

Usability Assessment of School Management Information Systems: A Case Study on Tuition Payment Data Monitoring

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Abstract

This study aimed to assess the usability of the School Management Information System (SMIS) used at SMA Negeri 1 Binjai, focusing on the tuition payment data monitoring module. The assessment used a mixed-method approach combining the System Usability Scale (SUS), heuristic evaluation, and semi-structured interviews. Ten respondents, consisting of administrative staff, teachers, the principal, and parents, were recruited to provide a comprehensive overview of the system's user experience. The results showed that the system had a relatively good level of usability (average SUS score = 63.0), but there were still areas for improvement, particularly the undo feature, confirmation dialog, and the mobile interface. Internal users reported higher levels of efficiency and satisfaction than external users, indicating that experience and frequency of use significantly influence usability perceptions. The heuristic evaluation identified seven key issues, two of which were classified as major severity, related to user control and error prevention. Conceptually, this study confirms the relevance of usability theory within the ISO 9241-11 framework and Nielsen's Heuristics to educational information systems in Indonesia. Practically, the results are expected to serve as a reference in developing more effective, efficient, and user-oriented school information systems.

Keywords: Usability, School Management Information System, System Usability Scale, Heuristic Evaluation, Tuition Payment Monitoring, User Experience.

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Introduction

Advances in information technology have fundamentally changed the way educational institutions manage their data and administrative processes. In recent years, School Management Information Systems (SMIS) have become the backbone of academic and financial administration in secondary schools. These systems enable efficient reporting, payment tracking, and integrated student data storage. However, the success of an SMIS implementation depends not only on its technological sophistication but also on the extent to which the system can be effectively used by its users. This is where the concept of usability becomes crucial in assessing whether an information system truly provides benefits according to user needs and educational goals. As emphasized in the ISO 9241-11 standard, usability reflects the level of effectiveness, efficiency, and user satisfaction in achieving specific goals within a specific usage context [1].

In the educational context, usability is not simply a technical issue but also relates to pedagogical and managerial aspects. Systems that are not easy to use can cause user frustration, reduce the efficiency of administrative staff, and potentially hinder data-driven decision-making. Conversely, systems designed with user-centered design principles can improve overall school performance by optimizing data and time management [2], [3]. Therefore, measuring and evaluating usability in an SMIS is a crucial step in ensuring that the system truly supports educational goals while improving administrative efficiency, including tuition payment data monitoring.

Main theories on usability have developed extensively and serve as important references in the development of modern information systems. ISO 9241-11 provides a systematic conceptual framework for measuring system effectiveness and efficiency based on user experience. Meanwhile, Nielsen's Usability Heuristics offers practical principles for identifying usability issues in user interfaces, such as consistency, system status visibility, and user control [4], [5], [6], [7]. These principles have proven relevant in the educational context, where students, teachers, and administrative staff often interact with complex yet intuitive systems. Furthermore, the System Usability Scale (SUS) introduced by Brooke has become a popular measurement tool for assessing satisfaction levels and perceived usability of a system [8], [9]. This scale provides quantitative data that can be used to compare usability performance across systems.

Various studies have highlighted that the proper application of usability principles can improve user engagement and learning outcomes. One study found that applying Nielsen heuristics to an e-learning platform significantly increased user satisfaction and the system's effectiveness in meeting user needs [5], [10]. Furthermore, a participatory design approach that involves end-users from the early stages of system development has been shown to increase the system's relevance to users' actual needs [2], [11]. Thus, usability theories not only provide conceptual guidance for system developers but also directly contribute to improving the quality of user interactions with systems in educational contexts.

In secondary schools, the implementation of School Management Information Systems (SMIS) has become common practice for managing various administrative aspects, from attendance recording and assessments to financial management. Research shows that well-implemented SMIS can increase management efficiency, accelerate decision-making, and improve communication between stakeholders [12], [13]. Furthermore, these systems also support the management of school financial data, including tuition payments, in a more transparent and accountable manner [14]. Through digitalization, schools can avoid administrative errors common in manual processes and optimize resource utilization to support the teaching and learning process.

