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Validity Trainer Tool As Learning Media for Electric Power Distribution System

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Abstract*— Electric Power Distribution System Learning has demands for learning outcomes so that students understand the concept, and have basic knowledge and skills in various constructions of electric power distribution networks. This requires varied and more contextual learning methods and requires contextual learning media as well. The learning media used should be able to provide real experiences for students in simulating the electric power distribution system according to the concepts they are learning. However, the ability of students in the configuration of various distribution networks has problems because there is no suitable learning media. Therefore, it is necessary to develop a valid power distribution system trainer for use in learning. This study aims to produce a valid electric power distribution system trainer. This type of research is research & development (R&D) using the ADDIE model. Research is limited to the development stage (development). The validation test was carried out by 4 validators using an instrument in the form of a validation sheet. The results of the validation show that the electric power distribution system trainer developed is in the valid category, both for content quality aspects and objectives, instructional, and technical. This indicates that the trainer developed is appropriate for use in learning in order to test its effectiveness.

Keywords: ***Research & development, trainer, electric power distribution system***

I. INTRODUCTION

Universitas Negeri Padang is one of the universities given the mandate to provide vocational education. One of them is D III Electrical Engineering Study Program, Electrical Engineering Department, faculty of engineering, Universitas Negeri Padang. The aim of the Electrical Engineering study program is to produce graduates who are professional and ready to work in the electricity sector. In achieving these goals, it is necessary to make changes and developments on an ongoing basis from all elements that affect the objectives of the study program. One of these elements is the implementation of a good learning process in accordance with the characteristics of good vocational education. The characteristic of vocational education is how to create a learning process that has a business / industrial atmosphere. Thus, graduates from this study program are expected to have basic experience regarding the world of work to be targeted (Prosser, 1925). Furthermore, Jama (2010: 1) said that along with the development of vocational education technology, it has an important role in the world of work. Vocational education is required to produce a competent workforce in the context of increasing productivity and efficiency, as well as readiness for the ASEAN Economic Community (AEC) competition and international labor market competition in the era of globalization.

The media commonly used in lectures on electric power distribution is in the form of simple props. This media does not yet describe the form of a complete radial, loop, or spindle electric power distribution network configuration and cannot be used as a simulator. With regard to the purpose of vocational education, a learning media is needed as a supporting tool, in addition to face-to-face learning transformation (lectures) in the classroom. Learning media is a dynamic element in learning. The position of the learning media has an important role because it can help the student learning process. Pratama (2018) states that learning media is a learning aid that can contribute to the learning environment that is regulated and designed by educators.

Learning should be carried out in a realistic and concrete manner, so that it develops understanding and critical thinking and avoids ongoing verbalism. The delivery of learning material that does not vary can be the cause of not achieving the desired learning objectives. With the variation in

learning, it is hoped that students can act on their own which in turn will develop all personal aspects. Students learn and work based on their interests and abilities, so that they can be useful in order to increase individual potential. Students are required to be able to apply all aspects obtained from the learning process, so that they can become creative individuals as expressed by Conny R. Semiawan that an effective and efficient learning strategy is the development of individual learning attitudes to create a person who does not only master knowledge and skills in transferring science and technology, but also being able to develop himself according to his potential, talents and interests into a creative person with high integrity.

Learning media are made and can be used according to the subject and urgency of the course. Lecture materials that tend to be memorized or theoretical in learning it may be enough just to use a manual. It is different with learning that tends to be applied or theoretical which requires additional information. In visualizing a teaching material, sometimes educators experience obstacles caused by limited instructors, equipment, tools, materials, costs and so on where the process of delivering information or transfer of knowledge is not enough just by delivering lectures.

Teaching methods and learning media are two interrelated aspects of the learning process. Learning media is a means that can support the achievement of learning objectives. Hamalik (Arsyad, 2014: 4) suggests that communication relationships will run smoothly with maximum results when using a tool called communication media. The use of media in the learning process can generate new desires and interests, generate motivation and stimulation of learning activities, and even have psychological effects on students. The use of appropriate media in the subject of electric power systems will make understanding abstract material more concrete or real by presenting the learning media for the electric power distribution system that has been made so as to avoid misconceptions and make it easier for students to understand the material of the electric power distribution system.

According to Suwarno (2015: 74), to convey messages from educators to students, teaching aids can be used in the form of pictures, models, or other aids that can provide concrete experience, motivation to learn, and increase absorption or which we know as visual aids. Therefore, the learning media is designed to be attractive so that students are more motivated in following the learning process, which is basically the students are less motivated by learning theory.

