (Hani et al., 2026).

The main issue to be examined is how *learning analytics* can be used to analyze student engagement and its relationship with learning outcomes in digital-based Islamic Religious Education (Hayati & Basnang Said, 2025). Activity data available on learning platforms have the potential to provide information about participation patterns, learning consistency, and students'

learning difficulties. However, these data need to be analyzed in accordance with the learning context and relevant indicators of learning outcomes (Husna et al., 2026). Furthermore, the implementation of *learning analytics* needs to take into account the limitations of data interpretation, student privacy, and the possibility that digitally recorded activities do not fully reflect the actual learning process (Inayah et al., 2026).

Based on these issues, this study focuses on the use of *learning analytics* to identify patterns of student engagement, analyze their relationship with learning outcomes, and examine the implications for improving digital-based Islamic Religious Education. The novelty of this study lies in connecting digital activity indicators with learning outcomes in the context of religious education, rather than merely measuring platform usage. This study aims to examine how *learning analytics* can be utilized to understand student engagement and learning outcomes and to support more informed instructional decision-making. Accordingly, the main research question is: How can *learning analytics* be used to analyze student engagement and learning outcomes in digital-based Islamic Religious Education?

RESEARCH METHOD

This study employs a qualitative method with a library research approach to examine the use of *learning analytics* in analyzing student engagement and learning outcomes in digital-based Islamic Religious Education (IRE). The primary data sources consist of scholarly journal articles discussing *learning analytics*, student engagement, learning outcomes, and digital learning, while the secondary sources include relevant academic books and scientific publications. The literature was selected based on its relevance to the research topic, source credibility, and alignment with the research objectives. Data were collected through searches of scholarly publications and documentation by identifying, reading, recording, and categorizing information according to the focus of the study (Taherdoost, 2022)

The data were analyzed using content analysis through several stages: source identification, data reduction, categorization, interpretation, and conclusion drawing. The literature was classified into three main categories: indicators of student engagement, the relationship between student engagement and learning outcomes, and the use of *learning analytics* to support instructional decision-making. Subsequently, findings across the literature were compared to identify similarities, differences, trends, and research gaps. The findings were interpreted using a descriptive-analytical approach to develop an understanding of the use of *learning analytics* in digital-based Islamic Religious Education. The credibility of the review was maintained by examining source credibility, comparing information across the literature, and ensuring that interpretations remained consistent with the available scientific evidence. Accordingly, this study is expected to produce a conceptual synthesis of the analysis of student engagement and learning outcomes as a basis for improving digital-based Islamic Religious Education (Sheikh et al., 2025)

RESULTS AND DISCUSSION

Research Results

Based on the synthesis of the literature, *learning analytics* has the potential to help educators analyze student engagement and understand patterns in learning outcomes in digital-based Islamic Religious Education (IRE) (Johar et al., 2023). The analysis can be conducted using data on the frequency of access to learning materials, participation in activities, task completion, quiz results, and progress in assessment scores. However, activities recorded on learning platforms do not always reflect the depth of students' understanding and therefore need to be interpreted alongside relevant learning outcome indicators (Zaldi et al., 2026). The measurement of engagement should encompass behavioral, cognitive, emotional, and social dimensions rather than relying solely on the frequency of access or the duration of platform use (Latifah et al., 2025). Accordingly, the use of *learning*

analytics in IRE requires a connection between digital activity data, engagement indicators, and learning outcomes. The main components of this analysis are presented in Table 1.

Table 1. Synthesis of the Use of Learning Analytics in Digital-Based Islamic Religious Education

No.	Aspect of Analysis	Indicators or Forms of Analysis	Implications for Learning
1	Behavioral engagement	Frequency of access, participation, and task completion	Identifying students' learning activity patterns
2	Cognitive engagement	Quiz results, answer quality, and understanding of learning materials	Recognizing levels of understanding and learning difficulties
3	Learning outcomes	Test scores, quiz results, and assignment scores	Mapping the achievement of learning objectives
4	Relationship between engagement and learning outcomes	Comparison of activity patterns with assessment results	Identifying patterns associated with learning outcomes
5	Instructional follow-up	Feedback, reinforcement materials, and learning support	Supporting adjustments to instructional strategies

Source: The researcher's conceptual synthesis based on the focus of the literature review.

