E-LEARNING DESIGN USING THE WATERFALL MODEL IN EINSTEIN INSTITUTION AT PURWOKERTO

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Abstract

The Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 109 of 2013 Article 1 regarding electronic learning (E-learning) is to utilize information and communication technology-based information packages for learning purposes so that students can access it anytime and anywhere. The research data collection use observation and interview. This research used waterfall methodology consist requirement analysis, system design, coding, and testing to build a framework for Einstein. The research will be designed an E-learning system has correlation to integrate five components or sub-systems including man, time, method, machine or equipment, and information. The actual business process result has 3labor still use manually to operate learning and administrative process. The proposed business process to help the documentation learning system and administrative process will update in real time cause using E-learning. The results of the study were E-learning testing include black-box and User Acceptance Test (UAT) to find out which system is designed according to the needs of Einstein. The result admin, student, and teacher framework can successfully operate menu and feature about learning and administrative process in E-learning system. However, the E-learning system has advantages and disadvantages for access rights to operate it

Keywords: ***Business Processes, E-learning, Einstein, Integral Systems, Gap Analysis, Waterfall Model*.**

1. Preliminary

O'Brien, James, and Marakas (2016) E-learning systems in education have been developed to improve learning and teaching systems that are still manually. Teachers in general are still less creative in utilizing media during the learning process, so that the learning material is increasingly difficult for students to understand. This is because the development of information technology has not been optimally utilized. Learning becomes less effective and efficient so that student learning outcomes are not optimal. The role of the information system technology industry is expected to be able to improve the quality of education in the global era. The online learning system using E-learning is able to provide learning material and store learning instruction data without time and space limits.

According to McLeod, Cooper, and George (2011) information system is an integrated system to support operational activities, management and decision making of an organization to provide information. The use of E-learning systems in the field of education supports learning efforts to be able to face the challenges of technological transformation in Indonesia. This helps planning, controlling, evaluating, and

improving the conditions of the proposed web development for E-learning systems using the waterfall model development. Learning focuses on mathematics and sciences lessons.

The actual business process problem currently does not have an E-learning system to convey learning information to students. The actual condition has problems with the learning system because the activities of the teacher, admin, and students do not yet have a system that is integrated with one another so that it can be stored in the database. Conventional condition constraints based on student learning time in one room resulted was less efficiency and effectiveness due to difficulties in obtaining learning information and consultation from the teacher. The problem often faced by students is the lack of giving material on try-out exams, quizzes, learning materials, and receive learning information late. Then, the constraints on storing student payment data, student and teacher data are still manually without information system. Other constraints include storing the attendance process for teachers, students, and admin which is done without information system. The actual condition problem when the admin communicates directly with students and teachers is very limited. Therefore, the researcher made a proposed business process by building an E-learning system design based on the waterfall model web development.

Another problem is that the learning process requires uses an E-learning system because in the 2019/2020 period Indonesia had a Covid-19 case. This problem demands that the Distance education policy uses the conventional learning process needs to be limited. Distance education policy is a remote teaching and learning process through the use of various technologies and communication media (Permendikbud No.109 / 2013). Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 109 of 2013 Article 1 regarding electronic learning (E-learning) is learning to utilize information and communication technology-based information packages for learning purposes so that students can access it anytime and anywhere. The distance education policy is supported by Circular Number 2 of 2020 concerning Prevention and Handling of Covid-19 in the Ministry of Education and Culture and Circular Number 3 of 2020 concerning Prevention of Covid-19 in educational units. This policy was made through the Ministry of Education and Culture to make various learning adjustments that do not burden the learning process of teachers and students. The Covid-19 problem created PJJ policies made by the government, so Einstein does a combination between the conventional and distance education by online learning uses google meet. According to Hendriana, et al., (2014) conventional learning is a form of learning activity that is commonly known, namely the interaction between teachers, students and learning materials in a certain environment.

The research study uses a waterfall model has aspects that must be designed and developed to determine the specifications and requirements of the E-learning system at Einstein. The process of monitoring business process activities of E-learning design requires a combination of learning data collection with the system requirements workflow process. E-learning system design based on waterfall model web development will be built to see the needs of stakeholders and users to facilitate online learning media. E-learning dashboard function is useful for identifying user needs, completeness of data, documentation, information, and feature functions for access rights

Table I. 1 Learning Process of Gap

Category	Existing Conditions	Expected Condition
Teacher	Providing consultations, subject matter, practice doing try out exam questions, doing practice questions on learning assignments, based on Mathematics and Sciences lessons are carried out manually and in coordination with students because they are according to the needs of students. Then the teacher confirms the teacher's attendance report to the admin at Einstein.	Teachers will get access rights to provide consultations, upload subject matter, practice study assignment questions, practice exams for Mathematics and Sciences try outs using the E-learning system without needing to coordinate with students. The teacher reports evidence of attendance using E-learning by logging in to the system
Admin	Admin manages registration data, payments, student data, teacher data, and makes information announcements still using paper archives. Admin confirms attendance report without information system. Admin communication with students and teachers directly is very limited	Admins will get access rights to enter data using the CRUD model system (create, reade, update, delete) regarding registration, payment, online courses and help make materials, student data, teacher data, managing online courses, try-out exam materials, and announcement information on E-learning system. Admins will get access to the discussion feature to communicate with students and teachers
Students	Students receiving learning information from the teacher need to coordinate when determining to do a try out exam, do practice questions on learning assignments uses the paper, and SmartTV. The registration and payment system is still manual using receipts and books without using information system. Then, receive announcement information using whiteboards and paper.	Students will get access rights to take try out exams, study assignment questions, and receive learning material information from the teacher using the E-learning system without the need to coordinate with the teacher to determine the subject matter. Then, the registration system, payment, and receive announcement information using the E-learning system
Infrastructure	The process of teacher reports to students about assessment feedback and reviews of student learning outcomes, results study assignments and try out exams when participating in conventional learning programs at Einstein still uses paper and does not storage into information system	The process of teaching teacher reports to students about assessment feedback and reviews of student learning outcomes, results study assignments and test try outs will be carried out in real time using the E-learning system.

