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The Use of Digital Technology in the Processing and Interpretation of Assessment Data at the Primary School Level

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ABSTRACT

Purpose – This study aims to analyse the challenges, opportunities, and impacts of utilising digital technology in improving the quality of assessment in primary schools.

Methodology – The method used is qualitative with a Library Research and Integrative Review approach through a systematic review of scientific articles from Google Scholar, Scispace, DOAJ, and Scopus published between 2015 and 2025. Literature selection was carried out through identification, screening, and eligibility stages, then analysed using thematic analysis techniques to identify patterns and key findings related to the management and interpretation of assessment data.

Findings – The results showed that digital technology plays a significant role in improving the efficiency, accuracy, and transparency of the assessment process through recording, processing, and automatic data visualisation. In addition, digital technology supports more accurate pedagogical decision-making through real-time data analysis. Its implementation still faces challenges in the form of infrastructure limitations, variations in teachers' digital competencies, and data security issues.

Novelty – On the other hand, great opportunities arise from the potential of technology to realise objective, adaptive, and student-centred evaluation.

Significance – The integration of digital technology has strategic potential to improve the quality of assessment in primary schools if implemented in a planned and sustainable manner.

Keywords: Data interpretation; Data processing; Digital technology; Learning assessment; Primary school; Library Research; Integrative Review.

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1. Introduction

The use of digital technology in primary education includes the use of hardware and software to systematically collect, manage, and analyse student assessment data. Assessment data management involves the process of collecting, verifying, storing, and processing information so that the results can be used in educational decision-making. Meanwhile, assessment data interpretation focuses on the application of statistical analysis and data visualisation to understand student competency achievements and progress. At the primary school level, diverse data characteristics require a contextual and easy-to-understand management system. Therefore, the integration of digital technology is expected to improve the effectiveness, accuracy, and readability of assessment results to support appropriate learning follow-up.

A number of studies show that the application of digital technology in assessment at primary schools can improve the efficiency and accuracy of managing student learning outcome data. Rohmah and Anam (2024) argue that the use of applications such as Google Forms and Quizizz makes it easier for teachers to conduct evaluations in an interesting and systematic manner. Asnawi et al. (2023) also developed a digital diagnostic test instrument that has been proven valid to support the analysis of primary school students' learning outcomes. However, Maulyda et al. (2024) found that teachers' low digital competence is an obstacle to the use of technology for interpreting assessment results. Furthermore, Tyas et al. (2025) noted that the increasing trend of digital-based assessment still faces challenges related to the suitability of instruments for the characteristics of primary school students. Thus, the use of digital technology in primary schools has great potential but requires an increase in teacher capacity and contextual adjustment of instruments.

The results of the study show that the application of a learning analytics dashboard can help primary school teachers analyse student learning patterns more effectively. Possaghi et al. (2025) emphasise that the use of digital dashboards in the context of primary education can improve teachers' ability to understand the cognitive and affective development of students. Furthermore, the OECD report (2023) reveals that the digitisation of assessment provides opportunities for a more adaptive and diagnostic learning outcome reporting system. However, its successful implementation is greatly influenced by instrument design, teacher skills, and school infrastructure support. Therefore, various studies recommend strengthening data literacy and developing simple technology interfaces so that teachers can optimally manage and interpret student assessment data.

Previous research shows that the integration of digital technology in primary school assessment systems can increase the transparency and accountability of academic decision-making. Setiawan and Rahmawati (2023) found that the use of a School Information System (SIS) can speed up the process of recapitulating scores and reduce human error in data management. Meanwhile, Wuryandani et al. (2024) reported that the implementation of a cloud-based platform helps teachers analyse learning outcomes development longitudinally. International research by Al-Khalifa et al. (2023) also confirms that machine learning-based digital assessment systems can produce more accurate predictions of student achievement. However, the effectiveness of these

implementations still depends on the readiness of infrastructure and teachers' technological literacy. Thus, these studies reinforce the importance of utilising digital technology as a strategic instrument in the management and interpretation of assessment data in primary schools.