Electric Distribution System Learning tends to put forward the theory without looking directly at the type of distribution network as a whole. This results in learning activities to be less attractive and less challenging for students to be creative in learning, so that their interest and motivation in learning tends to be low. It can be observed that in learning only one or two students in a group are serious about paying attention and implementing learning.

Furthermore, the allocation of theoretical lecture time is very limited, the weight of this course is 2 credits. Meanwhile, there are too many components to be explained, so that the discussion time for one topic is not enough, because it takes a long time to create an interesting theory learning simulation. In addition, the demand for learning outcomes in this course is for students to understand the concept of electric power distribution, and to have basic knowledge and skills in various construction of electricity distribution networks as stated in the Semester Learning Plan (RPS) in the Electric Power Distribution course. This of course requires a variety of learning methods and is more contextual so that it is easier for students to understand, considering that this course must be well applied in real life.

One of the efforts that can be made to improve student understanding and create an interesting and challenging learning atmosphere is to use learning media that can present real situations for students and allow them to carry out and observe simulations about the real conditions that exist. This is so that they understand the concepts that must be understood about various electricity distribution networks and the risks or disruptions that can occur in this network. Thus, they can understand the material through direct observation without any chance of risk related to the electricity that occurs. However, in practice, students are constrained by the absence of learning media that can be directly observed in the form of networks they are learning.

Heinich (2005: 9) argues that the media acts as a means of communication and a source of information. Seokidjo (2009: 52) also adds that the media is "a visual aid that helps the process of demonstrating something". The process of conveying information from the source to the recipient is very important because it affects whether or not the information obtained by the recipient is correct. Therefore, in the learning process it is also necessary to use media known as learning media which has the role of conveying information from educators to students.

Gerlach and Ely (1971) in Kustandi (2016: 12-14) suggest three media characteristics, including

fixative property, manipulative property, and distributive property. The fixative feature describes the ability of the media to record, store, preserve, and reconstruct an event or object. This allows a record or object to be transported regardless of time. Furthermore, the manipulative characteristic allows the transformation of an event or object, for example, observing the tsunami process can be observed with the manipulative ability of a medium. Finally, the distributive feature allows the media to be reproduced and used repeatedly simultaneously in various places because the consistency of the recorded information is guaranteed to be the same or almost the same as the original.

Smaldino (2012: 7) divides media into six forms, namely text, audio, visual, video, engineer, and people. The six types of learning media in the form of text, audio, visual, video, engineers, and the people around them in their use have now become an integration that has become a unity formed in a learning media.

One of the media that can be used to achieve this learning objective is the electric power distribution system trainer. This electric power distribution system trainer learning media serves to focus students in understanding the concept of the electricity network in the form of Radial, Loop, and Spindle networks like those in the field. By using the Electric Power Distribution System trainer, it is also hoped that it can help students in learning when the lecturer who teaches courses cannot attend to deliver material in class. Sukirno (2018) adds that by using a trainer students can operate real equipment and apply it with a function that matches the actual equipment. In addition, students can observe in detail the work system or function of each equipment used so that they can capture the teaching material that is being carried out. The development of instructional media for the Electric Power Distribution System trainer can reduce a static atmosphere and can create an effective, interesting, interactive and fun learning process. Apart from the things stated above, other uses of the use of various learning media will be able to create learning variations so as not to cause student boredom.

Mourel (1983) states that a trainer is a unit of equipment used to train students to actualize their knowledge so that they have knowledge and skills and will provide high retention of the knowledge they already have. This is in line with Hasan's opinion (Arisa, 2015: 17), namely, a trainer is a set of equipment in a laboratory that is used as an educational medium which is a combination of work models and mock-ups. Agus Sudarmanto (2017) said that the appearance of the trainer will clarify ideas and apply the theories learned in learning.

Based on the models and multimedia characteristics stated in Kustandi (2016: 70-71), trainers can be classified into simulation models. The simulation model matches the dynamic processes that occur in the real world. In this study, the authors tried to simulate an electric power distribution network system through the use of a trainer. In the use of this trainer, users, especially students, seem to be carrying out electrical network distribution activities, both in the form of a loop, spindle, and radial distribution network. The characteristics of the trainer learning media in this simulation model are the presentation of simulators, questions, answer responses, remedies and evaluations.

This study aims to develop a trainer for an electric power distribution system. The trainer developed then passes the validation test stage to determine the validity level of the tool. Thus, it is hoped that a valid trainer will be produced for use in lectures.

