

Usability Evaluation of E-Learning Besmart Using SUS at Yogyakarta State University

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ABSTRACT

Information Technology (IT) plays a crucial role in enhancing the performance of educational institutions, particularly in higher education. The implementation of IT aims to improve the quality of education, administrative efficiency, and information accessibility for students and staff. The success of an information system is measured by its ability to provide a positive user experience, which includes ease of use, usefulness, and overall satisfaction. A primary example of IT implementation in higher education is e-learning, which allows students to access lecture materials, assignments, and other resources online. Yogyakarta State University has developed an educational platform named Besmart to leverage IT within the campus environment, supporting academic activities such as uploading lecture materials, assignments, and related information. However, several challenges were encountered during its implementation, affecting students due to operational difficulties and understanding the platform's features. This study evaluates the Besmart e-learning platform using the System Usability Scale (SUS) questionnaire to assess its usability. The research involved 20 student respondents who were already familiar with using Besmart. The evaluation was conducted by distributing questionnaires and interviewing users to formulate improvement recommendations. The results showed an average SUS score of 58, indicating a Marginal Low level of acceptance. The adjective rating categorized the platform as "Good" with a grade scale of E. Users suggested that the e-learning platform needs additional features such as notifications for new materials and assignments, as well as an upgraded, more appealing interface. These findings provide valuable insights to enhance the usability of the Besmart platform to better meet user needs and improve the overall learning experience.

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1. Introduction

Information Technology (IT) plays a crucial role in supporting the performance of an institution. One such institution that significantly implements IT is higher education. The implementation of IT in higher education aims to enhance the quality of education, administrative efficiency, and information accessibility for students and staff. The success of an information system service is measured by its ability to provide a pleasant user experience, which includes ease of use, usefulness, and the overall satisfaction felt by users [1]. A concrete example of IT implementation in higher education is e-learning. E-learning is a technology-based learning system that allows students to access lecture materials, assignments, and other learning resources online.

In an effort to become a leading campus in information technology, Yogyakarta State University has developed an educational platform named Besmart, which maximizes the use of technology and

information systems within the campus environment. This platform supports academic activities, including uploading lecture materials, assignments, and other course-related information. Besmart is an essential educational platform for the university, and any malfunction could hinder the learning process or even lead to a failure in achieving its objectives. Additionally, the implementation process has faced several challenges from both lecturers and students, ranging from operational difficulties to difficulties in understanding the functions of various features within Besmart.

This study aims to evaluate the e-learning platform to assess the quality of the implemented application using the System Usability Scale (SUS) questionnaire. The respondents in this study were 20 students who were familiar with using the Besmart e-learning platform. The evaluation was conducted by distributing questionnaires to the respondents. In addition, interviews with users were conducted to formulate recommendations to be given to the platform administrators.

2. Literature Review

Previous research evaluated Learning Management Systems (LMS) using the System Usability Scale (SUS) in higher education institutions, where the usability and ease of use of LMS play a crucial role in system acceptance and user satisfaction. The respondents of this study included 137 students, 23 lecturers, and 9 administrators. The testing results indicated a SUS score of 58.6, suggesting a suboptimal quality. Therefore, the recommendations for administrators based on this evaluation include the necessity for planning, training, and communication both before and during the implementation of the LMS, as well as paying attention to the usability and learnability aspects of the LMS [2].

Subsequent research evaluated the usability of E-learning using Usability Testing, which examined three usability aspects: effectiveness, efficiency, and user comfort or satisfaction with E-Learning at Undiksha. This study involved 32 respondents and utilized the System Usability Scale (SUS) method. The results indicated that E-learning at Undiksha received a SUS score of 60.94, suggesting that the system does not yet possess good usability [3].

Another study on measuring usability in LMS using the System Usability Scale (SUS) involved 30 respondents, where the ELMA platform received an average score of 44 with a low rating and a grade of F, indicating that this LMS has a low usability level and requires improvement [4]. Subsequent research evaluated the usability of e-learning and Google Classroom using the SUS. This study aimed to assess the usability of E-Learning to determine user satisfaction levels with the Moodle and Classroom platforms using the SUS questionnaire. The test results showed that Google Classroom had a SUS score of 82.8, while Moodle (ELMA) had a SUS score of 40.8. It can be concluded that E-Learning with the Google Classroom platform better meets usability criteria compared to ELMA [5].

The next study is on e-learning at Telkom Institute of Technology Purwokerto (ITTP) concerning the system's usability using the System Usability Scale (SUS) method. Based on the system testing results from 100 respondents or users, the SUS score was found to be 55.3. This score indicates that the acceptance range falls into the Marginal Low category. From the adjective rating perspective, the SUS score of ITTP's e-learning system is in the OK category, and according to the Curved Grade Scale (CGS), it is graded as D [6].

