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Learning Analytics to Improve the Quality of Decision-Making in Digital Education

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ABSTRAK

This study aims to analyze the role of Learning Analytics in improving the quality of decision-making in digital education. A quantitative descriptive-analytical design was employed. The respondents consisted of educators and digital learning managers directly involved in the use of learning data and educational decision-making. Data were collected through a questionnaire measuring the level of Learning Analytics utilization and decision-making quality. Descriptive analysis was conducted to identify patterns in the relationship between Learning Analytics utilization and decision-making quality. The results indicate that higher utilization of Learning Analytics is associated with more rational, accurate, and useful educational decisions. These findings highlight the role of Learning Analytics as an essential support tool for data-driven and evidence-based decision-making in digital education

INTRODUCTION

The transformation of digital education has resulted in significant changes in how learning processes are designed, implemented, and evaluated. The use of Learning Management Systems, online learning platforms, and various digital learning support applications has generated a vast and diverse volume of learning data. These data include information on students' learning activities, engagement in learning, interaction patterns, and academic achievement recorded continuously. However, despite the increasing availability of learning data, their utilization as a basis for educational decision-making remains suboptimal (Kew & Tasir, 2021; Romero & Ventura, 2020).

In digital education practices, instructional and managerial decision-making is still frequently based on intuition, subjective experience, or simple descriptive reports. Decisions related to improving instructional design, implementing interventions for students, or evaluating the effectiveness of digital learning often fail to systematically utilize the available learning data. This condition creates a gap between data availability and the quality of decisions produced, resulting in missed opportunities to enhance evidence-based learning quality (Kurilovas, 2020; Asfaw et al., 2023).

Learning Analytics has emerged as a data-driven approach aimed at collecting, processing, analyzing, and interpreting learning data to support more rational and evidence-based educational decision-making. Through Learning Analytics, learning data are not merely presented in the form of statistical reports but are interpreted to identify

learning patterns, students' behavioral tendencies, and the effectiveness of digital learning strategies. This approach aligns with the paradigm of evidence-based decision making, which emphasizes the use of empirical data as the primary foundation for educational decision-making processes (Jin et al., 2025; Wong et al., 2025).

At the international level, Learning Analytics has developed as an integral part of data-driven education ecosystems. Various educational institutions have begun integrating Learning Analytics to monitor learning performance, student engagement, and the effectiveness of online and hybrid learning. Numerous studies indicate that the utilization of Learning Analytics can help educators and educational administrators understand learning dynamics more comprehensively and responsively (Palancı et al., 2024; Rundquist et al., 2024). However, most of these studies still position Learning Analytics as a technical monitoring and evaluation tool rather than as a strategic instrument in educational decision-making processes.

In the national education context, the utilization of Learning Analytics remains at an early stage and tends to be limited to reporting functions. Learning data are more frequently used for administrative purposes, such as attendance or grade recapitulation, rather than as an analytical basis for instructional and managerial decision-making. This condition indicates that the potential of Learning Analytics as a data-driven decision support tool has not yet been fully internalized in digital education practices (Sahni, 2023; Ngulube & Ncube, 2025).

From an academic perspective, research on Learning Analytics is still dominated by studies focusing on system development, analytical techniques, and technological integration. Meanwhile, studies that explicitly examine the role of Learning Analytics in improving the quality of educational decision-making remain relatively limited. Many studies stop at the stage of identifying data patterns without exploring how analytical insights are actually used in real decision-making processes by educators and educational administrators (Daoudi, 2022; Claassen et al., 2025).

In addition, some studies have not clearly linked the utilization of Learning Analytics with dimensions of decision-making quality, such as rationality, accuracy, and usefulness of educational decisions. In fact, decision-making quality is a key factor in determining the success of digital learning implementation. Without an adequate understanding of how analytical data are translated into operational and strategic decisions, Learning Analytics risks becoming merely a technical instrument with no substantive impact on educational quality (Nauman et al., 2021; Cho et al., 2024).