II. METHOD

This research is research & development. This can be seen based on the problem formulations previously disclosed. According to Borg (1989: 624), development research is an effort to develop or produce and validate a product used in learning. According to Putra (2012: 67), research and development methods are deliberate, systematic research aimed at finding findings, formulating, improving, developing, producing, testing the effectiveness of products, models, methods / strategies / methods, services, certain procedures that are superior, new, effective, efficient, productive, and meaningful.

The development model used is the ADDIE model. The research procedure is carried out in accordance with the ADDIE model stages proposed by Tegeh (2014: 78) as can be observed in Figure 1 below.

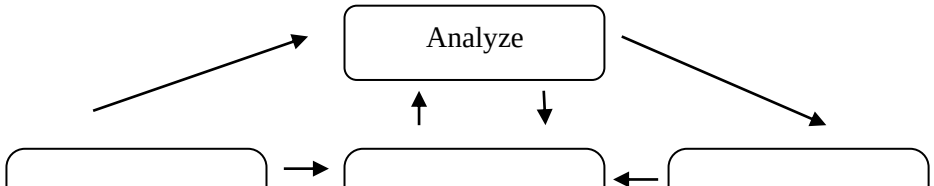

Figure 1. Research procedure

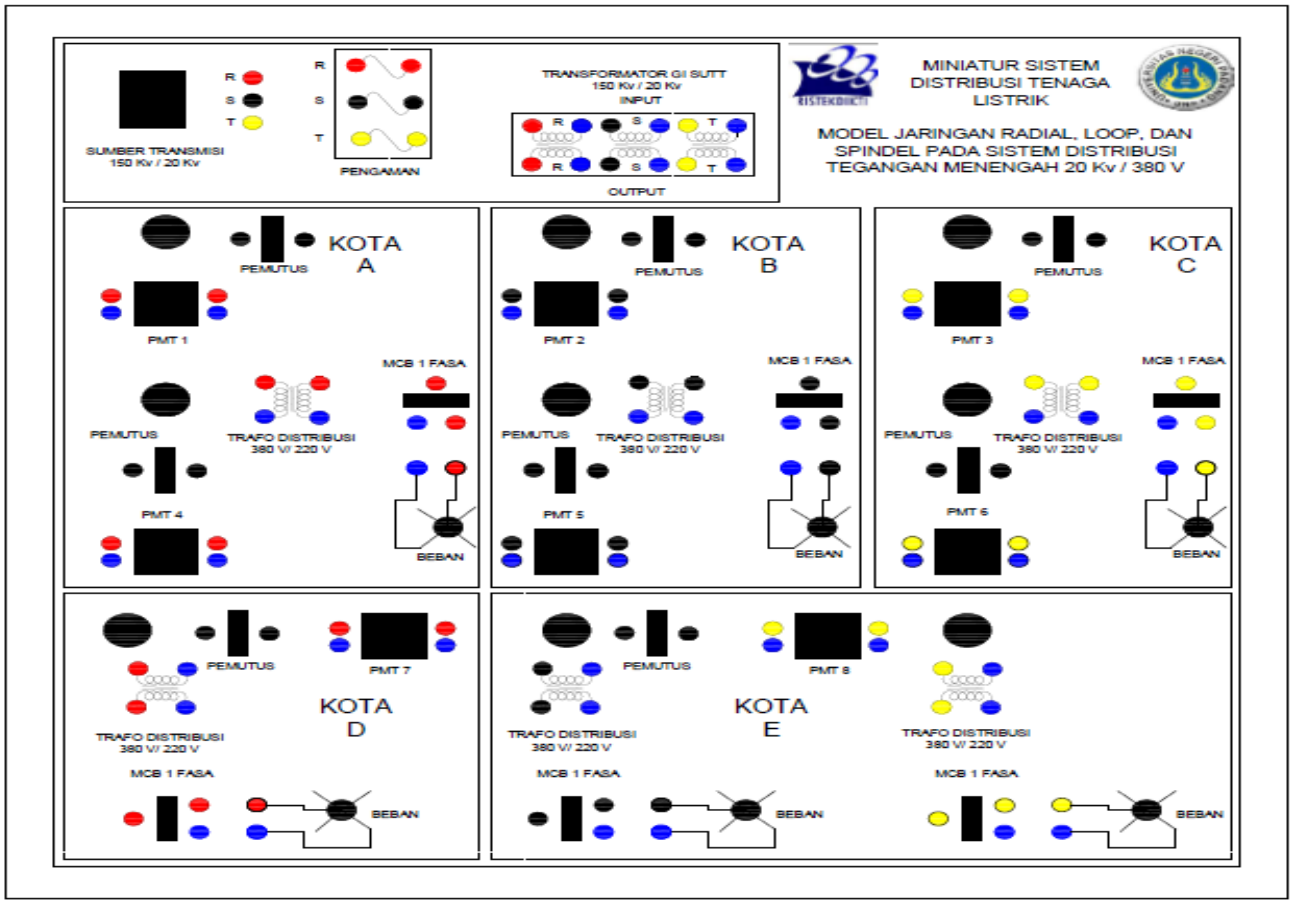

Figure 2. Trainer Design for Electric Power Distribution System

This research is limited to the development stage. At the analysis stage, curriculum analysis and student analysis are carried out. Curriculum analysis refers to the synopsis and RPS of the Electric Power Distribution System course so that the resulting trainers do not deviate from the learning outcome. From the results of the student analysis, it was concluded that students (students) are in the age range 18-20 years who have the ability to analyze and create their own hypotheses on a problem, where the subject of this research is a student of the Electrical Engineering Department of Electrical Engineering Department of Electrical Engineering FT-UNP odd semester 2019/2020 school year.

The second stage of this research is design. This stage verifies the form of problem solving to be carried out and determines the appropriate test method. This stage includes translating the needs and learning objectives into the specific objectives of making an Electric Power Distribution System trainer. At this stage, the researcher designed the Electric Power Distribution System trainer in

accordance with the needs analysis carried out. In addition, at this stage an instrument is also designed to test the validity of the product, test the practicality, and test the effectiveness of the product, as well as the instrument validation sheet to be used. The design of the trainer media design for the electric power distribution system can be seen in Figure 2.

