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EVALUATION OF ELECTRIC AND ELECTRONIC HANDOUT IN AUTOMOTIVE NGEINEERING BY USING FORMATIVE EVALUATION PROCESS

Binta Ustafiano[1], Wawan Purwanto[1]
Automotive Engineering, Faculty of Engineering,
Universitas Negeri Padang
Jl. Prof. Dr. Hamka, Air Tawar Barat, Padang, West Sumatera, 25131
Corresponding author: bintaustafiano@gmail.com

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ABSTRACT

Currently the automotive sector was equipped with an electronic control system. Thus, students' understanding of electronic systems is crucial. Streamlining the process, in Automotive Engineering study Program in enginering faculty of Universitas Negeri Padang has Electrical and Electronics course. This electrical and electronics course consists of 2 theoretical and 1 practicum credit. Then to expedite the process, a practical module has been provided from the lecturer course team. Science enhancement also influences electronics, so the learning modules require revision of the material, format, and packaging in accordance with the development of field technology applications. In this study focuses on the application of formative evaluation which is expected to provide input for the revision of teaching materials. After the analysis, it can be concluded that the electricity and electronics practicum module as a whole is good, but there are parts that must be improved and added as: material, formulas, examples of data processing, interesting designs, and presented by using e-modules.

Keywords: Formative evaluation, Elecricity and electronic course, Practicum module, Automotives engineering, E-module

INTRODUCTION

The most essential learning process in the classroom is how students can learn easily, be autonomous, be comfortable, and able to express their creative ideas as explained by [1], [2], [3]. So that in the process, completeness of learning becomes the main requirement that is well prepared [4]. It really must be an understanding, a teacher understands the impact on student learning development, as well as how best to improve the teaching material and student activity during the learning as described [5] and [6].

Previous research has revealed the theory of learning, how a teacher must learn and change the treatment of learning that has been applied [7]. Learning has outlined the cognitive theory of how a teacher should improve his professional abilities [8], then [3] has revealed methods of improving learning theory, critical thinking and its factors to be the best teacher in his class. [8], [9] suggested, a teacher should also learn about how to learn patterns of interaction and the development of learning techniques and ways of learning applied by their students.

In this study focused on analyzing the learning handout as an effort to improve students' abilities. The process of this research was carried out in the electrical and electronic course of Automotive Engineering major, Engineering Faculty of Universitas Negeri Padang. The purpose of this course is to provide students with an understanding of basic electricity in automotive engineering applications, which involve resistors, transistors, diodes, relays and automotive electrical system circuits as expained [10]. The main competencies that are expected to be achieved by students are being able to distinguish the functions and applications of basic electrical components, as well as making simple automotive electrical circuits.

As stated in essence the learning process occurs in at least three domains contained in humans such as the cognitive, affective, and psychomotor domains [11]. The cognitive domain is related to the ability of human intellect, the affective domain is related to the ability of humans to react to responses, and the psychomotor domain is related to the ability of humans to use their body movements. Good learning is able to hone these three domains of human ability proportionally, but in practice, learning is often found to only emphasize the achievement of the cognitive or affective domain without achieving the psychomotor domain.

This Electrical and Electronics course consists of 2 theoretical and 1 practicum credits. For practicum, students use practicum modules that have been provided. This module contains 10 sub topics with the implementation of 14 times. In the practicum module there are competencies, materials and tools, introductory theories, work steps, analysis, evaluation, conclusions and observation tables.

The development of automotive technology also affects electronics, so the modules used for electrical and electronic practicum require material revisions in accordance with the development of these technologies. Therefore it is necessary to do formative evaluation aimed at identifying and analyzing data and information, especially about specific weaknesses that exist in the practicum module. Formative evaluation results will be used to improve quality at the time of revision [1].

Formative evaluation results are expected to provide input for the revision of teaching materials. Therefore [2], explained that evaluation plays an important role in research and development (R & D) in the field of education. Furthermore, in an effort to improve the quality of practicum modules, analysis is carried out on teaching materials on this subject through formative evaluation. This article aims to describe the needs analysis of a practicum module. The underlying research method is formative evaluation with a qualitative approach. Data was taken by questionnaire and presented in a table to facilitate the process of analysis and conclusions.

Teacher learning model: teacher transfer knowledge process

As earliest investigate by [12], teaching process is part of the dialectical presentation of the teaching material, which conclude in teacher develop awareness and new understanding. While develop awareness is part of the improving teaching process in the classroom. Subsquently new understanding consists of tacher analytically, improving, and focusing to the new meaning of the teaching material. In essense, the learning process is strongly influenced by the teacher teaches, provides examples and enrichment of the learning material.

Teacher learning model are emphasize to student active to interprate their classroom, furthermore to be teachers instructional to create the learning process. The learning process is carried out by the teacher collaborating with various sources, ranging from the preparation of learning, handouts, delivery of material, and periodic evaluations. If students feel the teacher's exposure is too fast and difficult to understand, then the teacher should decrease, hereinafter the example problems are given to complete the explanation of the study. In providing variations of learning, the addition of a guidebook should be given. In addition to absorbing material from the teacher, students are encouraged to enrich the material from the handout. A good learning process does not only occur in the classroom, but outside the classroom and in the neighborhood, students must also be able to learn smoothly. Thus, the preparation of a handout must be prepared to facilitate learning wherever the student resides.