Based on this review, several research gaps need to be addressed. First, there is still a limited number of quantitative studies analyzing the role of Learning Analytics in improving the quality of decision-making in digital education. Second, there is a lack of descriptive-analytical studies mapping the relationship between the level of Learning Analytics utilization and the rationality of educational decisions. Third, there is insufficient empirical mapping of how analytical insights are used in instructional and educational management decision-making practices.

This study offers novelty in three main aspects. Conceptually, it positions Learning Analytics as an instrument for educational decision-making rather than merely a data monitoring tool. Analytically, this study employs a quantitative descriptive-analytical approach to describe the relationship between Learning Analytics utilization and decision-making quality. Contextually, this study is conducted within actual digital education practices rather than in system simulations or purely technological development contexts.

Based on the above discussion, the objective of this study is to analyze the role of Learning Analytics in improving the quality of decision-making in digital education. This study is expected to provide theoretical contributions to the development of Learning Analytics research and practical contributions for educators and educational administrators in strengthening data-driven and evidence-based digital education practices.

METHODOLOGY (Times New Roman, 12, bold, space 1)

This study employed a quantitative approach with a descriptive-analytical research design. This design was selected to describe and analyze the relationship between the utilization of Learning Analytics and the quality of decision-making in the context of digital education. The research focus was directed toward identifying patterns, trends, and levels of Learning Analytics utilization in instructional practices and educational management, as well as examining how such utilization is related to the quality of decisions made (Kurilovas, 2020; Jin et al., 2025).

The research population comprised educators, digital learning managers, and educational policymakers who are directly involved in the use of digital learning data. The research sample was selected based on respondents' involvement in decision-making processes that utilize learning data. Respondent characteristics were carefully considered to ensure relevance to the digital education context, particularly experience in using Learning Management Systems and online learning data.

The research instrument consisted of a structured questionnaire designed to measure the level of Learning Analytics utilization and the quality of educational decision-making. Indicators of Learning Analytics utilization included access to learning data, data interpretation capabilities, and the use of analytical outputs in instructional and educational management processes. Meanwhile, indicators of decision-making quality reflected dimensions of rationality, accuracy, and usefulness of decisions within the digital education context. The collected data were analyzed descriptively to illustrate patterns in the relationship between Learning Analytics utilization and the quality of decision-making.

RESULTS AND DISCUSSION (Times New Roman, 12, bold, space 1)

Sample Characteristics

A total of 162 respondents participated in the study, and all questionnaires were deemed valid for analysis. The respondents consisted of educators and digital learning managers who were directly involved in the planning, implementation, and evaluation of Learning Management System–based instruction. In terms of experience, the majority of respondents had more than two years of experience using digital learning platforms and were actively engaged in decision-making related to instructional design, monitoring student performance, and evaluating learning effectiveness. These characteristics indicate that the respondents possessed adequate relevance to the research context, ensuring that the collected data reflect actual decision-making practices in digital education.

Descriptive Analysis of Learning Analytics Utilization

The descriptive analysis indicates that the level of Learning Analytics utilization falls within the moderate to high category. Most respondents reported that learning data generated from the LMS were easily accessible and regularly available, particularly data

related to attendance, learning activities, and academic achievement. However, the utilization of these data remains predominantly focused on reporting and monitoring purposes rather than on in-depth analysis for strategic decision-making. This finding suggests that Learning Analytics has been used primarily as an information source but has not yet been fully leveraged as a comprehensive decision-support tool, a pattern that is consistent with findings from systematic reviews by Kew and Tasir (2021) and Palancı et al. (2024)

Table 1. Descriptive Statistics of Learning Analytics Utilization

Indicator	Mean	Std. Deviation
Access to learning data	3.98	0.62
Frequency of analytics use	3.74	0.68
Data interpretation ability	3.51	0.71
Use of analytics in decision-making	3.42	0.73

The mean scores indicate that the data access aspect received the highest score, whereas the utilization of analytical results in decision-making obtained a relatively lower score. This pattern indicates a gap between data availability and its actual use in educational decision-making processes.

