

Development of Learning Using Flipped Classroom Models in Basic Web Programming Subjects at SMK Al Hafidz Leuwiliang

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Abstract: The purpose of this study is the development of basic learning of web programming class XI RPL based on Microsoft teams using the flipped classroom model at SMK Al Hafidz Leuwiliang and to find out its feasibility and effectiveness. The research method used is Research and Development (R&D). The learning development model used is the ASSURE learning system design model which is integrated with the PEDATI learning model at the Model Design stage. The subjects of this study were students of class XI RPL. The results of this study based on the results of the feasibility test include (1) the results of testing learning materials obtained a percentage of 78% and are categorized as good; (2) the test results of learning media were 79% and were in the good category; and (3) learning design test results of 83% and categorized as good. One to One test results obtained a percentage of 88% and were classified in the good category, small group test results were categorized as good (85%) and field test results were also in the good category (87%). To determine the effectiveness of learning, it is carried out through testing the N-Gain value from the results of the pre-test and posttest. The result obtained was 0.75 (75%). Based on these values, and the paired test results are $T_{count} > T_{table}$ or $13.72 > 2.06866$ so that through flipped classroom learning can improve the learning outcomes of basic subjects of web programming, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Keywords: learning development, web programming, flipped classroom

Introduction

Since the COVID-19 pandemic in Indonesia, the education system has been running uncharacteristically. So that the Minister of Education and Culture issued circular number 4 of 2020 concerning the implementation of education policies in the emergency period of the spread of corona virus diseases (covid-19). In various studies, it is stated that the ineffectiveness of distance learning results in various problems, especially psychosocial problems of students (Kompas, 2021). The negative impact is that students lose their enthusiasm for learning (learning *loss*) lack of discipline and responsibility for schoolwork so that it is difficult to measure learning outcomes (Wahyuni, 2021).

In today's world of education, teachers and students are forced to explore using various technological media such as computers, laptops and *smartphones* to channel their creativity, interact with friends or teachers, and find various learning references through the internet. The positive impact of this technological growth has influenced the acceleration of the development of teaching technology in the world of education. So that the existence of the internet today is an infinite source of learning.

From the observations made at SMK Al Hafidz Leuwiliang, most students are more frequent and prefer to access information through their cellphones or smartphones rather than using laptops or computers. The learning media used during distance learning at SMK Al Hafidz Leuwiliang is using WhatsApp, the Office 365 package, namely Microsoft Teams. However, the use of Microsoft Teams is only limited to *video conferencing*, not as a *Learning Management System*. The challenge faced by teachers during the pandemic, especially at SMK Al Hafidz Leuwiliang, is how to optimize the learning process in online media, teachers still deliver material according to the essence of face-to-face learning, and make or deliver material that is interesting to students, so that learning objectives even in remote conditions are still well achieved.

Based on the results of surveys and interviews with several students and teachers at SMK Al Hafidz Leuwiliang in April - May 2022, 100 students found several obstacles faced, namely as follows: (1) as many as 59% of students are constrained by signals (2) as many as 23.4% of students do not have internet packages (3) there can be many 12% of students have cellphones that do not support online learning (4) as many as 3% of students feel lazy (5) as much as 2.6% Learners don't know how to use the app. However, in addition to the aforementioned obstacles, students convey some of the benefits they feel during online learning. One of them is that they have more free time at home with their families, can access many learning resources on the internet. In addition, based on the results of a survey of students, 83.1% of students felt comfortable using the Microsoft Teams application, and as many as 16.9% of students chose the Zoom meeting application. This is because the Microsoft Teams application saves more quota compared to other applications.

This can be seen in the results of the field survey, the duration of *conference* is 20 minutes using the Zoom Meeting application and 30 minutes using the Microsoft Teams application. *Conference* activities consist of: displaying material and playing videos through *share screens*, are as follows:

Table 1. Comparison of Quota Usage in the Conference of Zoom Meeting and Microsoft Teams Applications

Application Operator	Zoom Meeting (20 minutes)	Microsoft Teams (30 minutes)
Telkomsel	20 MB	19 MB
Indosat	240 MB	210 MB
Smartfren	100 MB	92.2 MB

The average score of class XI students in the Basic Web Programming subject at SMK Al Hafidz Leuwiliang in the initial observation has not shown any significant improvement. The observations also show that the use of Microsoft Teams as a learning medium, especially in basic web programming subjects, is not optimal. The learning outcomes of learners over the past 3 years for the basic subjects of web programming class XI SMK Al Hafidz Leuwiliang, are presented through a graph of average score data as follows.