The next study was conducted at ABC University, which developed an educational platform within the campus named WASKITA, maximizing the use of information technology to support academic activities in higher education. This study aims to evaluate the e-learning platform to assess the quality of the implemented application using the System Usability Scale (SUS) questionnaire. The study involved 34 respondents. The evaluation was conducted by assigning tasks corresponding to the features of WASKITA to identify areas that need improvement. Additionally, interviews with users, specifically lecturers at ABC University, were conducted to gather recommendations to be provided to the administrators. The usability measurement of the Moodle E-Learning accessed at (Waskita.amikom.ac.id) showed an average SUS score of 50, indicating that the acceptance level of this E-Learning system is Marginal Low. The adjective rating showed a "Poor" level with a grade scale of E. Users commented that the Moodle E-Learning platform is still complicated to use, which causes them to reconsider using the E-Learning system, especially on mobile applications [7].

Usability research was also conducted on the Blackboard, Canvas, and Google Classroom systems as Learning Management Systems (LMS). Furthermore, this study aimed to determine if there were any significant differences in usability among these LMS. The research employed the System Usability Scale (SUS) questionnaire to assess the usability of Blackboard, Canvas, and Google Classroom through an online survey. Analysis was conducted using One-way ANOVA to evaluate the System Usability Rating. With a p-value of 0.054, which is greater than the alpha value of 0.5, it was concluded that there were no significant differences in usability and user satisfaction among Blackboard, Canvas, and Google Classroom based on the given usability criteria [8].

3. Method

This research began with identifying the problem, followed by developing the background and objectives of the study. Subsequently, references were searched and appropriate methods were selected. A literature review was conducted by reviewing previous research to support the study's objectives and to obtain theories related to the methods that would be used in the Usability test. Data collection was carried out by distributing questionnaires to a predetermined sample of respondents. The data obtained were processed using the System Usability Scale method, and the test results were analyzed based on Usability aspects. The final stage of this research was drawing conclusions.

3.1. Sample

There are no fixed rules for selecting respondents for usability research using SUS. The respondents referred to here are those who are already familiar with using the Besmart e-learning platform. Based on various discussions and literature, the number of respondents can vary from 5 to 400 people. In this study, the sample used consisted of 20 students from Yogyakarta State University.

3.2. Usability Evaluation Using SUS

The Usability evaluation using SUS was conducted by accessing the Besmart E-Learning application or website. The System Usability Scale (SUS) is a method used to measure Usability by having users evaluate an application interface to determine the quality of the Besmart e-learning platform. This study utilized the System Usability Scale (SUS) questionnaire with a Likert scale of 1-5. The list of statements used can be seen in Table 1 below. [9]

Table 1. List of Statements in SUS Questionnaire

Code	Statements
Q1	I think I will use this Besmart e-learning platform again.
Q2	In my opinion, the Besmart e-learning platform is too complicated to use.
Q3	In my opinion, the Besmart e-learning platform is easy to use.
Q4	In my opinion, using this Besmart e-learning platform requires assistance from others.
Q5	In my opinion, the features of the Besmart e-learning platform work properly.
Q6	In my opinion, there are inconsistencies in this Besmart e-learning platform.
Q7	In my opinion, others will quickly understand how to use the Besmart e-learning platform.
Q8	In my opinion, this Besmart e-learning platform is confusing.
Q9	In my opinion, there are no barriers to using the Besmart e-learning platform.
Q10	In my opinion, it is necessary to familiarize oneself with using this Besmart e-learning platform beforehand.

In this study, the SUS questionnaire with a 5-point Likert scale is utilized, ranging from "strongly agree" to "strongly disagree" regarding 10 statements provided in the questionnaire. Each statement item has a contribution score. Odd-numbered statements deduct 1 from the score obtained from the user. Meanwhile, for even-numbered statements, the final score is obtained by subtracting the score given by the user from 5. The result of the System Usability Scale measurement is obtained by summing the scores of each question, which is then multiplied by 2.5. Values on the System Usability Scale range from 0 to 100. The calculation formula for SUS scores can be seen in Equation (1). The total score value on the System Usability Scale is obtained from the average of individual SUS scores, as presented in Equation (2).

$$\text{SUS Score} = ((Q1 - 1) + (5 - Q2) + (Q3 - 1) + (5 - Q4) + (Q5 - 1) + (5 - Q6) + (Q7 - 1) + (5 - Q8) + (Q9 - 1) + (5 - Q10)) \quad (1)$$

$$X = \frac{\sum x}{n} \quad (2)$$

Explanation:

X : Average Score

$\sum x$: Total score of system usability scale

n : Number of respondents

3.3. Determining Calculation Results

The final step in analyzing usability aspects is determining the calculation results. This assessment is conducted from three different perspectives, each with its own levels:

1. Acceptability Ranges (Not Acceptable, Marginal, Acceptable)
2. Grade Scale (A, B, C, D, E, F)
3. Adjective Rating (worst imaginable, poor, ok, good, excellent, and best imaginable)

Figure 1 illustrates that the Acceptability perspective can be utilized by researchers to comprehend the level of user acceptance towards an application. To evaluate the application's levels, a grade scale can be employed. Meanwhile, to determine the value or rating of the generated application, an adjective rating is used. This approach is then used as a benchmark in measuring usability using SUS [10].

