Development of Teaching-Learning Censors and Transducer Online Modules on the Education of Electrical Engineering State University of Malang Faculty of Engineering Department of Electrical Engineering

Drs. Suwasono, M.T., Drs.Hari Putranto, Mahfud Jiono. 2013
suwasono_53@yahoo.com
Faculty of Engineering Department of Electrical Engineering
State University of Malang

ABSTRACT

Curriculum Year 2012 of Electrical engineering for Electronic expertise program, obligate all students on Bachelor and Diploma study program of Electrical Engineering Education to learn, understand, master, and also test a variety of censors and transducers. But in fact, some students said that there are too many subject material for censors and transducers which must be mastered. Some students also said that they need more time to do practical work, censors and transducers. This reason caused the number of practiced jobsheet in campuss has not covered yet all variety of censors types that are listed in the competency base material censor and transducer in Electrical Engineering syllabus. It is because there is a gap in students' abilities to understand the basic concept of censor and transducer.

Based on the initial observation, it is required interactive learning online media to help and meet the needs of students who found difficulties in learning censors and transducers. In order to support an active and innovative learning process, a print module and a web-based online module are recommended as well as structured censor and transducer jobsheet that can be accessed by online.

Online learning is an effective approach to format a virtual classroom, where teachers can still deliver their teaching material within distance.

This research aims to solve problems in practical censors and transducers learning in School of Electrical Technic Faculty of Engineering Malang State University, by developing censor and transducer online module. It is expected could enhance students' learning achievement in censor and transducer learning takes.

The development resulted a print teaching module for lecturer's guidance and online print teaching module in jobsheet form for students. The module contains explanation about transducer temperature censor, style or pressure censor, light censor, and proximity censor.

The author used development model which was modified from Sugiyono and Borg & Gall. adapted to the field experience. The research's steps are used as follows: (1) Needs analysis, (2) Data collection, (3) Poduct design, (4) Product development, (5) Product validation, (6) Product revision, (7) Field test, (8) Product revision, and (9) Final product.

Keyword: development, learning module, censors and transducer.

1. INTRODUCTION

Information and Communication Technology (ICT) have an important role in education, particularly in learning process. One of quite popular solution is online learning. Its learning process can be carried out directly and simultaneously eventhough teachers and students are in a different location. This is inline with Strategic Planning of Ministry of Education and Culture of Indonesia 2012 which one of its mandate stated about of the domestication of ICT. The benefits of internet utilization makes collaborative learning is widely accessible, anytime and anywhere.

Bachelor and Diploma students of School of Electrical Techninc of Electronics expertise are obligated to learn, understand, master, and also test various of censors and transducers. But in fact, some students said that they have too many subject material for censors and transducers that must be mastered. They also said that the time for practical work, censors and transducers, which is provided by the School of Electrical Engineering is not sufficient. It is needed a print teaching module and jobsheet for lecturer's guidance and guidance jobsheet for student as a structured learning medium which could be online accessed.

Students of School of Electronic Engineering in Malang State University must understand and master the material concept and test several different censorship and transducer, which includes basic subjects of censorship temperature, a pressure or style censor style, light censor, and proximity censor. To help students in the learning process, it is needed a print of learning modules and jobsheet for lecturer's guidance lecturer, and also a structured online learning module. Because online learning is possibly overcome various problems, such as distance, time, cost, and lack of teaching resources, and especially the various of students' learning pace. At the end the censors and transducer learning process could be conducted in active, effective, and it is expected to enhance students' learning achievement.

2. METHODS OF RESEARCH AND DEVELOPMENT

A. Design Research

This research took a developmental type of research, which aims to develop and validate product. There are several stages involved, from needs analysis to product implementation. To produce certain products used a needs analysis research, and to test the effectiveness of the product so it can be used in a larger society, then the necessary research to test the effectiveness of these products.

B. Model of Development

This development of online e-module used a model that has been modified from Development Model of Borg & Gall (Borg & Gall, 2001) and it was adapted to field experience's conditions. As for research steps, learning materials media that are used are as follows: (1) Needs analysis, (2) Data collection, (3) Product design, (4) Product development, (5) Product validation, (6) Product revision, (7) Field test, (8) Product revision, and (9) Final product.

This research produced the print module and the electronics analog practice module for students of electrical engineering major. The model of development can be seen in Figure 3.1.

