Trainer Development of the Electrical and Electronics Course as a Learning Media in Electrical Department SMKN 1 Tilatang Kamang

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Abstract. Tilatang Kamang Village, which is in the rural area, causes most students to have limited access to technological developments, especially in terms of practical equipment in the laboratory. This limitation causes students to be unable to think quickly, and has an impact on the speed and accuracy of students in practicing in the laboratory. Existing teaching aids are ineffective, because they only consist of circuit boards that require a long time and make it difficult for students to operate. Low ability and limited experience of students at SMKN 1 Tilatang in using laboratory equipment are also the causes of ineffective learning, especially in the learning of electrical and electronic circuits. This type of research is Research and Development which uses the Borg and Gall research procedure. The research subject is the electric circuit media trainer and the respondent was a teacher of Basic Electricity and Electronics and an electrical student at SMKN 1 Tilatang Kamang. The research instrument is the trainer questionnaire validation, practicality, and effectiveness of the trainer. Data analysis includes trainer validity, practicality, and trainer effectiveness. The results showed that the trainer's validity was 90% with a valid category. The practicality of the trainer is viewed from the teacher's side by 96% with very practical criteria, while the average practice in terms of students is 90% with very practical criteria. The average effectiveness of trainers is 86.9% with effective criteria.

Keyword: Trainer, Validity, Practicality, Effectiveness

1. Introduction

Education is one of the needs in human life and also functions to optimize one's abilities, interests, and talents. As in the opening of the 1945 Constitution the aim of national education is to educate the nation's life so as to create a man of faith and devotion to the Almighty God who has noble character, knowledge and skills, physical and spiritual health, a solid and independent personality and a sense of social and national responsibility . In the field of education the Government has tried to make improvements such as the 2006 curriculum, Kurikulum Tingkat Satuan Pendidikan (KTSP) until the 2013 curriculum, and held upgrading to improve the quality of teachers, optimize learning in the classroom by involving students in improving the learning process.

There are three principles that deserve attention in the learning process. First, the learning process produces changes in student behavior that are relatively permanent, in this process there is teacher behavior as an agent of change. Second, students have the potential and ability which are natural seeds

to be developed without stopping, thus the teaching and learning process is the optimization of self potential so that ideal quality can be achieved. Third, change or achievement of ideal quality does not grow linearly in the process of life [6] , that is to say, the teaching and learning process is indeed a part of life itself, but it is designed specifically and intently to achieve ideal conditions or quality.

Based on these three principles, it can be concluded that the teacher acts as an activist in the teaching and learning process to achieve the ideal quality of students. Teachers are not the only source of learning for students, so teachers need the ability to plan or create other learning resources so that the learning environment is more conducive. The learning resources in question are learning media. Learning media that are used in the learning process function as a bridge or learning media to transform the objectives to be achieved. Learning media is also everything that teachers can use to help provide information to students. The availability of the number of learning media is quite important to support the teaching and learning process, especially in Vocational High Schools (SMK) which require graduates to have skills in accordance with the direction taken. As in Law Number 22 Year 2006, it is explained that Vocational School is one of formal education which has the aim of preparing students to become workers who have the knowledge, skills, expertise and finally have work readiness after completing their education. and can continue their education to college. SMK Negeri 1 Tilatang Kamang is one of the vocational schools in Agam Regency, where various learning activities are carried out in realizing the achievement of graduates. SMK Negeri 1 Tilatang Kamang has four departments, one of which is the Electric Power Installation Technique.

The Electric Power Installation Engineering Department (EPIED) at SMK Negeri 1 Tilatang Kamang has several subjects, one of which is studying the measurement of current and voltage. The subjects discussing this lesson are Basic Electrical and Electronics (BEE) subjects. This subject aims to form learners to be able to understand the basics of electricity and electronics, analyze direct current electrical circuits, conduct resistance measurements, and also be able to apply current and voltage measurements....

