DESIGN OF A WEB-BASED MANAGEMENT INFORMATION SYSTEM FOR THE YELLOW BOOK LEARNING PROCESS AT MTI CANDUANG AGAM

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Abstract

This research is motivated by the fact that the conventional method of teaching and learning the Yellow Book at MTI Canduang Agam is still being used, which leads to limitations in documentation, information access, and the efficiency of learning management. The main question in this research is how to design a web-based information management system that can digitize and optimize the Yellow Book learning process in a structured and effective manner. The novelty of this research lies in the development of an information system specifically focused on learning the Yellow Book with a digital approach in the Islamic boarding school environment. This research uses the Research and Development (R&D) method with the System Development Life Cycle (SDLC) model and the Rapid Application Development (RAD) approach. System evaluation is conducted based on the ISO/IEC 25010 standard with a focus on three characteristics: functional suitability, compatibility, and usability. The test results show that the system fulfills all main functions with a value of 100% for functional suitability and compatibility, and obtained a usability score of 89.97% from 24 respondents. This study concludes that the developed system is very feasible to be implemented and can improve the effectiveness of the learning process in Islamic boarding schools.

Abstrak

Penelitian ini dilatarbelakangi oleh masih dilakukannya proses pembelajaran Kitab Kuning secara konvensional di MTI Canduang Agam, yang menyebabkan keterbatasan dalam dokumentasi, akses informasi, dan efisiensi pengelolaan pembelajaran. Pertanyaan utama dalam penelitian ini adalah bagaimana merancang sistem manajemen informasi berbasis web yang dapat mendigitalisasi dan mengoptimalkan proses pembelajaran Kitab Kuning secara terstruktur dan efektif. Kebaruan dari penelitian ini terletak pada pengembangan sistem informasi yang secara khusus difokuskan pada pembelajaran Kitab Kuning dengan pendekatan digital di lingkungan pesantren. Penelitian ini menggunakan metode Research and Development (R&D) dengan model System Development Life Cycle (SDLC) pendekatan Rapid Application Development (RAD). Evaluasi sistem dilakukan berdasarkan standar ISO/IEC 25010 dengan fokus pada tiga karakteristik: functional suitability, compatibility, dan usability. Hasil pengujian menunjukkan bahwa sistem memenuhi seluruh fungsi utama dengan nilai 100% untuk functional suitability dan compatibility, serta memperoleh skor usability sebesar 89,97% dari 24 responden. Penelitian ini menyimpulkan bahwa sistem yang dikembangkan sangat layak untuk diimplementasikan dan dapat meningkatkan efektivitas proses pembelajaran di pesantren.

INTRODUCTION

Education is a fundamental aspect of human life, serving as a process of transmitting knowledge, character formation, and enhancing an individual's moral and spiritual qualities. In the Islamic context, the pursuit of knowledge is a lifelong obligation, as affirmed in Surah An-Nisa', verse 82 of the Quran, which states that Allah will exalt those who have faith and knowledge. Education is the process of transmitting knowledge, skills, and habits from one generation to the next through teaching activities that shape individual learning and character.(Suryani, 2024).

Education develops a person's full potential, shaping character and morals, enabling them to face life's various challenges. Education is a process involving learning, skill development, and habit formation, which is passed from one generation to the next, generally through teaching. Essentially, education aims to develop an individual's full potential and develop their character and morals (Zalsabella P et al., 2023).

Education aims to transform negative human thought patterns into positive ones. In fact, in Islam, education is obligatory for every Muslim to pursue or acquire knowledge (Nugraha, 2023). In the interests of religious education, religious educational institutions have been established in Indonesia which are regulated according to the beliefs held by the people of Indonesian.

Religious education has unique characteristics with a primary orientation in preserving and deepening religious teachings, especially not forgetting the study of books, one of which is the study of Islamic boarding school yellow books and yellow books are two inseparable elements in the Islamic education system in the Islamic boarding school environment. Since the early days of its development, Islamic boarding schools have always been closely related to the works of Salaf scholars summarized in yellow books as the main reference that has a role in the learning process and the development of religious understanding in Islamic boarding schools. (Fitri & Ondeng, 2022).