Table I. 2 Learning Process of Gap

Category	Existing Conditions	Expected Condition
Time	The process of reporting assessment feedback and reviewing learning outcomes from the teacher for students should be waiting up to 1 month to get it when they attend class	Time reporting feedback assessment and review of learning outcomes from teachers to students in real time from the E-learning system and managed by the teacher

(Source: Einstein Tutoring Institute)

Table I.1. Gap analysis is Einstein's learning process based on five categories, namely students, teachers, admin, infrastructure, and time. The category of students and teachers gap analysis is know to process the condition does not require coordination between students and teachers when determining the choice of subject matter, try out exams, practice working on learning assignment questions. E-learning system helps students receive announcement information. Furthermore, the admin reports updates and enters the latest data about student registration, student payments, student identity, teacher identity, and making announcement information does not need a manual method because it has a solution to using the E-learning system. Admin helps teacher problems in managing online courses and try out exam materials for students. Admin manages online courses and fixed exam materials based on the authority of the teacher. The teacher category provides consultations, uploads subject matter, exercises study assignment questions, practice exams for Mathematics and Natural Sciences, try outs using the E-learning system without needing to coordinate with students. Teacher reports the proof of attendance without confirming it with the admin. The infrastructure category includes teaching teacher reporting to students about assessment feedback and reviews of student learning outcomes carried out in real time using the E-learning system. Time category, reporting of assessment feedback and review of student learning outcomes in real time from the system.

The solution research is to make improvements use actual business processes into proposed business processes using the E-learning system design. The proposed condition to improve will help students learning challenges, because Einstein does not yet have an information system documentation using E-learning system based on web development using the waterfall model. This utilizes a web-based E-learning system as a learning tool, utilizes distance education methods, and increases student learning time without time and space limits.

ILiterature Review

1.1 Waterfall Model

According to Pressman (2012) Linear sequential software development drawings include :

a. Requirements Analysis

This stage is an analysis of system requirements. Collecting data at this stage can be carried out by conducting a research, interview, or literature study. An analysis system person extracts information from the user so as to create a computer system that can perform the tasks desired by the user. This stage produces a user requirement document that is related to the user's desire for the system creation. This document is a reference for the analysis system to translate into a programming language.

b. System Design

This stage is a design process to translate the requirements of a software design that will be estimated before coding. This stage describes the data structure, software architecture, interface representation, and algorithms. The results of this stage are in the form of a document called a software requirement. This document can be used by programmers to perform system creation activities. After that, this stage performs testing of the system so that errors can be found in the system and can be corrected.

c. Encoding

The coding function is a design translator in a language that is easily recognized by computer devices because it is done by the programmer to translate the transactions requested by the user. This stage is real stage for working on a system.

d. Testing

Programming system testing has three activities, namely the internal logic of the software, fixation of system commands, and external functions. The goal is to ensure the finished system can then be used by the user.

1.2 Business Process

Business processes according to Davenport (1993) in Sutabri (2012) a collection of structured and measurable activities and work are interrelated to solve problems and produce output for services a customer. Processes have a specific sequence of work activities across time and space with a prefix and a suffix. Meanwhile, according to Hammer and Champy (1993) in Rainer, et al., (2011) the collection of activities that require one or more input and produce outputs are useful or valuable for customers. Then, the business process according to Weske (2007) in Hasibuan (2011) a series of instruments for organizing an activity to increase understanding that is related to an activity. Meanwhile, according to Monk and Wagner (2009) in Jogiyanto (2015) a business process is a collection from activities that receive one or more inputs to produce output to get value for customers.

A business process is a collection of activities are interrelated to solve problem, so it can be divided into several sub processes have each attribute. However, one sub process with other sub processes contributes to each other to achieve the goals of all sub processes (Gunasekaran and Kobu, 2002) in Sukamto and Shalahuddin (2015).

3. Research Methodology

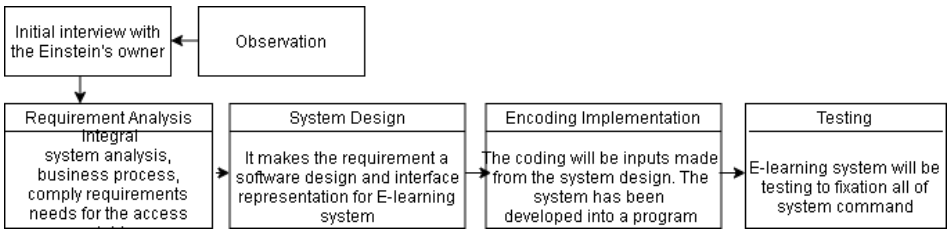

Figure 2 Research Methodology

The figure 2, explain the first thing to do is to observe a research object. Then conduct interviews with the Einstein's owner. The next stage is a requirement analysis will be done with the actual business process design for knows each gap process at Einstein. After that, the actual business process will be improved into

proposed business process. The requirement analysis to comply all of students, teachers, and admin needs. The integral system will be helped the researchers to integrated system have five components are man, time, method, machine, and information. The next stage is system design to makes the requirement an E-learning system and interface representation. Then, encoding implementation will be applied with programmer has function to translate language that recognized by computer devices. The next stage is testing an E-learning system to fixation all problem s and system command to find out the system can be used by user.

4. Result and Analysis

4.1. Requirement Analysis

The integral or integrated system is an entity or object consisting of various interacting components. This research integral system only discusses five components or sub-systems including man, time, method, machine or equipment, and information. These five components have the objective of specifying, predicting, and evaluating the results obtained from the integration system. The system will be designed to increase added value of tutoring services. This research system is E-learning because it is integrated with each other, include:

1. Man

Man referring to the role of humans as labour and human resources that exist at Einstein. Einstein tutoring has a workforce of eight including one admin and seven teachers will help the student needs in learning process.

2. Time

Time refers to the process of reporting results and student learning activities after using the E-learning system which can run in real time.

3. Method

Method refers to a guide or procedure for implementing Einstein's tutoring activities by documenting the flow of activities using the business process method. This business process guide can be used by students, teachers, and admins when carrying out activities at Einstein. However, the guidelines for business process activities in this study have improvements. This improvement discusses tutoring activities using actual business process methods to improve proposed business processes using E-learning information technology systems. This actual business process has a problem regarding tutoring. Einstein still uses manual methods to carry out the learning process. This manual method covers the learning process still using paper, books, laptops, smart TVs, and LCDs. The manual way of the payment administration process is by documenting it using a receipt and a laptop. Then, this research needs improvement using business process proposed using the E-learning system as a documentation the learning and administrative process at Einstein.

4. Machine (Equipment or technology)

Machine refers to the information technology infrastructure cause the author will use to design an E-learning system. Machine can refer to the equipment and device requirements for designing an E-learning system

5. Information

Information refers to feedback from an element of the system which is the final result or system output and input or input to the system will be an information that received by users of E-learning system. The E-learning information system is a solution to government regulations regarding the application of the distance learning process. This government regulation regarding distance learning policies is supported by Circular Number 2 of 2020 concerning Prevention and Handling of Covid-19 in the Ministry of Education and Culture and Circular Number 3 of 2020 concerning Prevention of Covid-19 in educational units.

