

DEVELOPMENT OF A WEB-BASED JOURNAL INFORMATION SYSTEM FOR DAILY TEACHING AND LEARNING ACTIVITIES AT SMAN 1 PAYUNG

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Keyword

*Website, Information System,
Functionality, Usability, ISO 9126*

Abstract

This study aims to examine the quality of the information system for website-based class daily journals which were developed in the context of digitizing subject teacher journals at SMAN 1 Payung. The purpose of this research is to change the process of processing learning data into a computational system to make it more effective and efficient. The sample in this study were subject teachers who were randomly selected. This study uses the SDLC approach with the waterfall development method. Information system testing in research was carried out using the ISO 9126 testing model. Information system quality testing uses ISO 9126 testing standards in two aspects, namely usability and functionality. Usability data analysis was tested using the Computer System Usability Questionnaires (CSUQ) questionnaire using the Likert Scale as a measurement scale with the questionnaire instrument: Psychometric evaluation and instructions for use developed by IBM as a standard for measuring software in the usability aspect with a score of percentage. While data analysis on the functionality aspect was tested using the Guttman scale based on ISO/IEC 9126 calculation standards. Each instrument that has a value of "Yes" or "No" is a fixed answer. The results of system testing on the functionality aspect are worth 1, which means that the maximum score and usability has a percentage of 93% which is "very high". Based on the test results, the web-based journal information system for teaching and learning activities is feasible to use.

INTRODUCTION

Currently, web-based information technology has been developed for various purposes, such as websites that are used to collect and archive information via the internet in various forms so that it will make it easier for users [1]. The website is currently an important thing in an educational institution [2]. Management of learning data must of course be carried out as a form of implementing the education system based on the considerations of PP 57 of 2021 concerning the first National Education Standards namely that education in Indonesia requires national standards which require adjustments to the dynamics and development of science, technology, as well as community life for the benefit of improving the quality of education [3]. Therefore the development of knowledge regarding technology can be used in educational institutions as needed [12].

Management of learning data such as recapitulation is an essential component in educational institutions [4]. Data management such as recording, storage, and archiving is very important to do in an educational institution so that the recapitulation process at the end of the learning year can be carried out appropriately based on stored data [5]. Data recapitulation is needed at each

semester change as a reference for learning assessment and learning planning to make it more structured and dynamic [6].

SMAN 1 Payung is an educational institution located in South Bangka Regency and is accredited A. Based on the results of interviews conducted with one of the homeroom teachers and subject teachers, it was stated that there were the same difficulties at each semester change where the teacher had to recapitulate data automatically. conventional methods such as the presence of students, implementation of KD/KI subjects, assessment and evaluation of learning through class agenda books and teacher agendas. In addition, from the results of the interviews it was also found that the learning process recording system was less effective because the data was collected manually through class agenda books. Then it was found that the school had not yet reached or lacked information about web technology that could be utilized by the school. Because of this the data recapitulation process could not be carried out effectively and efficiently because the data search was carried out one by one based on the class daily journal and teacher's.

Based on the explanation above, it is necessary to develop a Web-Based Class Daily Learning Activity Journal Information System as a form of digitization of class agenda books and teacher agenda books which are developed into one system. This information system has features or menus such as a class agenda book and is equipped as a teacher agenda book used by each subject teacher and homeroom teacher at school as a form of accountability for recording and collecting data on the teaching and learning process that has been implemented. In addition, this system will contain factual information as a form of learning assessment mechanism that has been implemented based on the Minister of Education and Culture Regulation regarding Assessment and Management Standards. So that the process of recording and storing data on teaching and learning activities as well as the process of recapitulating and searching for data such as grades, attendance, and daily journals at each semester change is more effective and efficient.

METHOD

2.1 Research Method Design

The research method used in developing this system is the SDLC (Software Development Life Cycle) approach with the waterfall method. Waterfall is an information system development method in which the design process sequentially appears to flow continuously downwards (like a waterfall) through the Conception, Initiation, Analysis, Design, Construction, Testing, Production/Implementation, and Maintenance phases [7].