The third stage which is the limitation of this research is the development stage. This stage is the stage of developing and validating the Electric Power Distribution System trainer for use in the Electrical Engineering Study Program of the Electrical Engineering Department, faculty of engineering, Universitas Negeri Padang. The validation process is accompanied by direct discussions or interviews with experts regarding the improvements that must be made. The design of the electric power distribution system trainer is consulted in advance with experts or experts and supervisors. Then, the design is assessed by a validator who has understood the principles of trainer development, namely 2 material validators, 1 learning media validator, and 1 validator for the electric power distribution system. The validation results are used as a reference for revising the trainer. Trainers that have been declared valid by the validator will be used for implementation in the field for further research.

The instrument used in this study was a validation sheet to determine the level of validity or validity of an Electric Power Distribution System trainer by experts. The validation data obtained were then analyzed using descriptive statistics. The data is processed using Aiken's V Statistics, as in equation (1) below (Syaifuddin Azwar: 2014).

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

In this equation, the validity criteria consist of valid (0.6) and invalid (<0.6) categories.

III. RESULTS

The research conducted aims to produce a media trainer product for the power distribution system and perform validation tests on this media. The instrument used to perform the validation test is an instrument that has passed the validation stage first.

Validation was carried out by 4 validators with various fields of expertise. Validation of the electric power distribution system trainer includes validation by 1 validator of learning media, 2 validators of material, and 1 validator of electric power distribution systems. Validation carried out includes validation of content quality and objectives, validation of instructional, and technical validation.

The results of validation by instructional media experts can be observed in Figure 3.

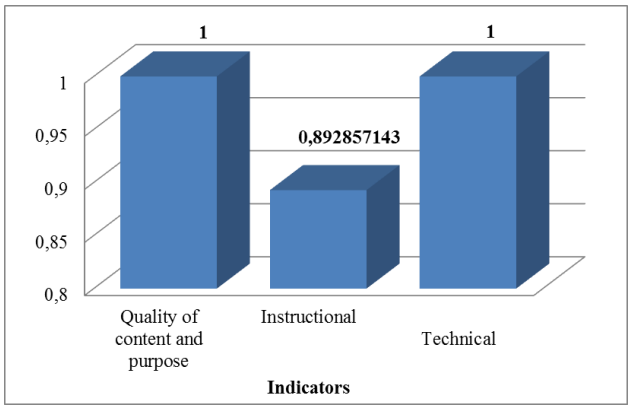

Figure 3. Validation Results of Learning Media Experts

Based on Figure 3, it can be observed that overall, the three validated aspects are in the valid category with an average validity of 0.95. The lowest score lies in instructional validation, but this value is already in the valid category. Thus, based on the assessment of instructional media experts, the developed media trainer has been valid for use.

