

## **The Effectiveness of Jobsheet Development in Basic Electrical and Electronics Subject Class X TITL at SMK Negeri 1 Bangkinang**

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### **Abstract**

This study aims to produce a product in the form of an effective Basic Electrical and Electronics practicum for students of class X TITL at SMK Negeri 1 Bangkinang. This type of research is a research and development type, where this research uses a 4D development model with four stages, namely definition, design, development and dissemination. Data collection in this study was carried out using 4 research instruments, namely validation questionnaires, practicality, work assessment sheets (rubrics). The results of the research obtained on the validity test of the Basic Electrical and Electronics subject jobsheet from 3 validators obtained an average validity of 0.88% with a valid category. The practicality test by the teacher obtained a practicality percentage of 90% in the very practical category, and by the students of class X TITL obtained an average practicality of 88% from 36 students in the very practical category. While the limited effectiveness trial obtained an average score of students who completed 90% with 9 out of 10 students who had fulfilled learning mastery according to classical mastery requirements, namely >85% with the effective category to use. So, the Basic Electrical and Electronics practicum worksheet is declared to have been effectively used in class X TITL at SMK Negeri 1 Bangkinang.

Keyword: Jobsheet, Research and Development, 4D Model, Basic Electrical and Electronics, Effectiveness.

### **INTRODUCTION**

In the current era of globalization, the quality of education is one of the influencing factors in the world of education, including efforts to improve the quality of learning outcomes. One of the efforts to improve learning outcomes is to improve and refine learning facilities. Education is a learning experience that takes place in an environment and is lifelong which is useful when used as a reference for living life [1]. Education is the process of changing the attitudes and behavior of a person or group of people in an effort to mature humans through teaching or training efforts, processes, methods, and acts of educating. Education is a process of establishing qualified human resources. Improving the quality of education can only be achieved through improving the quality of the learning process which leads to improving the quality of educational outcomes. The realization of the government's efforts to prepare educational graduates in entering a challenging era of globalization is to apply an industry-minded curriculum [2]. Pendidikan memiliki arti penting dalam mempersiapkan generasi muda untuk menjalankan kehidupan dan memenuhi tujuan hidup secara efektif maupun efisien agar dapat memberikan kontribusi yang berkualitas bagi kemajuan bangsa. Oleh karena itu, perlu dilakukan usaha yang terus menerus agar pendidikan yang diberikan berkualitas dan bersinergi dengan kebutuhan dan juga sesuai dengan perkembangan zaman [3].

Vocational High School (SMK) is one form of business entity carried out by the government in order to improve quality education, where the Vocational High School consists of many skill programs in accordance with the demands and needs of the existing world of work. SMK Negeri 1 Bangkinang is one of the Vocational High Schools in Bangkinang City, Kampar Regency with efforts to prepare qualified graduates and become professional and expert workers in their respective fields. To prepare these quality graduates, SMK Negeri 1 Bangkinang has various skill programs, one of which is the Electrical Engineering expertise program. This skill program has two expertise competencies, namely Electrical Power Installation Engineering (TITL) and Air Conditioning Cooling Engineering (TPTU). SMK Negeri 1 Bangkinang has implemented the 2013 Curriculum learning at the X, XI and XII grades in all its majors.

Basic Electrical and Electronics subject is one of the subjects in the Electrical Power Installation Engineering skill competency which is taught in class X in one academic year or two semesters. This subject consists of fourteen basic competencies. The learning objective to be achieved is to create skilled students both in terms of understanding (cognitive) and in terms of practicum (psychomotor) regarding basic electronic circuits and components. The form of learning that is applied is theory and practice using a basic electric trainer.

Based on the observations that have been made, in the competence of Electrical Power Installation Engineering Expertise there are several problems that occur, namely: (1) practical learning activities using the Basic Electrical and Electronics Trainer, there is no Jobsheet to support the Trainer, there is only a Manual Book from the trainer. so that practical learning has not been taught properly, (2) students' understanding in reading and making circuits is still lacking, this is proven because students cannot assemble components on the trainer during practical learning activities with the manual book guide, (3) students only hear explanations teachers so that there is no reciprocal relationship between teachers and students, without realizing the discussion about the material is passed and students only know what the teacher explained at the beginning of the meeting.

Based on the problems that have been described, one solution that can be used is to develop a manual book trainer into a valid, practical and effective practicum Jobsheet as a source and learning medium for Basic Electrical and Electronics subjects at SMK Negeri 1 Bangkinang.