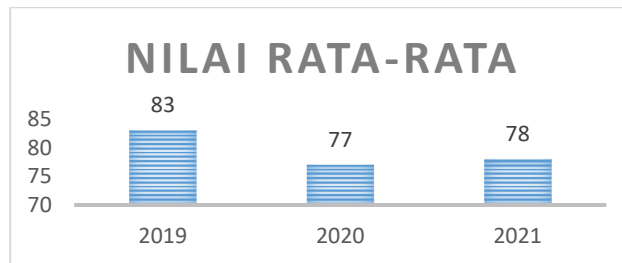


Figure 1. Average Score of Basic Web Programming Subjects

The subject of web programming is a C3 Competency expertise subject where all students in the Software Engineering Department must be competent in this subject. So that every meeting or learning module because it is interrelated and continuous, it is necessary to have media to store the module or it neatly, and can be accessed anytime and anywhere. So that students can repeat it or learn it first before face-to-face in class.

The learning process should be able to run effectively, efficiently and innovatively where this learning process is centered on students (Wayan Ilia Yuda Sukmana & Kadek Suartama, 2018). Especially at a time when face-to-face learning is limited, which is very minimal learning time. This is in line with a learning model where between giving material and assignments it is given in reverse or referred to as *flipped classroom* (Indrajit, 2020).

Based on the background description and considerations that have been presented above, the author is interested in developing online learning by conducting a research entitled "Development of Based Learning Using the Flipped Classroom Model in Basic Web Programming Subjects at SMK Al Hafidz Leuwiliang".

Model Development Concept

It was a person's efforts to fulfill the impulse of curiosity towards the world around him that gave birth to a study. Such efforts can be pursued by following formal and systematic methods to meet the impulse of curiosity or get an answer or solution to a problem (Malik et al., 2020).

With this formal and systematic method one then finds an answer that holds scientific value and can be accounted for. Because methods are the main pillar in a study, the role of a person as a user of the method becomes very

important. Research is a well-planned investigation in search of truth or facts in determining something. The word research comes from English, namely from the word *research*, which consists of two words, namely *re* meaning back and to search meaning *to search*. It can be concluded that the notion of research is to re-see a knowledge with the aim of changing conclusions in general or changing opinions with the birth of new applications in that opinion (Zakariah et al., 2020).

Research and Development if translated means research and development. Whereas in the Big Indonesian Dictionary, 'research' means to investigate or research a problem systematically, critically, and scientifically to increase knowledge, analyze new facts, or make better interpretations. While 'development' means the process, the way of developing actions, for example language development, which is an effort to improve the quality of language so that it can be used for various purposes in the life of modern society, (kbbi.web.id). So it can be synthesized that research and development in education is research that has the aim of developing or improving the quality of education.

R&D (*Research and Development*) or in Indonesian is a development research method is a process of developing and testing the effectiveness of educational products produced and can be useful in the wider community. This research is longitudinal (gradual and *multi-year*) in the form of a cycle with stages of finding problems, pre-existing products are evaluated and improved, then the effectiveness of the developed products is tested (Ardiansyah et al., n.d.).

The definition of development research according to Borg and Gall is a research design that has the objective that educational products need to be developed and validated (Gall et al., 1996). The use of educational products is very wide, including the development of teaching materials such as textbooks, learning videos, development of learning methods and processes. Development research is research that aims to improve pre-existing products and develop new products in various fields then tested and validated (Arief, 2012).

According to L.R. Gay in (Ibrahim, 2018) stated that development research is an effort made to develop a good product for school use, not used to test a theory. So, development research is defined as a systematic assessment of the design, development, and evaluation stages of the program. The product and learning process must meet the criteria of validity, practicality, and effectiveness.

According to Sujadi in (Husein et al., 2021), development research is defined as a process or steps to develop a new product or perfect an existing product that can be accounted for.

So, research and development can be interpreted as a process of research and development of a product that is carried out gradually, critically, and scientifically to create a new product or perfect an existing product or be used to do a better interpretation instead of testing a theory.

Theoretical Studies Related to the Variables studied

Online Learning

The rapid development of technology today, one of the efforts to improve the quality of learning is online *learning*. Initially, online learning was known for the impact and influence of the development of electronic-based learning (e-learning) published by Illionis University through a computer-based learning system (Hardiyanto, 2020).

