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# Design of Automatic Lighting Installation Props Using Photocell and Motion Sensors

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**Abstract— This teaching aid design approach is based on compiling learning materials that are fully necessary to achieve the desired understanding and skills. In the lighting installation subject, vocational electrical power installation techniques at SMK Negeri 2 Sinabang, there needs to be more demonstration media, which causes problems for students who find it very difficult to understand lighting installations and put them together. With this teaching aid medium, it is hoped that it can help students' understanding of installing lighting installations and improve student learning outcomes so that learning objectives are achieved. This teaching aid is designed to be a learning medium as a teacher's aids in teaching material on automatic lighting installations using photocell sensors and motion sensors in electrical power installation subjects. To determine the suitability of the props, a research instrument was made in the form of a media validation sheet, material validation, and questionnaire validation. The learning outcomes of students are known by providing several pre-test and post-test questions so that they can be used as a reference for how successful or appropriate the teaching aids are to be applied to students and lighting installation subjects. Based on the percentage results obtained from media expert validation, namely 89%, and material expert validation, namely 100% from the validator assessment, learning outcomes through the pre-test were 28% and the post-test 83%. The results obtained were based on validation and learning outcomes; the automatic lighting installation props using photocell sensors and motion sensors in the lighting installation subject at SMKN 2 Sinabang showed "Very Feasible."**

**Keywords: props, lighting installations, photocell sensors, motion sensors**



## I. INTRODUCTION

Teaching components are generally grouped into three main categories, namely: teacher content, lesson material, and students (Juhler, 2016). The interaction between these three components involves facilities and infrastructure such as methods, learning media, structuring the learning environment, and so on (Miranda et al., 2021). So that a teaching and learning situation is created that allows the expected goals to be achieved (Morrison et al., 2019). A teacher must be able to choose appropriate teaching and learning strategies that suit student characteristics, equip students with life skills according to student needs, and have the ability to improve teaching and learning activities towards achieving optimal learning outcomes (Truong, 2016).

There are several ways to implement a strategy in teaching and learning that is more effective and can improve learning activities that can be implemented by teachers, one of which is providing teaching aids that divide theoretical and practical lessons (Barrow, 2015; Nur Fajri, 2020). An approach based on the design of teaching aids means that the preparation contains the learning material that is really needed to achieve mastery of competencies (Gervais, 2016). In this way, students are expected to gain learning experiences that can fully develop their potential in the competencies they are studying without having to be burdened with things that are not related to mastering these competencies (Vogler et al., 2018). Even conceptually, the implementation of learning can be carried out in direct form through direct practice using learning media to design and build teaching aids (Adu, 2022; Efendi, 2020; Haleem et al., 2022).

The use of learning media in the design and construction of teaching aids in the teaching and learning process can arouse new desires and interests, generate motivation and stimulation for learning activities, and even psychologically influence students (Karo-Karo S & Rohani, 2018; Plass & Kaplan, 2016; Siahaan, 2018; Supardi et al., 2015). Therefore, in learning, there needs to be innovation in teaching, namely by using learning media and designing teaching aids that can increase understanding (Aprilia et al., 2022; Kause, 2019;

Kurniawan & Setyo Budi, 2024; Kwangmuang et al., 2021). Moreover, it is necessary to design media that is appropriate and in accordance with the current education system (Masterman, 2018).

The problem faced in learning at SMK Negeri 2 Sinabang, especially in the Vocational Lighting Installation subject Electrical Power Installation Engineering, is the need for demonstration media at SMK Negeri 2 Sinabang, especially in the electrical power installation engineering department. Teachers still use the lecture method. This causes problems for students, and it is very difficult for students to understand lighting installations and assemble them. With this teaching aid medium, it is hoped that it can help students' understanding of installing lighting installations and improve student learning outcomes. However, this knowledge must be remembered because many factors influence learning activities.

In the research that will be carried out with previous research, there are differences; the research that will be carried out now is more directed towards making automatic lighting system props using photocell sensors and motion sensors. Thus, the researcher wants to conduct research with the title Design of Automatic Lighting Installation Props Using Photocell Sensors and Motion Sensors at SMKN 2 Sinabang School. This research will be carried out only focusing on the design and installation stages. This will be carried out only at the design stage through validation testing of props and obtaining learning outcomes using props.