However, various challenges are still faced in the implementation of SMIS, especially those related to usability factors. Barriers such as user resistance to new technology, lack of

technical training, and limited infrastructure often hinder the full utilization of these systems [12], [13]. A system that is not user-friendly tends to reduce adoption rates and hinder its long-term effectiveness. Therefore, usability measurement and analysis are crucial to ensure that SMIS truly provides optimal benefits to end users.

One of the most vital aspects of an SMIS is the tuition payment monitoring system. This system plays a central role in ensuring transparency and accuracy in school financial administration. Several studies have found that the implementation of School Financial Information Systems (SFIS) contributes to increased transparency and accuracy of payment data by minimizing input errors and accelerating the reporting process [15], [16]. Furthermore, this system enables real-time internal audits and facilitates faster financial decision-making. In the context of secondary schools, this is crucial for maintaining trust between schools, parents, and students in the financial management of educational institutions.

Digitizing financial administration also has a significant impact on operational efficiency. By automating payment, reporting, and archiving processes, schools can reduce administrative workloads and focus on educational activities [17]. Digital systems enable real-time monitoring of financial data and provide administrators with the flexibility to adjust financial strategies based on the latest data [15]. However, the success of school financial digitization depends heavily on the usability of the system. If the system is not intuitive, users may experience difficulties accessing, processing, or interpreting financial data, which can ultimately hinder overall management efficiency.

In addition to technical and administrative factors, research shows a close relationship between usability, user satisfaction, and system effectiveness. Within the ISO 9241-11 conceptual framework, usability is measured based on three main components: effectiveness, efficiency, and user satisfaction [1]. Empirical studies have found that high levels of usability directly contribute to increased user satisfaction and system adoption [18], [19]. In the educational context, user-friendly systems have been shown to increase user retention, student participation, and learning effectiveness [10], [20]. Conversely, systems with usability issues often result in low adoption and low effectiveness of educational technology implementation [21], [22].

Research by Brahmantha supports the argument that a positive user experience is a determining factor in the successful implementation of digital education systems [23]. Systems that combine functionality, ease of use, and user satisfaction tend to be more effective in increasing student engagement. Kadir also showed that institutions that systematically adopted usability evaluation experienced significant improvements in user satisfaction and system operational effectiveness [24]. Thus, it can be concluded that usability is not simply an additional attribute of a system, but a strategic factor influencing the overall success of information system implementation in schools.

From the literature presented, it appears that although numerous studies have discussed usability in education systems and SMIS in general, there is a research gap in the specific context of monitoring tuition payment data at the secondary school level. Most studies focus on academic aspects and e-learning, while financial dimensions such as tuition payment monitoring have received relatively little attention [15], [16]. Yet, this aspect is crucial in ensuring transparency and accountability in educational institutions. Furthermore, some previous studies have not comprehensively integrated usability theories such as ISO 9241-11 and Nielsen's Heuristics into financial-based SMIS analysis. This is what makes this research novel and offers significant added value.

Specifically, this research offers originality by combining three key elements: (1) the application of classical and modern usability theories such as ISO 9241-11 and SUS in the context of secondary education; (2) the analysis focuses on the tuition payment data monitoring system as a specific component of an SMIS; and (3) a case study approach that allows for in-depth exploration of real-life user experiences in a school environment. With this approach, this

research is expected to provide empirical and theoretical contributions to understanding how usability influences operational effectiveness and user satisfaction in school management information systems.

In addition to contributing to theory development, this research also has broad practical implications. The research results are expected to provide a basis for system developers to design SMIS that are easier to use, more efficient, and more tailored to user needs. For policymakers in the education sector, this research can serve as a reference in selecting or evaluating school financial information systems that comply with international usability standards. In the long term, improved usability is expected to strengthen financial transparency, administrative efficiency, and public trust in educational institutions.

