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Optimization of Web-Based Learning Media in SMK PGRI 3 Walikukun

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Abstract. This study aims to determine: (1) appropriate web-based learning methods to improve student learning outcomes, (2) the teacher's method of using web-based learning media to influence student achievement, and (3) Is the optimization of web-based learning media able to meet standards creative, active, and fun learning at SMK PGRI 3 Walikukun. The method used in this study uses a research and development (R&D) approach. The population in this study were students of SMK PGRI 3 Walikukun Based on data analysis, the results of this study showed that: Optimization of web-based learning media through the PBL approach was more effective in improving ICT competency in SMK PGRI 3 Walikukun students both in the process and learning outcomes which include aspects of competence knowledge, attitudes, skills and participation compared to before are still widely used direct learning models. The results of the conclusions indicate an increase in teacher skills in applying the syntax of the optimization model of web-based learning needs to be improved, by using a problem-based learning system learning activities take place interactively and student-centered, the results can increase student grades.

1. Introduction
The success of students in understanding a learning material is the main goal of every teacher. How the delivery of learning a teacher is very influential on the success of students understanding the material being taught. With the development of technology today many media can be used as infrastructure to deliver material to students, one of which is learning to use website media. According to (Tsai & Machado, 2002) from InkiTiki Corporation the definition of web-based learning (WBL) is web-based learning related to learning resources that are presented through web applications, including if the learning resources are packaged on CD-ROM or other media. The advantages of web-based learning are numerous and varied. Chang (2007) states that researchers have demonstrated advantages of web-based learning such as time saving, cost reduction and space saving, and increased learning opportunities for non-school students. The use of instructional media using website media can reduce the static atmosphere and can create an effective, interesting, interactive learning process and can also arouse student learning motivation (Darussalam, 2012). The same thing was also stated by Gilakjani (2011), the use of digital technology in learning provides learning conditions with the opportunity to create a conducive learning environment for students, rich in information and learning.
resources, and can be inserted with various multimedia-based learning elements. SMK PGRI 3 Walikukun already has a media website, but the teacher has not been able to use it well, in conveying learning the teacher uses website media only to display the theory as in the text and teach it theoretically. This makes students feel bored and do not understand the material presented by the teacher. The results obtained by students are not satisfactory, so the results are far from Teacher's expectations. For this reason, this research is important in conducting research on web-based learning media optimization in SMK PGRI 3 Walikukun.

2. Study Review

2.1 Learning
Wina Sanjaya (2008: 51) learning is an activity aimed at student learning. Every teacher is important to understand the learning system, because by understanding this system, every teacher will understand about the learning objectives or expected results, the process of learning activities that must be carried out, the use of each component in the activity process to achieve the goals to be achieved and how to know the success of achieving the. Sanjaya (2008: 88) learning objectives must contain elements of ABCD, namely Hearings (which must have abilities), Behavior (behaviors that are expected to have), Conditions (in conditions and situations where the subject can show ability as a result of learning that has been obtained), and Title (quality or quantity of behavior expected to be reached as a minimum).

2.2 Understanding Learning
According to Hilgard and Bower in Purwanto (1987) learning relates to changes in a person's behavior towards certain situations caused by repeated experiences in the situation. Winkel (2009) mental or psychological activity, which occurs in active interactions with the environment, which results in a number of changes in knowledge, understanding, skills and value-attitudes. Slameto (2010) learning as a business process carried out by someone to get a whole new behavior change, as a result of his own experience in interactions with his environment.

2.3 Understanding Learning Outcomes
Learning outcomes according to Winkel, quoted by Sudjana (2004: 142) as follows::
2.3.1 Learning outcomes as an indicator of the quality and quantity of knowledge students have mastered;
2.3.2 Learning outcomes as a symbol of concentration of curiosity;
2.3.3 Learning outcomes as information material in educational innovations;
2.3.4 Learning outcomes as internal and external indicators of the situation of educational institutions;
2.3.5 Learning outcomes can be used as indicators of student intelligence.
Bloom (in Irwanti, 2011) divides learning outcomes into three domains, namely the cognitive, affective and psychomotor domains.
   a. Cognitive domain
This domain relates to intellectual learning outcomes consisting of six aspects, namely knowledge, understanding, application, analysis, synthesis and evaluation;
   b. Affective Domain
The affective domain is related to attitudes and values. Types of affective learning outcomes arise in students in a variety of behaviors such as attention to learning, discipline, learning motivation, respect for teachers, study habits, and social relations;
c. Psychomotor domain

Psychomotor learning outcomes appear in the form of individual skills and abilities.