The aim of this research is to determine the suitability of teaching aids for students in the teaching and learning process with the Electrical Lighting Installation subject. It also aims to obtain student learning outcomes by applying the design of automatic lighting installation construction tools using photocell sensors so that it can be seen whether it is suitable for learning.

## II. METHOD

The research design aims to be a learning aid in the subject of lighting installation engineering. This research design uses research and development. This type of research for development (R&D) is a process or research stage used to produce certain products and to test how good the project is (Gustiani & Sriwjaya, 2019; Sugiyono, 2021). The steps for research and development (R&D) are in Figure 1.

This research was carried out according to a number of stages contained in the diagram, which can be seen in Figure 1. This diagram will later function as a sequential organizer of the research process or stages.

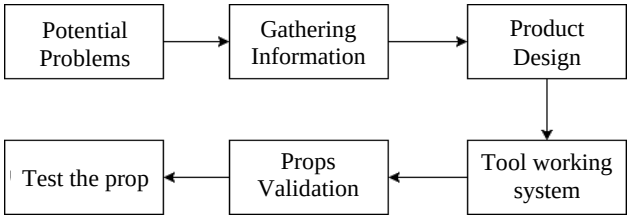


Figure 1. Research Stages

The research stage carried out was slightly different because the researcher only wanted to test the suitability of a teaching aid product for use as a learning aid for lighting installation techniques. The steps that will be taken in the research are based on Figure 1, a picture of the research stages.

### A. *Potential Problems*

Based on initial observations, lighting fixture or lighting installation subjects do not have adequate teaching aids, which decreases students' understanding of the material being taught and makes the learning process less effective.

### B. *Gathering Information*

The research tool was designed to produce a teaching aid that can help the learning process of lighting installation more effectively. The tools and materials for automatic lighting installations using photocell sensors and motion sensors include:

1. TestPen is a tool to determine the electrical voltage in a conductor.
2. Combination pliers as a tool that can hold, grip, twist and cut cables and other objects.
3. Plus and minus screwdrivers equipped with rubber or isolator-coated handles to ensure safety while working.
4. Insulation, or tire insulation, is a cable dressing that is connected to or has been peeled off of the insulator.
5. A photocell sensor as a replacement for a switch.
6. PIR Motion Sensor.
7. The MCB meter functions as protection for lighting installations.
8. A 2x1.5 mm2 NYM cable functions to connect and transmit current or voltage.
9. Light fittings, sockets, and lighting.

### C. *Product Design*

Researchers designed the design of this teaching aid with the concept of automatic lighting installation using photocell sensors and motion sensors as scalar replacements to make it easier for humans to carry out their activities. A picture of an automatic lighting installation using a photocell sensor and motion sensor can be seen in Figure 2. As

seen in Figure 2, the photocell and motion sensor have 3 cables. The function of these cables is that 2 cables are connected to the power source, and 1 cable is connected to the light/other equipment that will be controlled. In the image below, you can see instructions for using the cable on the photocell. For the black and white cables, we connect them to the electricity source (PLN) with the line/phase line to black and the neutral line to white, while the red line is connected to the lights/other equipment that will be controlled.

So that the lamp can operate properly, the neutral line (white cable on the photocell) is also connected to the lamp. So, in simple terms, the cable connection is shown in Figure 2.

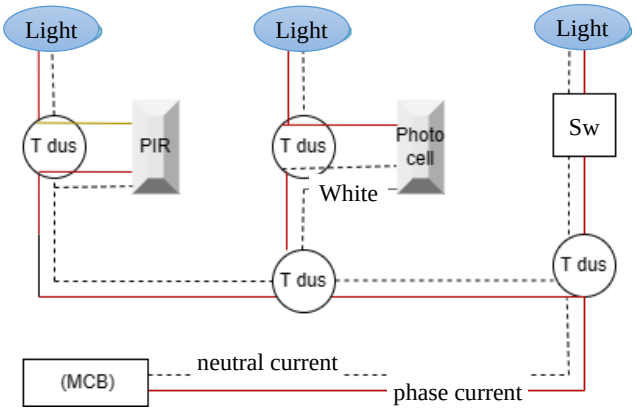


Figure 2. Photocell and motion sensor lighting installation circuit

### D. *Tool working system*

In designing the automatic lighting installation demonstration equipment using photocell sensors and also using motion sensors, the first thing that is created is the workflow of the equipment when the lighting is working. Photocells and motion sensors have an important role in building or providing activation in automatic lighting which can be seen in Figure 3 of the working system for lighting devices.