The Yellow Book is an important reference for developing an understanding of Islam. This book contains explanations of Islamic teachings derived from the Quran and Hadith(Tarihoran & Rezi, 2021). This book covers various branches of religious knowledge, such as jurisprudence, hadith, monotheism, creed, Sufism, tafsir, Islamic history, and other proven Islamic sciences. In Islamic boarding schools, these older books are often referred to as "classical" or "ancient" books (*al-kutub al-qadimah*). Some people also call it a "bare book" because the letters in the book are usually not accompanied by punctuation or capitalization.

The existence of technology has brought education to a more advanced and modern direction, this also affects the process of learning books for teachers in managing the learning process from manual to digital by designing a management information system for the yellow book learning process which is similar to an e-learning system.

METHODS

This type of research is Research and Development (R&D), which aims to develop a product in the form of an information system and test its effectiveness in the context of real use. The R&D method is used to design and develop technological products that are able to solve real problems in the field, with the main focus on two things: creating the product and evaluating the extent to which the product is effective in meeting the predetermined objectives. In this study, the product developed is a web-based information management system to support the learning process of yellow books at MTI Canduang Agam.

The system development design follows the System Development Life Cycle (SDLC) approach, which is a systematic framework for software development. The SDLC model used is Rapid Application Development (RAD), known for accelerating the development process through an iterative and collaborative approach. RAD consists of three main stages: requirements planning, RAD design workshop, and implementation. The requirements

planning stage is conducted through observation and interviews with Islamic boarding school teachers and staff to formulate comprehensive system requirements. In the design workshop stage, a collaborative system design process is carried out between researchers, users, and developers, where an initial prototype is displayed and adjusted based on user input. The implementation stage involves user testing of the system and validation of the system's functionality before its full implementation.

These phases include requirements planning, the RAD design workshop, and implementation. The following are the application development stages for each phase of application development(Prabowo, 2020) :

1. **Requirements Planning**
    In this phase, users and analysts meet to formulate the objectives of the application or system to be developed and determine the information needs arising from those objectives. The primary focus of this phase is solving the problems facing the company. While technology and information systems may drive some aspects of the proposed system, the focus will always remain on achieving the company's objectives.

2. **RAD Design Workshop**
    In this stage, the design and refinement process is conducted through an intensive, workshop-like working forum. Analysts and programmers collaborate to develop and present visual representations of the system's design and flow to users. These design sessions can last several days, depending on the complexity of the application being developed. During the RAD design workshop, users provide feedback on the prototypes presented, while analysts adjust the modules based on that feedback. If the developer or user has sufficient experience, this creative process can significantly accelerate development.

3. **Implementation**
    During the implementation phase, analysts collaborate intensively with users through workshops to design various business and non-technical aspects of the company. Once these elements are approved and the system is successfully built and tested, the new system or some of its components will be piloted before being officially implemented within the organization.

Researchers used product trials with the ISO/IEC 25010 standard. ISO/IEC 25010 is the standard used to assess applications in research. ISO 25010 comprises eight main aspects, but researchers chose only four aspects as the basis for measuring application quality(Swari et al., 2023).

1) **Functional Suitability**
    Functional Suitability is a measure of how well the software can run all existing system functions, whether it is in accordance with what is needed by the user. The following formula will be used to obtain the interpretation of the results of the functional suitability test.(Dako & Ridwan, 2021):

$$\boldsymbol{Persentase\ kelayakan}\,(\%) = \frac{skor\ total}{skor\ maksimal}\ x\ 100$$

After the test scores are obtained, the data will be processed using the specified formula and the percentage results will be converted into statements according to the existing table.(Roihanah & Rochmawati, 2021):

Hasil Presentase (%)	Kriteria Kelayakan
0-20	Sangat tidak layak
21-40	Tidak Layak

41-60	Kurang Layak
61-80	Layak
81-100	Sangat Layak

2) Usability

Usability testing is a technique used to evaluate products that will be tested directly by primary users (Welda et al., 2020). Usability using questionnaire testing usability testing was conducted using a use questionnaire developed by the STC Usability and User Experience Community.