Online learning is a system that makes it easier for students to learn more broadly, abundantly, and variously. In addition, learners can learn anytime and anywhere without being limited by distance, space and time. The form of learning material varies such as visual, audio, motion or video.

Online learning is learning that is presented electronically using computers and computer-based media. The teaching materials can be accessed through a network. The source comes from websites, the internet, intranets, CD-ROMs, and DVDs. With *E-Learning* we can provide instructions, monitor student performance, and report on student progress, so that we can still guide learners to achieve their learning outcomes.

So online learning is learning using electronic media with various forms of learning materials connected to the internet network, so that students can learn anytime and anywhere without being limited by distance, time and space. In addition, it makes it easier for teachers to be able to guide and control student learning outcomes online.

Flipped Classroom

Flipped classroom is a learning strategy and method that reverses the conditions of teaching in conventional classrooms. If in a conventional class the teacher gives lessons in the classroom, then followed by assignments at home, then in flipped classrooms, the teacher gives assignments to students to learn the material to be studied. Teachers provide learning videos, teaching materials, references, and others that can support students' understanding to gain knowledge and initial capital before normal learning in face-to-face classes (Patandean, 2021).

Flipped Classroom is defined simply as "homework and homework at school". *Flipped Classroom* is a pedagogical approach in which hands-on instruction moves from a group study room to an individual learning space, and the resulting group space is transformed into a dynamic interactive learning environment where educators guide learners as they apply concepts and engage creatively in the subject matter (Basyah, 2018).

The four pillars in *Flipped Classroom* are:

- (1) *Flexible* environment allows for a variety of learning models;
- (2) *Learning culture* deliberately shifts instruction to a learner-centered approach;
- (3) *Intentional content* thinks about how *Flipped Learning* helps learners develop conceptual understanding as well as procedural fluency; and
- (4) *Professional Educator* where the role of the teacher is required to be more in observing learners, giving feedback, and assessing their work. The effect of implementing *Flipped Classroom* is an increase in achievement and lower levels of student stress.

The implementation of *Flipped Classroom* learning is inseparable from the tools that must be owned. Tools in this study are:

- (1) Instructional video, with program bumper composition, apperception, material, confirmation, rep/summary, and cover;
- (2) Practicum Handbook in the form of steps to carry out practice in schools; and
- (3) Learning Material Book to strengthen the theory on the topic of Project Work.

These tools are packaged in a file format named *Flipped Classroom Material* or *FCM*. *Flipped Classroom* Project Work subjects are contained in the RPP with the aim of creating a dynamic website.

Basic Web Programming Subjects

Based on the presentation (Setiawan, 2017) in the Web Programming textbook that web programming is taken from 2 syllables, namely programming and the web. Programming in *English* is programming and is defined as the process, method, deed of the program. A Web definition is a computer network consisting of a collection of internet sites that offer text and graphics and sound and animation resources via a hypertext transfer protocol.

Many people know the web with the term *WWW* (*world wide web*), *World Wide Web* is the most popular internet service today the internet began to be known and widely used after the existence of *WWW* services. *WWW* is website pages that can be connected to each other (*hyperlinks*) that form a wilderness of information. *WWW* runs with the *Hypertext Transfer Protocol* (*HTTP*) protocol. A Web page is a plain *text* file that contains *HTML* syntax that can be opened/viewed/translated with an Internet Browser. *HTML* syntax is capable of loading text content, images, audio, video and animation. Now the internet is synonymous with the web, because of the popularity of the *web* as a standard interface on the services on the internet, from its beginnings as an information provider, this was also used for communication from email to chat, to conducting business transactions (*commerce*) (Setiawan, 2017). There are many advantages provided by *Web-based* applications over *desktop* based applications, so web-based applications have been adopted by the company as part of its information technology strategy.

The Basic Subject of *Web* programming is one of the basic compulsory subjects on the basis of the Computer Engineering and Informatics (TKI) expertise program. Based on the curriculum structure of the subject Web programming is delivered in class XI semester 2 which is delivered within 4 hours of lessons per week.

The basic material of web programming is emphasized on advanced commands in *HTML* for page creation and commands using *JavaScript*. The *HTML* commands taught in web programming include creating form components and styling a web page.

For java script material includes *web* page programming techniques, user input processing. In web page programming techniques, more details will be explained about the anatomy and workings of JavaScript code, the basics of client programming (variables, data types, and operators), 1-dimensional and multidimensional arrays, and branching control structures in client programs, looping control structures in client programs, built-in functions and user functions in client programs.