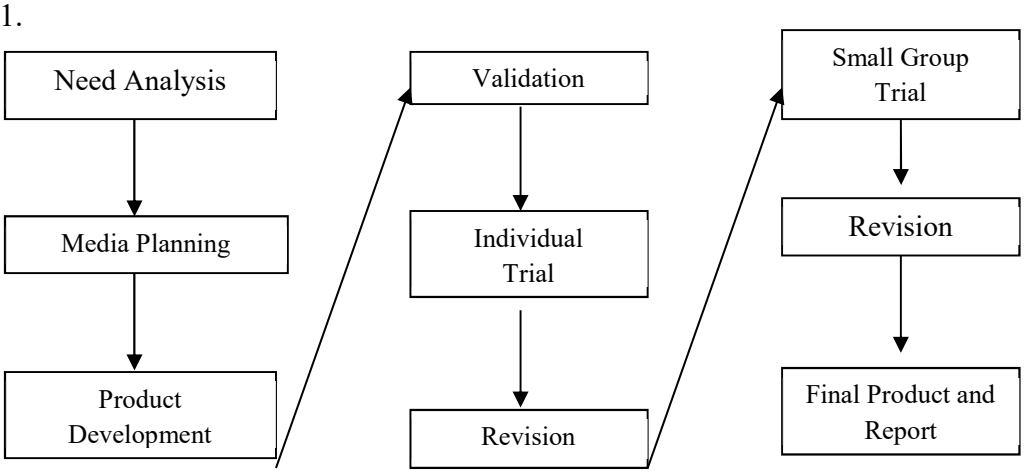

Figure 3.1. Scheme of Borg & Gall Development Model

C. System Description

The proposed application was a software application contains online web-based module which aimed to improve the educational services's quality for Bachelor and Diploma students of School of Electronics Technic. For more information about the proposed development system's architecture can be seen in Figure 3.2.

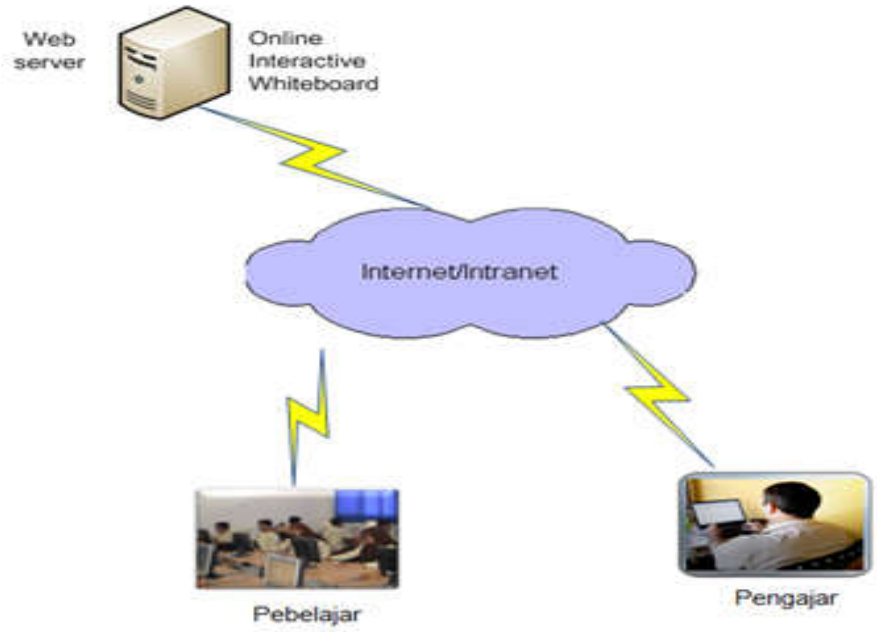

Figure 3.2 Architecture System

The development of censor and transducer e-module online can be accessed anytime and anywhere with unlimited space or time. It is expected that this proposed application could be used by many other parties; school, education institution, learners, teachers, and other community.

D. Trial Design

This e-module was validated in prior by the material and media experts, then tested to users. The development product trial used online questionnaire as a tool for collecting data and revision. This product trial were conducted in three phases; towards material experts subject, media experts subject, and the user subject. Expert's data was used as the basis for material's improvement to produce a product that really fit with censor and transducer e-module online that were designed for users. The revised materials were tested on users. More details about trial design can be seen in Figure 3.3.

