THE DEVELOPMENT OF COMPUTER BASED LEARNING MEDIA FOR PLC COURSE USING ADOBE FLASH

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Abstract - This study is aimed to develop a computer based learning system using adobe flash and research and development method for PLC study to increase the quality of learning. PLC is a programmable logic controller that is used widely in many industries in order to increase the efficiency and effectiveness of the production. There are several applications in PLC study that try to bridge the distance between theory and practical reality that exist in the industry process as close as possible, by using various of controller in industry process application. However, it is almost impossible to implement all those applications because of two major things, the limitation of laboratory equipment facility and the absent of teaching materials used to visualize the work process of the tools. This situation makes difficult for student to understand this PLC controller application. Therefore, a media that has an ability to produce an illustration of the control process and application in the industrial world, even only through a simulation, is needed. This computer based learning system is developed by using software Adobe Flash along with other supporting software. These softwares are used to create graphis, audio and video based on the analysis of the current needs, test the product trial, and revise the product based on the evaluation result. Based on the study, it is concluded that the computer based learning media using Adobe Flash is suitable to be used as a learning media for PLC study and can be categorized as good based on the evaluation result number given by media expert by 78.84%, PLC expert by 94.44% and student by 83.66%

Keywords: PLC, Learning, Media, Computer, Adobe Flash

I. INTRODUCTION

Education is a complex process, but its complexity is always aligned with human development. Through education and learning process, many aspects of life are developed. Various issues within the learning process are need to be identified and stabilized, so that the ideal learning condition is created to meet its goal purpose through optimum means.

Education world these days has shown massive improvement along with science and technology development. This improvement request preparation effort from learners so that they can participate in science and technology development for the next generation. The ability to use the technology to improve the educational world is definitely depends on the number of education expert and their capability.

Wiryokusumo said to improve the quality process and its learning result, we need not to forget one absolut truth, and that is the learner need to learn from learning resources at most. According to him, without adequate learning resources, it will be difficult to create learning process that will lead to optimum learning result. To learn, it is not limited to only use print material such as books that emphasize visual dimension as its learning source, moreover learning process can also include all the senses, totally and integratedly. Book is only one medium for human to learn. There are many other mediums that can be used to increase the quality of learning process such as: multi media computer, audio tape recording, video, audio slide and many more.

In regards to the elements that are intrinsic in learning that can support a learning process, a tool or a learning media is needed as a means of support, in addition to the transformation of learning though a face-to-face (lecture) inside a classroom. The use of tools or learning media as support is an inseparable part and is already integrated to the used learning methods.

Learning tools is one of the dynamic elements to study. Learning tools has important roles for students during their learning process. The use of learning tools as abstract learning materials, can help to make learning condition become more interesting

Currently there are many learning tools that have been created to help for self learning, however to look an option or solution for a good learning tools so that the learning process become effective, interesting, and interactive has become an issue that need to be solved.

Media learning tools for self learning in this technology advancement era is really needed. This is because to develop human quality, depending on knowledge transfer that done at school or university or other informal education verbally is not enough.

Learning tools or media learning can be made and used in accordance to the subject and the urgency of the study. A study that based on memorization or theoritical, might only need a guidebook. However, for the one that more for application or practical based, it need more additional information. Often, it is not enough to just share the knowledge verbally but it is difficult also to visualize some
teaching material for a study due to the limitation of the teachers, tools, materials, expenses and other more.

PLC study is a study that explains about sequential basic control, the introduction of PLC, its programming, its functions, and simple control application. This study is trying to connect the concept with the current reality happened in industry process. The controller in industry process application can not be applied completely in PLC laboratory because of the number of variety in industry process application such as product sort machine and conveyor and also the limitation of laboratory facility. PLC can also be applied for non industry such as red light system, escalator, and elevator. Since all of those application can not be applied in PLC laboratory, there for a media that could give an idea of what controller is in industry process application, even just in a simulation form, is needed. The expectation and output of this simulation is to encourage student to be able to make a simple program industry.

By using Adobe Flash software for PLC study for an interactive learning, students are expected to be more guided for self learning and also to give an idea of the controller in industry process application, since it is explained in the form of simulation although it is not described completely. Another advantage is that this software can be studied many times until students can fully understand, compared to use learning tools that is presented only on specific time, where the understanding of students for this study without intensive repetition is still questionable. Moreover, the students of this PLC study is a mixed of senior high school graduated and vocational high school graduated, therefore the ability to capture this study for both is different as there is no PLC study taught in senior high school, only in vocational high school majoring electric or electronic industry.

This Interactive learning media can also reduce the static atmosphere and also can reflect the learning behavior of students during the process of knowledge transfer, starting from accepting, cultivating, transforming and producing new messages in the form of behavior or verbally.

This medium is not only useful for students, but also for lecturer in helping them presenting the learning material. The expectation of having this computer based learning using adobe flash in PLC study, is to bring a positive impact during the learning process.

II. METHOD

The output of this research by applying research and development method, is a learning media of computer based PLC using adobe flash. The procedure for this research has 3 stages which are define, design and develop.

During define stage, the activity is focused on the analysis of requirement where the students could have an interactive learning medium that could guide them to learn PLC independently and also give an idea of PLC controller in industry process application which is shown in a simulation form so that their creativity and motivation can be improved.

