

Conference Paper

Analysis of Edu-Smart Learning Management System Software

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Abstract.

Edu Smart is a learning management system software (LMS) that was built as one of the distance learning solutions during the COVID-19 pandemic and became a resource for learning activities and administration activities. This research aims to measure the quality of Edu Smart LMS related to operational products used by the McCall method. The analysis is carried out on aspects of product operation consisting of the quality factors of correctness, reliability, efficiency, integrity, and usability. The data was collected through questionnaires from 28 respondents consisting of teachers, students, and UPT ICT staff of Universitas PGRI Semarang. The results showed that the overall quality of Edu Smart LMS is at the level of 52.6% (the quality of LMS Edu Smart is quite good). Several recommendations were given for the improvement and development of LMS Edu Smart, among others related to the addition of features, security, and ease of access.

Keywords: Learning management system; Edu-Smart; Mc. Call method.

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Published 21 December 2022

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the ICESRE Conference Committee.

1. Introduction

The quality aspect of the software is something that must be considered in software development. Software is not only seen from the results of its products but can also be seen from the stage of development of the software. The need for quality software continues to grow along with the increasing development of an organization (1)(2). Edu Smart is a learning management system software that was built for one of the distance learning solutions during the current covid-19 pandemic and became a facility for learning activities administration activities (3). Software quality testing is a process used to identify the accuracy, completeness, and quality of the software (4)(5). Software testing is a critical element of software quality assurance and represents the principal study of specifications, design, and coding (6).

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McCall's method. This method is the oldest testing model, developed in 1996; in this method, there are factors or criteria that affect the quality of the software. Factors that affect the quality of operational products in this method include correctness, reliability, efficiency, integrity, and usability. The McCall method has been used for research among others to measure the quality of the final task administration information system (7)(8). Analysis of usability of website users on Tokopedia use McCall to analyze the company's bonus system (9). This research aims to measure the quality of Edu Smart LMS related to operational products used by the McCall method.

2. Method

The theory and literature study related to the research of McCall's method to measure the quality of software from the Operation Product factor as presented in Fig 1.



Figure 1: Research Methods.

The instrument used in this study is a questionnaire to provide answers from user opinions during the use of Edu Smart using the Likert scale (1-5). The Likert scale used in the study can be seen in Table 1. While the assessment range for the weight of each quality factor and the weight for each metric can be seen in Table 2.

TABLE 1: Likert Scale.

Assessment Scale	Information
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

After determining the scale of the assessment, the question instrument was made based on McCall's theory (10)(11). Analysis of questionnaire data is done quantitatively using McCall's formula. The next step is to calculate the percentage using equation. Percentage range refers to the percentage division of quality categories (12). The range of quality categories can be seen in Table 3.

TABLE 2: Quality Weights and Metrics.

Assessment Scale	Information
0.8	Very Important
0.7	Important
0.6	Important Enough
0.5	It doesn't matter
0.4	Very unimportant

TABLE 3: Quality Factor Presentation Category Range.

Category	Percentage
Excellent	81% - 100%
Good	61% - 80%
Pretty Good	41% - 60%
Bad	21% - 40%
Very Bad	< 21%

The steps to calculate quality testing with McCall’s method is as follows: 1) Determine the criteria/metrics/parameters to be used to measure a quality factor, 2) Determines the weight (w) of each quality factor criterion ($0 \leq w \leq 1$), 3) Determines the value scale, where the assessment scale used between 1 - 5, where 1 is the minimum assessment and 5 is the maximum assessment. The rating scale refers to the Likert assessment scale. 4) Enter the value in each criterion resulting from the respondent’s assessment, 5) Calculate the average value based on step 4. 6) Calculates the total value with the equation formula:

$$Fa = w_1c_1 + w_2c_2 + \dots + w_nc_n$$

Fa is total value of factor *a*

w_i is weights for criterion *i*

c_i is the value for criterion *i*.

