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Quality Analysis of the Cyberlearning Application at SMAN 1 Air Saleh Using the McCall Method

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Abstract

This study aims to measure the software quality of the Cyberlearning Application at SMAN 1 Air Saleh. Following a comprehensive literature review, data were collected through questionnaires developed based on the McCall Method as a software quality assessment framework. The completed questionnaires were tested for validity and reliability to ensure that the variables and indicators were both valid and reliable. The respondents consisted of 82 students, comprising 18 students from Grade X, 15 students from Grade XI Science, 15 students from Grade XI Social Science, 19 students from Grade XII Science, and 15 students from Grade XII Social Science. The respondent profile included 41 male and 41 female students, with an age distribution of 16 respondents aged 15 years, 16 respondents aged 16 years, 31 respondents aged 17 years, 17 respondents aged 18 years, and 2 respondents aged 19 years. The validated variables and indicators were subsequently used to calculate the quality value (Fa) for each factor through a weighting process conducted by experts using a scale ranging from 0.1 to 0.5 for the factors of Correctness, Reliability, Efficiency, Integrity, and Usability. The McCall Method calculation results indicate that the Cyberlearning Application achieved quality scores of 63% for Correctness, 60.40% for Reliability, 78.20% for Efficiency, 78.40% for Integrity, and 70% for Usability. Based on these results, the Cyberlearning Application at SMAN 1 Air Saleh is classified as a high-quality application.

Keywords

Cyberlearning; software quality; McCall method; validity and reliability; educational technology

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Introduction

An Academic Information System (AIS) is a collection of integrated applications specifically designed to manage academic administrative data through the implementation of computer-based technology, enabling academic administration to be conducted accurately, effectively, and efficiently. In the digital era, the role of information systems in educational institutions is increasingly vital as institutions are required to provide fast, transparent, and reliable academic services. The rapid development of information technology is strongly driven by the growing demand for accurate, effective, and efficient technologies and information systems to support educational management (Dwi Pebriani & Afriyudi, 2022). Through the adoption of AIS, schools can improve service quality, reduce manual errors, and enhance communication between administrators, teachers, and students.

The transformation toward digital learning platforms has become a strategic necessity, particularly after the acceleration of educational digitalization following the COVID-19 pandemic. Learning management systems and academic information systems are now widely utilized to distribute materials, manage assignments, record grades, and support online interaction. These systems not only facilitate learning continuity but also increase institutional readiness in responding to technological developments. As a result, schools are encouraged to continuously innovate and adapt their educational services through the utilization of digital platforms.

The Cyberlearning Application at SMAN 1 Air Saleh functions as a digital information medium for students who require teaching and learning services delivered by teachers. This application aims to support learning activities by providing access to learning materials, assignments, and academic communication. Based on observations of the application available on the Google Play Store, the Cyberlearning Application at SMAN 1 Air Saleh has only been developed and implemented for approximately one year. The number of active users currently consists of 455 students, 35 teachers, and 13 school staff members, indicating that the system has been widely adopted within the school environment.

However, as a relatively new application, the Cyberlearning system still faces several limitations. Some technical errors are still found during usage, and several pages of the application contain incomplete information. These shortcomings potentially affect user experience, learning effectiveness, and trust in the system. Inadequate information quality and system reliability may hinder the optimal utilization of the application as a learning support tool. Therefore, ensuring that the application meets appropriate software quality standards is essential to support sustainable system development.

Until now, since the application was officially implemented, no formal research has been conducted to evaluate its software quality. The absence of a structured quality assessment concerning system performance, usability, completeness of information, and reliability constitutes a significant gap in system management. Without systematic evaluation, it is difficult for school administrators to identify weaknesses, prioritize improvements, and ensure that the application functions optimally in supporting academic activities.

Based on these conditions, this study aims to analyze the quality of the Cyberlearning Application at SMAN 1 Air Saleh and to provide concrete development recommendations for

school administrators. The results of this software quality analysis are expected to serve as an objective reference for future system enhancement, improve the effectiveness of digital learning implementation, and support the long-term sustainability of academic information system services at SMAN 1 Air Saleh.

Methodology

The McCall Method is a framework used to describe and evaluate software quality factors. This method consists of three perspectives: product operation, product revision, and product transition. The product operation perspective includes the factors of correctness, reliability, usability, integrity, and efficiency. The product revision perspective includes maintainability, flexibility, and testability. The product transition perspective includes portability, reusability, and interoperability (Farisi et al., 2022). The McCall Method provides a systematic approach to evaluating software quality.

The procedural steps applied in this study using the McCall Method are as follows:

1. Determining the criteria used to measure each quality factor.
2. Determining the weight (w) of each criterion ($0.1 \leq w \leq 0.4$), where 0.1 = very unimportant, 0.2 = unimportant, 0.3 = important, and 0.4 = very important.
3. Determining the criteria scale using a range from 1 to 5, where 1 represents the minimum assessment and 5 represents the maximum assessment.
4. Inputting the values of each criterion based on respondents' assessments.
5. Calculating the total value using the formula:$Fa = w_1c_1 + w_2c_2 + \ldots + w_nc_n$,where Fa is the total value of factor a, w_i is the weight of criterion i, and c_i is the score of criterion i.
6. Converting the total value into a percentage by multiplying the result by 100%.

The final result of the McCall Method is the system quality value expressed as a percentage, which is interpreted according to the quality category scale established at the initial stage of the assessment.