2.4 Types of Learning Outcomes

According to Sukmadinata (2005), "Achievement or learning outcomes are the realization or expansion of a person's potential skills or capacities". Learning achievement is said to be perfect if it meets three aspects, namely: cognitive, affective, and psychomotor.

2.5 Factors That Influence Learning Achievement

According to Purwanto (2006) learning factors are divided into 2 (two) groups: (1) individual factors, including maturity / growth factors, intelligence, training, motivation, and personal factors; and (2) factors outside the individual that we call social factors, including family / household factors, teachers and their teaching methods, tools used in teaching and learning, the environment and opportunities available, and social motivation.

2.6 Understanding Learning Media

The word media is a plural form of the word medium which literally means an intermediary (Djamara, 2006) in the world of education, teachers often use media to teach what is called learning media (Rusman, (2012) and Daryanto (2010)). Learning media are a number of assistive devices, simulation materials or programs used in learning activities (Erlina, 2009), messenger technology that can be used for learning purposes and are a physical means of delivering subject matter (Rusman, (2012) and Sukiman (2012) from the sender to the recipient so that they can stimulate the thoughts, feelings, attention, and interests and desires of students in such a way that the learning process occurs to achieve learning objectives effectively.

2.7 Types of Learning Media

Learning media that are often used in learning activities are very diverse and some are deliberately designed according to the needs of learning activities (Setiawan, 2013). Can be used to stimulate the thoughts, feelings, attention and abilities or skills of students so that it can encourage the learning process (Febrian, 2016). Asyhar (2012), there are 4 (four) types of learning media, namely: "(1) Visual media, are types of media that are only used to rely solely on the student's sense of sight, for example: visual media that is not projected (objects of reality, protective models, and graphics), and projection media (power point, paint and automatic cad), (2) audio media, is the type of media used in the learning process by relying solely on students' sense of hearing, for example: radio, vocal cords, and recordings vinyl (3) Audio-visual media, is a type of media used in learning activities that involve hearing and vision and in a process or activity, for example: video tapes and film frames, and (4) Multimedia, is media that involves several types media and equipment are integrated in the process or learning activities, for example: TV and power point."

2.8 Learning Media Function

Learning media function to convey learning messages (Ouda Teda Ena, 2001). According to Asyhar (2011), learning media is divided into seven parts, namely: (1) media as a source of learning; (2) semantic functions; (3) manipulative functions; (4) fixative function; (5) distribution function; (6) psychological functions and (7) socio-cultural functions. According to Usman and Asnawir (2002) including: (1) helping facilitate learning for students and teachers (2) providing more tangible experiences; (3) attract more student attention; (4) all students' senses can be activated, weaknesses of
one sense can be balanced with other sensory strengths; (5) attract the attention and interest of students in learning; and (6) can bring the world of theory into reality.

2.9 Definition of Optimization
Optimization is an action, process, or methodology to make something (as a design, system, or decision) to be more / fully perfect, functional, or more effective (Balai Pustaka, 1994: 800). According to Machfud Sidik related to the optimization of an action / activity to improve and optimize. (Sidik, 2001).

3. Research Methods
This type of research is conducted using quantitative descriptive. The subjects used in class XI were two classes with 70 students. In this study using data analysis techniques using surveys

3.1 Understanding Problem Based Learning (PBL)
Broadly speaking there are two approaches to learning, namely teacher centered learning (TCL) and student centered learning (SCL). Teacher centered learning (TCL) is teacher-centered learning, so this approach is often called the conventional approach. Whereas student centered learning (SCL) is student-centered learning. This method is a relatively new learning paradigm in developing countries. MacVaough (1988: 37) states that: Based on this opinion it is clearly stated that problem based learning there are 4 (four) of these activities in problem based learning (PBL), namely:

3.1.1 Problematisation
Problematisation (Problematisation) requires students to consider what they already know about the problem, what is the problem of that knowledge, and the most important is what is not known. This process is very good for continuing education because it refers to the ability of learners, asking for problematic issues for themselves, and making changes in attitude towards an action.