Table 2 Initial Interview Implementation

Speaker	Activities	Implementation Date
Founder of Einstein at Purwokerto city	Identification the existing learning process still using manually method without the information system. The existing learning process have gap between students, teacher, and admin at Einstein.	Purwokerto, January 2nd 2021

The table 2, explain the existing learning process have gap between students, teacher, and admin at Einstein. The existing learning process identification still using manually method without the information system. The next stage are identify and requirement analyze all of students, admin, and teacher because Covid-19 at Purwokerto, in order to obtain Einstein will be design the E-learning system as implementation the distance education policy is a remote teaching and learning process through the use of various technologies and communication media (Permendikbud No.109 / 2013). Those problem have the solution to documentation into an actual business process will be improved into proposed business process.

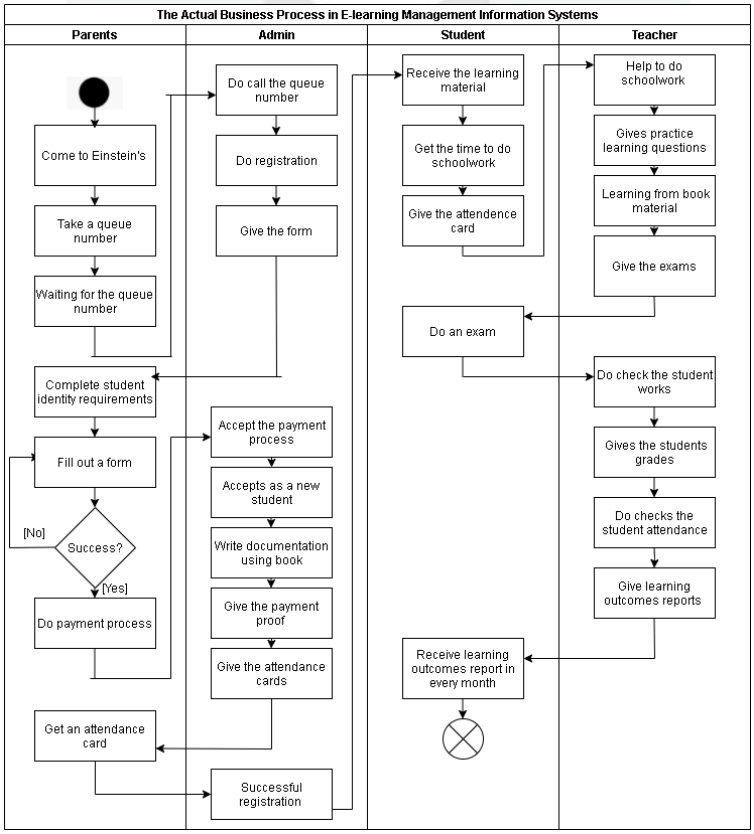

Figure 3 The Actual Business Process

The figure 3 explain the business process has gap between students, admin, and teacher. The student gap are need to registration by offline for waiting the queue, learning process still using manually, and receiving learning outcomes report needs to waiting in every month. The admin gap is administration process still using book to documented. The teacher gap are learning process, check student works, give learning outcome reports still using manually without information system and needs to waiting in every months for audit learning reports.

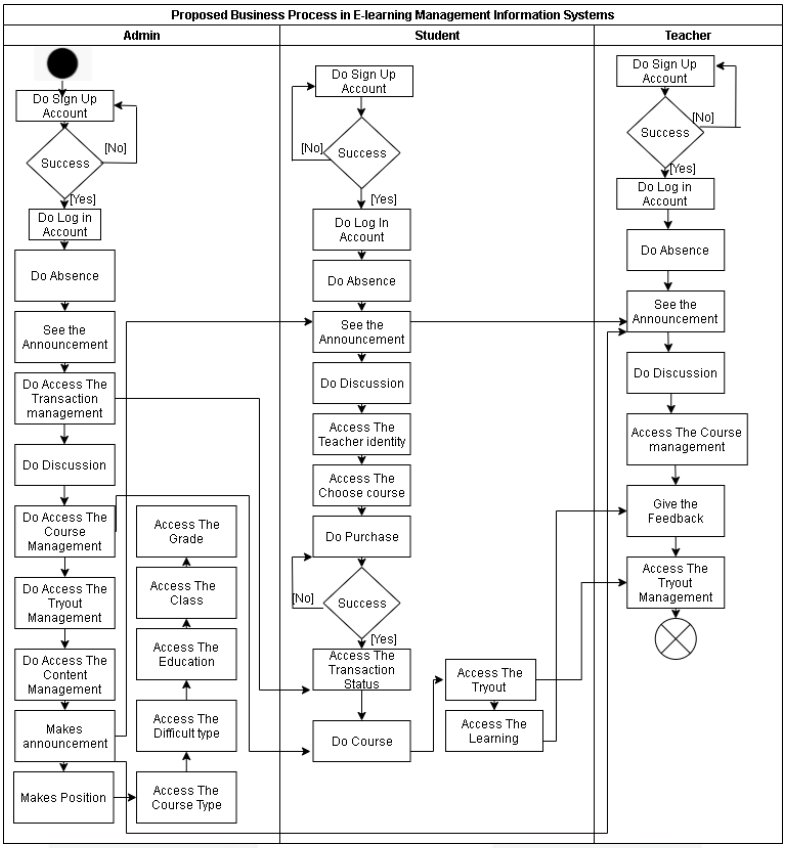

Figure 4 The Proposed Business Process

Then, the solution an actual business process to improve the proposed business process. The proposed business process explain about the learning process has support using information system E-learning. The proposed process explain E-learning system flow, when the user command to running the system as well.

Table 3 Usability E-learning System

Requirements	Description
Accessibility	Ease of use application has the key aspects in the E-learning web system based on waterfall model
Consistency	The proposed business process improvement mechanism has respective duties, responsibilities, and activities of each business process actor who can implement it consistently using the E-learning system.

Table 3 explain the usability E-learning system have two requirements are easy to accessibility and

consistency. The accessibility is ease of use application has the key aspects in the E-learning web system based on waterfall model. Then, the consistency is a proposed business process improvement mechanism has respective duties, responsibilities, and activities of each business process actor who can implement it consistently using the E-learning system.

Table 4 Reliability E-learning System

Requirements	Description
Accuracy	Accuracy for displaying data and procedures about the tasks, responsibilities and activities of each user of the E-learning system

Table 4 explain reliability E-learning system has accuracy for displaying data and procedures about the tasks, responsibilities and activities of each user of the E-learning system.

