

Research article

Edu-Smart Learning Management System with Iterative Model and Appreciative Inquiry for Distance Learning

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Abstract.

During the COVID-19 pandemic, all learning activities began to be conducted online. Online learning aims to meet educational standards by utilizing information technology to distribute subject matter and enable collaboration between students and teachers. This concept is known as the learning management system (LMS). A solution to support online learning policies is an LMS with hybrid-based gamification features. This article discusses the design of a distance learning LMS with hybrid-based gamification features. Such an LMS is more attractive than other LMS systems because it is equipped with gamification features. Gamification aims to make learning more engaging by incorporating game thinking, game design, and game mechanics into the learning process. This application is a website that has been converted into native code for platforms like iOS and Android and the hybrid application can be accessed easily via a smartphone. Students can be motivated to learn by using gamification in the LMS.

Keywords: Edu-smart, LMS, online learning

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Published: 28 September 2022

Publishing services provided by
Knowledge E

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Selection and Peer-review under the responsibility of the ICESRE 2021 Conference Committee.

1. Introduction

The Covid-19 pandemic has changed a lot of things. Learning activities for school students are implemented with a new system, namely distance learning whose activities are carried out outside of school. The government's policy regarding education during the COVID-19 period is contained in Circular Letter Number 4 of 2020 concerning the Implementation of Educational Policies in the Emergency Period for the Spread of Coronavirus Disease (Covid-19) dated March 24, 2020, which recommends continuing to carry out the teaching and learning process from home through online learning. [1]. The current pandemic conditions force innovation and adaptation related to the use of available technology to support the learning process [2]. Knowledge transfer during the COVID-19 period requires educators and students to interact online.


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Online learning is learning that utilizes technology where students try to cope with several tasks and make decisions at any time based on online. One of the goals of online learning is to maximize the decisions that students have made online by being given knowledge of the correct answers and additional information that can be accessed at any time [3]. Online learning can take advantage of platforms in the form of applications, websites, social networks and learning management systems [4]. Edu-Smart is a learning management system that was built as an online learning tool for school students by adding an appreciative inquiry feature that students hope will be more enthusiastic in using this platform.

Appreciative inquiry is a concept in behavioural research that focuses on rewarding something positive. Generally, appreciative inquiry is applied in an organization and departs from the advantages and strengths it has. Research related to Appreciative Inquiry includes developing appreciative inquiry as a learning model [5]. Appreciative inquiry can also be applied in the E-marketplace as a reward for customers who often use shopping transactions through the E-marketplace platform by providing additional points for discounts, advertising promos or giving merchandise [6]. The development of the Edu-Smart LMS uses an iterative model which is a combination of the waterfall and iterative model on the inner prototype model. This model produces an LMS version that has added functionality for each increment.

2. Method

The result of the research that will be developed is an Edu-Smart LMS with additional Appreciative Inquiry features. The methods used in collecting data to build this LMS include: 1) Observations are carried out by making direct observations on the existing LMS platform to find out the user interface design, types of features available and the process flow for its use. 2) Literature study by collecting data needs on the development of LMS, appreciative inquiry concepts from books, journals and scientific articles to gain conceptual knowledge from this research. 3) Surveys to partner schools related to subjects, lesson plans, assignments for application menu design needs and several LMS service users to find out the advantages and disadvantages of learning with LMS. The system development carried out in this study uses an iterative model. The steps in system development can be described in Figure 1.

In the analysis stage, functional and non-functional requirements analysis activities of the LMS are carried out which include the requirements for the main functions of the LMS, namely input, process and output, while non-functional requirements include