Method

Research Objectives

The research objectives of learning development with the *Flipped Classroom* model of this basic web programming subject are: (1) To develop Microsoft Teams-based learning procedures using the *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang. (2) To analyze the feasibility of developing Microsoft Teams-based learning using a *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang based on the *ASSURE* model integrated with the PEDATI model. (3) To analyze the effectiveness of Microsoft Teams-based learning development using a *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang based on the *ASSURE* model integrated with the PEDATI model.

Place and time of research

This research was conducted at SMK Al Hafidz Leuwiliang which is located at Jl. Moh Noh Noor Km 8 Kp. Hegarsari RT.04/01 Karyasari Village, Leuwiliang District, Bogor 16640, West Java Province. The subjects in this study were students of class XI RPL. This research was carried out for four months, starting from March – September 2022.

The R&D research method was chosen in this study because it is in accordance with the research objectives, namely to create a model for the development of online learning *web programming* in the second semester for XI RPL students and to test its effectiveness. The theory behind model development is the concept of instructional model development as described by the Association for Educational Communications & Technology (AECT) the notion of instructional development a systematic approach to the design, production, evaluation, and use of comprehensive instructional systems, including all relevant components from system to management model to use them (Agustian in (Suliarso et al., 2021).

The following is a process of stages carried out including:

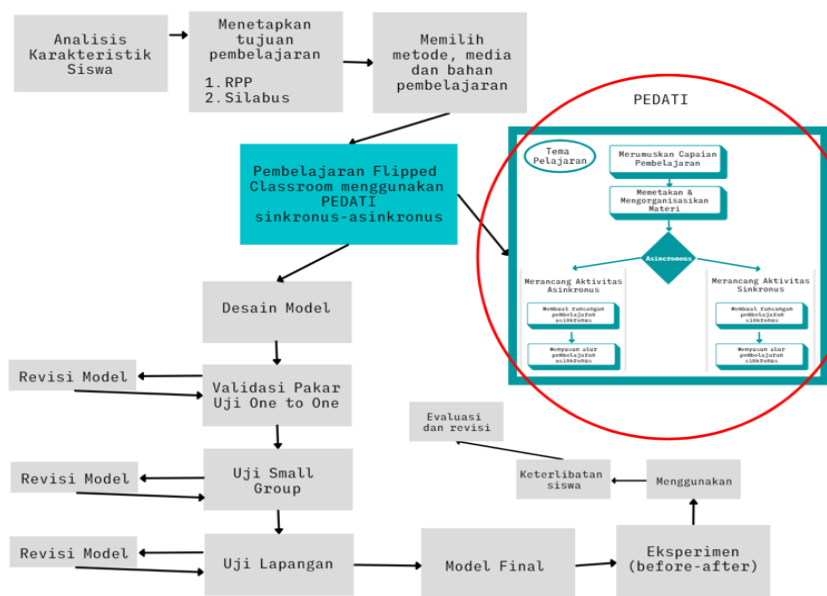


Figure 1. ASSURE Learning Design Model integrated with PEDATI Model conducted by Researchers

Results and Discussion

Analysis of Student Characteristics

The development of learning using the *flipped classroom* model in the Web Programming class XI semester II subject at SMK Al Hafidz Bogor is based on the results of observations in the field. Based on the results of observations, it was found that there is no material that can be accessed anytime and anywhere (*online*) specifically that can be used to complete learning materials using the *flipped classroom* method. The availability of internet networks in schools, there is positive support from the foundation for learning through Microsoft teams, devices and internet networks owned by students at home, besides that students are accustomed to accessing learning materials through their gadgets is very supportive of the implementation of *flipped classroom* learning.

The first step taken by researchers to develop *flipped classroom-based* learning is to analyze needs and goals. In this case, the researcher tried to find out: (1) The position of online learning in the Distance Learning curriculum in class XI of SMK Al Hafidz Leuwiliang. (2) The purpose of distance learning in class XI of SMK Al Hafidz Leuwiliang. (3) What materials are taught in distance learning. (4) The initial conditions of learning in distance learning. (5) Facilities and infrastructure available in schools. (6) Existing problems and constraints. (7) Efforts made to overcome these problems and constraints. (8) Expectations for distance learning.