Based on the results of observations made in the Electric Power Installation Engineering Department on BEE subjects, information was obtained that the learning process applied by the teacher was still not optimal. This can be seen when the practical process takes place, the teacher still uses the circuit board to install the components separately as a learning medium which has constraints, namely the practical process becomes less interesting student interest in learning can be seen when the teaching and learning process takes place, many students enter the room, play - playing while studying, and also takes a long time when using the media. This also results in the learning process becoming less than optimal. Besides the disadvantages of using this circuit board are sometimes when the circuit is tested, the circuit does not work this is because the cable is not tightly attached to each terminal..

Based on the problems encountered the researchers saw the potential of trainers that could be used as learning media. This electric circuit trainer and measurement is expected to make it easier for students to understand the lessons on BEE subjects about measuring current and voltage, increase the availability of electrical equipment trainers and measurements owned by schools and support students' practical activities so that the teaching and learning process can be carried out more optimally.

2. Study Literature

Learning is defined as an interactive process between teachers and students that takes place dynamically. Learning as a substitute for the old term learning process is not just changing terms, but also changing the role of the teacher in the learning process. The teacher does not only teach, but he also teaches students to want to learn. Learning has the purpose of changing behavior in order to achieve a certain outcome. Development research is a simplification of terms from research and development or Research and Development. Research and Development is development research as a process used to develop and validate educational products. [2] .

The steps of this process are usually referred to as the R & D cycle, which consists of studying the research findings relating to the product to be developed, developing the product based on these findings, the field of testing in which it will be used eventually, and revising it to correct deficiencies

found at the stage of submitting the test. In programs that are more stringent than R & D, this cycle is repeated until the test data fields show that the product meets defined behavioral goals. Development research as a systematic assessment of design, development and evaluation of learning programs, processes and products that must meet the criteria of validity, practicality and effectiveness [10] . Media comes from Latin, namely medius which literally means middle, intermediary, or introduction. In Arabic the media is an intermediary or delivery message from the sender to the recipient of the message [1] . Meanwhile, Gerlach & Ely said that the media, if understood broadly, is human, material, or events that build conditions that make students able to obtain knowledge, skills, or attitudes [1]

Based on the expert opinion above, it can be concluded that the media is a delivery channel tool in the form of learning content from the sender of the message to the recipient of the message which consists of printed communication and audio visual where the equipment can be seen, heard and manipulated to create an event that makes the recipient get knowledge, skills, and ideas in the learning process. Learning media is "messenger technology that can be used for learning purposes [9]. Media itu dipertimbangkan sebagai media pembelajaran jika membawa informasi dalam rangka mencapai tujuan pembelajaran. Media pembelajaran merupakan segala bentuk perangsang dan alat yang disediakan guru untuk mendorong peserta didik belajar secara cepat, tepat, mudah, benar dan tidak terjadinya verbalisme[4]. Dari uraian diatas dapat disimpulkan bahwa media pembelajaran merupakan suatu alat bantu yang digunakan dalam proses pembelajaran untuk menyampaikan informasi berupa materi pembelajaran yang disampaikan guru kepada peserta didik.

Good media has characteristics that must be met, there are three characteristics of the media that are indicative of why media is used and what can be done by the media to be able to help teachers in the learning process. The three characteristics are fixative characteristics, manipulative characteristics, and distributive characteristics [1]. Media is one of the communication tools in delivering messages, of course, very useful if implemented into the learning process, the media used in the learning process is referred to as learning media [9]. Media in the context of learning is not about technical and mechanical matters, because learning is part of the science of education. Learning is not just just giving material but can provide new experiences in the learning process that involves students actively. The new experience is in the form of direct experience using props such as trainers.