Last steps are calculating the percentage (%) of quality factor values using equations:

$$Percentage = \frac{Obtained\ Value}{Max\ Value} .$$

3. Result and Discussion

Edu-Smart that can be accessed through the URL of <https://edu-smart.id/>. Fig 2 shows the display of the Edu-Smart LMS.

Technical data retrieval of respondents using questionnaires distributed manually and online. The number of prisoners in the filling of questionnaire data as many as 28 people.

TABLE 4: Edu Smart Quality Assessment Results.

No	Quality Factor	Metrics and Parameters	Weight	Criterion Value
1	<i>Correctness</i> (0.7)	<i>Completeness</i> Learning information / materials displayed in Edu-Smart are complete, clear and easy to find by users	0.7	4.2
		<i>Completeness</i> All the features contained in Edu Smart can work	0.8	3.8
		<i>Consistency</i> Edu Smart has a consistent website look.	0.6	4.2
		<i>Traceability</i> Edu Smart can provide the latest information and list the last time or date of the updated information.	0.6	4.2
		<i>Traceability</i> Edu Smart Provides online help services such as "help" or admin contact services	0.6	4.0
2	<i>Reliability</i> (0.8)	<i>Error Tolerance</i> In case of an error or error, Edu Smart can provide a notification message about the steps to be taken to resolve the problem.	0.7	3.6
		<i>Error Tolerance</i> Edu Smart can function again after a system failure caused by a server that is down.	0.7	3.8
		<i>Accuracy</i> Edu Smart can display information and output correctly and accurately	0.8	4.0
		<i>Simplicity</i> Edu Smart can be used easily and not confusingly.	0.8	4.0
3	<i>Efficiency</i> (0.7)	<i>Executions Efficiency</i> Edu Smart can respond to, process and display requests from users quickly and on time	0.8	4.0
4	<i>Integrity</i> (0.7)	<i>Access Control</i> The Login process can work correctly and in accordance with user expectations	0.6	4.2
		Users can use the features provided in accordance with the access rights granted	0.6	4.2
5	<i>Usability</i> (0.8)	<i>Operability</i> Edu Smart is easy to use	0.8	4.2
		<i>Training</i> Edu Smart is easy to learn (new users can easily learn/use Edu Smart	0.7	4.2

1. The results of the calculation of integrity quality factor (*Fa4*) are as follows:

$Access\ Control = ((0.6 \times 4.2) + (0.6 \times 4.2)/2) = 2.52$. From the results obtained then changed in the form of percentage $(2.52/5) \times 100\% = 50.4\%$.

In the quality integrity factor, testing is also carried out on security (the fulfillment of mechanisms to control and protect programs or data against access from unauthorized parties). Total activity tested as many as five features. Edu Smart has fulfilled four features out of a total of 5 security features tested. The results of the security test are presented in the following Table 5.

TABLE 5: Security Test Results.

No.	Activity	Result
1	Login	Exist
2	Session Logout	Exist
3	Level User	Exist
4	Password Encryption	Exist
5	URL encryption	None

Table 5 shows the value of the Edu Smart security feature is 80%. So the value of the integrity quality factor ($Fa4$) is $((50.4\%+80\%) : 2) \times 100\% = 65.2\%$. The results of the calculation of the usability quality factor ($Fa5$) are as follows: Operability = $(0.8 \times 4.2) = 3.36$, Training = $(0.7 \times 4.2) = 2.94$, Communicativeness = $0.8 \times 3.8 = 3.04$, $Fa5 = (3.36+2.94+3.04) : 3 = 3.11$. From the results obtained $Fa5$ then changed in the form of percentage $(3.11 : 5) \times 100\% = 62.2\%$.

$$\Sigma = \frac{(0.7 \times Fa1) + (0.8 \times Fa2) + (0.7 \times Fa3) + (0.7 \times Fa4) + (0.8 \times Fa5)}{Max Value}$$

$$= \frac{2.628}{5} \times 100\%$$

= 52.6%

Based on calculations on all aspects of quality, it can be concluded that Edu Smart is at the level between 41% - 60% = 52.6% and belongs to the category quite well. Figure 3 is a recapitulation of Edu Smart quality factor calculation results. Based on Fig. 3, it can be known that the lowest assessment is in the usability quality factor with a percentage gain of 58.8% (quite good). This is corroborated based on advice given by respondents on the ease of use of the system, which includes operability, training and communicativeness. Input or suggestions from users related to the quality factor of usability are; The order of the menu on the material has not been sequenced according to the steps of learning material management, so the appearance needs to be improved, the lesson plan filling form is a little confusing, so it can be made more user friendly.