Based on the three quality perspectives, 11 quality factors were identified to represent the external view of the software from the users' perspective, including:

1. Correctness, consisting of completeness, consistency, and traceability.
2. Reliability, consisting of accuracy and simplicity.
3. Integrity, consisting of security.
4. Usability, consisting of communicativeness, operability, and training.
5. Efficiency, consisting of execution efficiency.

Results.

Respondent Demographics

Based on questionnaire data from 82 respondents, the age distribution was as follows: 16 respondents (19.5%) were 15 years old, 16 respondents (19.5%) were 16 years old, 31 respondents (37.8%) were 17 years old, 17 respondents (20.7%) were 18 years old, and 2 respondents (2.4%) were 19 years old.

In terms of gender, 41 respondents (50%) were male and 41 respondents (50%) were female.

Based on grade level, 18 respondents (22.0%) were from Grade X, 15 respondents (18.3%) were from Grade XI Science, 15 respondents (18.3%) were from Grade XI Social Science, 19 respondents (23.2%) were from Grade XII Science, and 15 respondents (18.3%) were from Grade XII Social Science.

Validity Test

The validity test was conducted by comparing the calculated Pearson correlation coefficient (r_calculated) with the critical value of the r-table at a 5% significance level. With n = 82, the degree of freedom was df = 80, and the r-table value was 0.098. All indicators for the variables of Correctness, Reliability, Efficiency, Integrity, and Usability showed r_calculated > r-table, indicating that all questionnaire items were valid.

Reliability Test

Reliability testing was performed using Cronbach's Alpha in SPSS version 25. The results indicate Cronbach's Alpha values ranging from 0.655 to 0.775, demonstrating that all variables met the reliability threshold and were acceptable for further analysis.

McCall Quality Factor Calculation Results

The quality percentages obtained for each factor were as follows:

1. Correctness: 63%
2. Reliability: 60.40%
3. Efficiency: 78.20%
4. Integrity: 78.40%
5. Usability: 70%

The overall quality percentage of the Cyberlearning Application was calculated to be 63.5%, which falls within the "Good" category based on the predefined quality classification scale.

Discussion

The results of the software quality evaluation indicate that the Cyberlearning Application at SMAN 1 Air Saleh demonstrates a generally good level of quality based on the McCall Software Quality Model. This finding confirms that the application has fulfilled many essential technical and functional requirements necessary to support digital learning activities. As an academic information system used daily by students and teachers, the achievement of acceptable overall quality indicates that the system is reasonably reliable as a learning support tool and capable of facilitating academic interactions between educators and students.

The highest quality scores were obtained in the Integrity and Efficiency factors, with values of 78.40% and 78.20%, respectively. A high Integrity score indicates that the system has implemented adequate security mechanisms to protect user data, including student and teacher credentials, learning materials, and assessment information. This condition is particularly important in educational information systems, where data confidentiality and protection from unauthorized access are critical concerns. Meanwhile, the strong Efficiency

score demonstrates that the application is capable of processing user requests effectively without excessive delays or system burden. This efficiency supports smooth learning activities, especially during periods of high user access.

The Usability factor achieved a score of 70%, which suggests that the application is generally easy for users to understand and operate. Students are able to access learning materials, assignments, and academic information without encountering major technical difficulties. However, the usability results indicate that the system still requires refinement, particularly in terms of interface clarity, navigation consistency, and the availability of usage guidance for first-time users. Improving these aspects is essential to ensure that all users, including those with limited digital literacy, can fully utilize the application without confusion.

In contrast, the Correctness factor received a moderate score of 63%. This result reflects that some system functions have not yet achieved optimal completeness, consistency, and accuracy. Certain application features may not fully operate as expected, and some information displayed on the system may still be incomplete. These findings indicate a need for more thorough system testing, debugging, and content verification to ensure that all outputs generated by the application are accurate, consistent, and aligned with academic requirements.

Similarly, the Reliability factor obtained a score of 60.40%, which is categorized as moderate. This indicates that while the system is generally functional, it still experiences occasional instability, errors, or limitations in maintaining consistent performance over time. Reliability is a critical quality dimension in a cyberlearning system because learning activities depend on continuous system availability. Interruptions, errors, or failures may disrupt student learning and reduce user trust in the system. Therefore, strengthening system stability through regular maintenance, error handling optimization, and server performance improvements is highly recommended.

Overall, although the Cyberlearning Application at SMAN 1 Air Saleh performs well in terms of security and efficiency, continuous improvement is still required, particularly in the dimensions of correctness and reliability. These improvements are necessary to ensure sustainable software quality, long-term system stability, and higher user satisfaction. By addressing the identified weaknesses, the application has strong potential to develop into a more reliable, accurate, and user-friendly digital learning platform that fully supports the school's educational objectives in the long term.

Conclusion and Recommendations

This study applied a quantitative approach to measure the quality of the Cyberlearning Application at SMAN 1 Air Saleh using the McCall Method. The evaluation was conducted across five main software quality variables: Correctness, Reliability, Efficiency, Integrity, and Usability.

The results indicate that the Cyberlearning Application achieved a good level of quality, particularly for the Integrity (78.40%), Efficiency (78.20%), and Usability (70%) variables. These scores demonstrate that the application provides adequate security, operates efficiently, and is generally easy to use.

However, the Correctness (63%) and Reliability (60.40%) variables still require improvement. The indicators of completeness, consistency, traceability, accuracy, and simplicity showed moderate performance, indicating that improvements in functional accuracy

and system stability are necessary. Overall, the Cyberlearning Application at SMAN 1 Air Saleh can be classified as a good-quality application, but continuous development is recommended to enhance its reliability and functional correctness.

Disclosure Statement

The author declares that there is no conflict of interest associated with this research.

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Biographical Notes

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