Table 5 Performance E-learning System

Requirements	Description
Response time	Time determined to provide responsiveness related to operational activities that are integrated with users of the E-learning system
Start time	Time is determined based on user log in for absence in the E-learning system
End of time	Time determined based on finish to use E-learning system

Table 5 explain three requirements are response time, start time, and end of time to performance E-learning system. The response time is time determined to provide responsiveness related to operational activities that are integrated with users of the E-learning system. The start time is determined based on user log in for absence in the E-learning system. Then, the end of time is determined based on finish to use E-learning system

Table 6 Supportability E-learning System

Requirements	Description
Adaptation	Adaptation regarding the implementation of new structured duties, responsibilities, and operational activities
Conformity	Adjustment of user data needs to design an E-learning system will run based on operational procedures from the proposed business process
Configuration	Ease of managing, operate and use the E-learning system
Maintenance	Maintenance an E-learning system based on the needs of system users to carry out procedures for operational activities of the proposed business process
Testability	E-learning system testing will be run before the actor of business process use E-learning system

Table 6 explain a supportability E-learning system have five requirements are easy to adaption, conformity, configuration, maintenance, testability. The adaption is regarding the implementation of new structured duties, responsibilities, and operational activities. The conformity is adjustment of user data needs to design an E-learning system will run based on operational procedures from the proposed business process. The configuration is ease of managing, operate and use the E-learning system. The maintenance need is a system user to carry out procedures for operational activities of the proposed business process. The testability is a system testing will be run before the actor of business process use E-learning system.

4.2. System Design

System design is the second stage process in order to comply user requirement needs as a general guide to operate and command the E-learning system. System design include context diagram and mockup. The context diagram explains details of all system inputs and outputs to E-learning system design. Context diagram is a top-level diagram that depicts data flows into out of inside and outside external entities. This context diagram describes the E-learning data information system based on web development. This flow diagram illustrates the E-learning informa

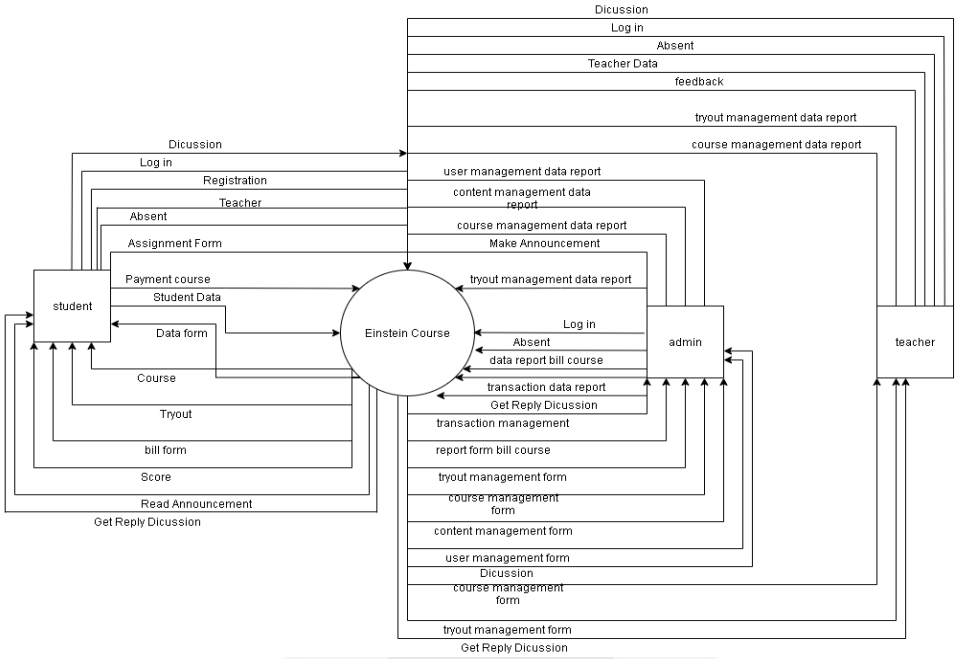

Figure 5 Context Diagram

The figure 10 explain a context diagram have an input and output for whole feature, when the user operates and command the E-learning system. Then, the researcher will explain mock up for visualization of an E-learning design concept that has been approved by the founder at Einstein in the Purwokerto city.