$$Pskor\ \frac{skor\ total}{skor\ maksimal}\ x\ 100$$

This test is carried out by calculating the Likert measurement results from respondents using a five-level Likert scale. On the Likert scale, each answer will be given a score according to the following order (Prasuci Nanda Minova et al., 2022):

Kriteria	Skor
Sangat Setuju	5
Setuju	4
Netral	3
Tidak setuju	2
Sangat Setuju	1

The usability test results data will be analyzed to calculate the answers based on the respondents using the formula below (Ferdian et al., 2024):

Skortotal $= (J_{SS}\ x\ 5) + (J_S\ x\ 4) + (J_N\ x\ 3) + (J_{TS}\ x\ 2) + (J_{STS}\ x\ 1)$.

Criteria for interpreting the scores from usability testing results, first find the percentage score using the formula (Prasuci Nanda Minova et al., 2022):

$$Pskor\ \frac{Skor\ total}{i\ x\ r\ x\ s}\ x\ 100\%$$

After receiving the percentage of responses, respondents were then given an explanation or assessment of the research results, as shown in the table below. (Prasuci Nanda Minova et al., 2022):

No.	Presentase Skor	Kategori
1	81-100	Sangat layak
2	61-80	Layak
3	41-60	Cukup Layak
4	21-40	Tidak Layak
5	0-20	Sangat tidak Layak

3) Compability

Compatibility testing aims to evaluate the extent to which a system can function properly in various different environments, including various devices and browsers, screen sizes, and operating system versions as needed. The following are the steps taken in each phase of application development. This research is similar to functional suitability testing, namely using the option of success or failure. If success is worth 1 and if the answer fails is worth 0. After obtaining the score data from the test results, the next step is to calculate the percentage using the predetermined test formula that will be implemented (Dako & Ridwan, 2021):

$$\textbf{\textit{Persentase kelayakan}}\ (\%) = \frac{skor\ total}{skor\ maksimal}\ x\ 100$$

The data sources in this study were obtained through interviews, direct observation, and internal documentation of the Islamic boarding school, such as the learning schedule, syllabus, and the existing evaluation system. Data collection techniques focused on exploring user needs and identifying problems in the yellow book learning process. Qualitative data from interviews and observations were analyzed descriptively to formulate system requirements, while quantitative data were obtained through a system feasibility test based on the ISO/IEC 25010 standard, which includes three main characteristics: functional suitability, compatibility, and usability.

System testing was conducted using a black-box testing and user validation approach, involving 24 respondents (2 teachers and 22 students). The system feasibility evaluation was based on a questionnaire designed to measure user perceptions of the system's usability, functionality, and compatibility. The final scores were then analyzed quantitatively using percentages and interpretation of feasibility categories. The results of this stage serve as the basis for concluding the system's effectiveness and recommending its further development.
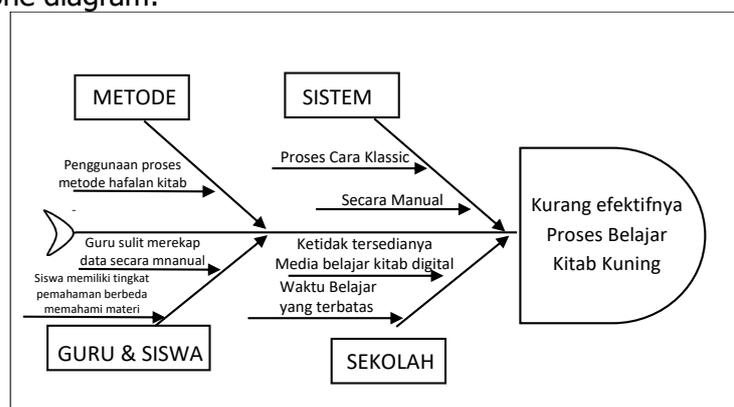
RESULT AND DISCUSSION

RESULT

This research resulted in a product in the form of a web-based yellow book learning process management information system developed using the CodeIgniter Framework. This system is intended to support the process of managing learning data, evaluating learning outcomes, and student attendance at MTI Canduang, Agam. The presence of this system is expected to replace the manual method that has been used to be a digitalized system, thus providing convenience and efficiency for teachers or ustadz in managing learning information. Rapid Application Development (RAD) in software development emphasizes an iterative approach in the process and involves active collaboration with users. The presentation of the results of this study is arranged systematically according to the stages in the model, the presentation of the results of this study is structured as follows:

