

The Book of Fundamental Electromechanical for Vocational High School

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Abstract— This research aims to develop teaching materials for basic electromechanical work subject and determine the feasibility of teaching materials that have been developed by teachers and students. The method used in this research is using research design and development. Teaching materials developed in this study is the book for Basic Electromechanical Works subject. This text book is for class X SMK Power Engineering Program with a thick 221 pages, which consists of five chapters. The materials contained in the book are based on core competencies and competency as well as the syllabus of basic electromechanical work subject in accordance with the curriculum of 2013. Data processing results obtained from the testing of teachers which are seen from the aspect of feasibility assessment of textbook content, language feasibility and feasibility of graphic aspects of limited trials, are included in good category, while the broader test resulted in very good category. Student eligibility test results seen from the results of the questionnaire limited trial resulted in good categories and the results of more extensive trials are included in good categories.

Keywords— *teaching material development, basic electromechanical.*

I. INTRODUCTION

The government has made various efforts to improve and enhance the quality of national education. One such improvement is the change in the curriculum. Curriculum 2013 is a further step development of competency-based curriculum that has been initiated in 2004 and 2006, which include competence KTSP attitudes, knowledge, and skills in an integrated manner. One characteristic of the curriculum in 2013, namely the addition of class hours. The addition of school hours as a consequence of the change in the learning process of the students who originally were told a student to find out. Moreover, it will also change the original assessment process from becoming output-based and process-based output.

Teachers are expected to have the ability to create teaching materials in accordance with existing mechanisms with due regard to social and environmental characteristics of learners. Teaching materials can mean any kind of material systematically arranged that enable students can learn with a curriculum designed according to regulations [1]. Teaching materials can be packaged in the form of print and non-print . Teaching materials which can be structured in different shaped like textbooks, modules, handouts, worksheets can also be packaged in any other form. Teaching materials should be able

to qualify as teaching materials used such as the relevance of the curriculum in force today, the suitability of the method with the submitted materials, the content of the book or the angle of scientific ie whether the theories used in the preparation of teaching materials it is appropriate or not.

Based on preliminary observations made by researchers at vocational high school 1 Cibinong Bogor District Electricity Engineering Program. Researchers get information on these schools do not yet have teaching materials like text books in accordance with the latest curriculum because the subject is the basic job electromechanical new subjects contained in the curriculum of 2013. Therefore, the use of learning resources using the old book and aided by taking resources from the internet.

II. METHODS

This study uses research and development. Research and development can be defined as the study design which deliberately, systematically, is aimed or directed to find, formulate, refine, develop, produce, test the effectiveness of products, models, methods or strategies, services, certain procedures that are superior, new, effective, efficient, productive and meaningful [2]. This notion is reinforced by opinion [3] that research and development is designed to develop a product or improve existing products with measures that can be justified.

Simply put research and development is research used to produce a particular product, and test the effectiveness of these products [4]. Research and development basically has two main objectives, namely to develop the product and test the effectiveness of the product to achieve goals. Development carried out by the authors is a product development of teaching materials elementary subjects electromechanical works for vocational education.

III. RESULTS AND DISCUSSION

A. Preliminary Study

A preliminary study was conducted in September 2014 at vocational high school 1 Cibinong. From the preliminary study obtained a picture of the learning in Basic Subjects Electromechanical Works in the school. Preliminary studies carried out by the method of analysis needs through interviews

with program chairman expertise and Industrial Automation Engineering Subject teacher Basic Electromechanical Works.

Based on the results of the interview can be concluded that in vocational high school 1 Cibinong readiness of facilities and infrastructure instructional materials in teaching in Subjects Work Basic Electromechanical still lacking because schools do not have teaching materials printed in Subjects Work Basic Electromechanical, so that schools require the teaching materials for support the learning process. Teaching materials needed in SMK Negeri 1 Cibinong are teaching materials in accordance with the curriculum of 2013.

B. Instructional Materials Analysis

Based on interviews with teachers in Basic Subjects Electromechanical Works subject matter in accordance with the basic teaching materials electromechanical work, there must be a photo or image, function and how to use tools to facilitate students in understanding the subject matter. Learning materials required in teaching basic job electromechanical materials are materials about: safety regulations, health and safety, hand tools, power tools and mechanical measuring devices.

Designing the description of the material on teaching materials is based on core competence and basic competences as well as the syllabus in accordance with curriculum 2013. In preparation, the material in this book uses references from several books, namely:

- Safety and health workshops
- Techniques health and safety in the industry
- Module implementing safety procedures, occupational health and workplace environment
- Occupational health and governance workshop
- Using the tools and equipment in the workplace
- The basic equipment automotive
- Theory bench work
- Machine Tools workshop
- The electro mechanical work
- Work basic electromechanical
- The basic job of automotive engineering
- The use of workshop equipment

Once the material is prepared, the drafting of teaching materials can be implemented. Electromechanical Works Basic Subjects studied in class X vocational high school with six hours of lessons. There are no prerequisites must complete other subjects in order to Learn Lesson Basic Electromechanical Works.