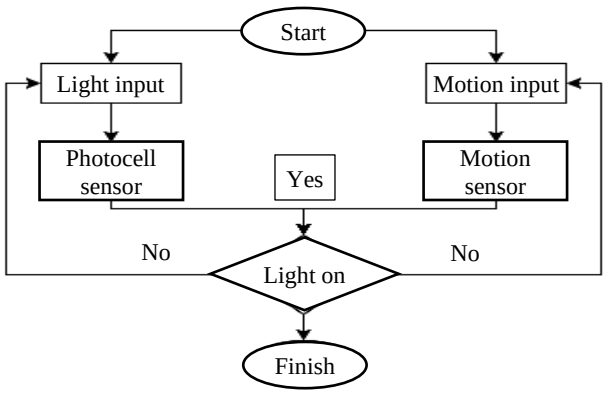


Figure 3. Sensor working system

### E. *Props Validation Instrument*

Validation aims to measure the suitability of a designed teaching aid before being used as a learning aid. The validation sheet is an instrument in this validity test research with a team of experts as respondents who fill in the validation sheet. The feasibility test of the automatic lighting installation demonstration equipment using photocell sensors was validated by media experts and material experts. The form of validation in this research uses a Likert scale measure to determine the results of expert opinion, with various answers ranging from very doable to very incompatible with the teaching aids, by providing a list of alternative answer criteria on this scale from one of the values from 1 to 5 (very good to very bad).

### F. *Test the props*

The props were tested by trying to use the props on a limited sample that the researcher had determined as the respondent in response to the props. After receiving an explanation of the research stages to be carried out, the researcher will display a flowchart showing the flow of the implementation stages from start to finish in this research.

The object of this research is students of SMKN 2 Sinabang in the field of electrical installation engineering and lighting installation engineering in the professional field of electrical engineering. A total of 30 students were used as a sampling technique for testing teaching aid products using an automatic lighting device with a photoelectric sensor. The sampling technique is a sampling technique that is carried out randomly without paying attention to the strata in the population because the population members are homogeneous.

The data analysis technique in this research is based on a quantitative approach. The measurement scale in this research was carried out by applying the Likert scale technique to determine the results of expert opinions and provide answers ranging from very good to very bad regarding teaching aids. The form of data in this measurement is interval data. Interval data can be analyzed by calculating the average of the answers of the experts who assessed each answer. As a calculator for the average suitability of teaching aids in terms of the design and content of teaching aids, you must know the ideal score for all indicators and the ideal score for each indicator item.

## III. RESULTS AND DISCUSSIONS

### A. *Photocell Sensor Circuit*

The Photocell Sensor Series is a photocell sensor, also known as a photoelectric cell sensor or photodetector, is an electronic device used to detect light or electromagnetic radiation in various applications. These sensors usually consist of photoelectric cells that produce electrical signals when exposed to light. In Figure 4, the photocell sensor circuit has several cables connected with several colors of cable; the specifications are that the black cable on the sensor is connected to the electrical power source (PLN), the red cable is connected to the light fitting, and the white cable is connected to the neutral cable.


Figure 4. Photocell sensor circuit

### B. *Motion Sensor Circuit*

The Motion Sensor Circuit known as PIR (Passive Infra-Red) is one of the devices used in teaching aids where a motion sensor, by definition, is a tool capable of detecting or capturing temperature changes in the surroundings, especially movement, which is then used in props to automatically turn on the lights. It can be seen in Figure 5 that the Motion Sensor Circuit has connected cables: the red cable is connected to the electrical power source (PLN), the black cable is connected to the Neutral cable, and the yellow cable is connected to the Light Fitting.


Figure 5. Motion sensor circuit

### C. *Overall series of automatic lighting installation demonstration equipment using motion sensors and photocell sensors*

The result of this overall design is a combination of a series of motion sensors and photocells connected to a series of lighting installation props that are ready to be designed in such a way as to become a prop. The series of lighting installation props using motion sensors and photocell sensors can be seen in Figure 6.

