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Competency Evaluation of Electrical Installation Field Practice of Vocational High School Students in Manado

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Abstract--- *Evaluation is an integral part of education process. Field practice competency of vocational high school students needs to be evaluated in order to know their learning development and outcome. Result of the evaluation can be a reference to the improvement of learning activity implementation including the used methods. This research aimed to find out students' learning development and outcome regarding to the Electrical Installation subject of VHS in Manado, North Sulawesi Province, Indonesia. Research method was survey method. Research data was qualitatively analyzed. Research finding showed that students' competency in Electrical Installation subject was categorized high..*

Keywords--- *Competency Evaluation of Electrical Installation Field Practice, Vocational High School.*

I. INTRODUCTION

Development of a country depends on its human resources. Science and skill owned by young generation are needed in order for them to be able to start and work independently in industries. Many countries attempted to develop vocational education institution to educate young generation to obtain science and competency in many fields needed such as business field and industrial field. The goal of vocational education institution for students is to have skill, behavior, and work habits that are all needed in business and industry [1].

The education that has already been implemented needs evaluation. Evaluation is an important part of the implementation of education, it includes evaluating students' learning outcome after they involved themselves in learning activity for certain amount of time or semester. In education, evaluation aims to know the instructional development, advancement and academic competency achieved by students after experiencing learning activity in certain duration, such as semester. The result of evaluation will then become reference for decision making or decision that relates to learning process and teaching methods [2]. Professional teacher is expected to have ability to evaluate students' learning outcome, for instance, evaluation students' practice activity in electrical installation subject.

Electrical engineering is a department in VHS. Engineering major aimed to bring about graduates who would be able to work [3], it was the reason why they were expected to own skills which were needed in business field and industrial field. One of skills that needs to be mastered is electrical installation. Electrical installation is one of the required subjects that needed to be mastered by those whose major was electrical engineering in vocational high school. This subject was one of competencies that needed to be owned by student so that they would be able to install the electrical installation on a building (house, office, service business building, etc.). Student who had major

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competency was able to stand on his own feet and able to cooperate. Electrical engineering graduates were expected to start a business up on installation and tools reparation. The possessed skill was obtained through learning process so that the competency which is in line with criteria as a prepared professional to industries or as entrepreneurship [4].

Competency was the main goal of VHS students so that they would be successful in industrial field or as entrepreneurship [5]. The aspects of competency were knowledge, skill and ability to be turned into cognitive, affective and psychomotor behavior [6].

In Manado, North Sulawesi Province, information about students' competency of electrical installation were not found yet. The writing of this paper aimed to depict VHS students' competency regarding to the ability to install electrical installation. This research was considered important to be conducted in order to know students' skill development and competency in electrical engineering subject in Manado, North Sulawesi Province. This research focused on the competency to install lighting installation. Research finding was used as content of information to improve learning process and teaching method in electrical installation subject.

II. LITERATURE REVIEW

2.1 Definition of Electrical Installation

Electricity energy has become daily necessity of human living in this technology development era. Electricity energy is needed for lighting and electrical tools to assist human in doing activity in their houses, offices or industry [7]. The assembling of electrical installation was assembled for energy distribution over particular building that connect to one another. This energy distribution used electrical installation system which is applied on building and tools that employ electricity energy. Electrical installation is a distribution system to be utilized by consumer, where the installation must on the exact standard of general electrical installation requirements [7] [8].

In general, construction of building is followed by electrical installation, yet, there were only small numbers of people who really master knowledge on electricity [9]. Generally, there are two types of electrical installations, these types are: electrical installation for lighting; used for lighting, and power installation; used for power needs, such as electrical motorcycle, temperature regulator, distribution transformer and others [8] [10].

2.2 Electrical Installation Skill

As the matter of fact, electrical engineering graduates who are lack of entrepreneurship-based skill will be left behind and become unemployment [11]. Curriculum is a determining factor to bring about prepared graduates. Curriculum of education ought to carry important meaning so that the graduates have the opportunity to work among society [12]. Training the students about technical skill is such a challenge in integrating field practice, theoretical comprehension, sound mind, ability to observe and encouragement in working [13]. Experience obtained from school could be applied in workplace [14].

In the curriculum of Electrical Engineering Study Program in Indonesia, students were given knowledge and training on electrical installation work skill. This skill was a basic possession in order to be able to live

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independently and to start business up in electrical installation field. VHS certificate owned was not a guarantee that they were capable to work in industry but how they could apply the skill to be accepted by the society.

Electrical installation is a subject ins VHS to form students' skill to install electrical installation from small-sized building to multistory building. Problems such untidy sequence of electrical installation; untidy wired, unsafely installed and uncomfortable were often found. This might cause short electric current and possible to produce flame.

The phases of electrical installation learning process, namely:

Planning. Planning is a start line, which is a learning activity to train students drawing the building sketch where electrical installation will be installed [8]. In undertaking this activity, students must place the light points and make the wiring direction.

Matter determination. In this phase, students are taught to determined matters that are going to be used, it covers lamp, electric socket, cable, multimeter, pipe, isolator and other supporting items.

