

Utilization of Cloud Computing Technology in E-Learning SMK PGRI 4 Pasuruan

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Abstract

Learning activities at the SMK PGRI 4 Pasuruan school still use the conventional model, namely face-to-face, so it is necessary to develop online learning media or what is now often referred to as e-learning to help teachers and students take material and do assignments online. With online learning, it is hoped that teachers can update learning materials and students can access them without being constrained by place and time, besides that assignments to students can be well controlled. In general, all SMK PGRI 4 Pasuruan schools have the same business processes as well as system and information technology requirements. However, in reality, each school develops its architecture and information system separately. On the other hand, the majority of schools do not have sufficient budget to procure infrastructure to support the information systems needed, especially for learning activities such as e-learning. This research uses the Agile Software Development method. This research aims to help the SMK PGRI 4 Pasuruan school improve the quality of learning by utilizing e-learning learning media without having to think about the procurement, installation and configuration of hardware or software.

Keyword: Cloud Computing, Learning Management System, School

INTRODUCTION

The development of the times is accompanied by the rapid advancement of Information and Communication Technology (ICT). Information and communication technology has a great



impact and influence on all aspects of human life. Currently, almost all residents of life can be controlled and monitored through technology. The rapid development of information and communication technology is based on several fields of technology, such as Cloud Computing, Big Data, Artificial Intelligence and so on. (Pradana, 2021)

The world of education has been positively impacted by the rapid development of technology and science. Global changes such as the COVID-19 pandemic have driven a significant increase in the use of technology in learning. Learning media, which was originally in the form of modules, is now developing by utilizing internet media and smart devices such as computers, laptops or smartphones, which are now often referred to as e-learning.

SMK PGRI 4 Pasuruan is one of the schools that still implements conventional learning. If the teacher does not have time to attend and meet his students to give homework assignments or materials, then the media used to convey it is social chat media such as whatsapp. Teachers must contact their students to provide homework or materials, if it is an assignment in the form of homework, the results of the work must be sent by the students one by one to their teachers via whatsapp media.

Such learning activities need the development of online learning media or what is now often referred to as e-learning to help teachers and students in accessing materials and assignments online. E-learning-based learning to support teaching and learning activities allows teachers to develop their learning media by using electronic-based learning media (e-learning) with the aim of enriching learning materials so that it will make students more interested so that it will increase their interest in learning. One of the reasons for increasing interest in learning is influenced by the ease of obtaining subject matter through electronic-based learning media (e-learning). E-learning consists of all forms of learning and teaching that are supported electronically. Information and communication systems, whether networked or not, function as a special medium to carry out the learning process. (Fithri et al.2020)

The development of e-learning has now been supported by services from cloud computing. Cloud computing is a model that allows easy access to networks and applications. Compute resources are configured to provide services that users can use with little effort or engagement. By applying the concept of cloud computing as a software as a Service (SaaS) service, it is hoped that it can help schools in reducing operational costs in building an e-learning system. (Zulafwan,2016)

In addition, cloud computing-based e-learning platforms also allow for better collaboration between students and educators. With features such as discussion forums, virtual classrooms, and other online communication tools, students can actively interact with



classmates and educators, exchange information, and support each other in the learning process. This collaboration builds a stronger learning community and improves the overall learning experience.(Cahyanto,2023)

SaaS applications are a service-centric cloud computing delivery model used by IT Infrastructure by using a multi-tenant architecture to provide users with a rich experience with the desired set of features demanded by cloud users (Kumar, 2014). By using the SaaS concept, users as software users can directly use and utilize the software without having to spend development or procurement costs first.

With the existence of an e-learning application that applies the concept of SaaS cloud computing, later it can be used by the school at SMK PGRI 4 Pasuruan to overcome existing problems. The e-learning application developed will have more advantages compared to conventional e-learning applications, one of which is an e-learning application that can be used by all students at SMK PGRI 4 Pasuruan by maintaining data privacy in each school

METHOD

System design for e-learning applications based on cloud computing, using the Agile Software Development method. Agile software development is a software development method that is based on repetitive work, where the rules and solutions that have been agreed upon by each team member are carried out by collaborating in a structured and organized manner.

