DEVELOPMENT OF ENGLISH TEACHING MODULE FOR ELECTRICAL ENGINEERING STUDY PROGRAM

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Abstract

The proper teaching materials determine successful teaching-learning activities. Teaching materials are required to adapt to the current situation of the institution, curriculum, and learners. The new curriculum adopted by the Electrical Engineering Study Program required the updated version as English courses had been replaced by the first and last semester of both from D3 and D4 programs. Developing the new teaching materials for the study program aimed to provide relevant issues and teaching strategies that could boost students' motivation in the classroom. Thus, the developed teaching materials were to propose the teaching and learning that fit the learner's needs. The research objective was to develop new teaching modules for the Electrical Engineering Study Program that were much more interactive, effective, and efficient for the learners to study English within the Electrical Engineering context. This research applied Research and Development (R&D) model adopted from Borg and Gall comprising six stages, namely: (1) needs analysis, (2) designing the product, (3) proposing the product, (4) evaluating the product, (5) testing, and (6) disseminating the product. As a result, the new teaching module was redesigned to provide English teaching and learning effectively and efficiently that could be easily understood and helpful for the student to achieve the learning outcomes as expected.

Keywords: Electrical Engineering Study Program, teaching module

INTRODUCTION

The success of learning activities can be affected by some factors. The proper teaching modules that support learning activities are one of them. Teaching modules result in the success of learning. The availability of appropriate teaching tools will involve the learners adjusting to teaching

activities (Pulukadang et al, 2020). When the learners get along with the activities it leads to the desired learning outcomes.

As for the teaching materials, the teaching module has many utilities. Mostly teachers design a module that fits their student needs to optimize the learning outcomes. The teacher is necessary to develop the efficient teaching materials for optimizing the learning activities for the students (Chantarasombat & Rooyuenyong, 2020). Furthermore, the teaching materials can be improved with appropriate sets of activities based on the learners' situation. The teaching materials and sets of activities are developed based on the current situation of the learners. The proper teaching materials are those that are prepared based on students' needs. Teachers or lecturers must know their students' needs.

Appropriate teaching material is required to support the teaching and learning process (Purwati & Vania, 2021). The role of teaching material is a key for helping teachers or lecturers provide teaching and learning effectively. Regarding the current situation, analyzing the needs is done to develop teaching materials that are suitable for learners. This development needs to be supported by theory, literature review, or personal experience as the basis for developing the appropriate teaching materials. Moreover, various sources, such as textbooks, the internet, research articles, interviews with the experts, colleagues, or researchers of the development of teaching materials can be taken as references.

Based on the observations, students frequently experienced learning difficulties in the English for Specific Purposes (ESP) context. ESP is supposed to provide the students with specific tasks and competence in English based on their field. One of the problems that occured in ESP class was the obstacles of conveying the course. It happens because ESP concerns the needs of learners because of their work or specialization background (Basturkmen, 2010). On the other hand, for teachers, teaching ESP requires them to assign students with clear instructions and specific themes related to their knowledge (Suryadi, 2021). The availability of references is not promising for the appropriate ESP that is suitable for the learners.

Therefore, it is necessary to develop materials that adopt the nature and characteristics of learners based on existing curriculum standards. In compiling teaching materials several things come as considerations to meet the needs of learners. Teaching materials aim to find a solution to the learning problem encountered by the learners.

Since the teaching material is delivered in non-native-speaker language, the challenge is understanding the instruction in learning (Hibatullah, 2019). The teaching materials with an appropriate guide may be helpful for the students to understand the lesson. Somehow, lecturers are hurdling in conducting teaching materials because of the complicated task, unclear learning instruction, or not engaged with the students' imagination. To overcome the problems, developing appropriate teaching materials is crucial. If the learning is conducted within unclear explanation, then the teaching material should be able to help students understand the course by inserting pictures, photos, charts, and schematics.