Figure 6. Automatic lighting installation demonstrator

Based on Figure 6, the teaching aid is formed with several components in it, including 1 socket installed and 1 MCB installed; then there is a 1 channel switch connected to 1 light, a motion sensor connected to 1 light, and a photocell sensor connected to 1 lamp. Each has a function for turning on or turning on the lights.

### D. *Results of a series of visual aids when executed*

The series of lighting installation props is automatically carried out using the main components, which are divided into 3 components: switches, photocell sensors, and motion sensors. These components have different roles in their work to turn on the light fittings. Photocell sensors and motion sensors use current from the same PLN, but the method of work is different and can be seen in the stages or steps in the performance of the props, as follows.

1. The teaching aid is connected to an electric current

Figure 7 shows the overall circuit form of the automatic lighting installation props. The initial stage

in running these props is to turn on the component by connecting it to an electric current, with the help of 1 installed socket and 1 installed MCB. The props require electricity. To use them, they are ready to be used or function as they should.

Figure 7. Prop

2. Switch Components

The visual aids use switch components to compare the differences between the other two components in carrying out their work or function, such as turning on or off electrical equipment. Understand the switch itself is an electrical component useful for circuit breakers and connecting the flow of electricity from the current source to the electrical load. The picture of the switch in the lighting installation is as in Figure 8.


Figure 8. Comparison of on and off switches

3. Photocell Sensor Components

The teaching aids focus on the use of automatic lighting installations that use motion sensors and photocells in the circuit section and how this photocell sensor works; namely, by receiving an electric current, the photocell sensor will function as it should; the way the photocell sensor works is to detect the light received, In this lighting installation prop, the photocell component will turn on the light fitting when the area or area being received is dark, the light will turn on, conversely, when the area or light is bright, the light sensor will receive the light and turn off the light fitting. It can be seen in Figure 9 how the photocell sensor works in turning on and off the light fixture.


Figure 9. Photocell sensor turning off and on

4. Motion Sensor Components

The motion sensor or PIR installed on the props has the function of turning on the lights by receiving or detecting incoming movement. The PIR sensor is designed and engineered to only detect infrared emissions with a wavelength of 8-14 micrometers. Outside this wavelength, the sensor will not detect it. Humans themselves have a body temperature that can produce infrared emissions with a wavelength of between 9-10 micrometers (standard value 9.4 micrometers); a PIR sensor can detect this wavelength. So, in other words, if a human or animal passes through the sensor area, the sensor will automatically detect it and immediately go to the "ON" position. It can be seen in Figure 10 that the motion sensor, when no hand approaches, the light will not turn on, but when a hand approaches a certain distance, the sensor will detect it and will provide input to the light fitting so that the light is on.

Figure 10. Motion sensor turning off and on

### *E. Validation Results*

Validation results were carried out based on a validation questionnaire. Validation was completed by 4 selected experts, namely lecturers from the Electrical Engineering Education study program as media validators, namely Mr. Muhammad Ikhsan, S.T., M.T as the first media expert and Mrs. Hari Anna Lastya, S.T., M.T. as the second media expert and the teacher at SMKN 2 Sinabang as the material validator, namely Mrs. Sylvia Dwi Rahayu, S.Pd as the material validation expert I and the second material validation expert Mr. Ilham Surman, S.Kom to verify the feasibility of the design of the automatic lighting installation props using sensors. Photocells and Motion Sensors in Lighting Installation Subjects at SMKN 2 Sinabang. The experts are 2 lecturers and 2 teachers at SMKN 2 Sinabang who know their fields. Validation is tested based on 3 types of validation, namely media expert validation, material expert validation, and questionnaire expert validation.

#### 1. Results of Media Expert Validation and Material Expert Validation

Validation is carried out by providing a validation sheet containing several questions related to the design of teaching aids with the aim of obtaining information, suggestions and input from experts through proof of concept according to the media. Later, it can be developed into an embodiment of teaching materials through lighting installation props that are useful for students, especially in lighting installation subjects. Media Validation was verified or tested by Mr. Muhammad Ikhsan, S.T., M.T. as the first media expert and Mrs. Hari Anna Lastya, S.T., M.T. as the second media expert who is a lecturer in the Electrical Engineering Education Study Program. Meanwhile, Material Validation was tested by Mrs. Sylvia Dwi Rahayu, S.Pd as the first material validation expert, who is a teacher in the field of electricity and teaches lighting installation subjects who have an educational background in Electrical Engineering and the second material validation expert was Mr. Ilham Surman, S.Kom. who is involved in computer network administration subjects. Media validation was carried out precisely on July 21, 2023, while material validation was on July 27, 2023, in the teacher's room at SMKN 2 Sinabang.