There are several stages including the Design Stage, Implementation, Software Test, Documentation, Deployment, and Maintenance. The advantage of using the agile method is that it is able to reduce production costs because the pilot product will only contain basic features that precede other features in the product. In addition, the website is also made based on consumer needs and market conditions, more flexible, efficient, and according to needs and also does not require too large resources. The stages can be seen in figure 1.



Figure 1. Stage Agile Software Development Method



Each stage has its own role and function. The description of each stage can be as follows:

1. System planning, is one of the initial stages when the categorization process requires a step or stage. At this stage, developers and users make designs based on mutual agreement. The activities carried out were in the form of interviews, observations and viewing existing document archives.
2. Implementation, which is the preparation of menus for customers which is produced from the design of a new system that is approved into a programming language.
3. Testing, is the main prerequisite of a system. In this step, the developer develops the system in the form of coding, then tests the new software.system that has been implemented will be tested, where there are no errors or bugs when the system is run.
4. Documentation is the process of documenting a device, done by recording the step by step of the system being built. In this step, the test results are documented for easy future maintenance.
5. Deployment, the developer disseminates information about service updates to customers. In thi Maintenance, maintaining the system so that it is in the best condition. In this step, the maintenance process is carried out regularly so that the software continues to run and is maintained according to the best quality as it should be.(Handayani, et al. 2023)

RESULTS AND DISCUSSION

The use of e-learning is divided into 2 groups, users and administrators. Users are divided into three, namely, teachers, members and visitors. A user is a user of an e-learning site, while an administrator, a person who is responsible for processing an e-learning system in order to be controlled. Here's an explanation from each user :

1. Administrator
Administrators act as managers and are part of the online learning system. Administrators can perform manipulative processes such as adding, changing and deleting data in the system. In other words, administrators have the right to process data.
2. Teacher
The role of the teacher is to provide instructions to the members, allowing them to practice mastering the material.
3. Member
Members who have been verified as participants have materials provided by the



4. Visitors

Visitors to e-learning websites whose facilities are limited can only access the main view, news, about us and registration forums, guests do not complete the authentication process and therefore, the access granted is limited(Ginting, 2018)

The e-learning system that will be built can be accessed directly by all users, but unregistered users cannot use all the features provided. Users who want to be able to enjoy all the uses of e-learning must register first. After users log in to the e-learning system using their respective logins, users can then start using all the features provided. The design of the system presented in the creation of e-learning consists of several web pages where each page is interconnected. To find out the needs of the system to be built, a system design is designed that describes the stages to design the program through a modeling tool.

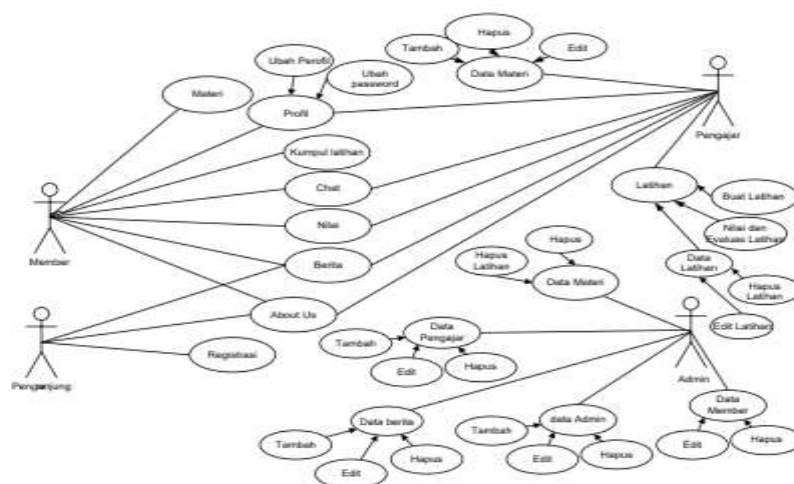


Figure 2. Use Case E-Learning

E-learning in the Learning Process

The online learning process can be held in the following ways: (1) The conventional learning process (more face-to-face meetings) with additional learning through computer interactive media via the internet or using computer interactive graphics. (2) With a mixed method, that is, most of the learning process is carried out through computers, but still requires a face-to-face meeting for the purpose of tutorials or discussing teaching materials. (3) The learning method that is only carried out online as a whole, this method is not found at all face to face meeting. (Hartanto, 2020)



With this model, students can get materials from their respective locations. The advantage of such a learning model is that the student's level increases and his communication skills drive progress. With this model, communication between students and teachers occurs simultaneously or individually through a network. The e-learning information technology-based learning model brings cultural change in the context of learning. There are at least four important elements in learning culture using school online learning. The four elements are (1) Students must learn independently with appropriate variations so that they are able to direct, motivate and regulate themselves in learning. (2) Educators are able to develop knowledge and skills, facilitate learning, understand learning and are necessary for learning. (3) Availability of adequate infrastructure. (4) There is a creative manager and infrastructure preparation to facilitate learning.