1. Perencana Kebutuhan

The first step in starting system development is the requirements planning stage in the form of data analysis that focuses on collecting information and identifying system requirements in detail. This research was conducted to address the challenges faced by MTI Canduang Agam, especially in terms of managing yellow book learning which is still manual and carried out by teachers, including the process of depositing and recording student attendance and student understanding in a very short learning time. Information and problem findings at this stage become the main foundation in the planned information system design process. The following image explains the problems that occurred in the form of a fishbone diagram:

2. System Design Workshop

The first step in starting system development is the requirements planning stage in the form of data analysis that focuses on collecting information and identifying system requirements in detail. This research was conducted to address the challenges faced by MTI Canduang Agam, especially in terms of managing yellow book learning which is still manual and carried out by teachers, including the process of depositing and recording student attendance and student understanding in a very short learning time. Information and problem findings at this stage become the main foundation in the planned information system design process. The following image explains the problems that occurred in the form of a fishbone diagram:

a) General System Design

The general system design describes that users such as admins or teachers can access information systems designed based on school needs, to facilitate data management.
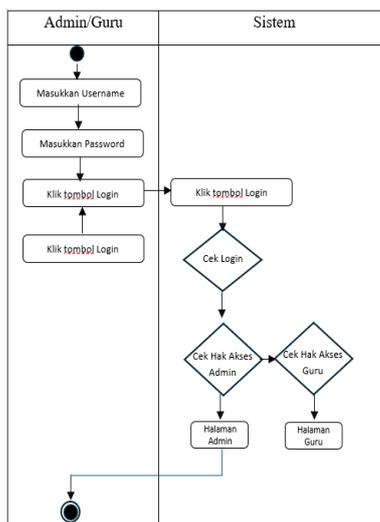
b) Desain UML
  1) Use Case Diagram
      Use case diagrams show the relationships between actors and use cases. Use case diagrams represent the system's main functions and system requirements from the user's perspective. Meanwhile, actors represent the users or parties who provide information to the system
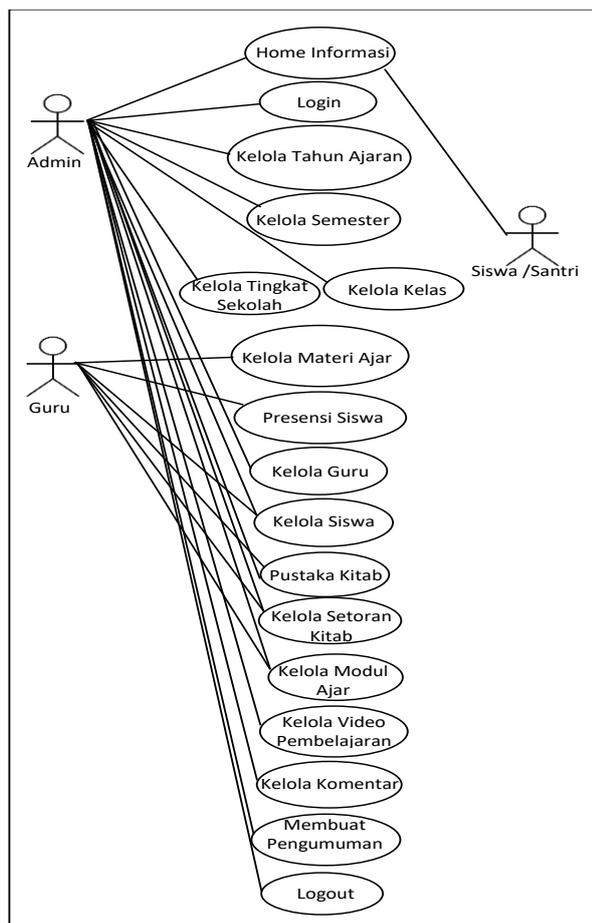
2) Activity Diagram