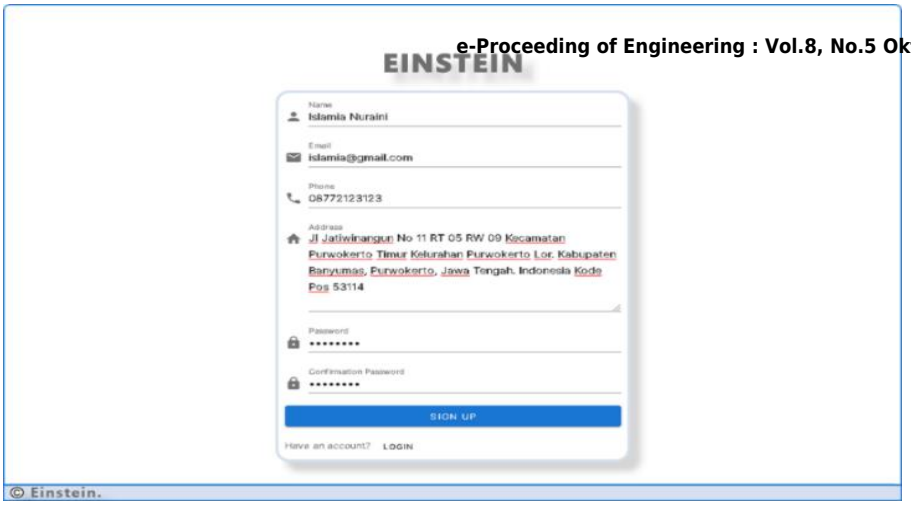

Figure 6 Registration E-learning System

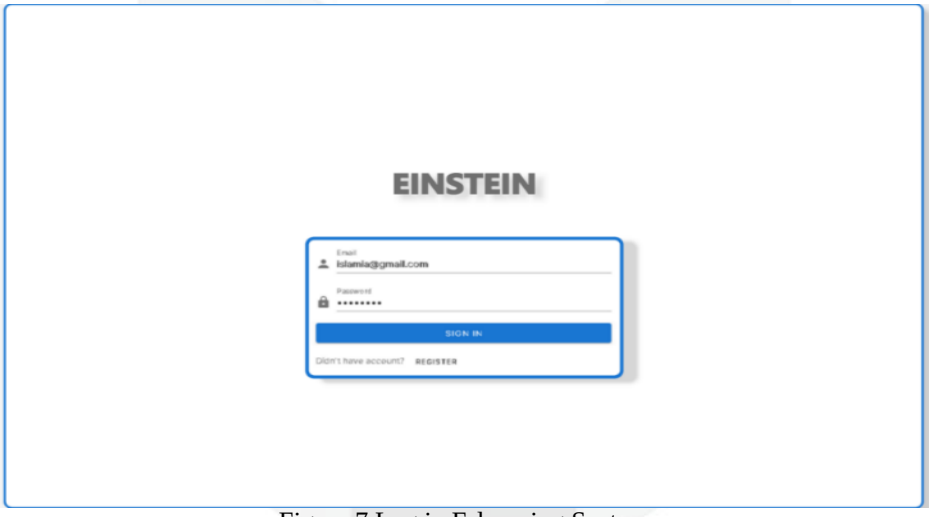

Figure 7 Log in E-learning System

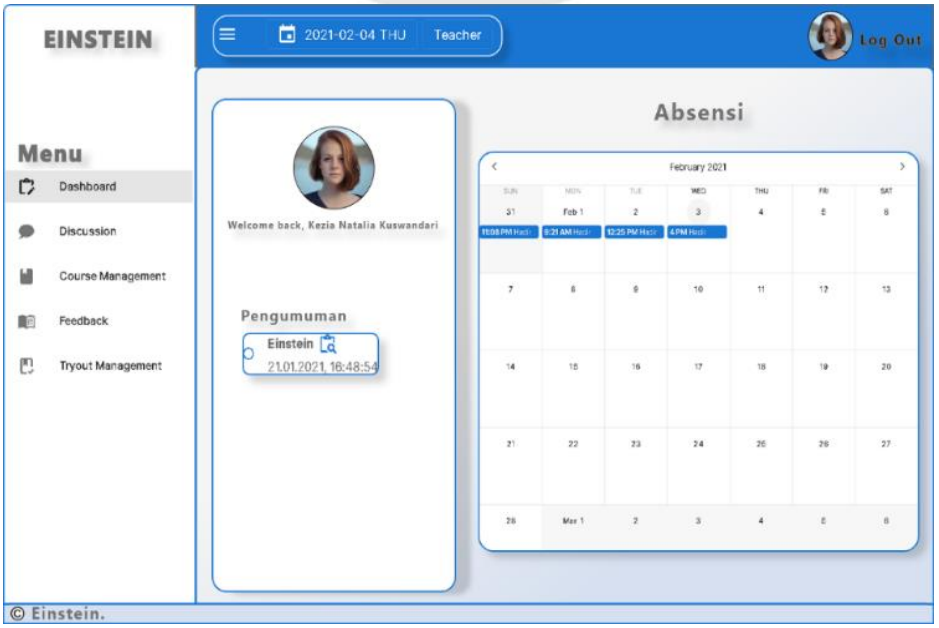

Figure 8 Teacher Dashboard E-learning

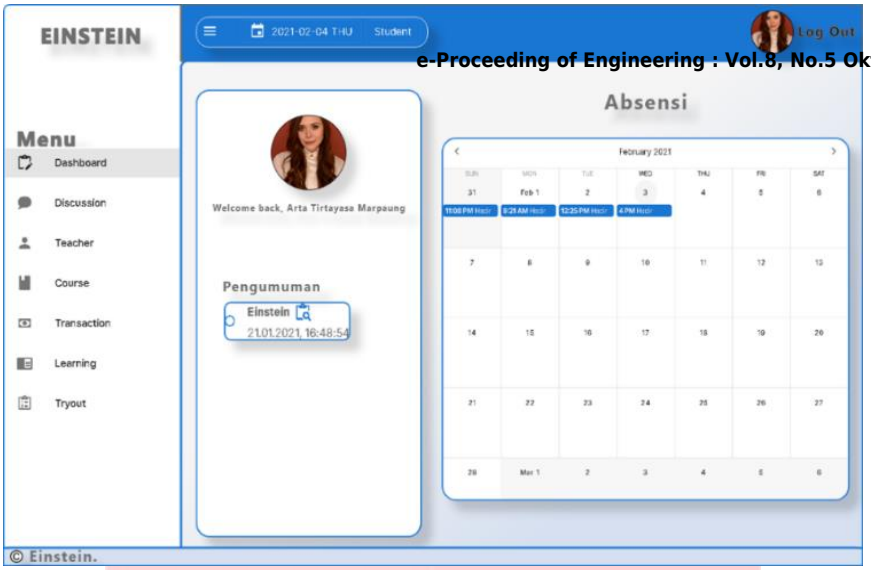

Figure 9 Student Dashboard E-learning

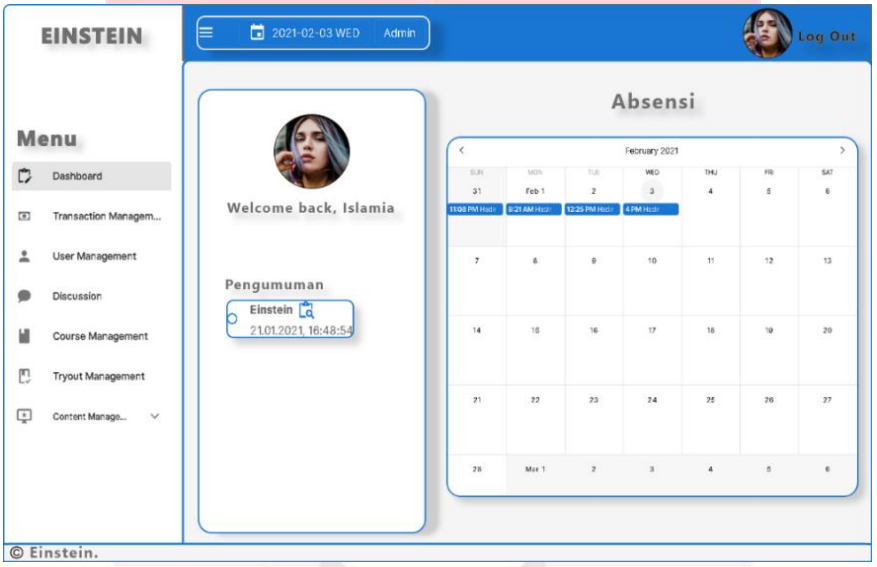

Figure 9 Admin Dashboard E-learning

4.3. Encoding Implementation

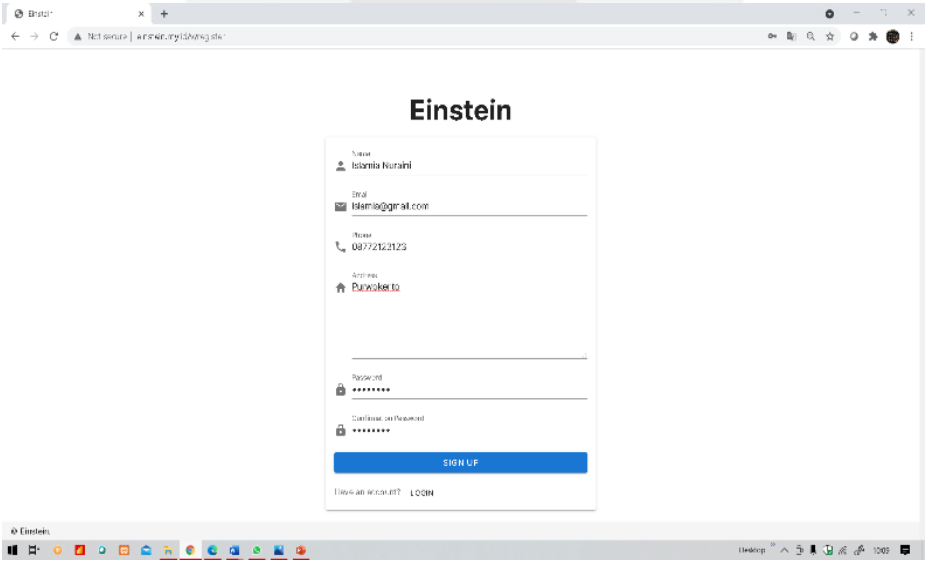

Figure 10 Registration E-learning Implementation

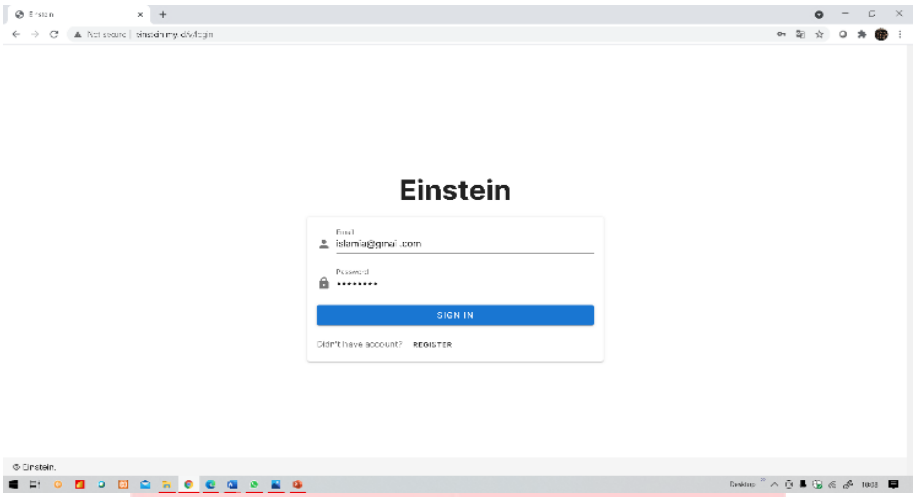

Figure 11 Log in E-learning Implementation

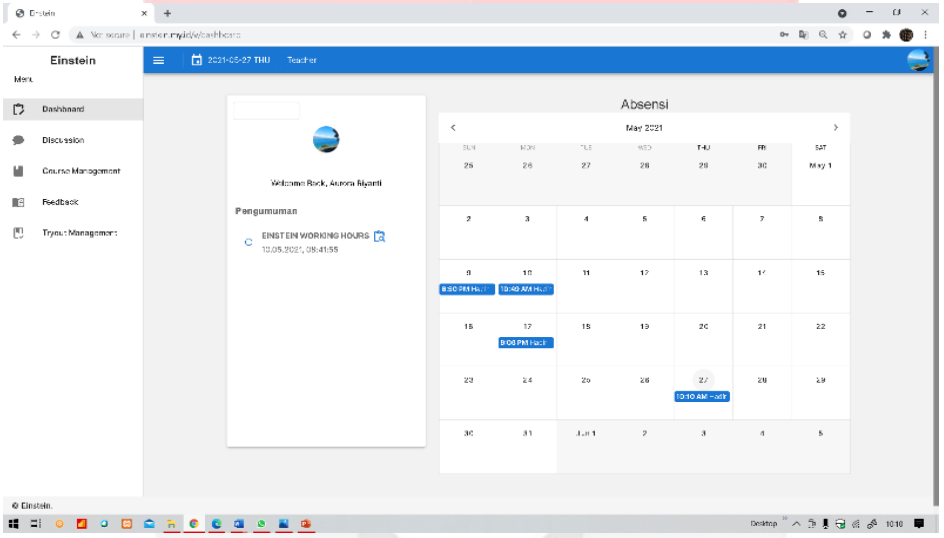

Figure 12 Student Dashboard E-learning Implementation

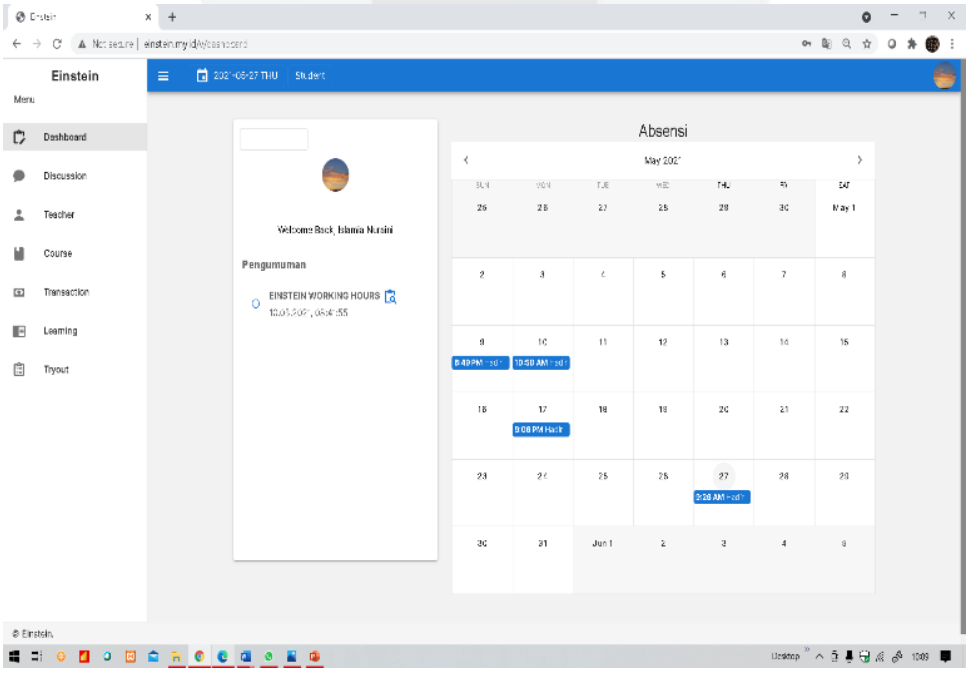

Figure 12 Teacher Dashboard E-learning Implementation

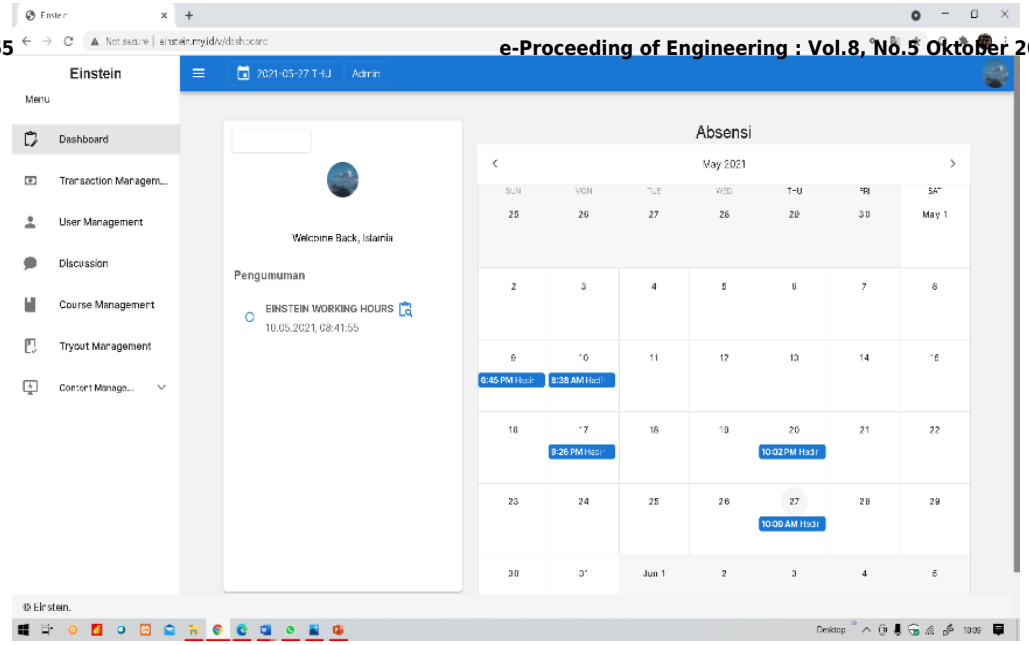

Figure 13 Admin Dashboard E-learning Implementation

Those figures explain about the coding function is a design translator in a language that is easily recognized by computer devices because it is done by the programmer to translate the transactions requested by the user. This is real stage for working on the E-learning system.

4.3.1 Stakeholder Analysis

Stakeholder analysis to find out who has an interest or role directly or indirectly in the design of the E-learning system which will be implemented using the waterfall methodology. This technique can help researchers to classify stakeholders. The model that will be used is engagement plan analysis. This technique will classify stakeholders based on their needs and requirements to design an E-learning system

Table 6 Stakeholder Analysis

Stakeholder Name	**Organization**	**Expectation**	**Way to Manage Expectation**
Owner	Einstein	Those problem from stakeholder in Einstein will be solve to build an E-learning system.	Make a sure the stakeholder requirement needs is clear about each role to build a E-learning system project.
Teacher	Einstein	The teacher will get access right when using E-learning to operate and manage learning material. The teacher will easy to accessible and distribute the learning material in a real time and whenever they want to operate it.	Make a sure the teacher requirements need are completable to build a teacher dashboard or teacher account E-learning. The way to manage this will get a teacher access right involved early in identifying system requirement and understand the project purpose and teacher's role to build a E-learning system project.