C. Stages of Preparation Subjects

Based on the analysis of teaching materials further draft prepared teaching materials Elementary Subjects Electromechanical Works. Teaching materials developed in the

form of a book as thick as 221 pages of text, which consists of five chapters, the following is a description of basic teaching materials electromechanical work, namely:

- Safety regulations: a history of growth and work safety supervision; history of safety; the history and growth of the work safety supervision in Indonesia; the basic provisions of the labor force (law dated 19 November 1969); occupational health and safety regulations; work accident; labor rights and obligations relating to occupational safety and health; The types of accidents that can occur in the industrial sector; the need for occupational safety and health education; The terms of safety; goals and objectives of safety and occupational health.
- Health and Safety: the sense of safety and health; occupational health and safety purposes; signs; personal protective equipment; personal protective equipment; first aid.
- hand tools: a screwdriver; keys; hammer; handsaw; miser; electrical solder; crimping tool.
- Power tools: drilling machine; grinding machines: plate cutting machine tool mechanical measurement: caliper; micrometer; steel ruler; square.

D. DISCUSSION

1) Eligibility Test Results According to Teachers

According to the national standard of education quality books must fulfill the four elements of the feasibility contents feasibility, feasibility presentation, feasibility language and graphic feasibility.

a) Trial Limited

As the initial phase of development of teaching materials such as text books must be through a limited pilot phase to assess the feasibility of this book. Teachers who judge this book is a vocational school teachers who teach Basic Subjects Electromechanical Works. In this case the judge teachers by filling in a questionnaire given.

The average percentage of the value obtained for the feasibility aspects of the content and presentation of feasibility is 80.63% which is included in both categories. The advice given by teachers is adding job sheet in each chapter that is the practice so that the students can add to the learning experience by doing project work, not only from theory.

The average percentage of the value obtained for the feasibility aspects of language presentation is 81.25% which is included in both categories. The advice given by the teacher is to fix some pictures / illustrations in the book in order to see more clearly and to understand the student.

The average percentage of the value obtained for the feasibility aspects of the content and presentation of feasibility is 83.50% which is included in both categories. No advice given by teachers in the aspect of feasibility graph.

b) Trial Wider

As the next stage of development of this text has to go through more extensive test phase to access the feasibility of this book. Teachers who judge this book is a vocational school teachers who teach Basic Subjects Electromechanical Works. In this case the judge teachers by filling in a questionnaire given.

At trial broader improvements have been made by adding job sheet in each chapter as suggested teacher at the time limited trial. The average percentage of the value obtained for the feasibility aspects of the content and presentation of feasibility is 93.75% which is included in the excellent category. No advice given by teachers in the contents feasibility aspects.

On a broader test has been carried out repairs by replacing or clarifying some of the illustrations/pictures previously seen not so obvious as suggested when the teacher limited trial earlier. The average percentage of the value obtained for the language aspect is 95.63% which is included in the excellent category. No advice given by the teacher in the feasibility aspect of language.

The average percentage of the value obtained for the feasibility graphic aspect is 96.40% which is included in the excellent category. No advice given by teachers in the aspect of feasibility graph.

c) Percentage chart Feasibility Test Results According to Teachers

Based on the results of limited testing and trial results more widely implemented by the teachers and chart the percentage of teachers eligibility test results can be seen in Figure 1.

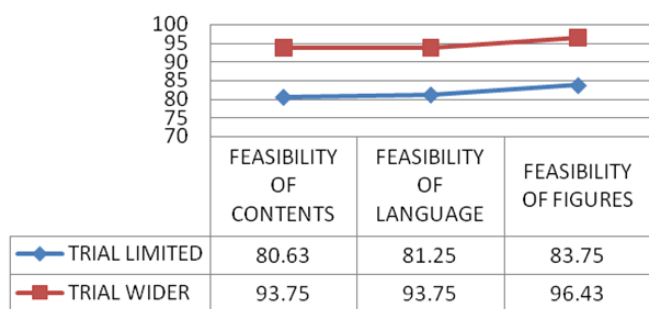


Fig. 1. Test results percentage chart eligibility teachers

In Figure 1 looks percentage in limited testing on the assessment of the feasibility of the content reached 80.63% with the good category, the feasibility of the language reached 81.21% with the good category and the feasibility of the graph reaches 83.75% in both categories, so that the average percentage earned on limited trial is 81.79% with the good category. The percentage of the test more widely in assessing the feasibility of the content reached 93.75% with a very good category, the feasibility of the language reached 93.75% with very good categories and eligibility kegrafikan reached 96.43% with excellent category, so that the average percentage obtained in the test more widely is 95.46% with a very good category.