Activity Diagram represents the flow of activities in a system. Activity diagrams manage system data in managing academic year data, managing semesters, activity diagrams managing school levels, activity diagrams managing class levels, activity diagrams managing book collections, activity diagrams for student data input, activity diagrams for teacher data input, activity diagrams for managing teaching modules, activity diagrams for managing yellow book deposits, activity diagrams for managing learning videos, activity diagrams for making announcements, activity diagrams for replying to comments, and activity diagrams for logging out. The following is a picture of an activity diagram in the research process:

1) Sequence Diagram

Sequence diagrams are used to illustrate the sequence of interactions between actors and the system in executing a process. These diagrams help explain how a feature in the system is executed sequentially from start to finish. The following is a sequence diagram:

2) Class Diagram

A class diagram depicts the structure of classes, including attributes, methods, and relationships between objects within a system. This diagram is used to explain how each component is interconnected within the system architecture. A visualization of a class diagram can be seen in the following image:

The class diagram above illustrates the structure of the yellow book learning system, which consists of several classes, such as user classes (admin, teacher, student), learning data classes (teaching modules, book deposits, subjects, videos), and other supporting classes such as classes, book collections, book positions, comments, and announcements. Each class is interconnected to support the management process and information access within the system.

c) Desain Databse Table

Database system design: The database design contains tables and the attributes of the system to be created. The database name in this system is db_manajemenkitabkuning_mti, and one of the table displays is shown below:

| No.	Nama *Field*	Tipe
1.	id	int
2.	user_id	int
3.	tahun_mulai	int
4.	tahun_akhir	int
5.	keterangan	varchar(255)
6.	created_at	timestamp
7.	updated_at	timestamp

d) Desain interface Sistem

System interface design is the initial stage in shaping the visual appearance of the system to be developed. Below are several interface designs for the system under development. The results of the design coding implementation, and one system design, can be seen below:

1) Desaing Output
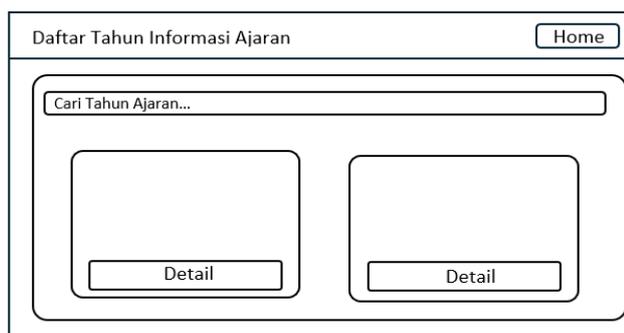
2) Desain Input
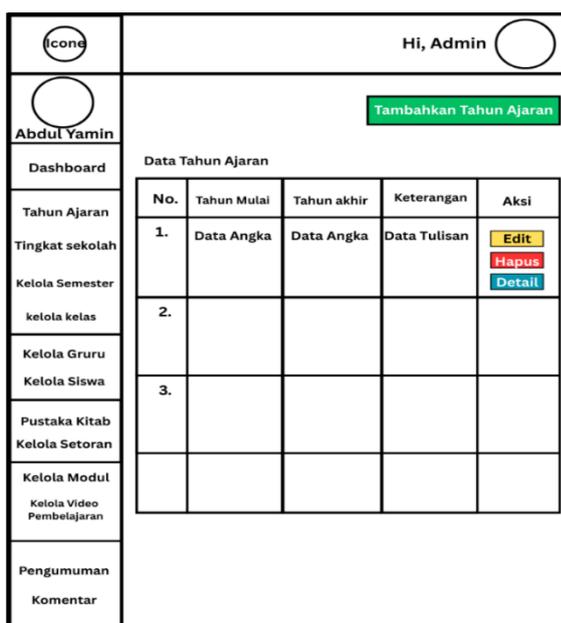
3. Implementasi

At this stage, the system developer begins implementing the previously approved design. This process is part of the application development process, which is carried out systematically through the development stages. The results of one implementation of the design coding and system design can be seen below:

1) Hasil output sistem
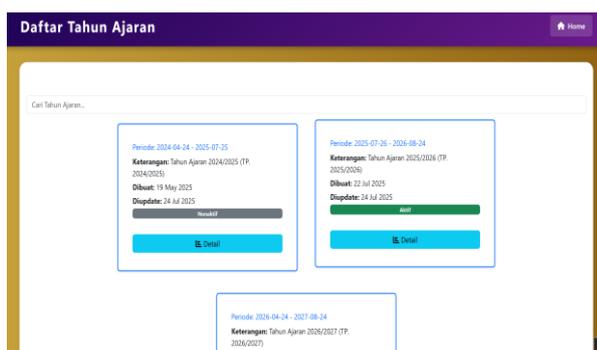
2) Hasil *input* sistem
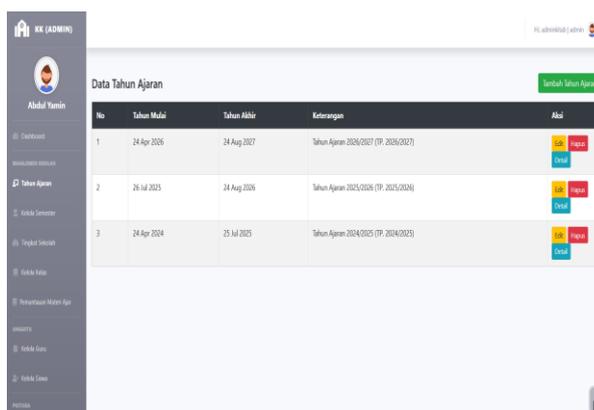
DISCUSSION

The yellow book learning information management system developed in this study has generally succeeded in addressing various problems faced by MTI Canduang Agam in the learning management process. Before this system, learning data management was still done manually, which caused various obstacles such as decentralized recording, poorly documented storage of teaching materials, as well as limited access to material information for students / santri and limited study time and diverse student / santri understanding in understanding the yellow book. With this web-based system, the entire learning process can now be organized more effectively, efficiently, and structured.

The system provides access and control according to each user's rights. The administrator, as the primary system manager, has full authority to manage master data such as academic years, classes, teachers, students, textbook collections, and announcements. Teachers are given an active role in uploading and sharing learning media in the form of teaching modules and learning videos, as well as managing student book deposits. Meanwhile, students can easily access learning information provided by teachers without the need for face-to-face meetings. This certainly provides greater flexibility in the learning process, especially in today's digital age.

The developed Yellow Book Learning Process Management Information System has been tested using the ISO/IEC 25010 software testing standard and was found to meet all testing criteria. In the functional suitability test, the system obtained a score of 100% and was categorized as very suitable because all functions worked well. The compatibility test also obtained a score of 100%, indicating the system can run simultaneously with other applications without any problems. The usability test results obtained a score of 94.5% and was categorized as very suitable because it was easy for users to use.

CONCLUSION

Based on the description presented in Chapters I through IV, several conclusions can be drawn. The system developed is a web-based Yellow Book Learning Process Management Information System at MTI Canduang Agam. This system was built using the CodeIgniter Framework, the PHP programming language, and a MySQL database. This system is designed to simplify the Yellow Book learning management process, including recording teaching materials, managing student data, inputting memorization notes, and providing learning media such as modules, videos, and digital books.

One of the learning methods supported by this system is the memorization method, a process in which students routinely memorize specific texts under the guidance and supervision of a religious teacher (ustadz), then submit them within a specified timeframe. The system provides a memorization recording feature to help ustadz monitor students' memorization progress in a more structured and documented manner. This demonstrates that the system is not only digitally oriented but also supports traditional learning practices long established in Islamic boarding schools.

The system can be accessed online and supports access from both computers and smartphones, making it easier for three main types of users—admins, teachers, and students—to access and search for learning information. The developed Yellow Book Learning Process Management Information System has been tested using the ISO/IEC 25010 software testing standard and has been found to meet all testing criteria. In the functional suitability test, the system obtained a score of 100% and was categorized as very suitable because all functions ran well. The compatibility test also obtained a score of 100%, indicating the system was able to run simultaneously with other applications without any problems. The usability test results obtained a score of 94.5% and were categorized as very suitable because it was easy for users to use. Overall, this system is able to help improve the management of Yellow Book learning to be more systematic, documented, and efficient, and support the digitalization process in the Islamic boarding school environment.

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