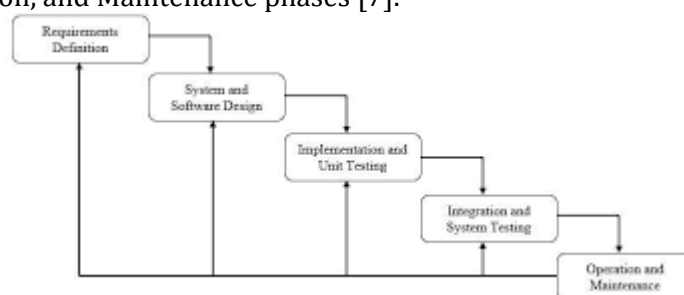


Figure 1. Waterfall Stages

The procedure or stages of the waterfall method research are as follows:

1. Requirements Definition
In the early stages, research needs were collected which were then analyzed and defined to fulfill the system to be developed. After the data collection process needs to be carried out data classification to facilitate database design and clarify the functions of the system.
2. System and Software Design
The system is designed based on the needs analysis that has been carried out and designed using the Unified Modeling Language (UML) to describe the work process of the information system through use case diagrams and activity diagrams.
3. Implementation and Unit Testing

At this stage the system can be developed based on the design that has been designed by coding the program and system configuration as needed. After the system has been tested, the data obtained will be used as a reference for improvements to the information system being developed.

4. Integration and System Testing

The system that has been developed will be tested based on aspects or components to meet the objectives of the information system itself. The system will be tested in three aspects, namely:

- a) Validation of the aspect of functionality aims to test the functionality of the information system whether it is running as needed. Functionality validation will be carried out by experts.
- b) Validation of the usability aspect aims to test the usability of the system using an instrument in the form of a questionnaire (J.R Lewis) which will be filled in by the user.

5. Operation and Maintenance

After testing and repair, the system can be operated and get maintenance at any time when needed.

2.2 Data Gathering

This research was conducted at SMA Negeri 1 Payung. Implementation time in December 2022 – May 2023. The research subject for the usability aspect was the teacher at SMAN 1 Payung, the research subject for the functionality and usability aspect was the web-based class journal information system for daily teaching and learning activities. Data gathering method used in this research is as follows:

a. Interview

Information was collected through interviews conducted with users as data analysis needs, namely subject teachers and homeroom teachers at SMAN 1 Payung. The purpose of the interview is to find out:

1. User problem
2. User requirements
3. Type of information system required by the user
4. System features required by the user

b. Literary Studies

The literature study was carried out by analyzing the use of class agenda books and teacher agenda books.

c. Observation

Observations were made to directly observe the process of recording learning activities by subject teachers in class.

d. Questionnaire

Questionnaires are used to collect data through user responses to information systems developed on the aspects of functionality and usability.

2.3 Data Analysis

The research instrument in testing the developed information system is functionality and usability. Instrument of functionality validation will be carried out by experts using Black Box with a Guttman Scale calculation system based on ISO/IEC 9126 [8]. The usability instrument in this research will use a questionnaire: Psychometric Evaluation and Instructions for Use developed by IBM as a standard for measuring software in the usability aspect [9].

a. Functionality Aspect Data Analysis

The functionality aspect was tested using the Guttman scale based on ISO/IEC 9126 calculation standards. Each instrument that has a "Yes" or "No" value is a fixed answer on the Guttman Scale [10]. The test results will be analyzed using the following formula:

$$X = 1 - A/B$$

A = Number of functions that are not working properly x Number of respondents
 B = Number of functions that are working properly x Number of respondents

Variable A is the number of instruments that have a value of "No" or a zero value of "0" by respondents. While variable B is the number of instruments that have a value of "Yes" or a value of 1 by respondents. Information system functionality is determined using ISO/IEC 9126 measurement interpretation, namely $0 \leq X \leq 1$. Information system functionality will be categorized as good if X is close to 1.

b. Usability Aspect Data Analysis

The usability aspect will be tested using a Computer System Usability Questionnaire (CSUQ) questionnaire using a Likert scale as a measurement scale[11]. The Likert scale on the CSUQ instrument uses a scale of 5 which has a rating level from very positive to very negative.

Table 1. Likert Scale Table

Scale	Score
Strongly Agree (SA)	5
Agree (A)	4
Uncertain (U)	3
Disagree (D)	2
Strongly Disagree (SD)	1

RESULTS

A website-based daily journal information system developed with current technological insights greatly facilitates educators in managing learning data [12]. At the stage of making a daily journal information system can be seen through of use case diagrams fig.2. Users (in this study are teachers) can immediately create or process journal data after entering the system based on personal data that is integrated in the system. The journal information system will be managed by the school operator or server admin.

Table 2. Unit Testing Result

Test Variable	Tools	Results
Functionality	Black Box	
	Computer Usability	1
Usability	Satisfaction	
	Questionsires (J.R. Lewis)	93%

The results of the functionality test using blackbox get the results value of X is 1 with 3 respondents by media experts. Black box testing considers input values in a study [13]. The media expert test uses a questionnaire with a Guttman Scale calculation which has a fixed answer, "Yes" or "No" based on ISO/IEC 9126. This calculation is used to determine whether the developed website can meet user needs. Information system functionality is determined using ISO/IEC 9126

measurement interpretation, namely $0 \leq X \leq 1$. Information system functionality will be categorized as good if X is close to 1. These results indicate that the value of X on media experts is 1. The results of the data analysis explained that the information system has a good level of functionality.