Practical learning activities using trainers as learning media require supporting books such as Student Worksheets (LKS) or Jobsheets to facilitate student practicum learning activities. Jobsheets as a support for learning media can help students learn and carry out practical activities independently. The jobsheet contains guidelines for practicum activities, work structure, work procedures and work results, and can not be separated from skill exercises to measure the students' ability to understand the extent to which the material has been studied.

The teaching and learning process is essentially a communication process, in which the teacher role as a messenger and students as recipients of messages. Learning on Basically it is an effort of educators in helping students carry out activities study [4]. To help students do good learning activities, it is necessary to have a learning system.

Student competencies will be formed and develop through the learning process using a student-centered, method-oriented and learning approach. This learning will provide challenges and a fun learning experience. Students are expected to use an in-depth approach and a strategic approach to learn, not just learn to remember information or study to pass. Necessary lessons developed by the teacher in order to the formation of competence is an interaction that enable students to build knowledge, attitudes, and skills through various transformations learning experience [2]. A learning can take place effectively if it meets the criteria, among others, namely: (1) a fun learning situation must be created, (2) learning that attracts students' attention is fun because it is challenging, relevant, leads to goals and is supported by methods that allow the achievement of success, (3) supported by teachers and an effective learning environment.

Learning resources are anything that can provide ease of learning in order to obtain the necessary information, knowledge, experience and skills. Learning resources are also defined as resources that are utilized for the benefit of the teaching and learning process, either directly or indirectly, in part or in whole [5]. Learning resources are sources of information from the learning process, where this learning information can be sourced from source books, communities and other learning media. Learning resources have several functions in supporting learning activities, namely to provide association opportunities for students to acquire and enrich knowledge by using various tools, media, resource persons and places. Besides that, it also has a function to improve the development of students in language through communication with them about matters relating to learning resources.

There are three principles that deserve attention in the learning process, namely: (1) process learning results in relatively permanent changes in student behavior, in the process this is the teacher's behavior as agent of change, (2) students have potential and abilities which is a natural seed to be grown and cultivated without stopping, this process learning is the optimization of self-potential so that the ideal quality can be achieved, and (3) the change or achievement of the ideal quality does not grow linearly in line with the life process [6], that is, the learning process it is a part of life itself, but it is designed specifically to achieve ideal quality. Based on these three principles, concluded that the teacher is not the only source of learning for

students so that teacher's ability to plan or create other learning resources so that more conducive learning environment. Learning Resources what is meant is learning media. Media learning used in the process learning functions as a bridge or learning transformation media towards the desired goal want to achieve.

Learning outcomes are an evaluation action that can reveal aspects of the thinking process and can reveal other psychological aspects, namely aspects of values or attitudes and aspects of skills inherent in each student. Learning outcomes include three domains, namely: (1) the cognitive domain, with regard to intellectual learning outcomes consisting of six aspects: knowledge or memory, understanding, application, analysis, synthesis, and evaluation, (2) the affective domain, with regard to attitudes consisting of from five aspects: acceptance, response or reaction, assessment, organization, and internalization, (3) domain psychomotor, with regard to learning outcomes of skills and the ability to act [7]. So learning outcomes are the abilities possessed by students after carrying out learning process activities.

Jobsheet is a book written with the aim that students can learn independently without or with teacher guidance [8]. Jobsheet or student worksheet is a student guide that is used to carry out problem solving activities. Jobsheets or student worksheets contain a set of basic activities that must be carried out by students to maximize understanding in an effort to form basic abilities according to indicators of achievement of learning outcomes that must be achieved. Student worksheets (jobsheets) are sheets of sheet containing the tasks that must be done by student. The jobsheet will contain at least the title, the basic competencies to be achieved, the time solutions, equipment/materials needed for completing tasks, brief information, work steps, tasks to be done, and reports to be done. [9].

Jobsheet structure includes: title, study instructions, basic competencies, work steps/tasks, assessment. The titles in this Jobsheet are determined on the basis of basic competencies, subject matter, or learning experiences in accordance with the curriculum. The learning instructions contain the sequence before learning begins, they must pay attention to the steps in the learning instructions. Basic competencies must be in accordance with the established syllabus. The work steps/tasks contain the work order during the practicum. And the assessment is intended to assess the results of the practicum that has been carried out to determine student learning outcomes [10].

Some of the criteria for a good jobsheet assessment include: (1) Clarity of learning objectives. Including the ease of understanding the teaching materials; (2) Clarity of content or material; (3) Clarity of general instructions; (4) the suitability of equipment and materials; (5) the suitability of preventive measures or K3; (6) Accuracy of work steps; (7) Clarity of working drawings. Including the level of attractiveness of images or text illustrations; (8) The suitability of the initial question and the final question; (9) Accuracy of bibliography instructions; (10) Appropriateness and accuracy of the evaluation format. Including the level of difficulty of the evaluation questions; and (11) Clarity or accuracy of language use.

