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## Developing learning media for power plant course

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# Developing learning media for power plant course

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**Abstract.** This study aims to (1) develop an appropriate learning media for Power Plant Course, and (2) assess the feasibility of the developed learning media. This is a research and development study using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The research object was the Power Plant Course and the subjects were 30 students of Electrical Engineering Education Department, Faculty of Engineering, Yogyakarta State University. The data were collected by means of questionnaires on a 4-point Likert-type scale. This instrument was validated through expert judgement with the Delphi technique. The obtained data were then analyzed using qualitative descriptive technique. The final product of this research and development study was a learning media used in the Power Plant Course. The results of the feasibility test by the material and media experts as well as by the end users indicate that the developed media is “highly feasible” as the obtained mean scores are 3.41, 3.53, and 3.62 respectively.

## 1. Introduction

The Department of Electrical Engineering Education (DEEE) employs the Competency-Based Curriculum (KBK), i.e. a curriculum of which the learning development, implementation, and evaluation are adjusted to the development of competencies required by the real world of work. Through the implementation of this curriculum, the graduates are expected to have the suitable competencies as required by the industries. Since the 2015/2016 academic year, DEEE has implemented the 2014 Curriculum. The teaching and learning process in the Power Plant Course (PPC) develops the students' competencies in all three domains: cognitive, affective, and psychomotor. PPC covers all the topics related to the operation, maintenance, reparation, and simulation of Steam Power Plant (PLTU), Hydroelectric Power Plant (PLTA), Gas Power Plant (PLTG), Nuclear Power Plant (PLTN), Solar Power Plant (PLTS), Wind Power Plant (PLT Angin), Diesel Power Plant (PLTD), micro-hydro, and generator set. In addition, the students will also deal with topics related to alternator characteristics and generator paralleling. Further, they will have opportunities to have a simulation of Load Frequency Control in a power plant center using the LQR and Robbust methods and conduct field study on a power plant station. The teaching and learning process is carried out in varied activities such as observation, practice, and demonstration, either individually or in-groups. The students are assessed authentically in some aspects on the bases of competency-based assessment, including attendance, attitudes (piety, participation, neatness, cooperation, and work safety), as well as



knowledge and skills reflected in group practice assignments, individual practice reports, and individual competency/practice tests.

In the implementation of the PPC teaching and learning process in the 2015/2016 academic year, most lecturers still encountered difficulties in achieving the students' targeted competencies. This problem was clearly reflected in the students' PPC scores that were not satisfactory enough. One of the probable triggers of this constraint was the unavailability of supporting learning media in PPC. Besides, the results of an observation in the classroom showed that some students faced difficulties in understanding the materials, did not actively participate during the process, and had low motivation in learning. This condition can be used for evaluation purposes for the lecturers to analyze the causes of the matter and to look for the possible solutions. When viewed from the lecturers' side, these problems are in relation to their teaching styles, strategies, models, media, feedbacks, assignments, assessments, and evaluations. Another constraint in PPC teaching and learning process in the 2015/2016 academic year was the limited availability of learning media, particularly computer-based interactive media. In an effort to overcome those problems, the researchers have developed a custom learning media to help the PPC students in their learning process.

## **2. Method**

This study is a research and development aimed at developing a learning media for the Power Plant Course (PPC) using the Adobe Flash Cs6.

In developing the desired media, the researchers employed the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) proposed by Branch (2009) [1]. In the Analysis phase, a need analysis for developing the PCC interactive learning media was carried out. This analysis covered three aspects: curriculum, materials, and the students' characteristics. The second phase, Design, dealt with the media presentation aspects, including the navigation structure, interface design, and storyboard. The grand design was then developed in the Development phase through three main activities, namely media development, expert validation, and evaluation. The developed media then was implemented in the fourth phase, Implementation. The last phase, Evaluation, was then carried out in the teaching and learning process of PPC in the theory class.