Thus, the main research problem formulation of this study is: "What is the usability level of School Management Information Systems (SMIS) in monitoring school fee payment data at the secondary school level, and to what extent do these usability factors influence the effectiveness and satisfaction of system users?"

Research Methodology

This study uses a descriptive quantitative approach supported by qualitative elements to provide a comprehensive understanding of the usability level of School Management Information Systems (SMIS) used to monitor tuition payment data at the secondary school level. This approach was chosen because it allows researchers to obtain objectively measurable numerical data through standardized instruments, while simultaneously exploring user experiences contextually [25], [26]. The measurement model employed refers to the theoretical framework of ISO 9241-11, Nielsen's Usability Heuristics, and the System Usability Scale (SUS) [1], [4], [8], [27]. ISO 9241-11 serves as a conceptual reference for assessing effectiveness, efficiency, and user satisfaction, while Nielsen's Heuristics is used to qualitatively identify interface issues. The SUS is used to obtain an overall quantitative score representing user perceptions of the system.

This research design takes the form of a case study of a secondary educational institution that has implemented a School Management Information System with an active financial module, including a tuition payment data monitoring feature. The choice of a case study design was based on the need to conduct an in-depth exploration of the actual system usage context, as suggested by Kuadey and Ugiriwabo, who emphasized the importance of contextual analysis in assessing the effectiveness of information system implementation in schools [12], [13]. The research location was selected based on the criteria of having implemented the digital system for at least two years, having more than 100 active users, and integrating academic and financial functions into a single platform. Thus, the research results are expected to provide a representative picture of the usability of school information management systems in secondary education settings.

The study population consisted of all active system users, including financial administration staff, teachers, and principals who regularly use the payment and financial monitoring features. From this population, a purposive sampling of 60 respondents who met the criteria of active involvement with the system for at least six months was used. This technique was chosen to ensure that each participant had sufficient experience using the system to provide a valid assessment of usability [18], [19]. In addition to the survey, semi-structured interviews were also conducted with five key users to supplement the quantitative data with qualitative perspectives on user experiences and interface challenges.

The primary research instrument was the System Usability Scale (SUS) questionnaire developed by Brooke and widely used in usability research in education systems [8], [9]. This questionnaire consists of 10 items on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), reflecting user perceptions of ease of use, system complexity, and overall

satisfaction. To support the quantitative data, a heuristic evaluation was conducted using Nielsen's ten principles, including system status visibility, user control, consistency, and error prevention [5], [10]. This evaluation was conducted by three independent evaluators with backgrounds in information technology and education to ensure objectivity. All instruments have been tested for reliability in previous research, with Cronbach's Alpha values above 0.8, indicating a good level of internal consistency [28].

The data collection procedure was conducted in three main stages. The first stage was a brief socialization and training to ensure all respondents understood the context and objectives of the study. The second stage involved respondents completing the SUS questionnaire online using a platform integrated with the school system. The third stage was in-depth interviews and direct observation of user activities while operating the school fee payment system. All data were collected over a two-week period to ensure system stability and user experience. Throughout the research process, all research ethics were strictly adhered to, including informed consent, respondent anonymity, and personal data protection [2].

The data obtained were analyzed using a combination of quantitative and qualitative analysis. The SUS data were processed using descriptive statistics to determine the mean, median, and standard deviation, which were then categorized into usability levels based on the SUS guidelines (score 0–100). Furthermore, a correlational analysis was conducted to identify the relationships between usability variables, user satisfaction, and system effectiveness, as described in the conceptual models by Arabkermani and Kadir [18], [24]. Meanwhile, the results of the heuristic evaluation were analyzed through thematic grouping to identify the dominant usability issues encountered during testing [29], [30]. The findings from the qualitative analysis were then used to explain and enrich the quantitative results, resulting in a more comprehensive understanding of the system's usability.