a) Media Expert Validation Results

The results of the media validation test carried out by the media expert validator show the assessment of the expert validator I of all indicators with a value obtained totaling 65. The validation results from the media expert validator II obtained a value of 59, with the maximum value of the overall indicators from media validation being 70. The total of the two validators' assessment results is 124 with a maximum media validation value of 140 from the two media expert validators. Based on calculations carried out using the percentage formula in the percentage formula.

$$\text{Percentage} = \frac{124}{140} \times 100\% = 89\%$$

The second validator's assessment received a percentage for the first Validation Expert, which was 93%, for the second Validation Expert, which was 84%, and the overall percentage of the media expert's assessment was 89%. Based on the results obtained, it can be concluded that the media validation test received the title "very feasible" in the application of automatic lighting installation teaching aids using photocell sensors and motion sensors in lighting installation subjects at SMKN 2 Sinabang.

b) Material Expert Validation Results

The results of the material validation test carried out by the material expert validator, who is one of the teachers at SMKN 2 Sinabang, based on the assessment given by the material expert on the automatic lighting installation props, were very satisfactory. It was found that the value obtained was 100 from the assessment of the two validators, with the resulting percentage being 100% based on the assessment of the two validation experts and calculations carried out based on formula calculations, so it can be concluded that the material validation test received the title "very feasible".

#### 2. Student Learning Results Using Design and Construction of Props

SMKN 2 Sinabang determines student learning outcomes, especially in the field of electricity or lighting installation. Several stages are carried out, namely explaining electrical knowledge, especially lighting installations; after giving a brief explanation, automatic lighting installation demonstration tools are explained and presented, with the aim of providing a direct picture by practicing props on the students.

Students will be tested to obtain student learning outcomes by being given several pre-test questions to determine the extent of their knowledge of the field of electricity or lighting installations. Post-test questions will be carried out after the explanation or presentation stage regarding lighting installations. Teaching aids practice with the aim of how well they understand the visual aids to prove that the visual aids are effectively applied to lighting installation subjects. Students will be tested on their

abilities by being given 10 pre-test questions first to test the extent of their abilities and knowledge regarding lighting installations. The results of students' pre-test answers can be seen in Table 1.

**Table 1**. Pre-test results of Electrical Students

| No | Name | Questions Answered | Score |
|---|---|---|---|
| 1 | Afdal Ramadan | 8 | 10 |
| 2 | M Furqan | 2 | 10 |
| 3 | Arjoni Amin | 10 | 40 |
| 4 | Rintun Milku | 10 | 30 |
| 5 | Rendi Al Amin | 4 | 30 |
| 6 | Julfan Arif | 10 | 30 |
| 7 | Sanafi Ramansyah | 9 | 20 |
| 8 | Rabbil Imam S | 10 | 90 |
| 9 | Wandianto | 10 | 40 |
| 10 | Forisman Halawa | 10 | 50 |
| 11 | Setujul Halawa | 9 | 50 |
| 12 | Fadil Zakia | 6 | 10 |
| 13 | Riski Gunawan | 2 | 0 |
| 14 | Aidil Azawi | 4 | 10 |
| 15 | Fajar Rahman | 8 | 30 |
| 16 | Heri | 5 | 50 |
| 17 | Sidi Ihsan | 3 | 20 |
| 18 | Rahmat Risal | 4 | 30 |
| 19 | M Afgan Ansar | 5 | 30 |
| 20 | Fiki Gunawan | 4 | 10 |
| 21 | Aidil Arfit | 7 | 20 |
| 22 | Julbahri | 4 | 0 |
| 23 | Andre | 4 | 20 |
| 24 | M Rizky Afgan | 10 | 40 |
| 25 | Aziz Hidayat | 5 | 10 |
| 26 | M syukran Lillah | 10 | 20 |
| 27 | Putra Anggun | 8 | 60 |
| 28 | Abin Saleh | 6 | 20 |
| 29 | Sandi Saputra | 10 | 70 |
| 30 | Nazibul Umri | 3 | 0 |
| **Total** | | **180** | **850** |
| **Percentage** | | **60%** | **28 %** |

The results obtained from the pre-test were that students could only answer 180 questions out of a maximum number of 300 questions given per student, 10 questions each with a percentage result of 60%. Questions answered correctly by students get a score with the total number of students, namely a percentage of 28%. So, there are still many students who do not understand or have the knowledge regarding the basics of lighting installation.