3.1.2 Problem Investigation
Problem Investigation requires learners to consider the elements of the problem that are currently understood and seek knowledge to understand the dimensions, content, location, and solutions that are known for the problem, it is important for learners to look for knowledge outside their scientific discipline, placing problems into new understanding frameworks, and looking for interdisciplinary knowledge solutions that are not yet known.

3.1.3 Problem Solving
Problem solving gives learners the opportunity to take action, and shows that their learning is more than contemplation on an infinite idea. This is perhaps the most important element for continuing education because success can only be realized through significant behavioral change and not just an understanding element.

3.1.4 Critical Reflection
Critical reflection requires students to evaluate the process used in problem solving and evaluate the benefits of the recommended actions to enlighten current understanding. At the same time, learners might know that the solutions they make cannot solve problems. Thus learners must create new concepts again for the continuation of solving the problem.

4. Results and Discussion


4.1 TKJ learning Basic competence Installing a Graphical User Interface (GUI) and Command Line Interface (CLI) based Operating System

The preliminary study was carried out by collecting data and analyzing various matters related to the analysis of TKJ learning needs of basic competencies. Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) in aspects of the TKJ curriculum and the factual conditions of TKJ learning in schools. TKJ learning for students of SMK PGRI 3 Walikukun which specifically includes basic competencies. Installing a Graphical User Interface (GUI) and Command Line Interface (CLI) based Operating System is about Preparing a GUI-based operating system installation and Implementing a GUI-based operating system installation according to the manual installation. Specifically the factual conditions of TKJ learning in SMK PGRI 3 Walikukun are described as follows,

4.1.1 Teacher

Preliminary study activities are carried out by collecting data and analyzing various matters relating to the analysis of the needs and factual conditions of TKJ learning in schools. TKJ learning as a study in the preliminary study includes: TKJ curriculum especially relating to basic competencies Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI), Semester Learning Plan (RPS), materials, methods and strategies, media, interactions, evaluations, and tools used. This condition factually reflects TKJ's basic competency in Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) in schools. Specifically the results of the preliminary study in the teacher's perspective are described as follows.

Table 1. Results of Preliminary Study Analysis conducted at SMK PGRI 3 Walikukun

| Number | Component                                                                 | Answer |
|--------|---------------------------------------------------------------------------|--------|
| 1.     | Conduct analysis and mapping of basic competency curriculum Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) | 70% 30% |
| 2.     | Design and create a Semester Learning Plan (RPS) TKJ Learning basic competencies Install Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) | 80% 20% |
| 3.     | Developing basic competency TKJ material Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) according to needs, level of student development, and problems in practice in the field | 80% 20% |
| 4.     | Using TKJ learning methods basic competency Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) that is varied and student-centered | 80% 20% |
| 5.     | Using diverse and innovative media in TKJ learning basic competencies Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) | 70% 30% |
| 6.     | Developing TKJ learning processes and interactions of basic competencies Installing a student-centered Graphical User Interface (GUI) and Command Line Interface (CLI) based Operating System | 80% 20% |
| 7.     | Assessing TKJ learning basic competencies Installing an | 80% 20% |
Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) in accordance with the objectives and includes all aspects (knowledge, attitudes, and psychomotor)

8 Utilizing books, learning resources, and technology that supports TKJ learning basic competencies Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)

9 Develop learning by honing the ability to solve social problems and decision making in learning TKJ basic competencies Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)

10 Developing TKJ learning interactions is more group than individual

11 Develop inquiry and group investigations in TKJ learning basic competencies Install Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)

12 Develop learning that hones independence, self-confidence, and skills in learning TKJ basic competencies Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)

Based on the table above shows that most teachers do an analysis of the basic competency curriculum Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI). The analysis conducted in relation to the TKJ curriculum is curriculum analysis in preparing the Semester Learning Plan (RPS), mapping the level of difficulty, breadth, scope of material, and integration of TKJ. In general, teachers are of the view that mapping is done to facilitate the preparation and implementation of effective learning in achieving learning objectives.