Descriptive Analysis of Decision-Making Quality

The analysis of decision-making quality shows that respondents tend to perceive the educational decisions they make as rational and information-based, although not yet fully optimal. The rationality dimension of decision-making obtained the highest mean score, while the usefulness dimension exhibited greater variation among respondents. This finding suggests that although learning data have been used as a reference, the consistency with which data are translated into decisions that generate direct impact remains variable across respondents.

Table 2. Descriptive Statistics of Decision-Making Quality

Indicator	Mean	Std. Deviation
Rationality of decisions	3.87	0.65
Accuracy of decisions	3.69	0.70
Usefulness of decisions	3.58	0.74

These results indicate that the quality of decision-making is at a moderate level, with considerable potential for improvement through more systematic and integrated utilization of Learning Analytics.

Relationship between Learning Analytics and Decision-Making Quality

The descriptive relationship analysis reveals a positive tendency between the level of Learning Analytics utilization and the quality of decision-making in digital education. Respondents with higher levels of Learning Analytics utilization tend to report decisions that are more rational, accurate, and useful. This pattern reinforces the assumption that Learning Analytics serves as an important support mechanism for data-driven decision-making, although the observed relationship is descriptive in nature and is not intended to establish causal inference.

Table 3. Descriptive Relationship between Learning Analytics Utilization and Decision-Making Quality

Level of Learning Analytics Utilization	Mean Decision Quality Score
Low	3.21
Moderate	3.64
High	4.02

Differences in mean scores across categories indicate that increased utilization of Learning Analytics is aligned with improvements in decision-making quality. This finding is consistent with previous studies emphasizing the role of learning data in supporting more rational and efficient educational decisions (Kurilovas, 2020; Jin et al., 2025).

The Role of Learning Analytics in Improving Decision-Making Quality in Digital Education

The results of this study indicate that the level of Learning Analytics utilization is positively associated with the quality of decision-making in digital education, particularly in terms of decision rationality, accuracy, and usefulness. This pattern suggests that Learning Analytics functions as an important support mechanism in data-driven decision-making processes. Respondents who reported higher levels of Learning Analytics utilization tended to produce educational decisions that were perceived as more rational and relevant compared to those with lower levels of utilization. These findings reinforce the assumption that educational decisions grounded in empirical learning data exhibit higher quality than decisions relying solely on intuition or subjective experience.

The role of Learning Analytics in enhancing decision-making quality can be explained through the framework of evidence-based decision making in education. Within this framework, learning data serve as a primary source of information for understanding the actual conditions of learning processes, identifying problems, and formulating appropriate responses. Learning Analytics provides objective information regarding student engagement, learning activity patterns, and academic achievement, thereby enabling decision-makers to base their actions on measurable empirical evidence (Kurilovas, 2020; Asfaw et al., 2023). This condition explains why respondents who more intensively utilize Learning Analytics tend to generate more rational decisions.

The descriptive analysis results show that access to learning data is relatively high, while the use of analytical outputs in decision-making remains at a lower level. This finding indicates that Learning Analytics has been utilized primarily as an information source but has not yet been fully integrated into educational decision-making processes. This pattern is consistent with the findings of Kew and Tasir (2021) and Palancı et al. (2024), who argue that in many digital education contexts, Learning Analytics is still mainly used for monitoring and reporting purposes rather than as a primary basis for strategic decision-making.

Nevertheless, the positive relationship identified between the level of Learning Analytics utilization and decision-making quality suggests that when analytical data are genuinely incorporated into decision-making processes, their impact on decision quality becomes substantial. Respondents with higher levels of utilization tend to demonstrate more accurate decisions due to having more comprehensive and systematic information

bases. This finding aligns with studies by Jin et al. (2025) and Wong et al. (2025), which emphasize that educational decisions supported by learning data tend to be more effective and efficient.