Based on the observation of the learning process, by interviewing and distributing questionnaires to students of SMK Al Hafidz Leuwiliang Bogor, the following data were obtained:

Table 2. Characteristics of Online Learning Participants

No	Aspects analyzed	Analysis Results
1	The main group of learners of class XI RPL 1	Students of SMK Al Hafidz Bogor competence of RPL expertise
2	general characteristics	<ul style="list-style-type: none"> • Age: 16 - 17 years old • Gender distribution: 19 male learners and 5 female learners • Language: Indonesian
3	Number of learners	24 people
4	Experience level	<ul style="list-style-type: none"> • The ability to operate the Microsoft teams app is relatively good • Synchronous and asynchronous learning using Microsoft teams
5	Attitude of learners	<ul style="list-style-type: none"> • Based on the results of interviews enthusiastic learners in pleasant learning situations and conditions • Many distractions cause students to be disturbed in learning activities

Setting Learning Objectives

The learning formulations for each subject are outlined in the table below:

Table 3. Learning Objectives

No	Subject Matter	Learning Objectives
1	Framework	Students can get to know and install <i>the codeigniter (CI) framework</i>
2	Model View Controller and Bootstrap	Students are able to create a website by applying the model-view-controller technique using bootstrap
3	Database	Students can display data on website pages
4	CRUD	Students can apply CRUD on the student registration website

Choosing Strategy, Technology, Media, and Materials

Determining Achievements, Descriptions and Learning Abilities

Table 4. Achievements, Description and Learning Abilities

1	Learning Outcomes	Create a web app using <i>Model View Controller (MVC)</i> by using <i>framework</i> technology
2	Description	Web programming equips students with the ability to create and develop web-based applications through an understanding of network technology, the internet, programming languages, and how various technologies work together, so that students are able to create / create and develop web-based applications with the latest technology that is useful in various fields.
3	Definition	MVC is a technique or concept that separates the main components in creating a website into three components, namely: <ol style="list-style-type: none"> 1. MODEL: The part of the processing that deals with the processing or manipulation of the database. Just like getting data from a database or entering another database and processing it. All statements related to database processing are placed in the model. 2. VIEW: The section that handles the user interface page or the page that is displayed to the user. Views from the user interface are aggregated into views and separated from controllers and models. This allows web designers to easily develop the look of a website's pages. 3. CONTROLLER: is a collection of action instructions that connect models and views, so the user will not be associated with the model directly, essentially from the view then the controller that handles the instructions. 4. Ad framework is a framework used to build and develop websites. The framework was created to assist web developers in writing lines of code. By using a program code writing framework, it becomes easier, faster, and neatly structured.
4	Expected capabilities	Students are able to create web applications using <i>the Model View Controller (MVC)</i> by using <i>codeigniter (CI) framework</i> technology for CRUD functions

Model Design

After obtaining the learning mapping, the process of designing synchronous and asynchronous learning activities is obtained. The asynchronous learning process is presented as follows:

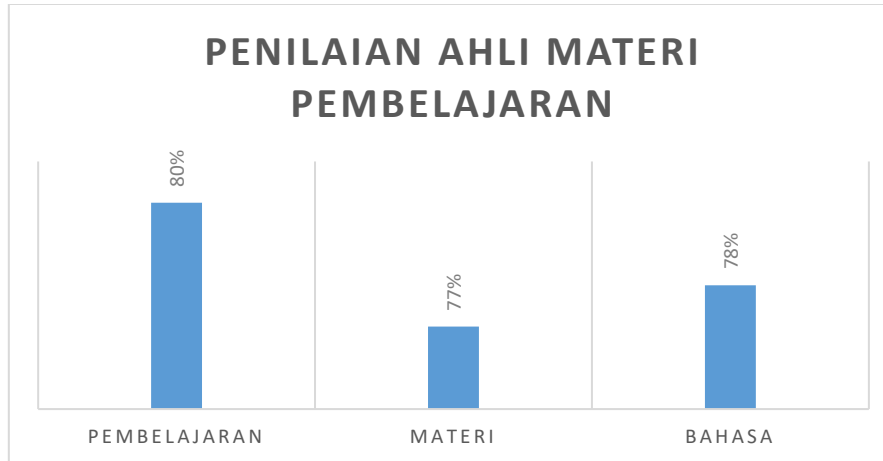
Table 5. Synchronous and Asynchronous Learning Mappings