Table 6 Stakeholder Analysis

Stakeholder Name	Organization	Expectation	Way to Manage Expectation
Admin	Einstein	The admin will get access right when using E-learning to operate and manage learning information and administrative process. The admin will easy to accessible and distribute the learning information and administrative processes in a real time and whenever they want to operate it.	Admins will get access rights to enter data using the CRUD model system (create, read, update, delete) regarding registration, administrative and learning information. The way to manage are collecting the requirement analysis, design a system requirement, and implementing the code to build an E-learning
Customer	Einstein	Students will get access right when using E-learning to operate learning material and administration process	Currently students receiving learning information from the teacher need to coordinate and used a manual process when determining the learning material. The registration and payment system is still using receipts and books. The way to manage is used collecting user requirement needs and analysis requirement to build an E-learning.

Table IV.6 describes Einstein has four stakeholder category consist owner, teacher, admin, and customers. Those stakeholders has difference indicators expectation and requirement needs to build an E-learning. Then, the researcher does manage each expectation from the stakeholder needs. At the end, the stakeholder can successfully operate the E-learning.

4.4. Testing

Programming system testing has three activities, namely the internal logic of the software, fixation of system commands, and external functions. The goal is to ensure the finished system can then be used by the user.

Table 7 Admin E-learning Account

Fitur Testing	Result	Status
Log in	Entering the system user identity data	Success
Attendance	Testing process produces admin attendance report output	Success
Transaction Management	Entering and storing student payment transaction data following conventional learning programs and buying learning materials	Success