The English teaching and learning activities in Electrical Engineering Study Program of Politeknik Negeri Malang needed to be changed due to the implementation of the new curriculum that required updated learning materials and contents. Therefore, developing the teaching materials was relevant to the current situations so that the output can support the teaching and learning process in the study program.

Books and modules are the most common learning resource. The core of the teaching module emphasizes student independence (self-study for some periods). The module can be performed as a complete and stand-alone unit with sets of learning activities for helping students achieve the learning objectives. Modules are teaching materials that are systematically arranged based on a standardized curriculum and wrapped in each of the smallest learning units that allow the learners to be studied independently within a period. The goal is that learners can understand the competencies taught in learning activities as well as possible. Its function is as learning material used in student learning activities.

Meanwhile, module-based teaching is conducted when all of the teaching activities refer to the module. Teaching modules contains one or more units of teaching materials that empower students to study independently. A teaching module is a teaching unit structured with a specific purpose for learning purposes. One of the objectives of module-based teaching is to encourage learners to learn at their own pace. Module-based teaching also provides opportunities for students to know their learning abilities, which has been driven by several factors, such as learning techniques, problem-solving, learning habits, and heterogeneous background knowledge of the learners.

Teaching modules is defined as a complete measuring tool (Sudjana, 2005). They have some functions, namely: 1) teaching modules can function as independent units, but they can also run altogether; 2) teaching modules are centralized learning activities that are proposed and designed to assist students in achieving their learning goals; and 3) teaching modules can work as integrated teaching programs consisting of learning objectives, teaching materials, teaching methods, instructional media, learning resources, and evaluation.

To determine the proper teaching module development, it is necessary to analyze any factors, one of which is formulating clear and specific learning objectives. The learning objectives have to be measurable for determining students' performance for achieving the learning objectives. The formulation of learning activities should consider some aspects such as the characteristics, backgrounds, and abilities of students. Therefore, teaching module development provides a solution to students' problems by adjusting the learning environment according to their needs Before developing the material, it is necessary to conduct a diagnostic test to measure students' background knowledge as a prerequisite for developing a teaching model (entry behavior or entering behavior). This test aims to match the formulation of the test questions and the objectives of the module. The preparation of learning activities is grounded in helping and guiding students to achieve the competencies as formulated in the objectives. Learning activities carried out can be in the form of listening to audio materials, watching movies, and role plays. Alternative activities need to be considered to provide a varied and interactive learning experience for students. This is the essential part of the module and the most vital aspect of the module is the learning process.

The followings are the benefits of implementing the teaching module based (Lasmiyati & Harta, 2014).

- 1. provide feedback
- 2. clear learning objectives

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- 3. attractive and interactive design of the teaching document
- 4. adjustable for students learning styles
- 5. enhance student teamwork
- 6. evaluate students work to determine the level of achievement

The teaching module provides feedback to discover students' shortcomings, to make improvements immediately. At this point, the teachers do not only evaluate the work but also provide feedback in order to help their student overcome their problems in learning. Learning with a module means setting clear learning objectives. When students clearly understand the aims of learning may affect their learning performance to achieve some specific competence. Teaching modules are not the same as a bulk textbook. Teaching modules design should be attractive, provide a learning objective, include sets of interactive activities, and ease the learner to understand the course. The aim is to motivate and trigger the student's enthusiasm to get involved in the learning activities. When the students get involved and feel motivated to take part in the activities, they consider being more productive. Teaching modules, accordingly, would substantially help the learner to be independent.

The teaching module is designed to be adjustable with the learners. The teaching module gives opportunity to the learners to study at their own pace and styles. By providing adjustable time for students, it gives them time to deal with the learning environment. This also means for students to deal with their effort in learning. Those who give more effort in adjusting their time for studying will get more. Teaching modules can foster teamwork. The design of teaching modules consists of sets of activities to help students interact with their peers to enhance collaboration. By working together in pairs or groups while performing interactive activities can build students' bonds. The student collaboration will develop naturally. Remedial aims to provide adequate time for students to discover their weaknesses based on the task given. Students have to know their learning pace regarding the heterogeneous students' background and ability to complete the task. By giving the students time to discover their problems, it provides them a self-evaluation to improve their performance.