In online learning applications, educators not only need to master certain skills, but there are also several skills that educators must have so that the online programs they run can run well. There are three basic skills that educators possess to implement the learning model, namely (1) The ability to make learning designs in accordance with the learning methods described in the lesson plan. (2) Mastery of technology in learning as a learning resource in order to obtain quality educational materials. (3) Mastery of learning materials based on areas of expertise.

Several elements need to be considered when e-learning programs in digital classrooms, for teachers to use the internet and email to interact with students and measure their learning progress, students are able to manage study time to regulate the effectiveness of internet use in multimedia spaces. By examining the development of information technology in the world of education and several important elements that must be prepared when developing an e-learning program, the path of the e-learning program is not impossible to achieve.

Benefits of Using an LMS

Learning Management System (LMS) is a very important application for educational institutions. LMS assists educational institutions in managing learning programs that are conducted online. The use of LMS applications can make the learning process more efficient in improving learning. The benefits that can be obtained in the use of LMS applications applied in educational institutions are as follows:

1. Centralized learning

The learning system using the LMS application makes it easier for lecturers to provide material to students. This also makes it easier for educational institutions to improve the





learning system implemented. The use of the LMS application also makes it easier to deliver materials and assignments to students, as well as making it easier to carry out the assessment process and study results carried out by students.

2. Manage and track training

By implementing an LMS application, lecturers can easily manage and track training to make it easier for all students. Lecturers can also see the data and abilities of students and can see the areas of interest that students like.

3. Learning can be done anywhere and anytime

The application of the LMS application is very helpful in an educational institution, both for lecturers and students. By implementing the LMS application, lecturers can easily deliver material and assign assignments to students without the need to print it first so that it can save costs. Students can also take part in learning anywhere without having to come to the 37 | Learning Management System of educational institutions. When students are sick or cannot participate in learning, students can still follow the learning provided by the lecturer in the future. In contrast to face-to-face learning, where when students are sick and unable to enter school, they can only record material but cannot receive information from lecturers.

4. Easy to use as material repeater

By using the LMS application, the teaching and learning process carried out by lecturers and students can easily adapt to follow the learning process for the better. The learning system implemented through the LMS application can be done repeatedly. The purpose of repeated learning is to be used as learning material when there are students who still do not understand the material during learning.

5. Simple teaching and learning process

Learning carried out using LMS applications becomes more efficient. This is because each material can be uploaded and retrieved easily through learning media. For students, it will also be easier to learn when lecturers use recorded videos as a learning system. (Mujianto,2023)

Utilization of E-learning Technology

1. The use of cloud computing-based e-learning platforms can increase student involvement in distance learning. The interactive features and multimedia content provided by the e learning platform provide a more engaging learning experience, encouraging students to be actively involved in the learning process. This is in agreement





with Dewi (2013) who stated that with the E-Learning platform, interaction between teachers and students can occur anywhere and anytime.

2. The use of cloud computing-based e-learning platforms can also increase student motivation. The flexibility in managing study time and the presence of tracking and feedback features give students a sense of responsibility and appreciation for their efforts, which in turn increases their motivation to study more diligently. This is in line with the research of Kosasi (2015), which states that with e-learning students are motivated to collaborate with peers to discuss the problems they face.
3. The e-learning platform makes it easy to monitor and evaluate learning. Features such as student progress tracking, online assessments, and data analysis provide educators with a clearer picture of student achievement, areas for improvement, and the effectiveness of the learning strategies implemented. (Wiralodra,2023)