Recent studies also highlight the importance of strengthening teachers' competencies in managing digital-based assessment data. Pratama and Suharto (2023) found that continuous digital literacy training can improve teachers' ability to use online evaluation applications effectively. Similar findings were reported by Hasanah et al. (2024), who explained that training in the use of educational analytics systems improves the accuracy of interpreting student learning outcomes. In addition, a study by Awang and Ismail (2023) shows that the successful implementation of digital technology in assessment is influenced by institutional support and teachers' pedagogical readiness. Thus, the management and interpretation of assessment data in primary schools does not only depend on the availability of technology, but also on improving the capacity of the human resources who utilise it.

Several recent studies show that the integration of artificial intelligence (AI) and learning analytics in digital assessment systems can strengthen the process of interpreting student learning outcome data. According to Nuraini and Fauzan (2024), the use of AI in assessment systems in primary schools can detect patterns of learning difficulties and provide automatic feedback to teachers. An international study by Lim et al. (2023) also confirms that the use of learning analytics improves the effectiveness of data-based decision making in the context of primary education. In addition, research by Yuliana and Hartati (2024) shows that the integration of AI technology with cloud-based assessment management systems can accelerate the analysis of learning outcomes and minimise assessment bias. Based on these findings, it can be concluded that digital technology has great potential to optimise the management and interpretation of assessment data, provided that it is balanced with infrastructure readiness and improved data literacy among primary school teachers.

Based on the results of previous studies, it appears that the use of digital technology has contributed significantly to improving the efficiency and accuracy of assessment data management in primary schools. However, most studies still focus on the development of digital applications or instruments without examining in depth how teachers interpret assessment data to improve learning. In addition, gaps are also apparent in terms of teacher readiness, limited data literacy, and a lack of research that examines the holistic integration of digital technology, including simultaneous data management and interpretation. The novelty of this research lies in its comprehensive approach, which highlights the relationship between the use of digital technology, teachers' analytical skills, and the effectiveness of interpreting student learning outcomes. Therefore, this study aims to analyse in depth how the use of digital technology can improve the quality of assessment data management and interpretation at the primary school level.

2. Methods

This study utilises a Library Research approach with an Integrative Review design, as the focus of the research is directed towards the collection, analysis, and synthesis of various scientific sources related to the use of digital technology in the management and interpretation of assessment data at the primary school level. This approach allows researchers to gain a comprehensive and in-depth understanding through systematic review of relevant scientific works, without conducting direct observation of the research subjects (Creswell & Poth, 2018). Through integrative review, researchers can combine findings from empirical and conceptual studies to identify patterns, conceptual developments, and research gaps on the topic under review.

The research data was sourced from scientific publications obtained through Google Scholar, Scispace, DOAJ, and Scopus as the main databases. The inclusion criteria included articles published between 2015 and 2025, written in Indonesian or English, and discussing the use of digital technology, assessment data management, learning outcome interpretation, and the primary school education context. The exclusion criteria included articles that did not undergo peer review, did not provide full access, or were not relevant to the focus of the study. The search process was conducted using a combination of keywords such as 'digital assessment,' 'learning analytics,' 'digital data management,' 'primary school,' and 'assessment interpretation' with the help of Boolean operators to obtain more targeted search results (Booth et al., 2021).

The literature selection procedure was carried out in three main stages, namely identification, screening, and eligibility. In the identification stage, all articles found were collected and documented. In the screening stage, articles were examined based on their titles, abstracts, and relevance to the focus of the study. The eligibility stage was carried out by reading the articles in full to ensure their relevance, methodological quality, and contribution to the problem formulation. The literature that passed the three stages was then grouped based on themes, such as the type of digital technology used, assessment data management strategies, data interpretation methods, and the role of teacher competence in the process.