The results of the usability test using the JR Lewis questionnaire obtained 93% results with 6 respondents. IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use, is used as an instrument in assessing the usability quality of an information system [14]. Calculations for system usability tests use a Likert Scale which has 5 levels of values from very positive to very negative (Strongly Agree, Agree, Doubt, Disagree, Strongly Disagree). The percentage of information system eligibility can be determined after the highest value is obtained. Information system functionality categorized good and the quality level of the information system developed is of high value

DISCUSSION

a) Requirement Definition

In this study, data was collected through interviews related to the functional requirements of the information system and observation of the device requirements used in building the system. The following table shows the results of the analysis and collection of research needs.

Table 3. Needs Analysis

Requirements	Description	Informations
Functional Needs	The system has 2 types of users	1. Administrator: manage user account data, manage journal data 2. Teachers: create, modify, edit, import, export journal data
Devices Needs	Tools used to design and build systems	1. Hardware : Computer/PC 2. Software: OS Windows 10, Laravel 8, XAMPP (web and database server), Web Browser, Visual Paradigm.

b) System and Software Design

Web-based journal information system for daily teaching and learning activities is designed using UML; use case diagrams and activity diagrams [15].

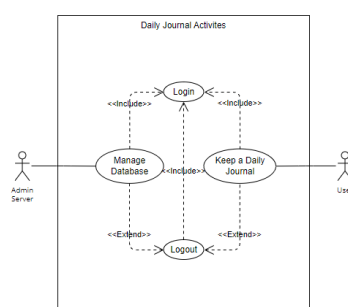


Figure 2. Use Case Diagram

Based on the needs of using the system with two users, namely administrators and users, namely teachers. System administrators can manage central data starting from integrating user accounts, class student data, lists of subjects and tutors, to subject schedules for each teacher. Meanwhile, the user as a teacher can process the entered journal data.

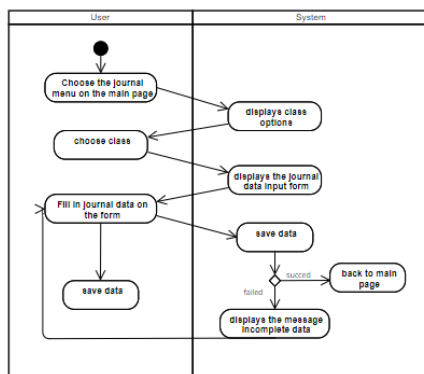


Figure 3. Activity Diagram

In the picture above is a diagram of teacher activity on the system where the teacher keeps a journal based on the class being taught, can choose the class and subject that he wants to make a daily journal until it's finished.

c) Implementation and Unit Testing

The correlation between the Merdeka curriculum and learning loss is closely related, where one of the goals of implementing the Merdeka curriculum is to address the occurrence of learning loss experienced by students (Romli Triputra et al., 2022). In order to achieve this goal, SMA Al-Islam 1 Surakarta implements the Merdeka curriculum as one of the approaches to tackle learning loss among its students.

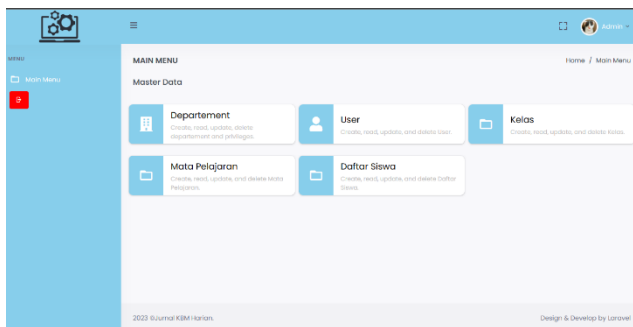


Figure 4. Administrator Page

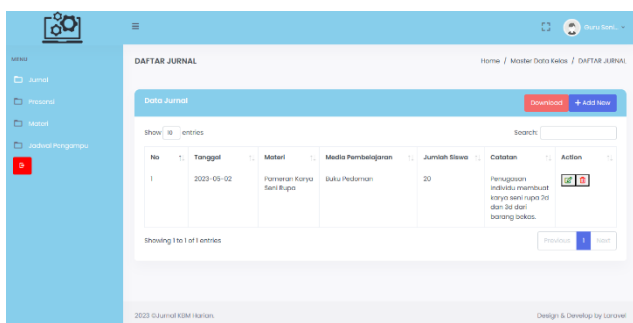


Figure 5. Users Page

After logging in to the system, administrators and teachers will be shown different pages. The administrator will see the overall master data from the database that has been entered. Meanwhile, the teacher will see several menus on the main page and can start keeping a daily journal or processing other data.

d) Integration and System Testing

1. Functionality Testing

Testing the functionality of the system was carried out by three media experts using an instrument with 18 statement items and a Guttman Scale. The following are the results of testing and data analysis in the figure below.