Despite of having benefits, according to Morrison, Ross, and Kemp (2004) in Lasmiyati and Harta (2014), module also has some drawbacks, namely 1) interaction between students is reduced so it is necessary schedule face-to-face or group activities, 2) single approach causes monotony and boring because it needs trouble challenging, open and varied, 3) free independence causes students to undisciplined and delaying doing tasks because it is necessary to build a culture of learning and time limit, (4) planning must be mature, requires teamwork, requires environment of facilities, media, resources and others, and (5) material preparation requires high costs more expensive when compared to the method lecture.

In supporting the recent research, several previous studies become research references. The first reference was the research conducted by Lestari (2021) on "*Pengembangan Modul Pembelaja-ran Bahasa Inggris Berbasis Andragogi Pada Program Studi Pendidikan Biologi, Universitas Muhammadiyah Palembang*". In the previous study, the Rowntree's model proposed some steps in developing modules: planning, development, and evaluation. Tessmer's formative evaluation model is used to evaluate the module consisting of the following stages: self-evaluation, expert review, one-to-one evaluation, small group evaluation, and field testing. This study had a conclusion that the learning module is useful and helpful for conducting teaching and learning. The

previous research was in line with the current learning situation in the Electrical Engineering Study Program since the learners are also university students. To promote effective learning for higher education involves the students' physical and emotional experiences in their activities.

The other research was conducted by Hakim et. al (2019) on *Pengembangan Modul Bahasa Inggris Untuk Program Studi Ekonomi Syariah Berbasis Contextual Teaching Learning (CTL).* The research results were the developed teaching module that was developed with the following stages: 1) development of learning analysis; 2) establishing standards and objectives; and 3) selection of strategies for technology, media, and teaching materials and evaluation. The developed teaching material had also passed the validation stage from two experts of ESP and Teaching Material. The teaching material was developed based on the students' needs, lecturers' feedback on the proper activities, and the experts' evaluation. The research conducted was considered valid since the development of the teaching modules implements the current curriculum established in the study program.

These previous studies were relevant to research on teaching materials development for English courses in the Electrical Engineering Study Program at the Politeknik Negeri Malang. A similar situation in the ESP classroom was the background to conduct the teaching material development. Besides, the experts' involvement in evaluating the teaching material was also the focus of the research to make the valid output for the learners.

METHODS

This research adopted Research and Development (R&D) development model from Borg and Gall consisting of 6 stages, namely 1) conducting need analysis, 2) designing teaching module blueprints, 3) designing the teaching modules, 4) testing the teaching modules, 5) evaluating the teaching modules, and 6) disseminating the product which produces the output of the teaching module as the final product. The steps for developing an English learning module are described in Figure 1.



Figure 1. Teaching Module Development Design

The first step was needs analysis which was conducted to find solutions to existing problems. Need analysis promotes outlining the learner's specific needs to achieve the desired outcomes (Asri et al., 2019). The needs analysis was done by observing and interviewing lecturers and students in the Electrical Engineering Study Program. Based on the observations and interview results, it could be concluded that teaching English in the study program was not supported by

appropriate English teaching modules. The teaching materials used in the classroom for teaching and learning were paper-based handouts that did not promote any interactive activities for students, so accurate and interactive teaching materials were needed.

After that, the teaching module blueprint was developed as a follow-up to the solutions in the needs analysis. The objective of teaching materials development was to design teaching modules that could fit the needs of students. Furthermore, the teaching module development aimed to provide students with suitable teaching materials to attract them to learn English. The development activities carried out were collecting references, making mind maps, and developing module content.

The next step was designing the teaching module. It involved designing sets of pictures, references, and evaluations.

Then, validating the designed teaching module which involved 4 experts, 2 experts in teaching material, 1 expert in linguistics, and 1 expert in instructional media. Moreover, the teaching material validation aimed to provide suggestions and feedback on the instruction and language used, while instructional media validation was to give recommendations and feedback related to the quality of the product. After the validation, then the teaching module was revised.

