DEVELOPMENT MEDIA INTERACTIVE LEARNING IN OPERATION MACHINE CNC TU - 2A FOR SMK (CASE STUDY IN SMK 6 BANDUNG)

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ABSTRACT

Lathe CNC (Computerized Numerically Controlled)is a machine that is operated by a language code in the form of numbers and letters. Lathe in vocational used as an exercise of competence which should be owned by every student. SMK Students are required to have knowledge regarding conventional lathes, before using a CNC lathe. CNC lathe machine learning has not done well because of the lack of infrastructure is not yet complete, of course, it can interfere with the learning process and pratikum students. Based on interviews with department heads machining techniques in SMK 6 Bandung, stating that SMKN 6 Bandung only have 1 piece CNC lathes TU - 2A, the number of CNC lathes TU - limited 2A certainly can interfere with the process of learning and practicum. Based on these issues, the making of interactive learning media for the operation of CNC lathes TU - 2A can be one solution in studying and practicing CNC lathes TU - 2A. A total of 84 students who answered the questionnaire stated that as many as 78% of students agree with their interactive learning media for CNC lathes TU - 2A. CNC lathe machine learning media TU - 2A CNC lathe can simulate TU - 2A and able to assist students in learning CNC lathes TU - 2A.

Keywords: Learning Media, Interactive, CNC lathes TU-2A, Engineering, Mechanical Machining.

1. PRELIMINARY

Lathe CNC (Computerized Numerically Controlled) Is a machine tool. Operation of CNC lathes TU - 2A using the form machine language code - a code consisting of numbers and letters. The learning process CNC lathe machining TU - 2A which is in conformity with the competency-based curriculum issued by the government, but there are problems which limited the number of machines they become an obstacle to the process of practical work and the learning process. [1].

According to interviews with department heads machining techniques in SMKN 6 Bandung declared that SMKN 6 Bandung only have 1 piece CNC lathes TU-2A. This type of machine being used is not produced and the price of the expensive CNC lathe CNC lathes led to the number of TU - 2A amounted to one fruit. Machines used in SMKN 6 Bandung is a CNC lathe TU - 2A EMCO. CNC lathes TU - 2A was used because the machine is as basic a practicum student to operate a CNC machine, a minimal amount can make a CNC lathe TU-2A is used for lab damaged. Damage that occurs on a lathe CNC TU - 2A can result embelajaran and practical process to be blocked

Based on the problems above, the manufacture of simulation learning media to be one option that can be used as learning for male and female students of SMKN 6 Bandung. CNC lathe machine learning TU - 2A manifested in a thesis entitled "Development of Interactive Learning Media Operating CNC Machines At TU-2A For SMK (A case study in SMKN 6 Bandung)"

1.1 Similar research

Similar research to assist in the study was used to see the suggestions put forward in previous studies. Similar research by learning media lathe CNC TU - 2A is "Learning Media Development Machining Lathe For Vocational Education"

conducted by M Izzy and "Media Development Interactive Learning as an Alternative Learning CNC Milling Machine For Vocational Mechanical Engineering" by Enjang Rahmat. Both applications have been selected for the workings of these two applications is similar to the workings of a CNC lathe TU - 2A and from the second application is used as a medium of learning.

a. Learning Media Development Vocational Lathe Machining

Media applications for vocational learning lathe machining made by Mochammad Izzy [7]. This application is used to help students of mechanical engineering at SMK International craft. The problem faced in this research is the engine limitations provided in vocational International craft. The interface in this study is depicted in Figure 1.

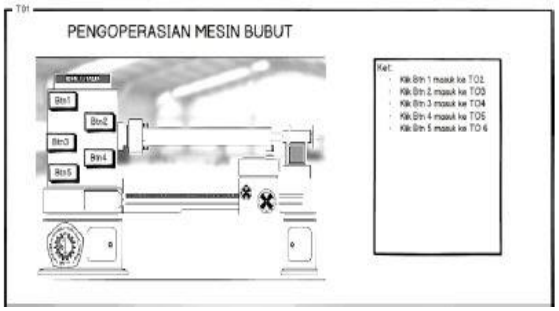


Figure 1 Display Interface Design

Here is an analysis of the application development learning medium machining lathe made by M Izzy. Lathe machining construction analysis table shown in Table 1.