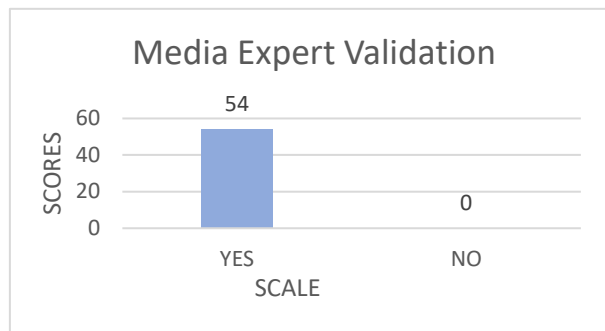


Figure 6. Functionality Test Result

The calculation of functionality testing uses the formula from ISO/IEC 9126 as follows:

A = function that doesn't work properly (No) x number of testers = 0

B = total number of functions evaluated x number of testers = 18 x 3 = 54

So $X = 1 - A/B = 1 - 0/54 = 1 - 0 = 1$

Based on the test results above, it can be concluded that $X = 1$ so that the web-based teaching and learning activity journal information system has an aspect of functionality according to ISO/IEC 9126.

2. Usability Testing

Testing the usability aspect of the system uses a questionnaire developed by IBM with 19 statement items by 6 users as a sample []. Testing on the questionnaire using a Likert scale. The following are the results of the usability test below.

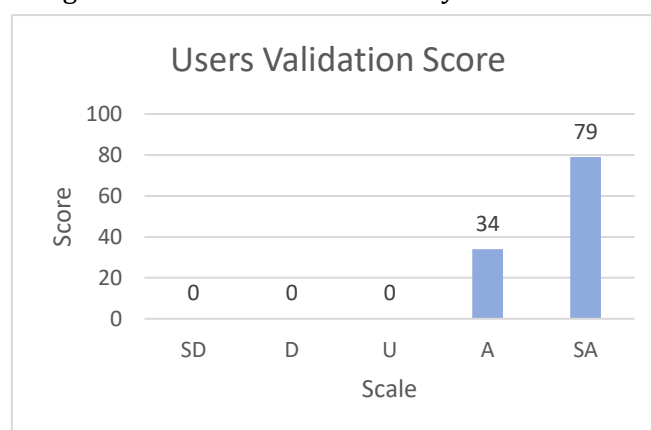


Figure 7. Usability Test Result

The results of the calculation of the respondents' answers will be compared to the highest and lowest values as follows:

Maximum Score = 6 x 19 x 5 = 570

Based on the trial results the total score is 531, the percentage of information system eligibility is as follows:

$$(531 / 570) \times 100\% = 93\%$$

The percentage of results can be compared with the percentage level of information system eligibility as follows:

Table 4. Percentage Levels

Percentage Scale	Level
0% - 20%	Very Low
21% - 40%	Low
41% - 60%	Sufficient
61% - 80%	High
81% - 100%	Very High

The percentage of usability testing results is 93%. The results of this test are then converted into a qualitative scale so that "very high" results are obtained and meet the usability aspect based on ISO/IEC 9126 standards.

CONCLUSION

Based on the research results, system information of daily journal for teaching and learning can be used. This learning media can be run on notebooks, laptops, personal computer, or tablets. System information of daily journal also very much needed in this era, because it can encourage teachers to process data effectively, efficiently, systematically and structured. Testing on the functionality aspect produces a value of 1 (maximum value), and the usability aspect with a validation percentage of 93% which has a very high/good value. Based on the test results, the journal information system for daily teaching and learning activities that has been developed is feasible to use. The limitation of this research is that the system was developed only for teachers. In the future, this system information can be used to apply journal of class daily teaching and learning activities at SMAN 1 Payung.

ACKNOWLEDGEMENT

Thank you to the supervisor lecturers, Informatics Engineering Education Study Program, and the school where the research was conducted at SMAN 1 Payung who provided directions and facilities in this research process.

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