## **METHOD**

### **Types of research**

This research was conducted at SMK Negeri 1 Bangkinang class X TITL by testing and collecting data. This type of research is Research and Development (R&D) with the 4D development method [11]. This R&D research is used to produce a certain product and test the effectiveness of the product.

### **Research subject**

The subjects in this study were students of class X TITL at SMK Negeri 1 Bangkinang for the academic year 2021/2022 with the respondents being teachers of Basic Electrical and Electronics subjects and students of class X TITL at SMK Negeri 1 Bangkinang.

### **Research procedure**

The R&D research model developed is a 4D model which consists of four stages of development, namely: 1) The definition stage, the goal is to establish and define and define various sources of information related to the product to be developed, consisting of five steps, namely front end analysis, student analysis, concept analysis, task analysis and formulation of learning objectives. 2) The design stage, including the preparation of tests, media selection, format selection and initial design. 3) The development stage (Develop), to produce the final form of the Basic Electrical and Electronics (DLE) learning worksheet after going through revisions based on input from the validator and test data for the product. 4) The dissemination

stage, after obtaining valid and practical results, the tools that have been developed can be distributed on a wider scale, for example other schools, other classes, and other teachers.

### Assessment Instruments and Data Analysis Techniques

The research instrument is a tool used to measure and collect data in research so that it is easier to process [12]. The instrument used is in the form of a questionnaire or questionnaire which includes a validation, practicality and effectiveness questionnaire.

Validation questionnaires are used to measure the validity of the products developed with the stated objectives and determine the feasibility of the resulting products, and the results of the analysis use the following formula:

$$V = \frac{\sum s}{[n(c-1)]} \quad [13]$$

Keterangan:

$s$  = r-  $I_o$

$I_o$  = the lowest value of the validity assessment (value = 1)

$c$  = the highest value of the validity (value = 5)

$r$  = number given by validator

$\sum s$  =  $S_1 + S_2 + S_3$

**Table 1. Category Validity**

No	Achievement Rate (%)	Category
1	≥ 0.6	Valid
2	< 0.6	Invalid

Practical analysis was carried out after the validity test was carried out. This practical analysis is used to analyze the observational data using the practicum jobsheet which was developed by looking at the questionnaire responses of students and subject teachers, and the results of the analysis use the following formula:

$$\text{Practical Value} = \frac{\text{jumlah skor yang diperoleh}}{\text{jumlah skor maksimum}} \times 100\% \quad [14]$$

Based on the practical results obtained, then categorized according to the level of practicality as in table 2 below:

**Tabel 2. Kategori Kepraktisan**

No	Achievement Rate (%)	Category
1	81 – 100	Very Practical
2	61 – 80	Practical
3	41 – 60	Practical enough
4	21 – 40	Less Practical
5	0 – 20	Not Practical

Jobhseet's effectiveness analysis was carried out after the validity and practicality tests were carried out. This analysis uses an instrument in the form of a questionnaire or student work assessment sheet (rubric) which is used to see student learning outcomes after using the resulting product. According to the Ministry of Education and Culture (Trianto, 2009:241), a class can be said to have completed its learning if the class contains 85% of students who complete learning. So, the worksheet can be said to be effective if the student's level of completeness is equal to or more than 85%. The formula for the percentage of students' classical completeness can be calculated by the following formula:

$$PK = \frac{JT}{JS} \times 100\% \quad [15]$$

Information :

PK = Percentage of Complete Learning

JT = Number of students who completed

JS = Total number of students

## RESULTS AND DISCUSSION

The research and development carried out aims to produce a product in the form of a practical worksheet for Basic Electrical and Electronics subjects as a learning medium that meets the effective criteria for use. This jobsheet consists of the front (cover), content and cover. The front consists of a cover, introduction, table of contents and instructions for using the worksheet. The content section consists of 5 jobsheets with different titles. The closing part is a biography of the author.