User Management	Managing E-learning system user data accounts	Success

Table 7 Admin E-learning Account

Fitur Testing	Result	Status
Discussion	Entering content or discussion content	Success
Course Management	entering the types of learning material, learning assignment questions, and entering the name of the teacher who created the learning material	Success
Try out	Input questions about material try out	Success
Content Management	Input announcement, course type, difficulty, educational, class, grade	Success

The table 7 explain about admin E-learning account has the testing feature phase include log in, attendance, transaction management, user management, discussion, course management, try out, and content management. Those feature function have been testing by the founder at Einstein. The testing result are successes because all of feature can be consistent, easy to access and accurate to run and command by the user.

Table 8 Teacher E-learning Account

Fitur Testing	Result	Status
Registration	entering a long name, email, telephone number, address, and password	Success
Log in	Entering the system user identity data	Success
Attendance	Testing process produces teacher attendance report output	Success
Discussion	Entering content or discussion content	Success
Announcement	It will know all announcement from Einstein	Success
Course Management	Managing and edit online course learning materials including course editing, course type, name of learning material, price, class, type of learning material, premium or free, action, type of answer, creating courses, course content, and course teacher	Success
Feedback	entering value data about the work of learning assignments in the course feature	Success
Try out	Input questions about material try out	Success

The table 8 explain about teacher E-learning account has the testing feature phase include registration, log in, attendance, discussion, announcement, course management, feedback, and try out. Those feature function have been testing by the founder at Einstein. The testing result are successes because all of feature have been support with usability, reliability, performance, and supportability to run and command by the user.