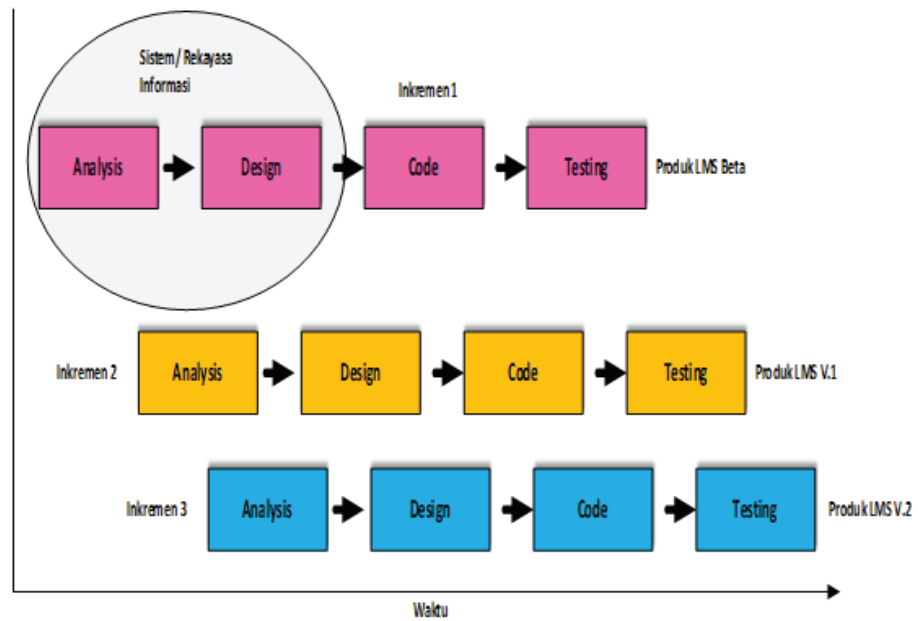


Figure 1: Iterative Model.

security features in the LMS, hardware and software requirements needed to build an LMS. Then the design stage is carried out using an object-oriented approach and UML modelling tools (Use Case diagrams, Activity Diagrams, Sequence Diagrams and Class Diagrams) followed by LMS development with programming language and Database Management System and integrating the concept of appreciative inquiry in it. The next stage is limited testing using black box tests and user acceptance tests.

3. Results and Discussion

In the needs analysis stage, several requirements have been identified which are classified into functional and non-functional requirements. Functional requirements are the needs of what processes can later be done by the system to overcome the problems that have been defined from the analysis problems that occur in the learning process of the Edu-Smart LMS can be seen in Table 1.

Figure 2 describes the operational flow of the functional requirements analysis of the Edu-Smart LMS. Non-functional requirements in the Edu-Smart LMS include hardware requirements as server and client hardware, software requirements to build applications so that applications can run on web or mobile (hybrid) platforms.

TABLE 1: Functional Needs Analysis Results.

Actor	Featured
Administrators	Login Managing Data (Add, Update, Delete) Teacher Profile Data, Subject Material Data, RPP Data, Student Data, Attendance Data, Learning Data, Task Data, Exam Data. Gamification Setting Appreciative Inquiry Features.
Teacher	Login Managing Data (Add, Update, Delete) Teacher Profile, RPP, Subject Matter, Assignment Data, Learning Data, Exam Question Data. Presence Settings Gamification Setting Appreciative Inquiry Features
Students	Login View lesson plans, lesson materials, learning journals Upload Assignments Doing Presence Sending the results of the UTS / UAS Exams Learning Journal Input

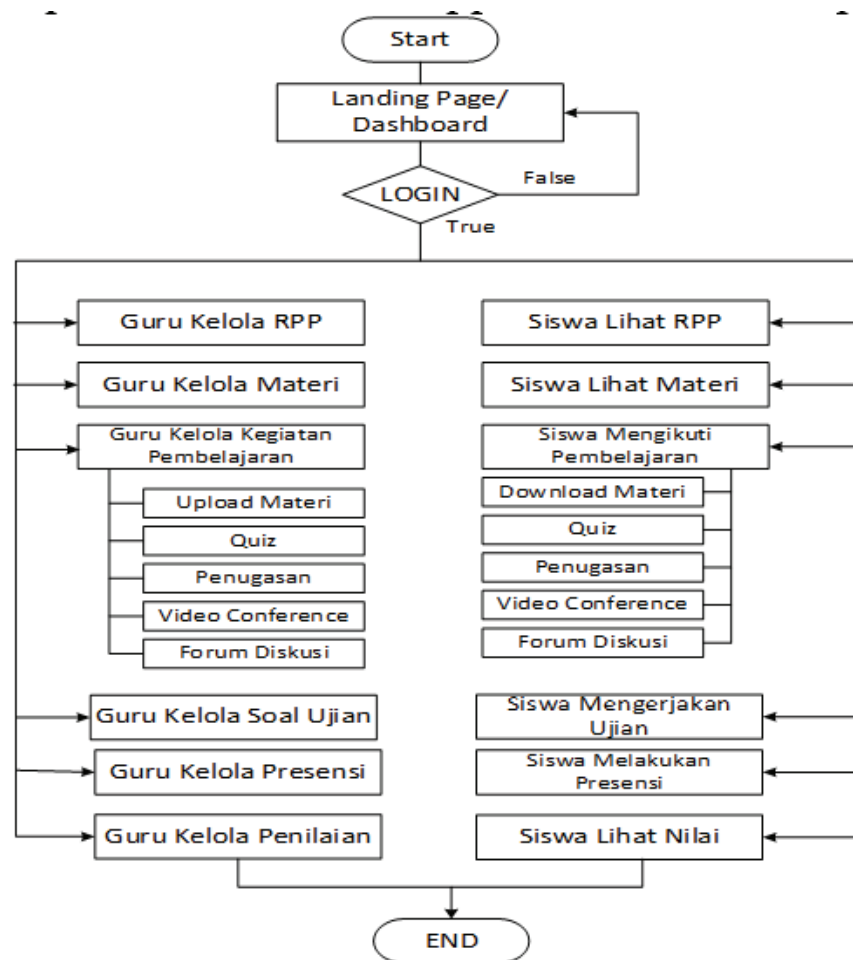


Figure 2: Functional Requirements of Edu-Smart LMS.