Design stage is intended to design PLC computer based learning media based on PLC curriculum. Development stage is intended to produce PLC learning media that has been revised based on input from media expert, material expert and students which then be validated so it become a worthy product to try

III. RESULT AND DISCUSSION

Design of Product Development
Several steps to design PLC media learning are as follow:
1. Flowchart Design
Flowchart is a complete description about program flow created by specific symbols. This flowchart is shown on picture 1.

2. Storyboard design
Storyboard is a detail flowchart where it contains of learning information, procedure and learning instruction. Flash based learning media storyboard for PLC study can be seen in picture 2.
Explanation:

- Interface above is shown after preloading
- Menu list with an icon symbol for every menu is placed in the middle, where the icon symbol will get bigger if it is hovered
- Home button is used as a link to homepage
- Author button is used as a link to compiler information
- Help button is used as a link to all material menu

3. Collecting of Graphic material
Collecting all of the graphic material required for the storyboard is needed before compiling the program. Supporting software used for this is Adobe Photoshop

4. Collecting of Animation material
Animation is needed when it come to describe the message that required motion element, making the interface more vivid and eye catching. Software used for this is Adobe Flash CS3

5. Programming
Programming is a main step in creating interactive learning. Basically programming is combining all of graphic material, animation and text following the flow on flowchart. This research is using Action Script 2.0 in Adobe Flash CS3 as its programming.

6. Finishing
Finishing is the last stage in creating the program. The output of this program is an application file (.exe).

Result of Product Development
The product name generated from this research is learning media of computer based PLC using Adobe Flash. The program contains several files where all are connected by the link through actionscript button. Tutorial video with the extension of .FLV is also connected via link. First interface of Preloading program is shown in picture 3 while main menu interface is shown in picture 4.

Main menu is an interface displayed after preloading program is run. Main menu contains of certain menus as follows:

1. Lecture Unit or SAP (Satuan Acara Perkuliahan)
This menu contains of PLC study description, general instructional objective, and specific instructional objective. The interface of SAP is shown in picture 5.

2. Material
This menu contain material that are divided into five parts as shown in picture 6.

Material 1 explaining about the concept, principal, installation part, area structure of memory and PLC wiring. Material 2
explaining about logic gates concept. Material 3 explaining about PLC programming. Material 4 explaining about PLC instructions while Material 5 explaining about tutorial video of cxprogrammer programming. Some parts of PLC material are shown in picture 7 and picture 8.

3. Evaluation
This evaluation menu is intended to find out how far a user understand the material that has been learned. In evaluation menu, user can see the obtained score in real time. Evaluation interface menu is shown in picture 9.

4. Simulation
Simulation menu contain of PLC application of interactive animation along with diagram ladder. This simulation has 5 PLC applications which are traffic light, bor, packing line and garage door. PLC application menu is shown in picture 10, while one of the example of packing line application is shown in picture 11.

5. Glossariam
This menu contains of glossary of common words used in PLC theory.

6. Reference
This menu contains of book reference used for this research

Evaluation Product Result

Learning media of computer based PLC is considered as a successful program if this program runs well based on the goals to be achieved. To be able to know the advantage and disadvantage of this program, a testing process to analyze the data based on the created questionnaire is required. Aiming to
run data analyze is to find out if this media learning product for PLC study is feasible. The method is giving the questionnaire to 3 type of people: media experts, PLC study material experts and students.

Questionnaire for media experts consists of 13 questions. Those are interface, navigation, respond, animation, color, text, font, image, music, tutorial video, and feedback. Scale consists of 1-4 score and is judged by rating scale from 0%, means rather good, to 100%, means very good.

While questionnaire for material expert consists of 9 questions. Those are difficulty level of material, material comprehensiveness, material clarity and difficulty level of evaluation. Evaluation result data from media experts and material experts are shown on table 1 and table 2.

Result evaluation to students is done through 2 stages where the number of students as respondents are 29. The revision of evaluation is done when the result percentage of first evaluation is less than 75%.

PLC learning media product that is tested by students as its respondents. Questionnaire for student consists of 15 questions. Those are interface, navigation, respond, animation, color, text, font, image, music, tutorial video, feedback, difficulty level of material, material comprehensiveness, material clarity and difficulty level of evaluation. Evaluation data result from students is shown in table 3, while evaluation graph of first phase and second phase are shown in picture 12 and picture 13.

### CONCLUSION

Based on the research result that has been conducted, there are several conclusions that can be taken as keys take out which are:

1. Computer based learning media using Adobe Flash has been successfully created and capable to give an interactive learning experience for students to guide them to be able to do self learning, while also competent to give an idea of controller in industrial process application

2. This learning media is competent to help lecturer of PLC study in presenting PLC material and smoothing the lecturing process. This also helps students during learning process to understand PLC study so that the maximum level of understanding can be reached

3. The result of the learning media assessment for PLC study given by media expert is 78.84% which is considered as good. Result given by PLC material expert is 94.44%, also considered as good, and the result given by students which is 83.66% also considered as good. Because the score number of all results are higher than 75%, it is safely said that computer based learning media using Adobe Flash is feasible to use as a learning media.
BIBLIOGRAPHY