The research object was the Power Plant Course and the try-out subjects were 30 students from Class A and D, the Department of Electrical Engineering Education, Faculty of Engineering, Yogyakarta State University. The try-out was conducted in the even semester of the 2016/2017 academic year. The data, both quantitative and qualitative, were collected through questionnaires, observations, and interviews. The respondents' answers were rated using the 4-point Likert-type scale, ranging from "less feasible" to "highly feasible". The instruments were validated through expert judgement, whereas the reliabilities were tested using the Cronbach's alpha.

## **3. Result and Discussion**

This research and development study has produced an interactive learning media for the Power Plant Course (PPC). This section will present the details of the developed media.

The very first page is the Introduction Page. Figure 1 shows the Introduction Page.



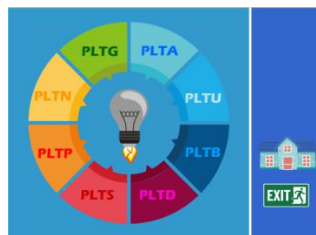
**Figure 1.** The Introduction Page

The Home Page is the main page in this PPC interactive media. The user interface of this this page is shown in Figure 2.



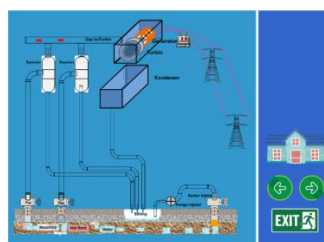
**Figure 2.** The Home Page

The next page is the Material Page that contains all the materials covered in this interactive media.



**Figure 3.** The Material Page

This page shows the Material Page of sub-sections 1, 2, 3, and 4. An example of the Material Page for sub-section 1 is presented in Figure 4.



**Figure 4.** The Material Page of Sub-Section 1

The last page is the Evaluation Page that provides some tasks for the students regarding the presented materials. This evaluation is meant to help the students measure their understanding of the matters.

The developed media is validated by a material expert and a media expert to gain feedbacks. Both experts have validated the media to be feasible to be used in the teaching and learning process in PPC.

### 3.1 The Feasibility of the Interactive Learning Media of the Power Plant Course

The validation results of the developed media by both experts are presented in Table 1 and 2.

**Table 1.** The Results of the Expert Judgement towards the Media Quality

Aspects	Mean Scores
Programming (Technical Quality)	3.62
Media Interface (Media Presentation)	3.44
Total	3.53

For the media expert, the developed media is “highly feasible” as it obtains a mean score of 3.53.

**Table 2.** The Results of the Expert Judgement towards the Material Quality

Aspects	Mean Scores
Instructional Quality	3.30
Content Quality	3.52
Total	3.41

The mean score for the material quality of the developed interactive media is 3.41, indicating that the media is categorized as “highly feasible”.

### 3.2 The Students' Assessment of the Interactive Learning Media of the Power Plant Course

A small and a large group try-out were conducted to obtain data on the students' assessments of the developed interactive media. The questionnaires distributed to the students as the media users covered four aspects: programming (technical quality), interface, materials, and utility. Table 3 presents the mean scores for each of these four aspects.

**Table 3.** The Students' Assessment of the Interactive Learning Media

Aspects	Mean Scores
Programming	3.55
Interface	3.44
Material	3.67
Utility	38.7
Mean Score	3.62

For the students as the media users, the interactive media is “highly feasible” as it obtains a mean score of 3.62. Thus, it can be said that the developed interactive media for the Power Plant Course is highly feasible to be used in the teaching and learning process.

#### 4. Conclusion

Based on the research results and the discussion on the development of interactive learning media for the Power Plant Course, the researchers have come to the following conclusions: (1) the developed media is categorized as “highly feasible” to be implemented with a mean score of 3.41, viewed from the aspect of the materials presented in it; (2) from the interface and programming aspects, the interactive media is “highly feasible” as well for the obtained mean score is 3.53; and (3) the end users rate this media as “highly feasible” as the mean score for programming, interface, material, and utility aspects is 3.62.

#### 5. References

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