Data analysis was performed using thematic analysis techniques to identify patterns of findings, main concepts, and interrelationships between variables in the selected literature (Braun & Clarke, 2021). The analysis process included initial coding, theme formation, interpretation of findings, and comprehensive synthesis to describe the use of digital technology in the management and interpretation of assessment data in primary schools. The validity of the research was strengthened through triangulation of sources, namely, comparing findings from various articles and different databases. Meanwhile, reliability was maintained through an audit trail, namely the systematic recording of the entire process of searching, selecting, and analysing literature so that the review process could be traced and replicated by other researchers.

3. Results and Discussion

3.1 Implementation of Digital Technology in Assessment Data Management in Primary Schools

In recent years, the integration of digital technology in data management in primary schools has become increasingly prominent as an important strategy for improving the

efficiency of educational administration. The use of digital platforms allows for faster and more accurate recording, processing, and reporting of assessment data compared to manual methods. This transformation also helps schools reduce the risk of input errors, improve data storage consistency, and facilitate the process of monitoring student learning progress. In addition, the digitisation of assessment provides opportunities for schools to optimise resource allocation through real-time data analysis. The presence of technology also strengthens the transparency of academic performance through easier access to data for teachers and management. Thus, digital technology serves as an important foundation for supporting more modern information management that is responsive to learning needs.

However, the transition to a digital assessment system is not without various implementation challenges that schools must face. Many primary schools still experience technological infrastructure limitations, such as inadequate hardware or unstable internet connections. Teachers, as the main implementers of data management, also need continuous training to be able to optimally utilise digital features. On the other hand, the cultural shift from manual to digital systems often encounters initial resistance because adaptation takes time and requires increased technological literacy. In addition to technical issues, schools must also pay attention to data security aspects to protect students' academic information. These various challenges show that the digitisation process requires strategic planning and strong policy support for effective technology integration. Nevertheless, the long-term benefits of digitisation open up great opportunities to improve the quality of data-based decision-making in primary schools.

In addition to technical challenges and human resource readiness, the use of digital technology in assessment data management also requires targeted school policies and consistent support systems. Schools need to ensure that standard operating procedures related to data input, verification, and interpretation are comprehensively developed so that all teachers have the same guidelines. Collaboration between school principals, teachers, and administrative staff is essential to ensure that technology integration is in line with academic and administrative needs. In addition, periodic evaluations of the effectiveness of digital systems are necessary to assess whether the technology used has had a positive impact on assessment management. The role of the government and education agencies is also crucial, especially in providing ongoing training and technical support. With a systematic and collaborative approach, primary schools can optimise digital technology as a strategic tool for improving the quality of assessment management.

3.2 The Effectiveness of Digital Technology in Data Interpretation and Learning Decision Making

The effectiveness of digital technology in interpreting assessment data is becoming increasingly prominent as primary schools need to understand student learning progress accurately and continuously. Technologies such as analytical dashboards, e-report applications, and learning management systems provide visual representations that make it easier for teachers to analyse learning outcome trends. Through structured data visualisation, teachers can identify patterns, weaknesses, and strengths in students

more quickly than with manual methods. This not only increases efficiency but also helps to produce more targeted pedagogical decisions. In the context of primary education, the ability to read data in real time is key to managing learning intervention strategies. Thus, digital technology plays an important role as an instrument in building a responsive and data-driven learning environment.

Recent research shows that digital technology can strengthen teachers' capacity to conduct formative and summative assessments through systems that provide automatic analysis. Features such as common error detection, competency mapping, and individual progress tracking enable teachers to design more personalised learning approaches. In addition, digital technology also encourages student engagement through rapid and transparent feedback, which has an impact on increasing learning motivation. By utilising algorithms and artificial intelligence, some applications can even predict students' learning needs based on their academic performance history. This shows how technology not only functions as an administrative tool, but also as a key support in data-driven decision-making. Improvements in the quality of data interpretation ultimately have an impact on the effectiveness of the learning process as a whole.