Furthermore, trainer validation is also assessed by experts in electric power distribution systems. The results of the validation from the electric power distribution system expert can be observed in Figure 4.

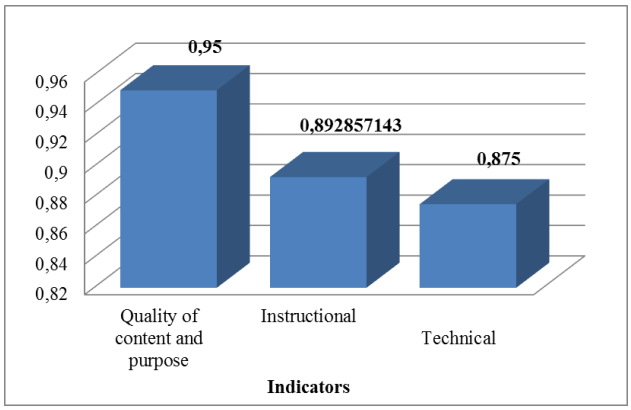

Figure 4. Distribution System Expert Validation Results

Based on Figure 4, it can be observed that the validation results are generally in the valid category with an average validity of 0.91. The validation value obtained was fairly even for the three aspects

that were validated. Based on the data obtained, this distribution system trainer has also been declared valid for use according to electric power distribution system experts.

The last validation that is carried out is material validation by material experts. This validation involves 2 material experts to assess whether the designed trainer is suitable for use in learning. The results of the validation by material experts are presented in Figure 5.