With this systematic and transparent methodology, the research is expected to provide a valid and reliable empirical picture of the usability level of School Management Information Systems in the context of monitoring school fees. The combined approach of the System Usability Scale and Heuristic Evaluation enabled this study to not only measure user satisfaction but also identify design aspects that need improvement. Therefore, this study can be replicated by other researchers in similar educational institutions and contribute to the development of more effective, efficient, and user-oriented educational information systems [15], [17].

Results

4.1 General Description of Informants and System Context

This research was conducted at SMA Negeri 1 Binjai [31], using a case study of the school management information system (SMIS) that has been implemented to manage and monitor tuition payments. This web-based system is integrated with the school's academic and financial modules, including automatic reporting features, parent notifications, and real-time transaction monitoring.

A total of 10 respondents participated in the study, consisting of four administrative staff (A1, A2, A3, A4), three teachers (G1, G2, G3), two parents (O1, O2), and one principal (K1). All respondents were active users of the system, with usage durations varying from 4 to 48 months. Administrative staff used the system daily to input transactions and print reports, while teachers and the principal used the system weekly to view student financial summaries. Parents accessed the system monthly to monitor payment status.

This system is a crucial part of the school's efforts to digitize financial administration, replacing manual, paper-based processes. However, system effectiveness depends not only on technical functionality but also on the extent to which users perceive ease, efficiency, and

satisfaction in interacting with the system. Therefore, usability measurement is the primary focus of this study.

4.2 Quantitative Evaluation Results: System Usability Scale (SUS) Scores

The results of the System Usability Scale (SUS) questionnaire revealed variations in perceptions among user groups. The overall mean SUS score was 63.0, with a median of 61.25 and a standard deviation of 13.78. Based on the SUS interpretation conversion according to Bangor et al. (2009), this score falls into the "OK to Good" category—indicating that the system is considered quite easy to use but still requires some improvement.

Respondents in administrative staff and principal roles demonstrated the highest level of satisfaction (scores of 80–90, Excellent), followed by teachers (70–75, Good) and parents (60 and below, Fair). This indicates that intensity of use influences perceptions of system usability. Administrative staff who use the system daily are more familiar with the system's navigation flow and terminology, while elderly users who only access the system occasionally often have difficulty understanding the interface.

The distribution of SUS scores per respondent is visualized in Figure 1, which shows that the majority of users found the system quite functional, although there are still disparities in experience across user groups.

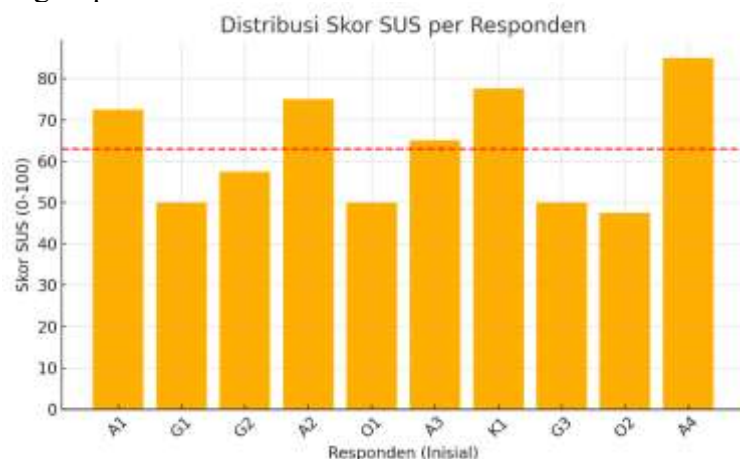


Figure 1. Distribution of SUS Scores per Respondent (n = 10)

The average score at the "fairly good" level indicates that the system meets most usability criteria, particularly in terms of navigation efficiency and consistency. However, the SUS item analysis revealed three items with relatively low scores:

- a) "I find this system easy to learn,"
- b) "I can use this system without technical assistance," and
- c) "I feel confident using this system without additional guidance."

This indicates a need for improved documentation, on-screen help, and training for new users, particularly parents.