In making this design, the UML (Unified Modeling Language) system design tool is used which is a system design tool with an object-oriented approach. The design of the Use Case Diagram in Edu-Smart is presented in Figure 3.

From the use case diagram modeling that is formed, the main use cases can be defined in Table 2 below.

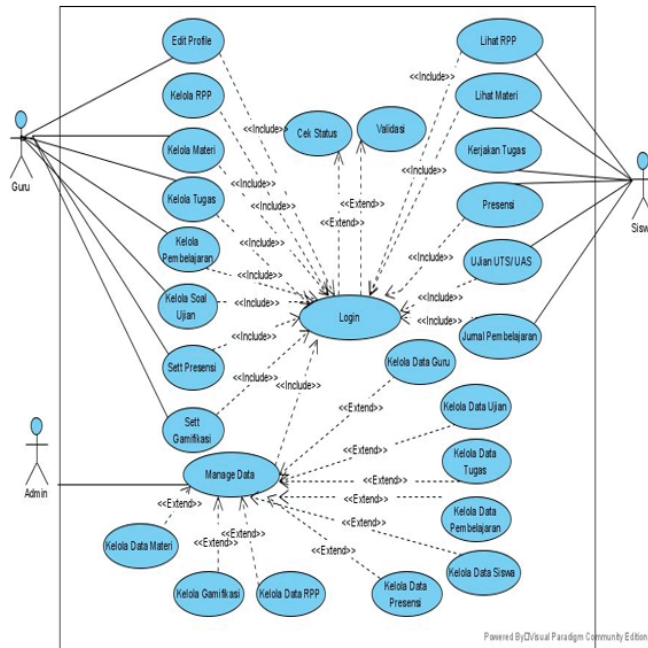


Figure 3: Use Case Diagram dari LMS Edu-Smart.



Figure 4: Login Page.

Figure 4. Shows the appearance of the Edu-Smart LMS User Interface. On the login page there are two inputs that must be filled in, namely username and password, and there are several menus including Home, about us and contact as well as language options for using the Edu-Smart LMS.

Figure 5 shows a dashboard page that contains several menus and several thumbnails that serve as information on the total schedule recapitulation, teachers who have input the syllabus/RPP, teachers who have not input the syllabus/RPP, online users, today's LMS visitors, total visitors, hits of the day this, and the total hits. In addition, it is also equipped with a manual book download link for using the Edu-Smart LMS.

TABLE 2: Description of the Use Case Diagram of the Edu-Smart LMS.

Use Case	Description
Manage Material	This use case can be accessed by the teacher to manage the subject matter that will be input/uploaded in the LMS and has an association with login.
Profile Update	This use case can be accessed by teachers to update teacher profiles that are stored in the LMS and have an association with login.
Manage lesson plans	This use case can be accessed by teachers to manage lesson plans for subjects that will be input/uploaded in the LMS and has an association with login.
Manage Tasks	This use case can be accessed by the teacher to manage the assignments that will be given to students so that they are stored in the LMS and have an association with login.
Manage Learning	This use case can be accessed by the teacher to manage learning data carried out with students so that it is stored in the LMS and has an association with login.
Manage Exam Questions	This use case can be accessed by the teacher to manage data on exam questions given to students so that it is stored in the LMS and has an association with login.
Presence Set	This use case can be accessed by teachers to set attendance dates for students so that they are stored in the LMS and have an association with login
Gamification Set	This use case can be accessed by the teacher to set points / gamification values/appreciative inquiry for students so that they are stored in the LMS and have an association with login
Data Management	This use case can be accessed by the Administrator and has associations with use cases Manage material data, use cases manage gamification, use cases manage RPP data, use cases Manage RPP data, use cases Manage attendance data, use cases Manage student data, use cases Manage data learning, use case Manage assignment data, use case Manage exam data, use case Manage teacher data and login.



Figure 5: Dashboard.