Table 1 Lathe Machining Development Analysis

No.	Component	Information
1	*hardware*	This application is based Desktop
2	*Graphic*	This application has a 2D shape
3	Control	Controls of this application by pressing the button on the machine

Suggestions put forward in this peneleitian is can make the display into a 3D application to make it look more real and attract students.

b. CNC Machine Learning Media Development for vocational Miling

Enjang instructional media development by Grace, entitled, Development Media Interactive Learning as an Alternative Learning CNC Milling Machine For Vocational Mechanical Engineering [8]. By conducting a case study in SMK 1 Purwakarta. The machine used is a CNC lathe milling TU - 3A. The problems that occurred in this study is the limited number of lathes are used as learning and practicum in SMK 1 Purwakarta. Analysis of application development can be seen in table 2

Table 2 Analysis Application Development

No.	Component	Information
1	*hardware*	This application is based Desktop
2	*Graphic*	This application has a 2D shape

2. RESEARCH CONTENT

2.1 analysis System

System Analysis aims to analyze the existing problems in this research, analyze needs - the need to support this research.

2.2 Problem analysis

Analysis of the problem is the stage to collect information about the problems that are in the engineering machinery in SMKN 6 Bandung. Machining engineering student at SMK 6 Bandung amounted to 160 people, is divided in five classes, each class numbered 30. The learning process consists of two types of learning theory and practice. The learning process is done by the teacher theory that explains the material in front of the class. Practicum process carried out when the learning process theory has been delivered. Lab process can not go well because of the number of machines is limited and the number of students that many make a long queue because students are required to work on his own, with a CNC lathe machine learning time TU - 2A as much as 5 x 45 min. Practicum process conducted every student ranges from 15-20 minutes,

2.3 Analysis Procedure Ongoing

CNC lathe machine learning process TU-2A in SMKN 6 Bandung walk with a lecture and lab. The process - a process which consists in SMKN 6 Bandung is as follows.

a. Learning Procedures Analysis

The learning procedure in SMKN 6 Bandung illustrated in Figure 2.

1. Teachers deliver material to students in class.
2. Students pay attention to the material presented by the teacher.
3. Teachers give students time to ask, if anyone asks teacher to return the material.
4. If the question session is complete. Teachers will provide an exercise conducted in the classroom. Exercises in accordance with the teaching materials are delivered.
5. Students work on the problems - exercises given.
6. After work on the problems - exercises, the study followed by laboratory.

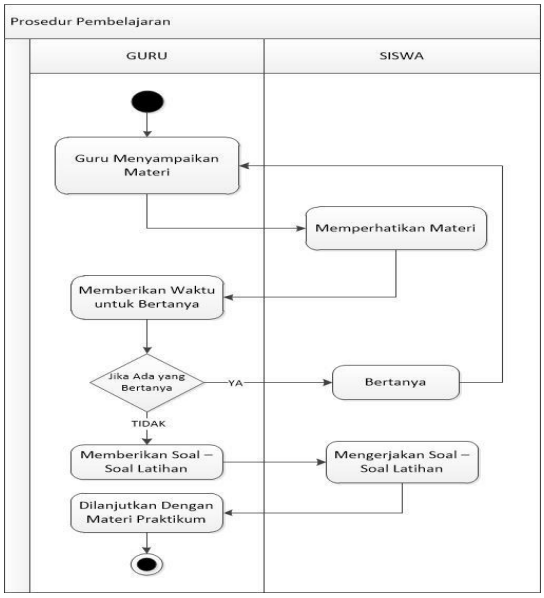


Figure 2 Procedure Learning

b. Analysis of Practical Procedures

The process pratikum in SMKN 6 Bandung illustrated in Figure 3.

1. Once students understand the material presented in class. Students are prepared to do pratikum.
2. Teachers will distribute worksheets for each student.
3. Students work on worksheets as instructed.
4. Teachers check the worksheet if done is correct then the student can operate CNC lathes TU-2A, but if not, students are asked to fix spreadsheet.
5. Because the engines are available with just one then students do pratikum interchangeably.
6. If till the deadline for students not yet finished with its work, it can be continued at a later meeting.
7. Before leaving the room pratikum students are required cleaning and tidying the room pratikum.
8. Students provide worksheets and practical work piece.