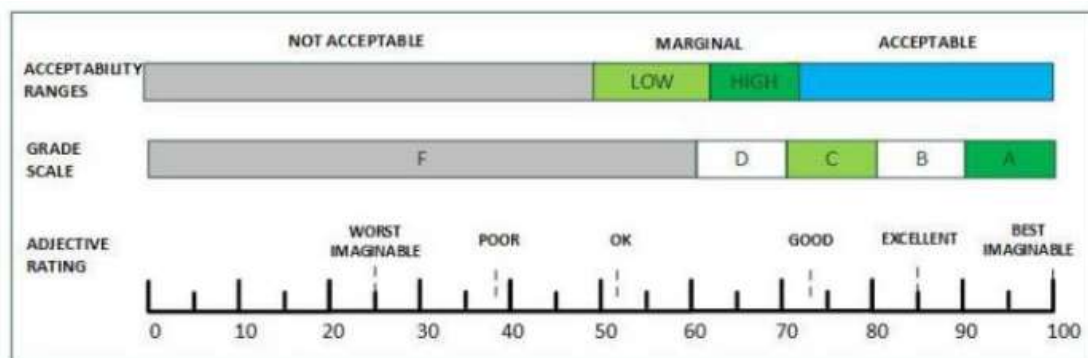


Fig. 1. System Usability Scale (SUS) Assessment

The researcher utilized WhatsApp messages to distribute the prepared questionnaire, which was then filled out by respondents online via Google Form. The questionnaire was disseminated for one week, starting from May 26, 2024, to June 1, 2024. It encompassed general information about the respondents and their usage data of the E-Learning Besmart platform.

4. Result and Discussion

The analysis results conducted on students from Yogyakarta State University as respondents or users in this study were obtained from the online distribution of questionnaires using one of Google's features, namely Google Form. Subsequently, the questionnaire results were subjected to validity and reliability tests using SPSS software.

Validity testing was conducted to determine whether the questionnaire used in this study is valid before being used as a testing tool. In this research, validity testing was performed using the Pearson method with a significance level of 0.05 or 5%. The validity test results are considered valid if the T-table > T-test score, with a T-table of 0.444. The validity test results can be seen in Table 2. Validity testing was conducted using SPSS, and the results showed that the T-table > T-test for all statement items. Therefore, the results of this testing are valid and can be used for further testing.

Reliability testing was conducted to determine the level of reliability of the statement instrument. The results of reliability testing are presented in Table 3.

Table 2 Validity Test Table

Item	T-test	T-tabel	Explanation
Q1	0,882	0,444	Valid
Q2	0,611	0,444	Valid
Q3	0,919	0,444	Valid
Q4	0,513	0,444	Valid
Q5	0,717	0,444	Valid
Q6	0,702	0,444	Valid
Q7	0,674	0,444	Valid
Q8	0,857	0,444	Valid
Q9	0,574	0,444	Valid
Q10	0,496	0,444	Valid

Tabel 3 Reliability Test Table

Cronbach's Alpha	N of Items
0,878	10

In the table above, the Cronbach's alpha value is 0.878. The analysis results indicate that this figure exceeds the significance value of 0.6, thus concluding that the instrument used is reliable and can be used for further testing. The questionnaire testing was calculated using the predetermined formula. Table 4 presents the usability measurement results of the E-Learning Besmart.

Table 4 SUS Calculation Results

Respondent	SUS Score
1	42.5
2	40
3	67.5
4	65
5	60
6	50
7	70
8	32.5
9	65
10	85
11	52.5
12	15
13	70
14	32.5
15	55
16	80
17	72.5
18	72.5
19	57.5
20	75
Average SUS Score	58

Table 5 below shows the interpretation results of the E-Learning Besmart measurement.

Table 5 Interpretation Results of E-Learning Besmart Measurement

Acceptability Ranges	Grade Scale	Adjective Rating
Marginal (Low)	E	Good

The usability measurement results of E-Learning Besmart indicate an average SUS score of 58. This result defines that the level of acceptance of this E-Learning platform is at the Marginal Low level, and in terms of adjective rating, it indicates 'Good' with a grade scale at level E. After obtaining the testing results with SUS, the researcher conducted interviews with the respondents to gather additional information to reinforce the previous questionnaire data. This information then served as a reference for the researcher to provide improvement suggestions in accordance with Usability standards and user needs. Based on the findings of this study, here are some recommendations that can be proposed:

1. Adding notification facilities for new materials or assignments
2. Upgrading the interface to make it more appealing

5. Conclusions And Suggestions

Based on the analysis results conducted on E-Learning Besmart, it shows a relatively low score with a measurement result of 58. The measurement instrument based on the obtained values indicates that E-Learning Besmart is at the Marginal Low level, and in terms of adjective rating, it indicates 'Good' with a grade scale at level E. Users believe that E-Learning Moodle still needs additional notification features for new materials and assignments. Additionally, it can also be upgraded to a more appealing interface.

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