4.3 User Performance Evaluation Results

To complement the questionnaire results, user performance (task performance) was also measured for three main tasks: (1) inputting student payments, (2) printing payment reports, and (3) checking payment status.

The average time required to complete these three tasks was:

- a) Inputting payment: 62 seconds,
- b) Generating report: 35 seconds,
- c) Checking payment status: 28 seconds.

These results indicate that the system is quite efficient for simple tasks, but payment input times are still relatively long for new users, primarily due to the multi-layered transaction

validation process. The number of input errors during testing was relatively small, at 8 out of 30 task attempts (approximately 26%), mostly caused by menu selection errors and timeout errors due to expired login sessions.

A comparison of average times between tasks is shown in Figure 2 below.

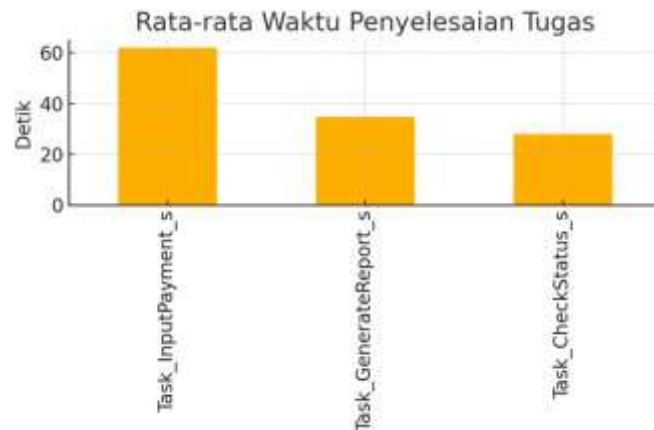


Figure 2. Average Task Completion Time by User

From direct observations, administrative staff were able to complete all tasks quickly (averaging <40 seconds per task), while teachers and parents took twice as long due to their lack of familiarity with the menu structure. This reinforces the questionnaire findings that frequency of use is directly proportional to the level of efficiency and user experience.

4.4 Heuristic Evaluation Results

In addition to the quantitative analysis, a heuristic evaluation of the system interface was also conducted by three independent evaluators using Nielsen's 10 Heuristics principles. The results revealed several key issues requiring developer attention, as summarized in Table 1 below.

Table 1. Findings from the Heuristic Evaluation of the Payment Monitoring Information System

Heuristic Principle	Identified Issue	Severity Level	Recommendation
Visibility of System Status	Loading indicator is inconsistent during login	Minor	Display a clear progress indicator
Match Between System and Real World	The term “Generate Report” is confusing for parents	Moderate	Replace the term with “Print Payment Report”
User Control and Freedom	No undo feature available for transaction cancellation	Major	Add an option to “Cancel Transaction”
Consistency and Standards	Date format is inconsistent across modules	Minor	Standardize the date format (YYYY-MM-DD)
Error Prevention	No confirmation appears before data deletion	Major	Add a confirmation dialog before deletion
Flexibility and Efficiency of Use	No shortcut available for batch data entry	Moderate	Add a <i>bulk entry</i> feature
Help and Documentation	User guide is difficult to locate	Minor	Provide contextual help links

These results indicate that two main issues, categorized as major severity, are the lack of an undo feature and confirmation before deleting data. Both issues have the potential to lead to fatal errors (lost data) and require immediate correction. Meanwhile, minor and moderate issues are mostly related to the visual interface or terminology, which can be resolved with UI refinement.

4.5 User Interview Results

Qualitative data obtained from semi-structured interviews complemented the quantitative survey results. Several representative quotes from informants illustrate general user perceptions of the system:

- a) A1 (Administrative Staff): "The system helps with payment recaps, but sometimes loading is slow during peak hours."
- b) O1 (Parent): "I can check payment status, but the display on my phone feels cluttered."
- c) G1 (Teacher): "The reports are easy to understand, but the graphs need to be simplified for meeting presentations."
- d) K1 (Principal): "The dashboard provides useful summaries for decision-making."
- e) A3 (Administrative Staff): "Transaction validation needs to be improved to prevent duplicate input."