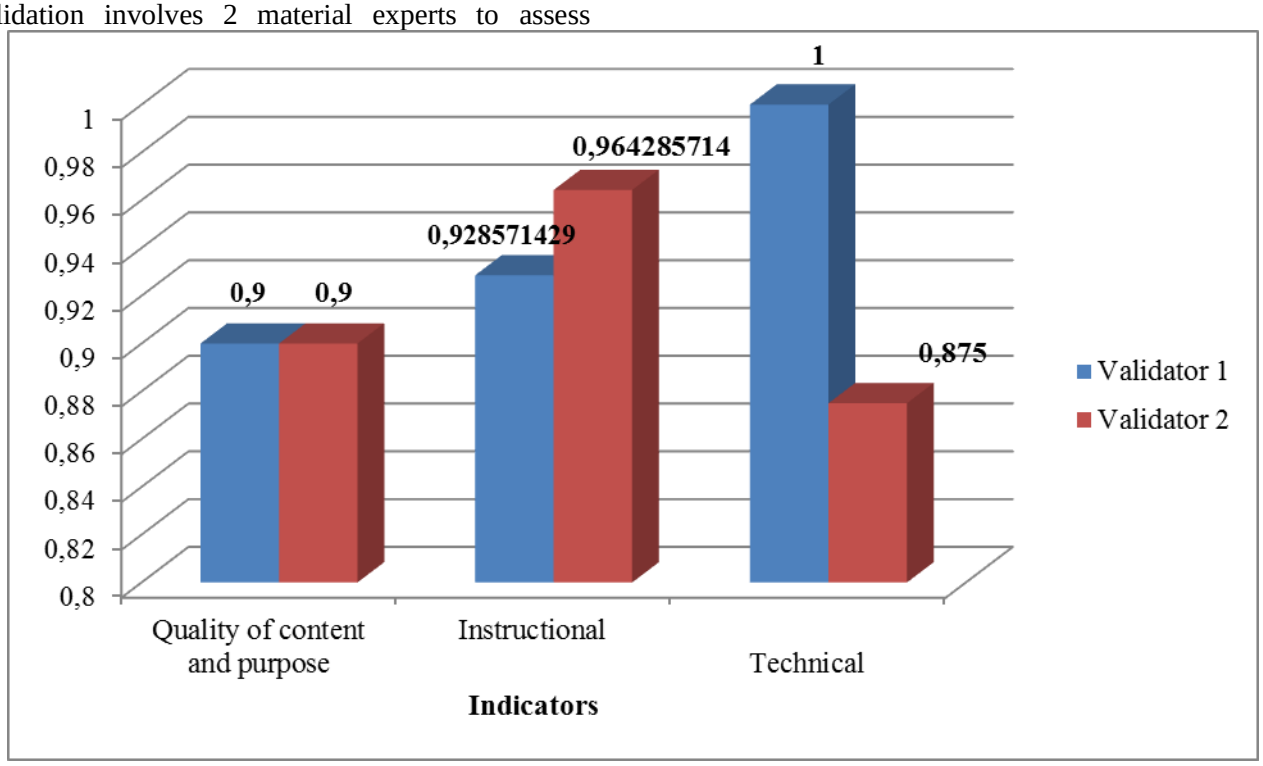

Figure 5. Material Expert Validation Results

Based on Figure 5, it can be observed that the validation results of the two validators are in the valid category with the average validity by the first validator of 0.94 and the average validity by the second validator of 0.92. The average value obtained from the two validators is 0.93 with a valid category. These results indicate that the electric power distribution system trainer produced is suitable for use in learning according to the assessment of material experts.

The overall validation results of all validators are presented in Figure 6.

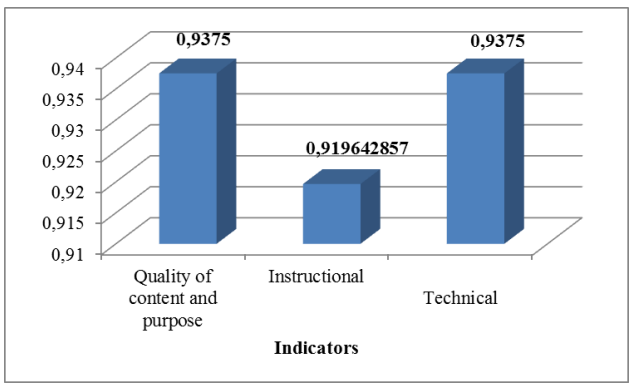

Figure 6. Validation Results by Validators

Figure 6 presents the average validity value of all validators. All aspects of the assessment are in the range of the value 0.9 with the valid category. Thus, in terms of content quality and objectives, instructional, and technical aspects, the electric power distribution system trainer developed is in the valid category based on the assessment of media experts, material experts, and electricity distribution system experts. This indicates that the designed trainer is suitable for use in lectures on electric power distribution systems.

IV. DISCUSSION

The electric power distribution system trainer developed in this study was assessed by four validators with different areas of expertise, namely from media, material, and power distribution system experts. Based on the results of the validation, the developed trainer has been declared valid by experts from various aspects of the assessment.

According to instructional media experts, the designed trainers meet the characteristics of the learning media. The trainer developed has fulfilled the function of learning media as a tool to channel messages to be conveyed to students (Gerlach, 1980: 5). The trainer developed also helps students apply theories about distribution networks through real simulations on the device. This is in line with the opinion of Agus Sudarmanto (2017) which states that the appearance of the trainer can clarify ideas and apply the theories learned in learning. In addition, trainers who are designed also fulfill one form of media according to Smaldino (2012: 7), namely engineers, in which trainers are three-dimensional that can be touched and held by students and resemble real objects. In addition, students can also simulate real distribution networks such as real conditions in the field. Furthermore, the material expert suggested that the tool be equipped with instructions for use so that it could be used by students for independent activities.

Furthermore, the trainer is declared valid by an electric power distribution system expert. This indicates that the trainer can be used to demonstrate three types of distribution system network configurations (radial, spindle, and loop). The layout of the components in the trainer has been adjusted to the real form in the field. This is in line with what Walker and Hess (1984) put forward in Kustandi (2016: 143), that valid criteria here also fulfill the aspect of accuracy of the material to be presented and its completeness in explaining concepts that students must understand..

Valid criteria also fulfill material aspects. Validity in this category is related to the quality of content and the goals of Walker and Hess (1984) in Kustandi (2016: 143). Trainers are declared valid because they are relevant to the learning outcomes of the course and the Semester Learning Plan (RPS). In addition, there is a suitability for the trainer simulation designed with the material being studied. The trainer developed in this study presents a more detailed configuration of the electric distribution network than the trainer that has been previously developed. In addition, this trainer can be used independently by students as a simulator, in contrast to the previous trainers which only acted as teaching aids. This also shows that trainers can stimulate student interest in learning and make it easier for them to understand the material being studied.

V. CONCLUSION

Based on the data obtained from the validator's assessment of the developed trainer, the validity level of this product can be calculated. The results of the validation analysis show that the electric power distribution system trainer has been in the valid category both for the aspects of quality content and objectives, instruction, and technique. This means that the developed trainer has met the criteria as a good learning media and is in accordance with the material and can be used to improve the quality of learning the electric power distribution system. For the next stage, the developed trainer can be tested in learning to see the level of effectiveness in learning.

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