4.1.2 Student

Analysis of needs in terms of students shows TKJ learning basic competencies Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) has not been able to develop the ability to provide solutions to solve social problems in everyday life. More learning emphasizes cognitive aspects, aspects of attitude and skills are less developed optimally.

As part of the work environment, teachers should be directly involved in solving various problems that occur. Because in general the learning process is not fully student-centered, the teacher is still in control of the learning activities. Student independence in learning is not optimal. Students in learning more carried out individually, both through the tasks given and the learning approaches given by students. This condition causes students to lack the courage to actively participate in solving various problems in the field.

In students' view, the learning approach taken emphasizes more on the individual approach. The group approach is only on specific tasks and is not routinely carried out by students in each learning. In learning interactions, students are generally dominated. Students are still the main source in learning by using the lecture method, questions and answers, and class discussion. Students still use textbooks as the main handle in students' views. Additional books relating to learning material are rarely used. In certain materials, the teacher gives assignments using books as a primary learning source. While web-based in schools has not been used as a source and the main learning media in the learning process carried out by students so far.
TKJ material developed by the teacher according to the teacher, has not led to field-based problems that occur in the work environment around students, it can even be said to tend to be ignored. During this time TKJ learning is sourced more from handbooks.

4.1.3 Material
TKJ material becomes a study at every level of education with increasingly complex Information System-based problems both in local and national contexts. Analysis of TKJ material so far has been:

Basic competency TKJ material Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) has not been fully developed by the teacher in learning. TKJ RPS mapping has not been carried out by all teachers. Material of basic competency TKJ Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) so far is still based on textbooks as the main source in learning. TKJ material basic competency Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) is very challenging to use various sources and media available in the work environment. Along with the complexity of social problems that exist in the life of the work environment and the importance of efforts to preserve sustainable diversity, through learning TKJ basic competencies Installing the Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) becomes very important to be implemented. Learning TKJ basic competencies Installing the Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) has not fully utilized the problem of field practice as a source and learning medium. Though the essence of TKJ is nothing but the study of the work environment with its environment both physically and non-physically

4.2 Early Learning Design Optimization of Web Based Learning
Web-based learning optimization model Problem Based Installing a Graphical User Interface (GUI) and Command Line Interface (CLI) based system departs from problems in the daily work environment, by raising issues and problems Installing a Graphical User Interface (GUI) based Operating System ) and Command Line Interface (CLI). The main objective of this development is to improve the competence of Installing Graphical User Interface (GUI) and Command Line Interface (CLI) based systems, both in terms of knowledge, attitude / values, skills, and participation in Installing Graphical User Interface (GUI) based Operating Systems and Command Line Interface (CLI). In the initial design of problem-based web based learning optimization Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) the construction consists of: (1) syntax, (2) operating system, (3) working principles, (4) support systems, (5) instructional impacts and companion impacts.

4.2.1 Syntax
The syntax in the design of problem based web based learning optimization Installing the Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) was developed into 6 syntaxes, namely: (1) student orientation to the problem, (2) mapping and determining the priority of the problem, (3) investigation of problems Installing Graphical User Interface (GUI) and Command Line Interface (CLI) based Operating Systems, (4) interdisciplinary and crossdisciplinary analysis, (5) group and classical discussions, (6) developing and presenting the work, and (7) analyze and evaluate the problem solving process. Optimization of problem based web based learning Installing Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI) in TKJ learning consists of 6 main steps that begin by orienting students to a problem situation and ending with the presentation and analysis of student work. The following is the development of
the Problem Based Learning syntax with the development of a problem-based web based learning optimization syntax. Installing an Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI).

**Table 2. Syntax Model Problem Based Learning and Development of Problem Based Optimization Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)**

| Stage 1 | Behavioral | Stage 1 | Behavioral |
|---------|------------|---------|------------|
| Student orientation to problems | - Explain the learning objectives  
- File a phenomenon  
- raises a problem  
- Motivate students to be involved in problem solving | Student orientation to the problem | - Raising the phenomenon of problems Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)  
- Evidence and examples of problems Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)  
- Motivate students to solve problems |

| Stage 2 | Behavioral | Stage 2 | Behavioral |
|---------|------------|---------|------------|
| Organizing students for learning | - Organizing learning tasks related to problems  
- Setting up the device in problem investigation | Mapping and prioritizing problems | - Identifying the factual conditions of the problem Installing the Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI)  
- Mapping issues Installing a Graphical User Interface (GUI) and Command Line Interface (CLI) based Operating System  
- Determine 5 main problems Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) |