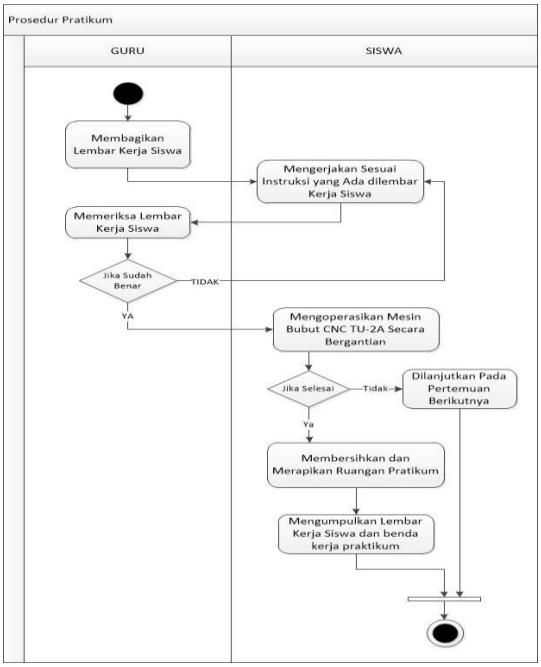


Figure 3 Procedure Practicum

2.4 Analysis of Material

The materials used in the construction of CNC lathe machine learning media TU-2A in accordance with the curriculum used in SMKN 6 Bandung, and refers to the Directorate of Technical and Vocational Education. CNC lathe machine learning TU - 2A is [4]

1. Learning Activity 1 Basic Technology CNC.
2. Learning Activity 2 CNC Lathe.
3. Learning Activity 3 Control Lathe CNC TU-2A.
4. Learning Activity 4 Cutting Technology
5. Learning Activity 5 Platform Programming
6. Learning Activity 6 Working Function G In CNC Programming

From learning to learning CNC lathes TU - 2A, the following details of the learning activities of students, which is shown in table 3

Table 3 Details Matter

Matter	Description Learning for Students
Learning Activity 1 Basic Technology CNC	Students gain basic material CNC lathe TU - 2A, like the history of engines, parts machined parts, CNC lathe workings TU - 2A. Students can find, identify and describe parts of a lathe, and answer practice questions independently.
Learning Activity 2 Lathe CNC	
Learning Activity 3 CNC Lathe Machine Control	Once students understand parts - parts CNC lathes TU - 2A previously learned, students can identify the parts of a lathe CNC TU - 2A. Students can also simulate the movement of the machine manually.
Learning Activity 4 Cutting Technology	Students can understand the technique of cutting on a CNC lathe TU - 2A, with memmahami speed feeds the workpiece and simulate.
Learning Activity 5 Platform Programming	Students can identify programming method, knowing the function of G and M, and able to understand the concept of CNC programming.
Learning Activity 6 Working Function G In programan CNC	Students can understand the program a CNC lathe TU - 2A and is capable of simulating CNC programming TU - 2A.

1. simulations

Simulation is a condition that was created to replace the real conditions resembling its original condition, it is done to avoid the risks that will be encountered in a real situation [2]. The shape of the simulation to be built for interactive learning media on the operation of CNC lathe TU-2A is a combination of animation, images, video, sound, and text. Table 3 simulation component specifications

Table 3 Component Specifications Simulation

No.	Component	Information
1	Part - Part Lathe	Loading picture and caption section
2	How it works lathe	Loading animation how the lathe, and provide information function - the function of each part lathe
3	Simualasi lathe	Loading animation, text, images and sound to operate.

2. Evaluation

Evaluation is generally done on a process of learning and skills that are carried out continuously. This is done by the students with the hope to master certain skills [2]. Evaluation is done on CNC lathe machine learning media TU - 2A is the evaluation of the work essay.