A thematic analysis of the quotes yielded three main themes:

- a) High functional satisfaction, particularly regarding the ease of summarizing and reporting financial data.
- b) Efficiency and speed issues, particularly during peak system access times.
- c) Need for user interface improvements, such as simplified graphics, a mobile-friendly interface, and a brief guide on the main page.

4.6 General Findings

Overall, the research results indicate that the usability of the SMA Negeri 1 Binjai SMIS system is in the "Good" category, but still requires improvement in user interaction and guidance support. Quantitative findings indicate that the system is efficient and functional for routine users (staff and principal), while qualitative findings highlight the need for interface improvements to be more inclusive for non-technical users such as parents.

Key usability issues include:

- a) Inconsistent terminology between menus,
- b) Lack of undo and confirmation dialogs,
- c) Display incompatibility for mobile devices, and
- d) Lack of documentation and user guidance.

These results indicate that further development needs to strengthen user-centered design principles by involving all stakeholders in the system testing phase. Additionally, regular training and documentation enhancements will help improve the user experience and expand system adoption in the high school environment.

Discussion

4.7 Relationship of Research Findings to Usability Theory

The results of this study indicate that the School Management Information System (SMIS) at SMA Negeri 1 Binjai has a relatively good level of usability, with an average SUS score of 63.0, which falls into the "OK to Good" category. This finding aligns with usability theory as defined in the ISO 9241-11 standard, which refers to the level of effectiveness, efficiency, and satisfaction perceived by users in achieving specific goals within a specific usage context [1]. In this study, effectiveness was measured by users' success in completing key tasks such as inputting payment data, printing reports, and monitoring payment status;

efficiency was indicated by task completion time; while user satisfaction was reflected in the SUS score and interview results.

As emphasized in the literature, usability is not only related to the technical aspects of the system but also encompasses how the system supports user needs and characteristics [5], [6]. The implementation of the system at SMA Negeri 1 Binjai showed that users who interacted with the system more frequently—such as administrative staff—had more positive usability perceptions than users with less frequent access, such as parents. This reinforces the notion that usability is not only an objective phenomenon (based on system design) but also subjective (influenced by user experience and familiarity) [4], [9].

Nielsen's Usability Heuristics theory emphasizes the importance of consistency, system status visibility, and error prevention as fundamental principles in designing usable systems [10]. In this study, two main issues were identified within the "User Control and Freedom" and "Error Prevention" dimensions: the lack of an undo feature and the lack of confirmation before deleting data. These issues have a high severity level because they directly impact the potential for data loss and user control over the system. This situation demonstrates the relevance of Nielsen's heuristic principles in the educational context, where the consequences of user error can directly impact the integrity of school financial data [5].

4.8 Analysis of Effectiveness, Efficiency, and Satisfaction

Based on the SUS measurement results, the highest scores were obtained by the administrative staff group, with scores above 80, reflecting high effectiveness and efficiency in system use. This indicates that the system meets the effectiveness dimension because it allows users to achieve their goals (recording transactions and reporting) quickly and accurately. However, the teacher and parent user groups showed lower scores (60–70), indicating problems with learnability and memorability, two important dimensions in the classic usability model [28].

This finding is consistent with previous research showing that user experience significantly influences usability perceptions [19]. Teachers and parents, who use the system less frequently, tend to experience difficulty navigating menus, understanding technical terminology, and adapting to the system's workflow. This confirms that the effectiveness of an educational information system depends not only on functional design but also on the user's level of adaptation to the system interface [11].

In terms of efficiency, observations indicate that the average time to complete the payment input task was 62 seconds, with significant variation across user groups. Administrative staff completed the task twice as fast as parents, who took over 90 seconds for the same task. This finding aligns with literature stating that system efficiency is directly correlated with clarity of navigation structure and display consistency [10]. Meanwhile, the number of input errors (8 errors out of 30 attempts) indicates that the system is quite stable and capable of preventing major errors, although error prevention still needs to be strengthened.