Handout learning modeling process for supporting the student skill development

Handout modeling are crusial rules for generating, validating, and deploymenting student skills as discussed by [4]. Moreover, improving the handout learning required student for built and complate informations for course material, not only explaint the fact and the teaching material, but also define and elaborate new topic according to the development of the learning outcomes. On the other hand, the improving of the handout creates mutual relationship between data from previous teaching to the future teaching in ensuring the gradual development of student skill. In consequence, handout development should be facilitate the topic for students to improve novelty arguments, then to thinking regarding the purpose of the teaching material. Thus can be an interisting activity when student are thinking and working in completing learning topics.

RESEARCH METHODOLOGY

Qualitative research was applied in this investigation. This research is a study used to observe natural objects, where researchers are essential instruments [13]. According to [14], qualitative research is an investigation that intends to understand phenomena about what is experienced by research subjects such as behavior, perception, motivation, actions, etc. holistically, and by means of descriptions in the form of words and language, on a special natural context and by utilizing various natural methods. The sample of this study were 25 Automotive Engineering students. The object of research is the electricity and electronics practicum module. The instrument used in this study was a questionnaire sheet containing 50 questions that were distributed to the research sample. The questionnaire was used to assess the electrical and electronic practicum modules in terms of material, design and drawing. The questionnaire aims to find out students' opinions on the practicum modules used. After the students filled out the questionnaire, the questionnaire was analyzed to obtain conclusions from this study.

RESULTS AND DISCUSSIONS

Evaluation of the module readability level aims to analyze the module readability level by identifying errors in the module, identifying words that are difficult to understand, to the module when reading them. The aspects assessed in the evaluation are the clarity of the material and the design of the practicum modules.

Table 1. The results of evaluation at the readability of the handout

Related aspect assessment	Conclusion from the evaluation results	average score
Clarity of module materials	a. The material is presented in the order in which it will be studied or practiced.	3.23

Arrangement of the material	b. The composition of each chapter is well ordered from the competencies that must be achieved to the observation table that will be in students after performing the practicum.	3.42
	c. The material is presented in a simple and easy to understand.	3.40
	d. It is expected that there is a module section that contains all the formulas that have been learned, so that it is easier for students to memorize during exams.	2.47
	e. It is expected to add examples of data processing methods, because many students have difficulty in processing data when completing practicum reports.	3.49

Table 2. The evaluaution results to the attraction of the practicum module

Related aspect assessment	Conclusion from the evaluation results	average score
Desain	a. Module design.	3.46
	b. Student uses practicum module	3.31
	c. Design color	3.39
	d. E-module desaign	4.32

Table 3. The evaluation results in the image and the course topic

Related aspect assessment	Conclusion from the evaluation results	average score
Suitability of the image and the course topic	a. Pictures in accordance with the teaching topic	3.42
	b. In the practicum step, there is a series of pictures that can be used by students to understand the practicum that must be carried out.	3.51

Table 1 shows that in terms of clarity in the order of material in the electrical and electronic practicum modules, it is very good, everything is collapsed and clear. For clarity of module material description, in general the module material can be understood, but it needs to be revised in several parts. The material is expected to be added so that students more easily understand the material and make it easier for students to complete practicum reports. Students hope that in the practicum module a special section will be presented containing a summary of the formulas they have learned so far. In this

section, the modules get the lowest score from respondents, where the average score is 2.47, based on the discussions that have been conducted with students, they need a collection of formulas that are easily understood by them. The aim is to make it easier for students to memorize formulas when they are going to take an exam. Besides the addition of examples of data processing is also a suggestion from students, because there are still many students who have difficulty processing data in making practicum reports.

Based on the data in Table 2, it can be seen that the current electricity and electronics practicum modules have a simple design. In addition, most students use the photocopied results module, so that it does not increases to the students' reading interest in learning. An attractive design is expected to motivate students to read the material to be practiced. Most students like bright colors, this can be a benchmark behind module developers later. While attention to students learning modules should be presented in e-modules, this can be seen from the score 4.32. The process of creating the electronic modules will have a better effect on students, where students can study anywhere without having to bring books. Plus the digital world today, the learning process should be done anywhere without having to bring a thick and tiring book.

Table 3 shows that the pictures contained in the current electricity and electronics practicum modules are in accordance with the material. It's just expected that the pictures in the module are added so that students can memorize the names and pictures of the tools that will be used when practicum. The addition of a series of tools that will be used in practical work is also a suggestion from students.

Complementing the data from the results of this study, interviews were conducted with several students who had filled out the research questionnaire. As seen in Table 2. Students want an e-module created in lectures, then the media can be easily used by students to complete learning both theoretically and practically. They can access learning materials at any time when they are motivated to learn. This will be the focus of researchers to realize an attractive electronic module. The aim is to create a pleasant learning atmosphere.

CONCLUSION

This study illustrates that the electrical and electronic practicum modules that have been applied as a whole show good results, only that there must be improved and added, namely: material, formulas, data processing examples, designs that are more interesting and packaged in online form (e-module). The scores generated and interviews conducted on respondents, the recommendation is an e-module that is interesting and can be accessed wherever they study.

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