2.5 Description of System

In designing learning media lathe CNC TU - 2A using computer-assisted learning model that CAI (Computer Assisted Instruction). CAI (Computer Assisted Instruction) is a method of assisted learning kompuer, whereby the role of CAI using computers - computers that are used as supplemental instructional aide. Utilization of CAI include the presentation of the information, content, and exercise [3]. Figure 4 illustrates the description of the system to be built.

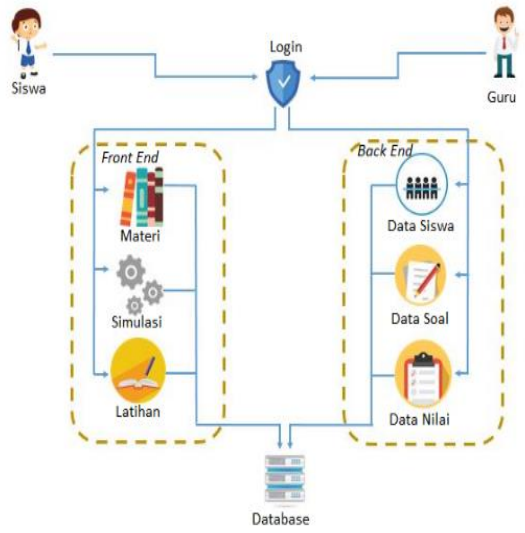


Figure 4 System Description

2.6 Description of Concept Application Built

Applications instructional media used to convey the material with visual media, it takes a good visual concept to avoid errors in the delivery of content. Here is a description of the concept of the application to be built. Table 4 shows the description of concept application to be built.

Table 4 Description of Concept Application On the Build

Elements in Application Development	Description
Title	Interactive Learning Media Development In Operation Lathe CNC TU - 2A for vocational
users	Male and female students majoring in mechanical engineering class XII Semester 1.
Audio	Audio consists of a sound recording machine, and audio - audio and other support.
animation	Animation is used in the development of instructional media, using 3D animation
interactivity	Interactivity between user and system simulation can be seen on the menu, and the menu is doing exercises.

2.7 Analysis of Interactive Learning Methods

Interactive learning media applications CNC lathe operation TU-2A is built using the tutorial, simulation and evaluation. Interactive learning method is a method used to present a discussion in a multimedia-based learning by using software such as computer-assisted program contains subject matter. Operation of interactive learning applications using the method / model tutorial is as follows:

1. Presentation materials - materials that will be used by male and female students in SMKN 6 Bandung refers to mechanical engineering books published by the Technical and Vocational Education, the curriculum used is adjusted by the school curriculum in 2013.
2. Learning process and material on interactive learning using a 3-dimensional image which is equipped with text, images, animations, and sounds that describe the material conveyed on the application.
3. Simulations are delivered equipped with audio and visual equipment to facilitate the material presented.

2.8 Requirements Analysis Non - Functional

Analysis of the needs of non - functional analysis is used to determine the system requirements specification. Analysis of the needs of non - functional shown in Table 5.

Table 5 perangakat Hardware Requirement Specification Development

Type Hardware	Information
processor	2 GHz
RAM	2 GB
Hard Drive	25 GB
VGA	2 GB
Etc	*Keyboard, Mouse, Speaker*

Table 6 displays builder software requirements specification.

Table 6 Software Requirements Specification Development

Type of Software	Information
Operating system	Windows 8.1

blender	Blender 2.78 is used to create objects - objects and create animations.
Unity	Unity 5.6 is used to build the application.

2.9 System Design

The system design is an illustration, the planning of several elements - the supporting elements of the system development.

a. Menu Structure Design

The menu structure is composed of students from the function to operate simulations, exercises, instructions, and so forth. The design of the menu structure on CNC lathe machine learning media TU - 2A shown in Figure 5.