As shown in Table 1, five main aspects of the use of learning analytics can be identified: behavioral engagement, cognitive engagement, learning outcomes, the relationship between engagement and achievement, and instructional follow-up. These five aspects can help teachers understand students' learning patterns in a more systematic manner. Nevertheless, the relationship between digital activities and learning outcomes cannot automatically be interpreted as a causal relationship. Factors such as prior knowledge, motivation, teacher support, and learning conditions must also be considered (Mashudi & Hilman, 2024).

Discussion

Analyzing Student Engagement through *Learning Analytics*

Student engagement is an important aspect of digital learning because it is associated with participation and the process of understanding learning materials. Through *learning analytics*, activities such as accessing learning materials, completing exercises, and participating in assessments can be analyzed to identify engagement patterns (Masitoh, 2026). However, a high frequency of activity does not necessarily indicate meaningful engagement, as students may access learning materials frequently without actually understanding their content (Muslikha et al., 2026).

In Islamic Religious Education (IRE), engagement analysis needs to consider students' understanding of religious concepts, the quality of their answers, and their ability to explain the learning materials (Pebrina et al., 2026). Therefore, digital activity data should be combined with exercise results, assignments, and learning reflections. This approach can provide a more comprehensive picture of student engagement while taking the learning context into account (Putra & Inayati, 2026).

The Relationship between Student Engagement and IRE Learning Outcomes

Engagement analysis becomes more meaningful when linked to learning outcomes. Data on task completion, activity consistency, and participation in quizzes can be compared with assessment results to identify learning patterns (Rahmat Saputra, 2026). Students who are active in digital learning but obtain low scores may need additional explanations, whereas students who rarely complete exercises may require guidance in managing their learning activities.

Nevertheless, the relationship between engagement and learning outcomes cannot automatically be regarded as causal. Student achievement may also be influenced by prior knowledge, motivation, teacher support, and the learning environment (Rizal & Helmawati, 2026). Thus, *learning analytics* serves as a supporting tool for identifying activity patterns and informing

decisions about subsequent instructional interventions, rather than as the sole measure of learning success.

Implications of *Learning Analytics* for Digital-Based IRE

The use of *learning analytics* can help teachers make instructional decisions based on students' needs (Rodhatul Jennah et al., 2025). The results of the analysis can be used to identify materials that students have not yet understood, provide feedback, develop reinforcement exercises, and determine the need for additional learning support. Consequently, digital data serve not merely as records of activity but also as a source of information for improving the learning process (Rizal & Helmawati, 2026).

Its implementation needs to take into account data quality, privacy, information security, and the accuracy of interpretation. Incomplete data or data that reflect only activities on a learning platform may lead to inaccurate conclusions (Rodhatul Jennah et al., 2025). Therefore, analytical findings need to be combined with teachers' assessments and other evidence of learning. In religious education, digital activities also cannot be used as a direct measure of students' religious attitudes or character, as assessment must be aligned with the learning objectives (Suaidi et al., 2025).

Overall, *learning analytics* has the potential to support understanding of student engagement and its relationship with learning outcomes in digital-based Islamic Religious Education. The contribution of this study lies in its conceptual framework, which connects digital activity indicators, learning outcomes, and pedagogical follow-up (Taufik & Zulkarnaen, 2025). Since this study employs a library research approach, the framework does not establish an empirical relationship among specific students. Further research is needed to test its application using actual learning data in order to assess the validity of the indicators and their usefulness in supporting instructional decision-making (Yusuf Bintang Tri Sakti & Dyah Saputri, 2026).

CONCLUSION

Based on the literature review, *learning analytics* has the potential to support the analysis of student engagement and learning outcomes in digital-based Islamic Religious Education (IRE). Learning activity data, such as access to learning materials, task completion, participation in assessments, and exercise results, can be used to obtain an overview of student engagement patterns. However, engagement cannot be measured solely by the frequency of digital activities; it also requires consideration of the quality of students' understanding, their ability to apply the learning materials, and their learning outcomes. The use of *learning analytics* can also help educators identify learning difficulties, provide feedback, and design instructional follow-up activities that address students' needs. Nevertheless, its implementation must take into account data quality, privacy protection, information security, and the accuracy of interpretation. In IRE, digital data cannot serve as the sole basis for assessing students' religious understanding or character development.

Thus, *learning analytics* can serve as a supporting tool for pedagogical decision-making to improve the quality of digital-based Islamic Religious Education. However, because this study employs a literature review method, the relationship between student engagement and learning outcomes has not been established through direct empirical data testing. Therefore, future research should examine the application of *learning analytics* using actual learning data to gain a deeper understanding of its benefits and limitations.

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