Then, the revised teaching module was tested on the students of the Electrical Engineering Study Program. The subjects were taken using the proportional random sampling technique. 25% of the total students were chosen (in this case 18 out of 72 students were randomly selected). After that, interviews were conducted, questionnaires were distributed in order to evaluate the students' perception about the teaching module.

Thus, the data from the results of the experts' validation, the interviews, and the questionnaire was analyzed. A qualitative research method and descriptive analysis technique were used to analyze the data.

After completing the test and evaluation stages, the last stage was the final improvement on the teaching module. The final result of product improvement was an English teaching module for the Electrical Engineering Study Program.

The procedures for selecting experts to evaluate teaching materials was based on several considerations.

- 1. Material development experts should have an educational background that is relevant to the vocational setting. A material development validator must have good insight and experience as a material developer. Some aspects of the assessment include.
 - a. material suitability
 - b. clarity of language use
 - c. clearly instruction
 - d. the variety of content
- 2. Media development experts must have good skills in organizing media to support learning. Some aspects of the assessment include.
 - a. effectiveness

- b. attractiveness
- c. efficient
- 3. English language experts should master teaching English for vocational and have experiences in organizing effective learning in higher education. Some aspects of the assessment include.
 - a. the suitability of the learner developmental stages
 - b. the language used in the teaching module is adjusted to the student's proficiency level

FINDINGS AND DISCUSSION

The discussion presents the results of the data analysis from the validation results by experts, the product trials on the students of the Electrical Engineering Study Program, the results of the interview, and the results of the questionnaires.

Validation results of the experts

Validation results of teaching material experts

The product was checked and validated by the teaching material expert. There are some aspects that were validated, i.e., material suitability, integrity of material organization, clarity of language use, material depth, ease of understanding the material by students, material breadth, material truth, and learning effectiveness level. The results of the validation showed that the development showed good results. The results from the questionnaire showed that the average score of the questionnaire was 2.9 (72.5%).

Validation results of instructional media expert

The teaching module as the product was then validated based on its effectiveness, attractiveness, and efficiency. The results of instructional media expert validation showed the average score of 3.42 or 85.45%. The results of the assessment indicated that the development of the teaching module with the use of instructional media had obtained good results, although a revision was required, such as the use of bullets when presenting the teaching material.

Validation results of English expert

The designed teaching module was also validated by a language expert. The aspects that were validated were the suitability of the level of student development with the language used in the module; the use of language used in the module is adjusted to the level of student development; and the language disorder and the accuracy of the flow of thought in the module are adjusted to the level. The results of the validation of English experts showed the average score of 3.25 or 81.25%. The results indicated that the development of teaching modules in terms of English contents and instruction had obtained good results.

The trial results on students

The revised module was then tested on 18 students of the Electrical Engineering Study Program. The data was taken from the interview conducted and questionnaire given afterwards. Thus, the data instruments were an interview guide and questionnaire.

The results of the questionnaire got an average score of 3.5 with 87.5%. The results showed that the development of the English teaching module had good results. Meanwhile, from the interview, it could be concluded that the students were interested in the revised teaching material.

Attractiveness level of electrical engineering English learning module

The learning module was measured for its level of attractiveness through a validation process by the instructional media experts and tested on the students. The results of data analysis to determine the level of attractiveness of the learning module on Electrical Engineering Study Program are presented in the table below.

	on Attractiveness components						
No	Criteria	Score		(%)	Description		
		Χ	Xi				
Attı	ractiveness						
1.	Image attractiveness	3	4	75	Satisfied/ No revision		
2.	The attractiveness of the display	3	4	75	Satisfied/ No revision		
	of teaching module design						
3.	The used of color combination in	3	4	75	Satisfied/ No revision		
	the teaching module design						
4.	The attractiveness of the display-	3	4	75	Satisfied/ No revision		
	ing contents of the teaching						
	module						
	Total	∑X=12	∑Xi=16	300			
	Average	3	4	75	Satisfied/ No revision		

Table 1. Data	Analysis	of Media	Expert	Validation	Results
	on Attrac	ctiveness (Compon	ents	

Notes:

- X : respondent's answer for one item
- Xi : complete answer in one item
- ΣX : total answers of respondents
- $\overline{\Sigma}$ Xi : complete number of answers

The results of the validation by instructional media experts on the attractiveness component are in Table 1 described as follows.