No	Learning Objectives	Subject Matter	Subject Matter	Learning Activities	
				Synchronous	Asynchronous
1	Students can use <i>the codeigniter framework</i> in building a website	Framework	<i>Codeigniter Framework</i> Explained		V
			Understand the use of a local web server and install XAMPP	V	
			Download and install the <i>Codeigniter Framework</i>	V	
2	Students can apply the concept of MVC in the <i>codeigniter framework</i> to build a website	Model View Controller and Bootstrap	Understanding <i>MVC</i> concepts		V
			Using <i>bootstrap</i>	V	
			Using <i>the code editor from visual studio code</i>	V	
			Create a student registration website	V	
3	Learners can use the database to build a website	Database	Describe the database		V
			Create a database	V	
			Create a database connection	V	
			Displaying data from the database to the website	V	
4	Learners can use CRUD on the database to build a website	CRUD	Explaining CRUD		V
			Implementing CRUD on a built website	V	

Expert Validation

Results of Expert Review of Learning Materials

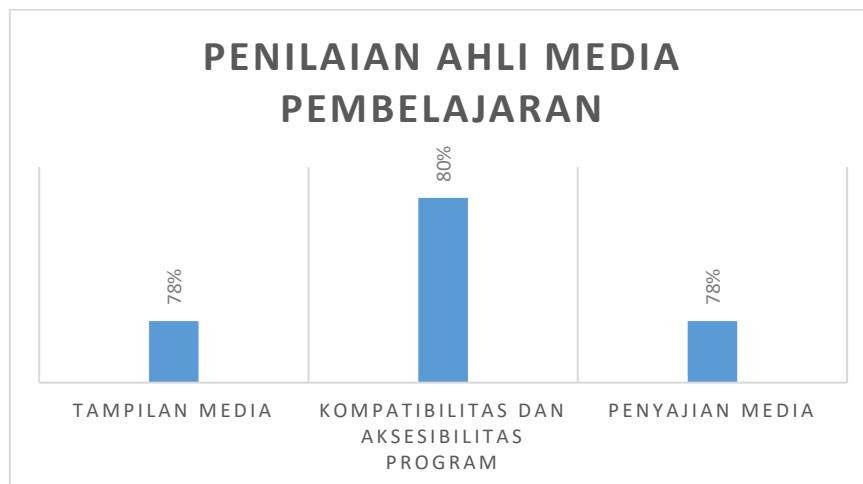
Based on the results of the expert recapitulation of learning materials on a 2 m graph, the results of the material expert assessment calculations obtained an average value of 78% which means "Good". This means that the learning materials developed are suitable for use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 1. Recapitulation of Expert Assessment of Learning Materials

Learning Media - Expert Review Results

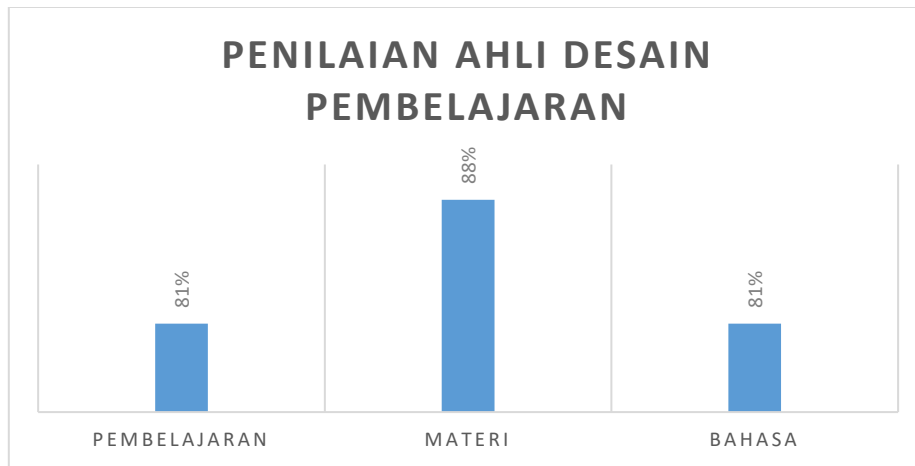
Based on the results of the recapitulation of learning media experts on a 3 m graph, the results of the calculation of the material expert assessment obtained an average value of 79% which means "Good". This means that the learning media developed is suitable for use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 2. Recapitulation of Learning Media Expert Assessment

Learning Design - Expert Review Results

Based on the results of the recapitulation of learning design experts on a 3 m graph, the results of the material expert assessment calculations obtained an average value of 83% which means "Good". This means that the learning design developed is feasible to use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 3. Recapitulation of Learning Design Expert Assessment

Model Final

The results of the *small group* test are poured into the storyboard, henceforth this *storyboard* design is developed into a final model.