Trainer is a collection of actual components and tools or duplicates of the actual ones that can provide direct experience for students. Trainer means an object that can train, teach and educate [5]. The purpose of using trainers in schools is to make it easier for students in the learning process and can fulfill learning goals. The role of this trainer as a learning media has a significant influence on students, making students active and creative in the learning process. Development research can be said to be successful if the product produced is valid, practical and effective. Because the purpose of this research is to produce trainers that are valid, practical and effective, it is necessary to know the meaning of validity, practicality and effectiveness. Basic Electricity and Electronics (BEE) is a productive subject contained in the curriculum and used in SMK Negeri 1 Tilatang Kamang. This subject is taught in the 10th grade with an Electric Power Engineering Engineering program. One of the Basic Competencies (BC) that students must have after the lesson is that students are able to measure current and voltage

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3. Research Methodology

This research uses research and development (R&D) methods. Research and Development is a research method used to produce certain products, and test the effectiveness of these products. Development research in the field of education is a type of research that aims to produce products for educational / learning purposes [11]. Development research conducted by researchers is to develop an electrical circuit media trainer and measurement to optimize the learning process of class X students in the Electric Power Installation Engineering (TITL) program in Basic Electrical and Electronics (BEE) subjects at SMK Negeri 1 Tilatang Kamang. The learning development model used in this development, namely the Borg and Gall research in the book can be seen in the figure below [12]

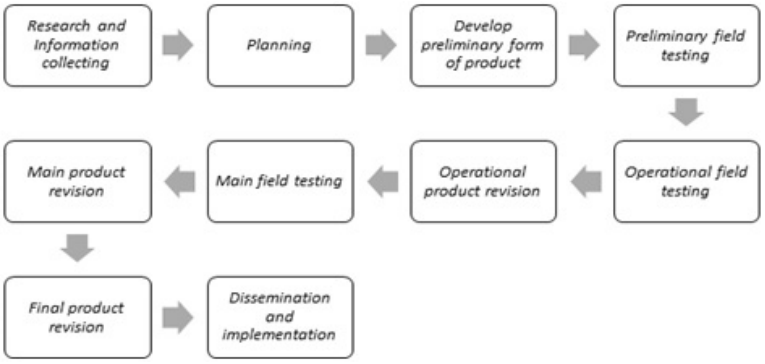

Figure 1. Chart of Implementation Steps for Research and Development

The subject of this development research is the electric circuit media trainer and the respondent is one of the Basic Electricity and Electronics subject teachers (BEE) as well as class X TITL students at the SMK Negeri 1 Tilatang Kamang totaling 23 people.

3.1. Research Instrument

Validation Trainer Questionnaire; The validation sheet is used to measure the validity of the product being developed. Valid whether the trainer is developed is based on the validator's assessment of the trainer. Validation sheets that are made in terms of educational aspects which refer to the requirements to validity cover 3 aspects, namely fulfilling the following requirements: (1) didactic; (2) construction; and (3) technical [3].

Practical Trainer Questionnaire; The practicality questionnaire is used to measure how practically the learning trainers that have been made on basic electrical and electronic subjects (BEE) are used in the practical process. Some things related to the practicality of trainers that are developed are the ease of use of trainers, time efficiency, easy to interpret, and have equivalence [12]. The trainer is said to be practical if the practitioner (teacher and student) states that the trainer developed can be used as a guide when practicing

Effectiveness of the Media Trainer; Effectiveness is measured by whether the trainer developed can be used as expected to improve the quality and learning achievement of students. Basic electrical and electronic subjects (BEE) are one of the practical subjects. So, the instrument used to measure the effectiveness of trainers that has been developed is through the rubric. The assessment points taken in this instrument are in accordance with the material taught in learning or the trainer that has been developed which refers to the syllabus of basic electricity and electronics (BEE).

3.2. Data Analysis Techniques

Data analysis techniques are done by collecting all the data needed and describing the validity and practicality of the product. Validity Analysis of Media Trainer; The media trainer validity analysis technique was conducted to see the data from the validation of the media trainer developed. Data from the media trainer validation results were analyzed for all aspects presented in table form using a Likert scale.