2) Feasibility Students

At this stage, limited trial and more extensive trials carried out in class X. Sample class X with the program Electrical Power Engineering expertise in vocational high school 1 Cibinong the number of students involved 20 people.

As the initial phase of development of teaching materials such as text books must be through the limited trial to assess the feasibility of this book. There are 30 point assessment that includes aspects of the display, the presentation of the material aspects and benefits of the tested aspects of the teaching materials developed electromechanical basic work. The average percentage of the total of 30 points to 79.90% of the amounts included in the category of good, which means it does not require any revision back. Some suggestions are given students among others, the presence of multiple images / illustrations are not very clear, cover less attractive, there are some spelling mistyped, and too much legislation is discussed in chapter one.

As the development of more extensive test phase this text must go through a more extensive test phase to assess the feasibility of this book. There are 30 points that include aspects of the display aspects, aspects of the presentation of the material being tested benefits and aspects of the teaching materials developed electromechanical basic work. The average percentage of the total of 30 points is equal to 81.15% included in the category of good, which means it does not require any revision back.

At trial wider improvements have been made to simplify and organize chapters one to make it more attractive so that students do not experience boredom, change / clarify some of the images that are less clear, correct some spelling errors were found, and replace the cover of the book to make it look more attractive.

Based on the results of limited testing and trial results wider implemented by the student then graphs the percentage of student eligibility test results can be seen in Figure 2.

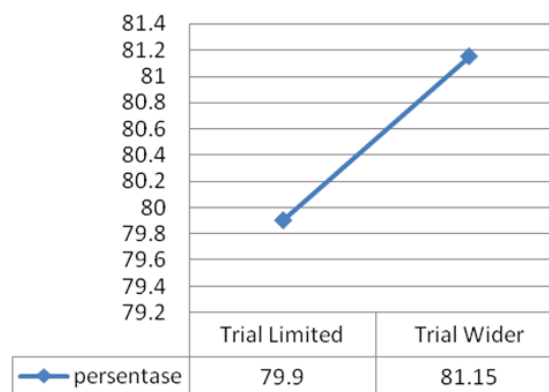


Fig. 2. Percentage chart eligibility Student Test Results

In the second picture looks average percentage in limited trial reached 79.90% with the good category, then the average percentage of the wider trials reached 81.15% with the good category. It is known assessment materials pengembangan Subjects Subjects Elementary Electromechanical Works is increasingly 1:25% of the test is limited to wider trials.

3) *Excess Teaching Material Developed*

Development of teaching materials Elementary Subjects Electromechanical Works 2013. The curriculum is based on teaching materials to make it look attractive, and can attract students to read in the preparation of teaching materials Elementary Subjects Electromechanical Works provides many illustrations / pictures support and full color, so that the reader is not only interested but also can more easily understand the discussion that described in the book. Moreover, the choice of words used is made as short as possible with a simple language to be easily understood by readers. To design the look and layout of the teaching materials Elementary Subjects Electromechanical Works made look as attractive as possible but still look coherent and well-organized.

Based on the test results to teachers and learners to work teaching material Basic Subjects Electromechanical been met, seen from the breadth of material, choice of themes, coherent concept, and conformity with the development of science. Gets a high percentage in the evaluation of students and teachers to the teaching materials Elementary Subjects Electromechanical Works.

Illustrations/images contained in teaching materials Elementary Subjects Electromechanical Works are also considered to be accurate, it can describe the content / materials and facilitate the understanding of the book of the discussion which is considered quite difficult to understand, evidenced by the high percentage of which was also obtained in the results of the evaluation of the book. In terms of appearance Subjects teaching materials Elementary Electromechanical Works in very good value; design of books, letters used, the layout, as well as the proportion of the image and the text gets a high percentage in the evaluation of the student book and teacher for this book.

IV. CONCLUSION

Based on a needs analysis Electromechanical Elementary Instructional Materials Work in vocational high school is strongly influenced by the circumstances and the condition of the school where the students were the subject of study. Teaching materials developed in this study is the basic textbooks electromechanical work. This text book for class X vocational high school Power Engineering Program with a thick 221 page book, which consists of five chapters. The material contained in the book are based on core competence and basic competences as well as the syllabus Subjects Basic Electromechanical Works in accordance with the curriculum of 2013.

Development of teaching materials basic electromechanical work in general has been good. Teacher test results seen from the assessment textbook contents feasibility aspects, feasibility aspects of language and graph aspects on limited trial included in either category, while the wider trial results in the category very well. The results of the feasibility test learners be seen from the results of the questionnaire limited trial included in either category, and the test results wider included in both categories.

V. REFERENCES

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