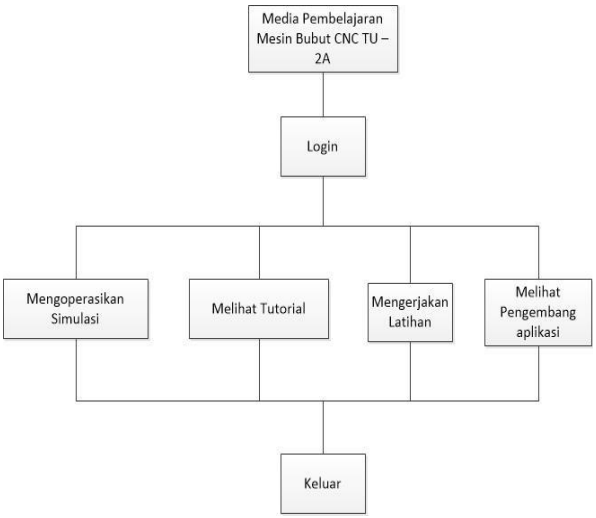


Figure 5 Menu Structure

b. Implementation Interface

Implementation of the main page can be seen in Figure 6.



Figure 6 Implementation of Home

Implementation of simulation pages can be seen in Figure 7



Figure 7 Implementation Guide Simulation

2:10 Testing System

Testing of the system is the steps being taken to determine the level of kerberhasilan system and find errors - errors. This experiment is black box testing and testing the questionnaire.

2:11 Black Box Testing

Black Box Testing is used to determine whether all of the software has been running properly [5]. In the black box testing, focusing on functional testing, instructional media applications lathe CNC TU - 2A functionally there are no errors and result in line with expectations.

2:12 Testing Questionnaire

Tests conducted questionnaires to students SMKN 6 Bandung to assess the success of instructional media lathe CNC TU - 2A. Keusioner testing uses and methods linkert statement. Linkert methods do to get a result to measure attitudes, opinions, or a presespsi raised by a person or group [6]. Table 7 displays the weight value linkert scale used in the study in.

Table 7 Weight Scale Linkert

Information	Score

Strongly agree	5
Agree	4
Enough	3
Less Agree	2
Disagree	1

2.13 Questionnaire Results

The test results obtained by distributing a statement - a statement to the 84 students to know the result of the success rate of this study. The questionnaire used the following methods adalh linkert statement - a statement that is used in testing the questionnaire.

1. Applications CNC lathe machine learning media TU - 2A displays are easy to understand.
2. Applications CNC lathe machine learning media TU - 2A using language that is easily understood.
3. Material and questions presented in this application is easy to understand.
4. Process simulation presented in this application is easy to understand.
5. Instructional media applications CNC lathes TU - 2A motivated in learning and practicum.

From the statement - a statement on the obtained results. Hasi questionnaires illustrated in Figure 8

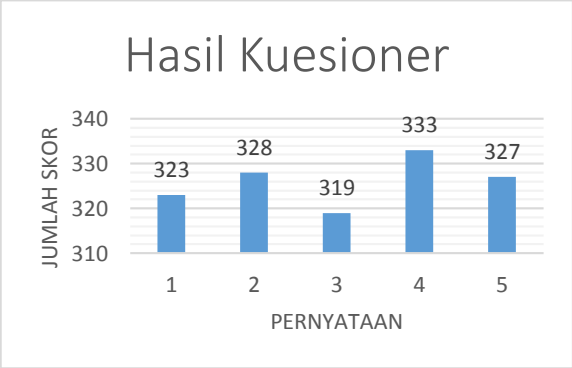


Figure 8 Results Questionnaire

From the above data that there is a minimum limit of the total score 252, with the number of scores obtained from each statement of the amount exceeding the minimum score, it can be inferred from any statement given to the respondent entered the category of instructional media agree on the application of CNC lathes TU - 2A.

3. CLOSING

In this chapter will dikemukanan the conclusions of the chapter - the previous chapters as well as suggestions that may be the improvement and development of instructional media applications lathe CNC TU - 2A.

3.1 Conclusion

Based on the results of testing and implementation, it can be concluded that the application of instructional media lathe CNC TU - 2A can help simulate the operation of a CNC lathe TU - 2A, and can help students learn the material on the CNC lathe machine learning TU - 2A.

3.2 advice

In the development of interactive learning media, there are still many deficiencies found. Developing learning media is necessary to add some features such as the appearance of matter - a matter which is chosen randomly so that the display about every student is different. The addition of learning materials, and the simulation shown will be great if the show more interactive.

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