1. Login Page

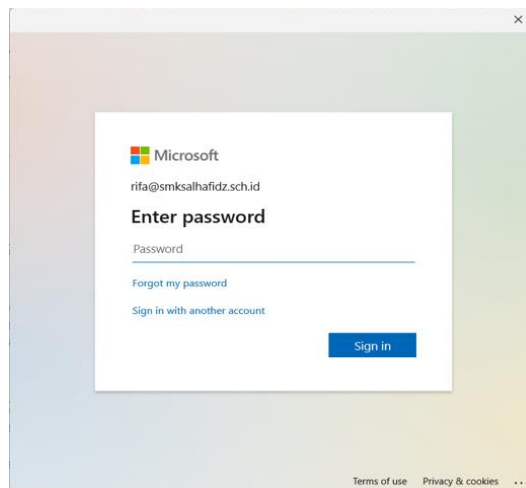


Figure 2. Login Page

2. Teams page

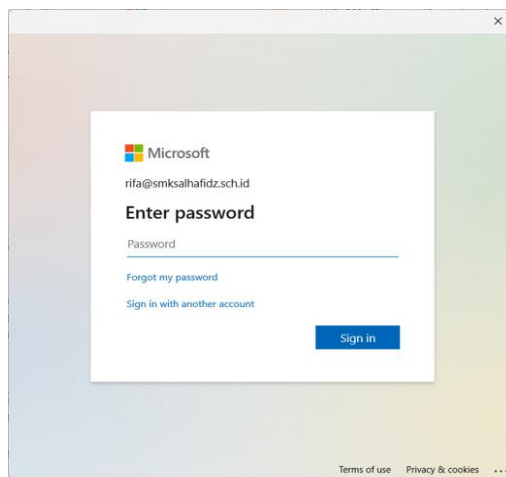


Figure 3. The Teams Page

3. Classroom Page

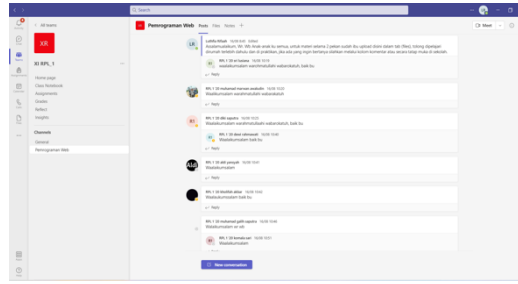


Figure 4. Class Page

4. Page Files

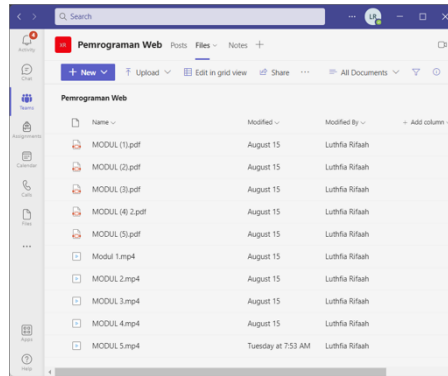


Figure 5. Page Files

5. Assignment Page

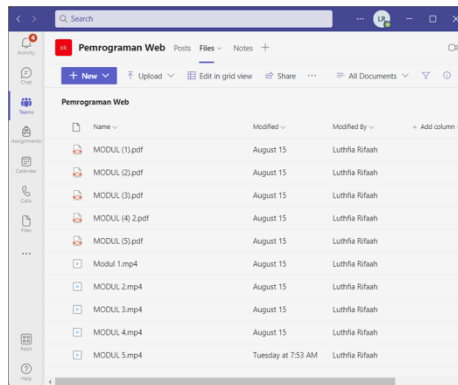


Figure 6. Assignment Page

6. Microsoft Form Assignment page on assignment menu

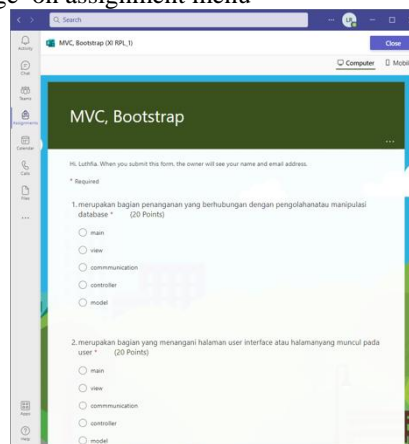


Figure 7. Task Page

7. Values page

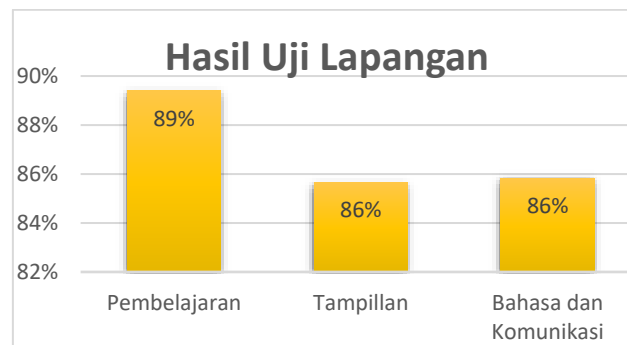
To return (10)	Returned (14)	Search students
Name	Status	Feedback
abd yusufah, RPL, 1 20	Returned	100 / 100
yanida nurul fadila, RP...	Returned	100 / 100
ari febrina, RPL, 1 20	Returned	100 / 100
devi rahmawati, RPL, 1...	Returned	100 / 100
ahli saputra, RPL, 1 20	Returned	100 / 100
syndri, RPL, 1 20	Returned	100 / 100
nomali abdullah, RPL, 1...	Returned	100 / 100
nomalis sari, RPL, 1 20	Returned	100 / 100
muhammad gailh saputr...	Returned	100 / 100
muhammad ikham, RPL, ...	Returned	100 / 100
muhammad marwan as...	Returned	100 / 100
RPL, 1 20 Ahmad Luk...	Returned	100 / 100
ari emiliawati, RPL, 1 20	Returned	100 / 100

Figure 8. The Values Page

Experiment

Field Test (Model Feasibility)

Based on the results of the field test recapitulation on the 4 m graph, the results of the assessment calculation obtained an average value of 87% which means "Good". This means that this prototype is suitable for use in learning basic web programming subjects for students of class XI RPL at SMK Al Hafidz Leuwiliang.



Graph 4. Field Test Results

Model Effectiveness Testing

1) N-Gain Scores

Based on the calculation results of N-Gain, the average value of N-Gain was obtained by 0.75. If converted with Table 3.6, a percentage of 75% is obtained and is categorized as "Quite Effective". So it can be said that the online learning model for the basic subjects of web programming class XI RPL SMK Al Hafidz Leuwiliang is quite effective to use.

2) Uji Paired Sample Test

Based on the calculation of the paired sample test, a comparison of $T_{\text{calculation}} > T_{\text{table}}$ was obtained, namely $13.72 > 2.06866$, it can be concluded that there is a significant difference so that through flipped *classroom* learning can improve the learning outcomes of basic web programming subjects, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Conclusion

The development model used is the ASSURE learning system design model which is integrated with the PEDATI model at the learning strategy development stage. The selection of this model is based on consideration of its