| Stage 3 | Behavioral | Stage 3 | Behavioral |
|---------|------------|---------|------------|
| Guide individual and group investigations | - Encourage students to gather information accordingly  
- Carry out investigations / experiments to get explanations and problem solving | Investigating problems | - Conduct an investigation  
- Develops critical thinking & analysis skills  
- Description and condition of the problem Installing the Operating System based on Graphical User Interface (GUI) and Command Line Interface (CLI)  
- Analysis of data and facts, causes, impacts, and solutions to problems |
Stage 4  
Develop and present the work  
- Assist students in preparing and planning and preparing appropriate work such as: reports, videos, and models

Tahap 4  
Performing Multidisciplinary and Crossdisciplinary Analysis  
- Specifically conducting Multidisciplinary and Crossdisciplinary studies on issues installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI)

Stage 5  
Analyze and evaluate the problem solving process  
- Helping students to reflect or evaluate the investigation and the processes carried out  
- Overall student reflection

Stage 6  
Develop and present the work  
- Present the work in the form of reports, drawings, photos, pamphlets, and posters

Stage 7  
Analyze and evaluate the problem solving process  
- Reflecting or evaluating the process and results  
- Fix weaknesses  
- Perform or provide reinforcement

Source: Development based on PBL Arends syntax, 1997; Eggen & Kauchak, 2012; Ibrahim & Nur, 2000)

4.3 Test Result

Table 3. Pretest Recapitulation of Competency Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) Students In Limited Test 1

| Aspect          | Pretest Value | Posttest Value | Average Increase |
|-----------------|---------------|----------------|------------------|
|                 | Control | Experiment | Control | Experiment | Control | Experiment |
| Knowledge       | 62.40   | 64.32       | 60.84   | 67.56       | -1.56   | 3.24        |
| Attitude        | 63.78   | 63.61       | 60.98   | 65.71       | -2.80   | 2.10        |
| The skills      | 66.23   | 68.13       | 67.30   | 69.87       | 1.07    | 1.74        |
| Participation   | 66.53   | 62.20       | 63.17   | 65.80       | 3.36    | 3.60        |
**Table 4. Recapitulation of Competency Pretest Value Installing Operating Systems based on Graphical User Interface (GUI) and Command Line Interface (CLI) Students in Limited Trials 2**

| Aspect      | Pretest Value | Posttest Value | Average Increase |
|-------------|---------------|----------------|------------------|
|             | Control       | Experiment     | Control          | Experiment |
| Knowledge   | 66.57         | 70.77          | 70.66            | 76.54      | 4.09         | 5.77         |
| Attitude    | 56.37         | 60.73          | 56.63            | 70.17      | 0.26         | 9.44         |
| The skills  | 56.54         | 59             | 59.60            | 73.67      | 3.06         | 14.67        |
| Participation | 64.90       | 69.48          | 65.50            | 74.52      | 0.6          | 5.04         |

5. Conclusion

The results of research on optimizing web-based learning media through the PBL approach in ICT learning for students at SMK PGRI 3 Walikukun can be concluded, that:

Optimization of web-based learning media through the PBL approach is more effective in increasing ICT competency in students in SMK PGRI 3 Walikukun both in the process and learning outcomes which include competencies in aspects of knowledge, attitudes, skills, and participation compared to before which there are still many using direct learning models (direct instruction). Improvement of teacher skills in applying the syntax of web-based learning optimization models, learning systems and reaction principles takes place interactively and is student-centered.

The advantages of optimizing Web-Based Learning make the community environment as a source and medium of learning, making the knowledge possessed by students as centers of learning centered on students, shaping students' thinking critically, logically, and able to solve problems. The application of Web-Based Learning optimization also fosters positive attitudes towards ICT subjects. While the weaknesses are efficiency and time constraints in implementing the model, the syntactic process series of optimization models Web-Based Learning is a long process, requires special skills for teachers to implement the model, and incomplete teacher understanding of the model, especially in the application of the syntactic model can influence the success Web Based Learning optimization application.

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