Thus, the findings of this study confirm that Learning Analytics plays a strategic role in improving the quality of decision-making in digital education. However, this role is optimally realized only when Learning Analytics is utilized not merely as a reporting tool but as an analytical instrument that is fully integrated into decision-making processes. These findings strengthen the position of Learning Analytics as a key component in the development of data-driven digital education practices.

Analytical Mechanisms and Theoretical Implications in Digital Education

The relationship between Learning Analytics utilization and decision-making quality can be understood through analytical mechanisms that bridge learning data and educational actions. Learning Analytics enables raw learning data to be transformed into meaningful information through processes of data collection, organization, and interpretation. This information then serves as the basis for decision-makers to evaluate learning conditions and determine the most appropriate actions. This mechanism explains why increased utilization of Learning Analytics is aligned with improvements in the quality of decisions made.

From a theoretical perspective, Learning Analytics functions as both a cognitive and organizational mechanism in digital educational decision-making. Cognitively, Learning Analytics assists decision-makers in reducing subjective bias by presenting data-driven information. Organizationally, Learning Analytics supports more systematic and transparent decision-making processes, as decisions can be traced back to the underlying data and analyses (Romero & Ventura, 2020; Nauman et al., 2021). This mechanism explains why decisions supported by Learning Analytics tend to be more rational and accountable.

The findings of this study also indicate that the utilization of Learning Analytics has not been uniformly translated into directly beneficial decisions. Variations in the usefulness dimension of decision-making suggest a gap between the availability of analytical information and the ability to use it optimally. This finding underscores that Learning Analytics does not operate automatically but requires interpretative capacity on the part of decision-makers. Without the ability to interpret and contextualize data, Learning Analytics risks being reduced to a mere reporting system (Daoudi, 2022; Claassen et al., 2025).

The theoretical implication of these findings is the need to view Learning Analytics as an integral part of the digital education decision-making ecosystem rather than as an isolated technical component. The effectiveness of Learning Analytics is highly dependent on its integration with educational management practices, organizational culture, and the data literacy of decision-makers. This finding is consistent with Ngulube and Ncube (2025), who emphasize that the success of Learning Analytics is determined by institutional readiness to strategically utilize data.

Although this study is descriptive in nature and does not aim to draw causal

conclusions, the consistent pattern of association between Learning Analytics utilization and decision-making quality provides an important empirical contribution. These findings indicate that Learning Analytics has substantial potential to enhance the quality of digital education decision-making when utilized systematically and supported by adequate interpretative capacity. Therefore, Learning Analytics should be positioned as a strategic instrument in the development of data-driven and evidence-based digital education.

CONCLUSION

This study concludes that Learning Analytics plays an important role in supporting improvements in decision-making quality within digital education. The descriptive analysis results indicate that higher levels of Learning Analytics utilization are associated with more rational, accurate, and useful educational decisions. These findings confirm that Learning Analytics functions not only as a learning data reporting tool but also as a strategic information resource that strengthens evidence-based decision-making processes.

Theoretically, this study contributes to the development of Learning Analytics research by situating it within the framework of evidence-based decision making in digital education. Learning Analytics is understood as a mechanism that bridges learning data and educational decisions through systematic processes of information interpretation and utilization. Practically, the findings imply that educators and digital education managers need to enhance their interpretative capacity regarding learning data so that Learning Analytics can be optimally leveraged in both operational and strategic decision-making.

As a recommendation, future research may employ inferential approaches or longitudinal designs to examine causal relationships between Learning Analytics utilization and decision-making quality. In addition, exploring institutional factors and user competencies in leveraging Learning Analytics could provide a more comprehensive understanding of how data-driven digital education practices can be optimized

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