Table 9 Student E-learning Account

Fitur Testing	Result	Status
Registration	Entering a long name, email, telephone number, address, and password	Success
Log in	Entering the system user identity data	Success

Table 9 Student E-learning Account

Fitur Testing	Result	Status
Attendance	Testing process produces student attendance report output	Success
Discussion	Entering content or discussion content	Success
Teacher	Student can see the identity of the teacher so that it can know by students. Students can find out the educational background of the teacher.	Success
Course	It provides information in the form of course learning material that students have not purchased. The students can fill out the payment bill requirements to afford learning materials so they can access the material.	Success
Transaction	It's provides billing information about the status of students' success in purchasing online learning materials and paying for conventional learning programs at Einstein	Success
Learning	Students have received information in the form of proof of transfer to the admin. After the admin receives proof of transfer information, the admin changes the pending status to finish status. It's provides learning materials including e-books, video links, answer review for students	Success
Try out	It's provides information to students in the form of work start time, completion time, and assessment. This assessment information is obtained when students have finished working on the try out exam, the system will automatically provide an assessment of the results of the try out exam. This feature test also provides correct answer review information from the system.	Success

The table 9 explain about student E-learning account has the testing feature phase include registration, log in, attendance, discussion, teacher, course, transaction, learning, and try out. Those feature function have been testing by the founder at Einstein. The testing result are successes because all of feature have been support with usability, reliability, performance, and supportability to run and command by the user.

4.4.1. E-learning System Implementation

The implementation stage describes changes in several aspects of the E-learning system. Changes from the implementation stage of web development have several aspects, namely infrastructure, resources, and technology.

Table V. 1 The Aspects of Gap Analysis

Aspect	As-Is	To-Be	Consequences
Infrastructure	The initial condition of the infrastructure for the method of disseminating teacher learning information to students is still using the manual method. Then the initial conditions for the role of admin when managing all	Data storage uses databases and E-learning systems that are mutually integrated between teachers, students and admins that can be accessed in	1. Data storage systems using databases and the cloud have additional costs for adding a database server to the E-learning system. 2. E-learning system need regular maintenance.

Table V. 2 The Aspects of Gap Analysis

Aspect	As-Is	To-Be	Consequences
	teacher data, data on conventional and online student payment programs, teacher attendance reports, students and admin still use computers and manual books. Then, storing teacher identity data still uses manual books without information technology	real time. How to access this system using internet technology online.	3. Access to work on learning assignment questions from teachers to students has additional costs so that students get access to learning
Human Resources	Human resources at Einstein's tutoring institutions have not implemented E-learning information system technology.	1. Teaching teachers need to conduct training on the use and provide instruction to students online using the E-learning system 2. Provide socialization to students about the use of the E-learning system when participating in conventional learning at Einstein 3. Providing socialization on the use of E-learning to admins to manage student and teacher data	1. Conduct training to help teachers when teaching so that they are right on target when providing learning to students using the E-learning system 2. Providing socialization on the use of the E-learning system to students so that its use is right on target based on the suitability of its functions and features. 3. Providing socialization on the use of E-learning to admins so that there is no misuse of the system when managing student and teacher data
Technology	1. The learning system at Einstein's tutoring institutions still uses manual methods without integrated system technology between teachers, students, and admins 2. Student and teacher data storage technology still uses computers and is written manually using books 3. Learning information distribution technology, attendance reports, and	The use of E-learning software, namely the MySQL database, XAMPP, and the design of the E-learning system framework using Vue Js, and draw.io	1. Online media learning technology uses the E-learning system. The E-learning system helps data integration between teachers, students, and admins 2. Data storage technology for user access rights uses a database system in E-learning 3. Learning information distribution technology, attendance reports, and

Table V. 3 The Aspects of Gap Analysis

Aspect	As-Is	To-Be	Consequences
	announcements still use manual methods using paper, books, computer devices and bulletin boards		announcements using features and information dissemination functions about Einstein in the E-learning system
Technology	1. The learning system at Einstein's tutoring institutions still uses manual methods without integrated system technology between teachers, students, and admins 2. Student and teacher data storage technology still uses computers and is written manually using books 3. Learning information distribution technology, attendance reports, and announcements still use manual methods using paper, books, computer devices and bulletin boards	The use of E-learning software, namely the MySQL database, XAMPP, and the design of the E-learning system framework using Vue Js, and draw.io	1. Online media learning technology uses the E-learning system. The E-learning system helps data integration between teachers, students, and admins 2. Data storage technology for user access rights uses a database system in E-learning 3. Learning information distribution technology, attendance reports, and announcements using features and information dissemination functions about Einstein in the E-learning system
Time	The process of reporting assessment feedback and reviewing learning outcomes from the teacher for students waits up to 1 month to get it when they attend class	Time reporting feedback assessment and review of learning outcomes from teachers to students in real time from the E-learning system and managed by the teacher	When the E-learning system needs regular maintenance, the process of reporting assessment feedback and reviewing learning outcomes from teachers to students will be delayed.

4.4.2. Analysis of Strengths and Weaknesses of the System

4.2.2.1. Strengths System

1. The E-learning system in Einstein tutoring in Purwokerto city can be accessed online by all teacher, admin, and student permissions at Einstein. E-learning system help actual business process problems become proposed business process improvements.

2. E-learning system design has different problems, powers, interests, functions and authorities for each teacher, admin, and student access rights.

3. Security systems regarding password data, student data, teacher data, payment transaction data,

announcements and information, teaching and learning process data, discussion room data, and E-learning system user privacy data will be maintained

4. User can access the website-based E-learning system by utilizing technology and electronic devices including laptops, computers, tablets, and cell phones.

5. E-learning systems help saving documentation and store data in real time using a database

4.2.2.2 Weakness System

1. The e-learning system can only be accessed using the website domain, not an application that has to be downloaded from the Application Store and Android.

2. The absence in E-learning system cannot integration with each access right. The information absence cannot send the report attendance to the access right

3. The output of the discussion room for conducting student consultations with teachers and admins can know in general and cannot be accessed privately.

4. The teacher account in E-learning system doesn't support historical right answer from students for review the course management and try out feature

5. The students account in E-learning system doesn't support the information bank account number, when they are do a course and semester payment transaction.

5. Conclusion

The conclusion of this study describes the E-learning system framework based on the waterfall model web development including:

1. The result of the design of the web development-based E-learning framework, which displays the design needs of the admin, teachers, and students. The admin framework designs the log in, attendance, announcements, transaction management, user management, discussion, course management, try out management, and content management features. The design for teacher needs display log in, attendance, announcements, discussion, course management, feedback, and try out management features. The design for student needs are log in, attendance, announcements, discussion, teacher, course, transactions, learning, and try out features. Also, the implementation of the E-learning framework design used the waterfall model because it is appropriate to explain each research process including system requirements analysis, design, implementation (coding), and E-learning testing. The design of the E-learning framework has five integral system components that are integrated with each other. Each component includes man, time, method, machine or equipment, and information interacts with each other to achieve the goal of designing an E-learning system

2.The results of the actual business process analysis discuss the activities of students, teachers, and admins still using the manual method. Actual business processes have activities among teachers, students, and admins that have not mutually integrated and stored data without using information system technology. The results of the proposed business process improvement discuss every activity among admins, teachers, and students using a web development-based E-learning system. Proposed business process improvements help fixing the problems and arranging document for the needs of admins, teachers, and students at Einstein.

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