The use of cloud computing-based e-learning platforms has a positive impact on increasing the effectiveness of distance learning. These positive impacts include (1) The use of cloud computing-based e-learning platforms can increase student involvement in distance learning. The interactive features and multimedia content provided by the e-learning platform provide a more engaging learning experience and motivate students to be actively involved in the learning process. (2) Cloud computing-based e-learning platforms allow for better interaction and collaboration between students and educators. Through features such as discussion forums and shared projects, students can interact with each other, exchange ideas, and learn together, increasing engagement and collaboration in distance learning. (3) The use of cloud computing-based e-learning platforms provides flexibility in managing learning time. Students can learn learning materials according to their own pace and learning style. This allows for personalization of learning and motivates students to learn independently. (4) Monitoring and evaluation of learning becomes more effective through the e-learning platform. This approach allows educators to track student progress, provide relevant feedback, and identify areas for improvement. This helps improve the quality of learning and the efficiency of educators.

LMS Features in the Online Learning Process

Learning Management System (LMS) applications in general have various features that support online learning so that the learning process can run optimally. The features of the LMS application service can support teacher performance and help students to get a meaningful learning experience. These features include :





1. **Easy to Understand User Interface** A good LMS must have a good user interface, attractive, easy to operate, and easy to understand by its users, both lecturers and students. LMS users will also not feel confused when using LMS applications. The attractive user interface feature can also attract a lot of attention, especially new users who want to try using the LMS application as an online learning medium
2. **Registration that Can Be Done Online** The registration feature is one of the features that is mandatory for all LMS applications to have. Through the registration service feature, students can register themselves online through the LMS address and can see the arrangement of the learning syllabus that has been prepared by the lecturer. This feature is very helpful, especially for students in registering because of the fast process and of course there is no need to bother looking for a form and then collecting it to an educational institution offline.
3. **Online Classes** As a learning medium, of course, LMS has an online class feature. Here the online class in question is a digital classroom service that presents the teaching and learning process without requiring physical contact. The online classroom feature presents various types of learning materials digitally, including learning videos or animations, lecturer recordings of learning materials, and learning material documents (articles or ebooks) that can be independently studied by students.
4. **A good LMS Online Quiz and Exam service** also provides online quiz and exam features so that lecturers can evaluate learning for their students. The online quiz and exam feature must also support the needs of lecturers in making questions and distributing exam questions to students.
5. **Online Discussion Rooms** This feature is very important to support the learning development of students. Through the online discussion room feature, lecturers can discuss student materials that are presented and that have been studied by students. The online discussion room also helps communication between lecturers and students in carrying out the teaching and learning process that is carried out online, and can help lecturers to measure the level of student understanding of the material that has been given
6. **Learning reports** LMS application service providers certainly embed a report feature that can make it easier for lecturers to evaluate the development of students. This feature is also useful for attendance attendance, monitoring the work of assigned assignments, and being able to recapitulate the answers to quizzes and exams of students.





Advantages in Supporting Online Learning in E-learning

The Learning Management System (LMS) application is an application designed to assist in the online teaching and learning process so that it can run optimally. The advantages include:

1. The cost required to use an LMS is cheaper than the face-to-face learning process
2. Making it easier for lecturers to collect and analyze data on student learning outcomes during learning in a shorter time
3. Make it easier for lecturers to find and organize learning materials for students.
4. Learning time is more efficient because by using LMS, students can access online learning anywhere and anytime.
5. The LMS learning method that uses several information technologies in the form of images, sounds, animations, videos, and texts makes the learning material easier to understand and not boring.
6. Encouraging students to be more active independently in learning.
7. Learning content for students can be well documented.
8. Facilitate interaction between teachers and students with chat features and discussion room groups.

CONCLUSION

This research makes an important contribution in improving and improving distance learning through the use of cloud computing-based e-learning platforms. Its contributions include improving learning effectiveness, expanding educational accessibility, encouraging student engagement, facilitating monitoring and evaluation, and stimulating educational innovation. In general, teachers' knowledge of cloud computing technology is good with the existence of internet media in information search. They feel that e-learning media can make it easier for teachers and students to interact so that learning becomes more interesting, even though they have never implemented it before in the learning process where they have only practiced e-learning after socialization from universities. The use of cloud computing technology has brought changes in the learning process, from face-to-face to online learning. Making teachers and students can communicate virtually without any distance and time. Increase student motivation and provide students with a new technology-based learning model.

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