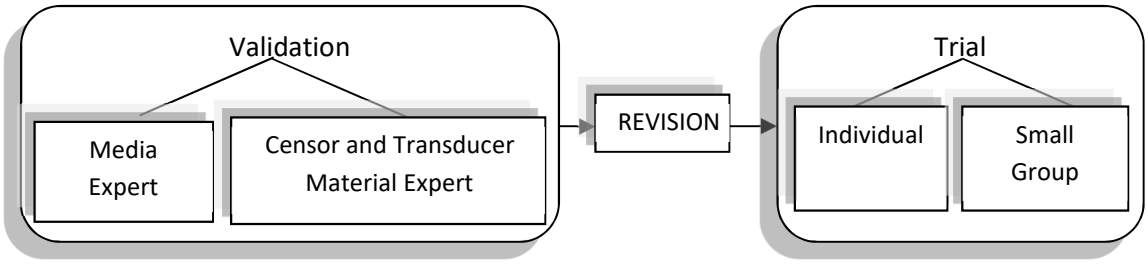

Figure 3.3 Trial of a Design Chart

E. Data Analysis Techniques

a. Development of Data Analysis Techniques

Development of data analysis techniques was done through (1) Transcripting user verbal data questionnaire, (2) Mapping the teaching modul, (3) Tabulating the material for the research, and (4) Writing and preparing the censor and transducer e-module online.

b. Data Analysis Technic E-Module Trial

Trial data collection techniques were done through (1) Collecting verbal data obtained from users' questionnaire results, (2) Recording the data already entered online, (3) Compiling, selecting, and clarifying the data already entered, and (4) Analyzing and formulating the results of analysis to be used in the completion of final development of censor and transducer e-module online.

The analyzed data in this e-modul development was quantitative data. It was obtained from poll judgment given to the media expert, censor and transducer experts, and users. The used formula to cultivate data from media experts, censors and transducer expert, and users was:

1) Percentage data per item, that was calculated by the following formula:

P = X / Xi . 100%

X was the answer, respondents in one item the amount and Xi was ideal in one item.

2) Percentage data of media experts, material expert and audiences' responses were calculated using formulas as follows:

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

Explanation:

P = Percentage

$\sum x$ = Total of respondents answer

$\sum Xi$ = The sum total ideal in one item

100% = constanta

Then, the decision to revise the censors and transducer e-module online was based on the validation of material experts, media experts, and users refered to validation program criteria adapted from Epic and Sriwijaya (2010: 212) as seen in table 3.1.

Table 3.1 Validity Prosentage Analysis Criteria

No	Criteria	Validation Levels
1	75,01% – 100,00%	Very Valid (can be used without revision)
2	50,01% – 75,00%	Valid Enough (can be used with minor revisions)
3	25,01% – 50,00%	Invalid (not applicable)
4	00,000% – 25,00%	Very Not Valid (illegal use)

CONCLUSION AND ADVICE

A. Consclusion

Trials had done upon 15 students of 10th grade of Mechatronics Engineering Program of SMK Negeri 8 Malang on subjects censors and transducers. The trial data can be seen on the attached table : TSEV1 declared a score of firts student, TSEV2 declared a score of second student, until TSEV15 declared a score of 15th students. $\sum TSEV$ stated score of all students, and $\sum S - max$ stated the amount of ideal score for all students.

Total score obtained for TSEV1 was 80, for TSEV2 was 79, for TSEV3 was 63, for TSEV4 was 76, for TSEV5 was 80, for TSEV6 was 72, for TSEV7 was 66, for TSEV8 was 73, for TSEV9 was 79, for TSEV10 was 76, for TSEV11 was 78, for TSEV12 was 79, for TSEV13 was 78, for TSEV14 was 80, for TSEV15 was 80s. So, it was obtained ΣTSEV was 1139. Ideal value for each score was 5, so it was obtained Σxi of 1200. The connection between those factors were used to calculate the validity (V) between ΣTSEV to ΣS-max using the following equation:

$$V = \frac{TSEV}{S - \max} x100\%$$

$$V = \frac{1139}{1200} x100\%$$

$$V = 94.92\%$$

Based on eligibility criteria, percentage of score small group was qualied as **valid**. Overall, censors and a transducer module is attractive and valid or properly used as a learning media according to the trial result. However there were some disadvantages that should be improved so that these modules can be used as a supporting media for students' self-learning.

B. Advice

Based on the given questionnaire to students of 10th grade in Mechatronics Engineering Program SMK Negeri 8 Malang, the obtained responses were as follows:

1) If the medium more evident and efficient, then it could be used as an effective learning medium.
2) Module has already proper and could be used in learning activities. It can be accessed through gadget and the contents were not boring.
3) Trainer extremely helpful in learning, if the trainer could be applied then teacher does not need to explain anytime longer.
4) Module that made already proper.

C. Follow Up

To maximize the product's benefit in learning activities, there are some suggestions related to censor and transducer module's development, some refinement is needed, among others :

1. Simulation Software that can be used as a substitute for the original trainer in the form of simulation. The results of the simulations is strived can be similar to real condition.
2. It is needed to add series of simulation materials for each indicators, so students can understood characteristic every censors, easier.

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