These assessments it can be concluded that the appearance of a system is crucial. The better the system looks, the easier the user is to use the system and the easier it is to learn (13). A good system should have an attractive, neatly organized, consistent and user-friendly look. The next value is efficiency and integrity, with each acquisition of value being 64.0% for the efficiency quality factor and 65.2% for the integrity quality factor. Both categories are rated good by the user. In terms of efficiency, Edu Smart can meet the needs of users, such as; Edu Smart can respond, process, and display requests from users quickly and on time, every Edu Smart page can be accessed quickly,

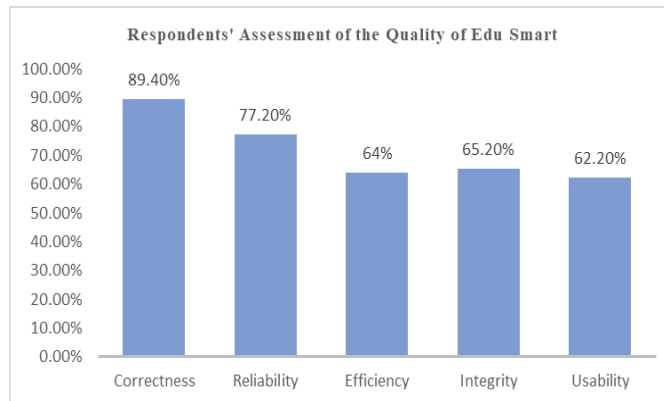


Figure 3: Respondents' Assessment of Edu Smart Quality Factors.

Users can upload and download documents quickly (3)(10). The reliability factor of 77% is considered by the user is good because the input is not in accordance with the format on all modules there is an error notification, all outputs needed in accordance with the user's desired format such as Lesson Plan documents, Syllabus, Schedule and others. The highest value on factor correctness of 88.4%, which is related to the features on Edu Smart, can run well and in accordance with respect to the needs of users. The required information such as manual usage and help services are available in Edu Smart, making it easier for end-users who will use LMS Edu Smart. Based on the results of the assessment, the author provides advice for the development and improvement of LMS Edu Smart as Table 6.

TABLE 6: Recommendations.

No	Recommendations
1	LMS Edu Smart manager should pay attention to the ease of use of the system
2	Training on users should be done massively because there are several features that require more detailed guidance, such as the management of materials to be shared, problem management for online exams and problem management for UTS and UAS.
3	LMS Edu Smart manager should provide chat features so that the needs, difficulties or questions of users can be responded to and resolved quickly.
4	LMS Edu Smart manager should review the security on the system by adding a <i>captcha</i> feature or security code to anticipate interference from users who are not entitled to access to the system.
5	We recommend making a launcher to facilitate Edu Smart access by using Gadgets.

4. Conclusion

Contingent on the assessment steps that have been done, it can be concluded that McCall's method can be applied to Edu Smart LMS testing. The results of Edu Smart LMS quality testing using McCall's method on product operation aspects, are as follows; value for quality correctness factor of 89.40% (excellent), value for reliability quality factor of 77.20% (good), value for efficiency quality factor of 64.00% (good), value for integrity quality factor of 65.20% (good), value for usability quality factor of 62.20% (good). Overall based on McCall's quality theory in the product operation category, LMS Edu Smart has a fairly good quality (52.6%).

Acknowledgements

We would like to thank Ministry of Education, Culture, Research and Technology for supporting and funding this research.

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