Post-test implementation stage, this stage is carried out when the students have finished providing an explanation of lighting installations and practicing automatic lighting installation props using photocell sensors and motion sensors. The post-test questions contain several questions related to explanations of lighting installations and automatic lighting installation demonstration tools. Each student was given a piece of paper with a total of 10 questions with an estimated time of 30 minutes, and the results of the total answers of 30 students were obtained in Table 2.

**Table 2**. Post-test results of electrical students

| No | Name | Questions Answered | Score |
|---|---|---|---|
| 1 | Afdal Ramadan | 10 | 80 |
| 2 | M Furqan | 8 | 70 |
| 3 | Arjoni Amin | 10 | 100 |
| 4 | Rintun Milku | 10 | 90 |
| 5 | Rendi Al Amin | 10 | 90 |
| 6 | Julfan Arif | 10 | 100 |
| 7 | Sanafi Ramansyah | 10 | 100 |
| 8 | Rabbil Imam S | 10 | 100 |
| 9 | Wandianto | 10 | 100 |
| 10 | Forisman Halawa | 10 | 80 |
| 11 | Setujul Halawa | 10 | 90 |
| 12 | Fadil Zakia | 7 | 50 |
| 13 | Riski Gunawan | 8 | 50 |
| 14 | Aidil Azawi | 7 | 70 |
| 15 | Fajar Rahman | 9 | 50 |
| 16 | Heri | 10 | 80 |
| 17 | Sidi Ihsan | 10 | 90 |
| 18 | Rahmat Risal | 10 | 100 |
| 19 | M Afgan Ansar | 10 | 80 |
| 20 | Fiki Gunawan | 10 | 100 |
| 21 | Aidil Arfit | 10 | 90 |
| 22 | Julbahri | 10 | 80 |
| 23 | Andre | 10 | 80 |
| 24 | M Rizky Afgan | 10 | 90 |
| 25 | Aziz Hidayat | 9 | 70 |
| 26 | M syukran Lillah | 10 | 90 |
| 27 | Putra Anggun | 8 | 70 |
| 28 | Abin Saleh | 10 | 100 |
| 29 | Sandi Saputra | 10 | 60 |
| 30 | Nazibul Umri | 10 | 90 |
| **Total** | | **286** | **2490** |
| **Percentage** | | **95.3%** | **83 %** |

Based on the results of student learning regarding lighting installations and based on the explanation of the automatic lighting installation props using photocell sensors and motion sensors, it can be concluded from the answers to the post-test questions. On average, students answered all the questions, and the smallest only answered 7 questions, very different from the pre-test results; students answered 180 questions or 60%. In contrast, in the post-test, students were able to answer 286 questions or a percentage of 95.3% of the total. There are a total of 300 questions, where one student gets 10 of the same questions. Then, the scores obtained from students can be seen in Table 2, namely, 2490 out of a total of 3000, and the percentage of scores resulting from the post-test is 83%.

So, it can be concluded that based on the post-test results, namely the value and how many questions were answered, it can be said that the teaching aids provide explanations that are easy and

understandable, so there is a big difference from the pre-test and post-test results. Therefore, the automatic lighting installation demonstration tool using photocell sensors and motion sensors in the Electrical Lighting Installation subject at SMKN 2 Sinabang is rated "very feasible".

### *F. Discussion of Research Results*

Researchers designed automatic lighting installation props using photocell sensors and motion sensors, which have gone through the media validation and material validation stages. The validation assessment is carried out with a validation expert's assessment, which becomes a reference for how feasible the automatic lighting installation demonstration tool can convey the right material, easy to understand, with the support of appropriate media (Abast et al., 2023; Imamah & Sagara Andika, 2021; Putri Lukman & Rieuwpassa, 2018; Susanto & Kusumawati, 2023).