Practical Analysis of Media Trainer; Data about teacher and student responses to learning media is done by filling out questionnaires. Practical analysis technique uses a Likert scale, then the final value is calculated by analyzing using the formula [7].. Effectiveness Analysis of Media Trainer; Analysis of the effectiveness of instructional media is carried out after the trial, where student learning outcomes have been obtained through tests. Student learning outcomes can be said to be complete if it meets the KKM, namely 80. Classical completeness or the percentage of student graduation that must be met is 85%. So learning media is said to be effective if the student graduation rate is equal to or more than 85%.

4. Research Findings and Discussion

Media Train Validation Test Results; Validation carried out by 3 validators produces 90% categorized as Very Valid, meaning that the electric circuit trainer media and measurements can be used for students in BEE learning. Media Trainer Practical Test Results; Based on the results of practicality recapitulation filled by students, the average value of practicality obtained from the practicality questionnaire is 85.5%. If interpreted in the category table, the value of 85.5% is in the practical category. Based on the filling in the questionnaire questionnaire filled out by subject teachers, the practicality of electronic trainer media was 96% with the Very Practical category. Effectiveness Test Results of Media Trainer;.

Validation results by 3 validators consisting of 2 Electrical Engineering lecturers and 1 subject teacher, electric circuit trainer and measurement stated that the media trainer is very valid, meaning that the media trainer is well used as a learning medium in BEE subjects. The information conveyed using the media trainer becomes clearer. This is in accordance with the requirements and criteria for media selection. In accordance with the objectives to be achieved, it is appropriate to support the content of the lesson [1]. The role of trainers as a learning media makes abstract learning more concrete. The application of media trainers in learning makes students active, more independent, and increases student motivation.

Practical testing is done by distributing practical questionnaires. Respondents in the practicality test were BEE subject teachers and 23 students of class X TITL 2 at Tilatang Kamang Vocational High School. The purpose of the practicality test is to find out the teacher's response and students' response to the media developed. Requirements that must be fulfilled in practicality tests include ease of use, time efficiency, easy interpretation and equivalence. Based on the questionnaire conducted, it was found that the electrical circuit media trainers and practical measurements were used as one of the learning media because they met the practical requirements.

Learning effectiveness is a measure that is related to the level of success of a learning process. The success of the learning process is indicated by the success of students mastering the material given. Effective criteria based on classical completeness, meaning the number of students who complete at least 85%, this is a condition of the effectiveness test. The trials conducted to see the effectiveness of the media showed that most students managed to master the learning material. It was proven by the use of 23 students in the trial phase, 20 students had a value of ekan 80 when it was pressed, 86.9% of students were above the KKM and 3 students <80 or 13.1% of the students had not reached KKM. Referring to the results of the effectiveness test, it was concluded that the results of the trial use ≥85% classical completeness K 13 so that the electric circuit trainer media and measurements were declared effective to be used on BEE subjects. After fulfilling the requirements in development research, the electric circuit trainer and measurement media are declared valid, effective, and practical. That way the electric circuit trainer and measurement media are worthy of being used as learning media. Valid, practical and effective media are media that can meet the criteria of validity, practicality and effectiveness [8].

5. Conclusion

The electric circuit media trainer and measurement are categorized as valid as learning media with an average percentage of 90%, meaning that the media has fulfilled the validation aspect requirements, namely didactic requirements, construction requirements and technical requirements to obtain very valid categories. The level of practicality of media trainers which is inspired by teachers with a percentage of 96% with a very practical category and with a percentage of 90% with a very practical category. Thus it can be concluded that the electric circuit media trainer and measurement are very practical and meet the requirements in practical aspects. Media trainers for electrical circuits and measurements are effectively used as learning media in basic electrical and electronic subjects that produce classical completeness with a percentage of 86.9%. media is declared effective because the percentage of completeness is greater than the requirements of classical completeness of 85%.

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