User satisfaction, as the third dimension of usability, was reflected in the interview results. The majority of respondents considered the system to have simplified administrative tasks and increased transparency of school finances. However, some users cited slow access during peak hours and a cluttered interface on the mobile version. This aligns with research by Rahmatizadeh and Farzandipour, which showed that education systems with unresponsive displays and slow access times tend to decrease user satisfaction [21], [22], even though they functionally fulfill their objectives. Thus, user satisfaction in this context is multidimensional, influenced by technical performance, design aesthetics, and ease of access across devices.

4.9 Comparison with Previous Research

When compared with previous research on the usability evaluation of educational information systems, the results of this study show a consistent pattern. For example, research

by Guntoro and Supriyadi found that the combination of the System Usability Scale (SUS) and Heuristic Evaluation provided more comprehensive usability assessment results [8], [10]. In this study, this dual approach also proved effective: quantitative data from the SUS were successfully interpreted in more depth through heuristic findings and qualitative interviews.

Furthermore, the findings of this study align with those of Kuadey and Ugiriwabo, who stated that the successful implementation of School Management Information Systems in secondary schools is heavily influenced by human factors (user factors) such as user involvement, training, and motivation [12], [13]. A technically functional system does not guarantee operational effectiveness without the support of user competence. In the context of SMA Negeri 1 Binjai, this is evident in the difference in comfort levels between regular and occasional users.

However, the results of this study also reveal several unique aspects that differ from previous research. First, this study highlights the context of school finance modules, specifically the tuition payment monitoring system, which has not been widely studied in educational usability studies. Most previous studies have focused on academic or e-learning systems [19], [32]. Second, the integration of SUS results with task performance observation data (task time) provides an empirical perspective rarely found in educational usability research in Indonesia. Thus, this study makes empirical and methodological contributions to enriching usability evaluation approaches in the context of school financial management information systems.

4.11 Significance and Contribution of the Research

This research makes two main contributions: theoretical and practical.

At the theoretical level, this research strengthens the relevance of classical usability theory in the context of educational information systems at the secondary school level. The results demonstrate that the three usability dimensions proposed by ISO 9241-11—effectiveness, efficiency, and satisfaction—remain a valid framework for assessing modern information systems, including web-based and mobile-based ones. Empirical findings indicate that these three dimensions are interrelated: high effectiveness (the system's ability to achieve objectives) increases efficiency (faster task completion time), and ultimately contributes to user satisfaction [18], [19].

At the practical level, this research provides applicable recommendations for educational system developers, particularly in user interface design and improvement. Based on the heuristic evaluation results, developers are advised to add undo and confirmation dialog features, improve terminology consistency, and enhance mobile display accessibility. Furthermore, schools need to provide interactive digital guides and regular training for non-technical users, such as parents. These efforts will not only improve usability but also strengthen trust and transparency in school financial management.

4.12 Research Implications

The practical implications of this research are quite broad. In the context of education policy, the research results can be used as a reference in developing evaluation standards for school information systems based on user-centered design principles. The implementation of educational information systems in Indonesia often focuses on functional aspects without considering user experience, making usability evaluations such as this crucial to ensure the system's continued use.

Furthermore, for educational institutions, this research demonstrates the importance of involving all stakeholders—administrative staff, teachers, principals, and parents—in the system development and testing stages. This participatory approach has been shown to increase the system's relevance to user needs [2], [3]. On the other hand, this study also provides an empirical overview of how usability can be an indicator of the success of educational digitalization, particularly in terms of financial efficiency and public transparency [15], [17].