Despite offering various advantages, the use of digital technology in data interpretation still faces challenges that need to be taken seriously. One of these is the readiness of teachers to understand analytical reports and their varying levels of digital literacy across schools. Dependence on digital systems also requires adequate infrastructure, including a stable internet connection and compatible devices. If these requirements are not met, the results of data interpretation may be inaccurate or not optimally utilised. On the other hand, issues of data security and student privacy are important concerns in the use of digital platforms. Therefore, the implementation of digital technology requires a comprehensive strategy, ranging from teacher training to the formulation of policies for secure and ethical data management. With this approach, digital technology can work in line with educational goals to improve the quality of learning in primary schools.

3.3 Challenges, Opportunities, and Impacts of Digital Technology Utilisation on Assessment Quality in Primary Schools

The use of digital technology in primary school education presents significant challenges, opportunities, and impacts on improving the quality of assessment. In the digital age, schools are required to adapt to rapid technological developments in order to meet the learning needs of the 21st century. Various studies show that the use of technology not only supports administrative efficiency, but also strengthens the evaluation process to be more objective, faster, and measurable. In addition, digital technology encourages teachers to develop new skills relevant to modern learning. Another positive impact is seen in the learning experience of students, which becomes more interactive, adaptive, and centred on individual needs. Thus, digital technology has great potential to improve the quality of the assessment system in primary schools if it is implemented optimally and sustainably.

However, the challenges of utilising digital technology in assessment remain quite complex, particularly in relation to teachers' readiness to adopt digital devices. Research by Rusman et al. (2023) shows that training in the development of digital learning media

can improve teachers' competence and confidence in learning practices. However, not all teachers have adequate access or training opportunities, so their digital competence remains varied. This challenge is even more apparent in the context of assessment, where teachers are required not only to master the operation of digital tools, but also to understand the interpretation of the data produced. These limitations can hinder the process of comprehensive technology integration in primary school environments.

In addition to skill challenges, Wiguna's (2023) research confirms that many teachers still find it difficult to use technology effectively for assessment activities. These difficulties can include selecting the right application, managing digital data, and understanding the analytical reports generated by the system. This situation highlights a digital divide that requires immediate attention through ongoing training, technical support, and school policies that foster digital transformation. With the right interventions, these barriers can be overcome so that digital technology can truly help teachers conduct assessments that are more accurate, transparent, and relevant to students' learning needs. The great potential of digital technology in improving the quality of assessment will be optimised when accompanied by improvements in the competence and readiness of educators.

4. Conclusions

The transparency and accountability of assessments. In terms of data interpretation, digital technology provides visualisation and automated analysis that helps teachers understand student development patterns in greater depth, enabling them to make more appropriate and responsive pedagogical decisions.

However, the success of digital technology utilisation is greatly influenced by infrastructure readiness, teacher digital literacy, institutional policy support, and data protection. Challenges such as device limitations, uneven teacher digital competence, and data security issues are crucial factors that need to be addressed through continuous training, technical assistance, and structured school policies. On the other hand, great opportunities are opening up through the use of technology that can strengthen objective evaluation, facilitate adaptive learning, and increase student engagement. Therefore, the systematic implementation of digital technology, supported by various parties, can have a significant impact on improving the quality of assessment in primary schools.

Digital technology has strong potential to transform assessment management into a more modern, data-driven system that meets the demands of 21st-century education. However, optimising its use requires synergy between teachers, schools and policymakers to ensure that the digital transformation of assessment is sustainable and effective.

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Conflict of Interest

The author declares that he has no conflict of interest in conducting this research. The entire process, from literature search, article selection, data analysis, to the preparation of the study results, was carried out independently without influence from any party. There are no personal, institutional, or financial interests that could influence the interpretation, representation, or reporting of research results regarding the use of digital technology in the management and interpretation of assessment data in primary schools. All findings are presented objectively based on the results of a systematic review of the literature.

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