Picture 1. Cover Jobsheet

At this validation stage, it is carried out to get input on all the contents of the material contained in the developed jobsheet design. Before the Basic Electrical and Electronics practicum jobsheet is used, it must be validated first by the validator, where the validator consists of 2 lecturers majoring in Electrical Engineering, Padang State University and 1 Basic Electrical and Electronics subject teacher at SMK Negeri 1 Bangking. After the validator fills out a questionnaire to provide input on the developed jobsheet, then a recapitulation of the data obtained from the validity results is carried out. Based on the results of the recapitulation using

the formula  $V = \frac{\sum s}{[n(c-1)]}$ , the results can be seen in table 3 below:

**Table 3. Jobsheet Validity Test Results**

No	Sub Item	Validator						$\Sigma s$	V	Information
		V1	S	V2	S	V3	S			
1	A	4	3	4	3	5	4	10	0.83	Valid
	B	5	4	5	4	4	3	11	0.92	Valid
	C	4	3	5	4	5	4	11	0.92	Valid
	D	5	4	5	4	5	4	12	1.00	Valid
	E	5	4	4	3	4	3	10	0.83	Valid
2	A	4	3	4	3	5	4	10	0.83	Valid
	B	4	3	5	4	5	4	11	0.92	Valid

	C	5	4	4	3	4	3	10	0.83	Valid
	D	4	3	5	4	4	3	10	0.83	Valid
	E	4	3	4	3	5	4	10	0.83	Valid
	A	5	4	4	3	5	4	11	0.92	Valid
	B	5	4	5	4	4	3	11	0.92	Valid
3	C	4	3	5	4	5	4	11	0.92	Valid
	D	4	3	5	4	5	4	11	0.92	Valid
	E	4	3	4	3	4	3	9	0.75	Valid
<b>Average</b>									0.88	Valid

Based on the analysis of the data obtained from filling out the questionnaire in the form of input from the validator on the developed practicum jobsheet, it can be concluded that in general the jobsheet is categorized as valid with an average of 0.88.

The practicality test stage of the jobsheet, which at this stage was carried out by distributing practicality questionnaires to respondents, namely students and teachers of Basic Electrical and Electronics subjects at SMK Negeri 1 Bangkinang and 36 students of class X TITL. The practicality results obtained from subject teachers were 90% in the Very Practical category, while the practicality results obtained from students with an average of 88% were categorized as Very Practical. Based on this, the jobsheet has met the practical requirements of learning media.

At this stage of testing the effectiveness of the worksheet, it is carried out to determine the effectiveness of the developed worksheet on the results of student practice. This effectiveness test phase involves students of class X TITL at SMK Negeri 1 Bangkinang in the subjects of Basic Electricity and Electronics. At this stage a limited effectiveness test was carried out, both from a limited time and a limited number of students due to the situation of schools implementing online teaching and learning processes caused by the Covid19 pandemic by only involving 10 students of class X TITL with 2 meetings.

The assessment of student practice at this stage uses a performance assessment with criteria (rubric). The standard of mastery learning obtained by each individual student is 75. The results of student practice mastery can be seen in table 4 below:

**Table 3. Student Completeness Results**

No	Name/ Initial	Meeting		Total Score	%	Category
		1	2			
1	AFY	75	80	155	77,5	Finished
2	ARU	79	84	163	81,5	Finished
3	BF	75	80	155	77,5	Finished
4	DAS	75	79	154	77	Finished
5	IM	73	75	148	74	Not Finished
6	LCW	79	82	161	80,5	Finished
7	MAA	77	82	159	79,5	Finished
8	NJH	76	79	155	77,5	Finished
9	TA	78	81	159	79,5	Finished
10	ZA	80	84	164	82	Finished

$$PK = \frac{JT}{JS} \times 100\%$$

$$PK = \frac{9}{10} \times 100\%$$

$$PK = 90\%$$

Based on table 3 above, the results of the data analysis obtained in the limited effectiveness trial conducted based on the assessment of the student work rubric during the practicum can be seen that as many as 9 out of 10 students completed and 1 student did not complete. Based on the results of the individual completeness assessment, 90% of the 10 students have met the criteria for learning mastery. The results of mastery learning can show that students' mastery learning has met the requirements for completeness of the Ministry of Education and Culture's assessment of >85%. So it can be concluded that the developed Basic Electrical and Electronics practicum worksheet can be declared effective.

## CONCLUSION

Based on the results of the research that has been done, the results of the data analysis can be concluded as follows:

1. The stage of testing the validity of the practicum worksheets in the Basic Electrical and Electronics subjects from 3 validators, it can be concluded that the developed worksheets are categorized as valid with the average validity of all validators being 0.88%.
2. The practicality test phase of the practicum worksheets in the Basic Electrical and Electronics subjects by the teacher obtained a practicality percentage of 90% in the very practical category, and by class X TITL students obtained an average practicality of 88% from 36 students in the very practical category.
3. The effectiveness test phase is limited to the practical learning worksheet for Basic Electrical and Electronics subjects obtained from students' classical mastery after using the practical worksheet 90% of students are declared to have fulfilled learning mastery, so that the practicum worksheet can be said to be effective and can be used in the practical learning process.

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