- 1. The attractiveness of the figure display. The score of the analysis obtained an average score of 75%. Based on the eligibility criteria, the teaching module was considered satisfying/not revised.
- 2. The attractiveness of the display of teaching module design. The score of the analysis obtained an average score of 75%. Based on the eligibility criteria, the teaching module was considered satisfying/not revised.
- 3. The use of the color combination. The score of the analysis obtained an average score of 75%. Based on the eligibility criteria, the teaching module was considered satisfying/not revised.
- 4. The attractiveness of the display of the contents of the teaching material. The score of the analysis obtained an average score of 75%. Based on the eligibility criteria, the teaching module was considered satisfying/not revised.

No	Criteria	Sc	Score		Description
		Χ	Xi		
1.	The teaching module cover has an	3,2	4	80	Satisfied/ No revision
	attractive design.				
2.	The teaching module display is.	3,2	4	80	Satisfied/ No revision
	attractive and easy to read				
3.	The teaching module uses an attract	t- 3,5	4	87,5	Satisfied/ No revision
	ive color composition.				
4.	The examples included in the teach	- 3,5	4	87,5	Satisfied/ No revision
	ing module are attractive and easy				
	to understand.				
5.	The pictures presented in the teach-	3,2	4	80	Satisfied/ No revision
	ing module are interesting and fits				
	to the material.				
	Total	∑X=16,6	∑Xi=20	415	
	Average	3,3	4	83	Satisfied/ No revision

Table 2. Data Analysis of the Result of Individual Trials

Notes:

. Tespondent sanswer for one iten	Х	: respondent's	answer	for	one	item
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Xi : complete answer in one item

 $\sum X$: total answers of respondents

 $\overline{\Sigma}$ Xi : complete number of answers

The results of individual trials on the attractiveness component are in Table 2 described as follows.

- 1. The teaching module cover had an attractive design. The score of the analysis obtained an average score of 80%. Based on the eligibility criteria, the teaching module was classified satisfying/not revised.
- 2. The teaching module display was attractive and easy to read. The score of the analysis obtained an average score of 80%. Based on the eligibility criteria, the teaching module was classified satisfying/not revised.
- 3. The teaching module used an attractive color composition. The score of the analysis obtained an average score of 87.5 %. Based on the eligibility criteria, the teaching module was classified satisfying/not revised.
- 4. The examples included in the teaching module were attractive and easy to understand. The score of the analysis obtained an average score of 87.5 %. Based on the eligibility criteria, the teaching module was classified satisfying/not revised.
- 5. The pictures presented in the teaching module were interesting and supported the presented material. The score of the analysis obtained an average score of 80%. Based on the eligibility criteria, the teaching module was classified satisfying/not revised.

No	Criteria	Score		(%)	Description
		Χ	Xi		
1.	Experts Average	3,5	4	87.5	Satisfied/ No revision
2.	Individual Trials	3,2	4	80	Satisfied/ No revision
	Total	∑X=7	∑Xi=16	175	
	Average	3,4	4	84%	Satisfied/ No revision

Table 3. Data Analysis on the Attractiveness Components

Notes:

Х	: respondent's answer for one item
Xi	: complete answer in one item
∑X	: total answers of respondents
∑Xi	: complete number of answers

The instructional media validation for the attractiveness component comprised the attractiveness of images, designs, color combinations used, and the attractiveness of the contents display of the teaching material. The results for the attractiveness component got an average score of 3.5 with 87.5%. Based on the eligibility criteria, the learning module was classified satisfied and not revised.