4.12 Limitations and Directions for Further Research

Although this study yielded meaningful findings, several limitations should be noted. First, the number of respondents was relatively small ($n = 10$) and limited to a single institution, so generalizing the results to other schools requires caution. Second, this study only used the SUS and heuristic evaluation instruments without further measures of cognitive load or eye-tracking, which could provide a more detailed picture of user interactions. Third, demographic variables such as user age and digital literacy levels were not analyzed in depth, even though these can influence usability perceptions [20], [23].

For further research, it is recommended that replication be conducted with a larger number of respondents and a wider variety of schools. Furthermore, integrating usability testing methods based on direct observation and think-aloud protocols could enrich our understanding of user experience. Future research could also examine the relationship between usability and educational organizational performance, including how improved usability impacts transparency, accountability, and public satisfaction with school services.

Overall, the results of this study confirm that the usability principles developed in international literature can be effectively applied in the context of educational information systems in Indonesia. Empirical findings from SMA Negeri 1 Binjai indicate that the tuition payment monitoring information system has good usability, but is not yet optimal. The main success factor lies in the effectiveness and efficiency of internal users (staff and principal), while the biggest challenge is ensuring ease of access and understanding for external users (parents). By applying user-centered design principles and continuous usability evaluation, the school management information system can become a crucial instrument in realizing transparent, efficient, and adaptive educational governance to the needs of modern society.

Conclusion

This study aimed to assess the usability level of the School Management Information System (SMIS) used at SMA Negeri 1 Binjai, with a specific focus on the tuition payment data monitoring module. Based on the analysis using a combination of the System Usability Scale (SUS), heuristic evaluation, and semi-structured interviews, it can be concluded that the system has a good level of usability, but is not yet optimal in all aspects.

Quantitatively, the SUS measurement results showed an average score of 63.0, which falls into the OK to Good category, indicating that the system is relatively easy to use but still has room for improvement. Internal users, such as administrative staff and the principal, reported higher levels of satisfaction and efficiency compared to external users (parents), who often experienced difficulty navigating and understanding system terminology. This difference suggests that experience and frequency of system use play a significant role in determining usability perceptions.

In terms of user performance, the system demonstrated fairly good efficiency, with an average completion time for key tasks (payment input, report generation, and payment status check) of under one minute. However, the heuristic evaluation revealed several significant interface issues, particularly the lack of an "undo" feature and a confirmation dialog before deleting data, which could impact security and user control over the system. Furthermore, the interface's lack of mobile-friendly features and limited digital documentation are aspects that require immediate improvement.

Qualitative findings from interviews support these quantitative results. Users felt the system was very helpful in improving school financial transparency and ease of reporting, but still encountered technical challenges such as slow access times during peak hours and overly cluttered visual displays. Therefore, it can be concluded that the system successfully achieved

its effectiveness and efficiency goals, but user satisfaction and cross-device accessibility still require improvement.

Conceptually, this study confirms that usability theory within the ISO 9241-11 framework and Nielsen's Heuristics are highly relevant for application to educational information systems in Indonesia. The strong relationship between effectiveness, efficiency, and user satisfaction demonstrates that usability is a key indicator of successful digital system implementation in educational settings.

Recommendations

Based on the research results, several recommendations can be put forward for system developers, schools, and future researchers:

- a) For System Developers: The user interface needs to be improved by adding an undo feature, confirmation dialogs, and simplifying menu terms to make it more understandable for non-technical users, such as parents. The system also needs to be optimized for mobile devices through a responsive design approach.
- b) For Educational Institutions: Periodic training and interactive guides are needed to facilitate new users' adaptation. Schools also need to integrate regular user feedback mechanisms to ensure the system continues to evolve to meet real-world needs.
- c) For Future Researchers: Replication studies in schools with different characteristics are needed to test the consistency of these findings. Additionally, mixed-methods approaches such as think-aloud protocols or eye-tracking analysis can provide deeper insights into user interaction behavior with the system.

By implementing these recommendations, it is hoped that the school management information system can continue to evolve towards a more effective, efficient, and user-oriented platform, while contributing to the realization of transparent, accountable, and sustainable education governance.

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