Figure 6 shows the video conferencing feature in the Edu-Smart LMS used for asynchronous learning between teachers and students. In this feature, after the video

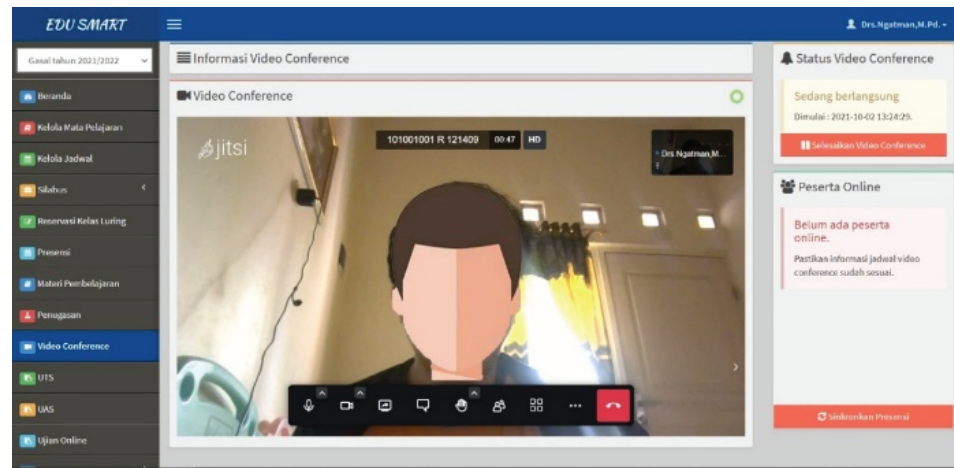


Figure 6: Video Conference Features.

conference session is held, the teacher can use the sync attendance menu to automatically present attendance to students who have attended the video conference. The appearance of the presence report can be seen in Figure 7 below.

PRESENSI
SMP NEGERI 2 GUBUG
 Jalan Raya Jeketro No 41. Ds. Jeketro Kec. Gubug, Kabupaten Grobogan, Jawa Tengah - Indonesia
 Telp: 02418316377, Fax: 0445217, Email: info@smp2gubug.sch.id, Homepage: www.smp2gubug.sch.id

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NO	NIM	NAMA	MINGGU																% MASUK
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	8570	ADITYA PUTRA PRATAMA	✓																6.25 %
2	8571	AIFA KARMA PUTRI	✓																6.25 %
3	8572	AKBAR RIZKY SETYANO	✓																6.25 %
4	8573	ALMIRAH BIKTA RAHMANN	✓																6.25 %
5	8574	ANGELA LICHA ENGGAJATI	✓																6.25 %
6	8575	ANTO WIJAYA KUSUMA	✓																6.25 %
7	8576	ASYIFA RIZKA HAMBIA	✓																6.25 %
8	8577	AYATUL KHUSNA	✓																6.25 %
9	8578	AZZAHRA ANASTASYA RAMADHANI	✓																6.25 %
10	8579	BESMA NARYAMA KUSWATRA	✓																6.25 %
11	8580	DAVIN DHAULHAQ KHALITSAR IRAWAN	✓																6.25 %
12	8581	DICI MAULANA NOVIAN ADIPUTRA	✓																6.25 %
13	8582	DANI PRASETYO BENDAYAN	✓																6.25 %

Figure 7: Attendance Report.

The Video Conference feature can directly synchronize the attendance of students who attend the lesson, making it easier for teachers to monitor asynchronous learning. The Edu-Smart user interface is designed optimally to be user friendly so that it is in accordance with research conducted by Munir who concluded that the easier the LMS is to use, the more the benefits of the LMS will increase and also have an impact on the desire to use the LMS [7]. The LMS developed by Agung Tri Wibowo to measure students' conceptual understanding and character has implemented several features that are almost the same as the Edu-Smart LMS, only there is no Video Conference feature which is an Asynchronous learning facility between teachers and students [8]. The LMS design developed by Syakir Ni'am uses a process-oriented approach using

Context Diagram, DFD Level and ERD design tools while the Edu-Smart LMS uses an object-oriented approach with UML (Unified Modelling Language) modelling tools [9]. The existence of the Appreciative Inquiry gamification feature in the form of giving additional points to students who are the fastest to collect assignments, additional points for attendance of students who are diligent in participating in learning in EDU-SMART are expected to increase students' enthusiasm in using this LMS.

4. Conclusion

Edu-Smart LMS can be designed using UML (Unified Modeling Language) modeling tools and iterative model development methods up to the code stage. Appreciative inquiry can be integrated into the Edu-Smart LMS by implementing a point system for certain actions. Attendance can be done directly by the teacher during learning and the video conference feature for asynchronous learning can automatically record the attendance of students who take part in video conferences by selecting the attendance synchronization menu.

5. Authors' Contributions

The first author of this article contributed to the concept of the Edu-Smart LMS, Bambang Agus Herlambang and Muhammad Saifuddin Zuhri contributed to the development of the Edu-Smart LMS.

acknowledgments

Thank you to the Ministry of Education and Culture (Kemendikbudristek) for providing funding assistance in the implementation of the Edu-Smart LMS development.

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