Therefore, automatic lighting installation demonstration tools can be an effective alternative in helping students understand the concept of lighting installation better. Media experts give a percentage value of 89%; material experts get a percentage value of 100% (Malado & Habibu, 2023).

So, it can be concluded that based on the overall validation results, the automatic lighting installation props using photocell sensors and motion sensors received the category "Very Appropriate" for use in lighting installation subjects. The results of the validation assessment can be seen in graphical form in Figure 11.

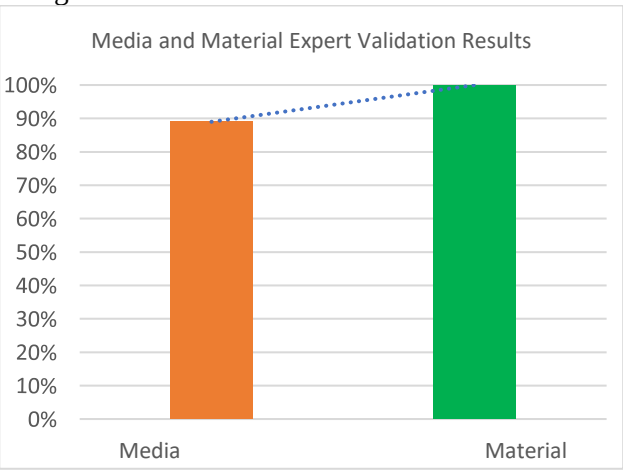


Figure 11. Graphic of validation results from media and material experts

Based on the explanation of the pre-test and post-test questions, which aim to obtain student learning outcomes in the application and explanation of the lighting installation props automatically using photocell sensors and motion sensors in lighting installation subjects, the results obtained are based on data, pre-test and the post-test obtained significantly different results, where the pre-test aimed to test how far the students' knowledge was regarding electrical installations, while the post-test was carried out after an explanation and presentation about how to design props and how lighting installation props work automatically.

The results of the pre-test students' answers obtained a percentage value of 28%, and the results of the post-test students' answers obtained a percentage value of 83%. So, it can be concluded that the role of teaching aids in explaining lighting installations automatically using photocell sensors and motion sensors in lighting installation subjects produces the title "Very Appropriate" to be applied as a learning medium, especially for students at SMKN 2 Sinabang. The results of the pre-test and post-test answers can be seen in graphical form in Figure 12.

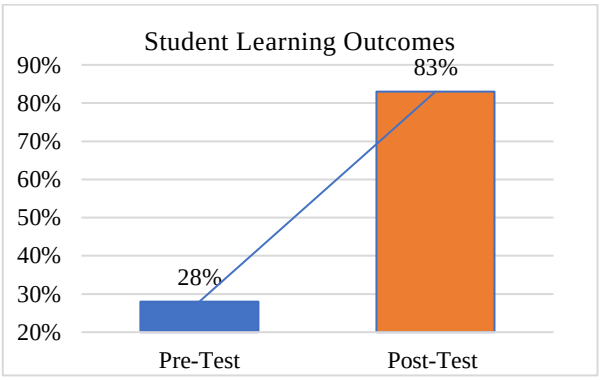


Figure 12. Student learning outcomes

## IV. CONCLUSION

Based on the results of feasibility tests on teaching aids and student learning outcomes in the application of automatic lighting installation props using photocell sensors and motion sensors in lighting installation subjects at SMKN 2 Sinabang, which have been carried out and explained in this report, can be concluded that based on the test data media validation, material validation, and questionnaire validation obtained a media validation percentage value based on the assessment of the two validators, namely 89%, for the material validation percentage value, namely 100% based on the assessment of the two validators. So, in terms of media and material, the feasibility of automatic lighting installation teaching aids using photocell sensors and motion sensors in the lighting installation subject at SMKN 2 Sinabang received the feasibility category "Very Appropriate," which means it is very suitable for use in lighting installation subjects for the electrical department.

Based on testing carried out by giving pre-test and post-test questions to 30 students, the percentage results on the pre-test questions were 28.3%, and the

percentage on post-test questions was 83%. So, it can be concluded that based on the learning results, students obtained good learning results in the application of the design of teaching aids for automatic lighting installations using photocell sensors, so it can be said that the teaching aids are very suitable for application in learning or the "Very Feasible" category.

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