complete, detailed and systematic process integrated with the PEDATI model which is very specific to the development of *flipped classroom* learning.

The results of the learning feasibility test analysis are determined based on the results of the assessment of learning material experts, learning media experts and learning design experts. The results of expert testing of learning materials obtained a percentage of 78%, by assessing three aspects, namely learning, material and language. The results of testing by media experts obtained a percentage of 79% carried out on three aspects, namely aspects of media display, accessibility and program compatibility, and media presentation.

The results of testing by learning design experts obtained a percentage of 83% carried out on three aspects, namely aspects of learning, media display, and language.

Based on the test results of the three experts, this basic web programming learning development model is categorized as 'good' so that it is suitable for use in learning in class XI RPL SMK Al Hafidz Leuwiliang. Effective The test of the effectiveness of the model obtained based on the results of the N-Gain calculation showed a value of 0.75 or 75%. Based on the results of these calculations, the development of learning for basic web programming subjects at SMK Al Hafidz Leuwiliang is quite effective. And the paired test results are $T_{count} > T_{table}$ or $13.72 > 2.06866$ so that through flipped classroom learning can improve learning outcomes in basic subjects of web programming, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Implication

The implications in this study can improve the quality of education for the SMA / SMK level in the implementation of information and communication technology-based learning. Peserta didik is more interested in following the learning process which has an impact on improving the quality and learning outcomes. This learning development is also able to encourage subject teachers and especially researchers to always innovate and act more creatively in providing solutions to problems in the technology-based learning and communication process.

Suggestion

1. For Teachers

Teachers can use and optimize this web-based learning as an alternative learning medium for students to overcome difficulties in delivering quite a lot of material with limited time, and teachers can provide a variety of learning.

2. For Students

Students can take advantage of this information and communication technology-based learning to learn basic web programming learning materials independently.

3. For Schools

Schools can optimize the development of information and communication technology-based learning as a support in the learning process at school.

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