The trial tests on students regarding the attractiveness component included the attractiveness of the cover, display, color composition, instruction, and figures. The results of individual trials on students got an average score of 3.2 with 80%. Based on the eligibility criteria, the learning module was classified satisfied and not revised.

Moreover, from the expert validation suggestions and comments, there was no revision needed for the module; however, there were some aspects that needed to be considered for the next revision or development. First, images were supposed to be added to the module section that are not yet accompanied by supporting images. The content of the English module was still focused on the problems arising around Politeknik Negeri Malang. Thus, it is expected that further developers can expand the scope of problems that arise so that they are not confined to only limited ones around the campus. Moreover, the contents such as the reading texts provided in the module need to be evaluated and updated with the latest information, trends, or development around the world.

In short, the validation results from instructional media experts and the individual test of the attractiveness component got an average score of 3.4 or 84%. Based on the eligibility criteria, the learning module was classified satisfied and not revised. Based on these results, the English teaching module had an adequate level of attractiveness as teaching material for the electrical engineering study program.

The teaching module ease level

The developed teaching module was measured for its ease level through validation by the experts and testing to students. The results of the teaching module determined the level of convenience of students in learning English courses in the Electrical Engineering Study Program.

No	Criteria	Score		(%)	Description
		Χ	Xi		
1.	The ease level to understand the	3	4	75	Satisfied/ No revision
	material using the teaching module				
2.	Clarity of language use	3	4	75	Satisfied/ No revision
3.	The level of depth of material in	3	4	75	Satisfied/ No revision
	the teaching module				
4.	The attachment of teaching materia	1 2,5	4	62,5	Satisfied/ No revision
5.	The accuracy of teaching material	3	4	75	Satisfied/ No revision
	Total	∑X=16,6	∑Xi=20	415	
	Average	3	4	72,5	Satisfied/ No revision

Table 4. Data Analysis of the Ease Level of the Teaching Module

Notes:

Х	:	respondent's answer for one item
Xi	:	complete answer in one item
∑X	:	total answers of respondents
ΣXi	:	complete number of answers

The results of validation by material experts regarding the ease of use of learning modules can be analyzed as follows.

- 1. The ease of understanding the material by students using the teaching module got a score of 75%. Based on the eligibility criteria, the learning module was classified satisfying/not revised.
- 2. Clarity of language use in the teaching module got a score of 75%. Based on the eligibility criteria, the learning module was classified satisfying/not revised.
- 3. The level of depth of material used in the teaching module got a score of 75%. Based on the eligibility criteria, the learning module was classified satisfying/not revised.
- 4. The completeness of the material in the teaching module got a score of 75%. Based on the eligibility criteria, the learning module was classified satisfying/not revised.
- 5. The accuracy of the material gets a score of 75%. Based on the eligibility criteria, the learning module was classified satisfying/not revised.

CONCLUSION

The English teaching module was developed based on the the latest curriculum in the Electrical Engineering Study Program of Politeknik Negeri Malang. The objective of the English teaching module development was to produce teaching materials within the level of attractiveness, convenience, effectiveness, and efficiency. From the results, it can be concluded that the research objectives were achieved. The details are as follows. The level of attractiveness of the teaching module was 75%. The level of ease for students by learning using the teaching module was 72.5%. For effectiveness, the teaching module was an adequate level of effectiveness as teaching material. This can prove from the validation results of the teaching module was 84% from the validation of instructional media experts. As a suggestion for the further researcher, the teaching module could provide more images to support students in understanding each topic

in engineering. The contents of the English teaching module were still focused on the scope of Electrical Engineering so future researchers can broaden the discussion so that the teaching module may be used widely to the other fields or departments in Politeknik Negeri Malang, such as Mechanical Engineering, Civil Engineering, or Chemical Engineering. In short, updating the teaching materials and references gradually can provide the relevant teaching module to the current situation of learners.

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