Tools selection. Students need to know the tools used in practice activity, such as types of clamper, screwdriver, multimeter, hammer, saw, knife and other tools.

Practice implementation. The last phase is the executing the activity. In this activity, teacher gives instruction to student to install the installation components according to the sketch they drew.

2.3 Competency Evaluation of Electrical Installation Practice Skill

Individual competency is defined as skill, ability, activity, action, performance that can be observed moreover can be measured. Competency is an activity that is able to be undertaken or achieved according to certain standard needed in society, business field and industry. Students' competency and skill need to be evaluated so that it can be predicted that an individual is capable to undertake task, such as ability that is needed by industry or to do business; evaluation is a part of curriculum which is in line with teaching and learning strategy in a whole for evaluation is a part of feedback and elaboration cycle. Evaluation will give chance to students in terms of converting to teachers the experience and impression over the applied teaching and pedagogical approach [15].

There are three aspects in doing the evaluation of education, namely: (i) knowledge evaluation by using test technique. Knowledge assessment relates to cognitive aspect; (ii) attitude evaluation by using non-test technique; and (iii) skill evaluation by using performance test [16].

III. METHODOLOGY

3.1 Research Question

The research question was "How was the electrical engineering students' development and advancement of electrical installation competency in Vocational High School over Manado City, North Sulawesi Province?".

3.2 Objective of the Study

This research aimed to evaluate the electrical engineering students' development and advancement of electrical installation competency in Vocational High School over Manado City, North Sulawesi Province.

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3.3 Research Design

Survey research was employed in this research to collect the research data in Vocational High School. Data was collected after students did the electrical installation activity directed by teacher's instruction in experiment room while the assessment was undertaken. This planned assessment was in form of observation instrument, or on the other word, observing students' behavior in undertaking electrical installation practice and giving checks on the instrument.

3.4 Population and Sample

The population of this research was Electrical Engineering Study Program of Vocational High School in Manado, North Sulawesi Province. There were 68 students of 11th grade chosen randomly as the sample.

3.5 Assessment Instrument

To do the assessment, observation instrument was used to assess students' behavior in practice activity. The indicator of assessment instrument of the electrical installation practice competency is presented in the Table 1.

Table 1: Assessed Aspect and Assessment Indicators

Assessed Aspect	**Indicator**	**Item**
Preparation	Planning,	1, 2, 3
Field practice application	Pipe Installation, cable wiring and connecting, cable station placement, installation of electrical components.	4, 5, 6, 7
Character	Behavior, interest, self-concept, academic value and moral.	8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Outcome	Tidiness, time management, and used workable installation sequence.	20, 21, 22

Assessment instrument was validated by three validators i.e. evaluation and measurement expert in electrical engineering study field, linguist, and electrical engineering teacher. The scale of assessment validation was Likert scale where "4" for very good; "3" for good; "2" for good; "1" for less good and "0" for not good. Criteria of validity assessment may be seen in Table 2.

Table 2: Criteria of Validity Instrument

Score	Category
≥ 3.5	Very valid
3.0 - 3.4	Valid
2.0 - 2.9	Less valid
≤ 1.9	Not valid

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Based on the result of instrument validation given by validators, the average score of 3.16 was considered valid. Competency assessment of electrical installation field practice used scale on the range 1 – 10 with assessment category as seen in Table 3.

Table 3: Evaluation Criteria of Electrical Installation Practice Competency

Score	Category
≥ 90	Very good
80 - 89	Good
70 - 79	Good enough
60 - 69	Less good
≤ 59	Not good

Evaluation students' skill by using scale of 1-4 is very good got "4", good "3", enough "2" less good "1" bad "0". Evaluation criteria on table 2.

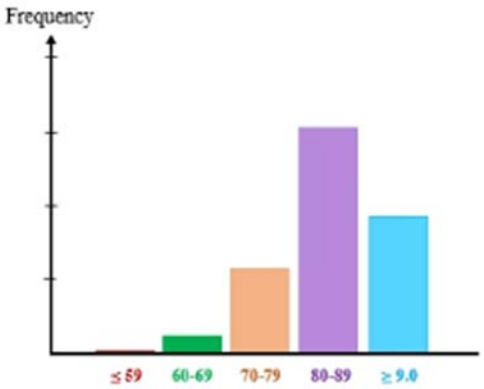
IV. Results And Findings

Based on research result from data of practical skills of electrical installation showed on table 3.

Table 3: Data of Research Result

Evaluation Score	**Frequency**	**Total Score**
≥ 9.0	19	181
8.0 – 8.9	32	256
7.0 – 7.9	13	91
6.0 - 69	3	18
≤ 5.9	1	5
Total frequency	68	
Total		551
Mean		8.1

Data of research result related to practical skills of electrical installation by the students showed in table 3 description of picture number 1.



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Data of research result presented in table 3 showed student who got score in practical skills of electrical installation categorized very good are 19 students, 42 students categorized good, 13 students categorized enough, 3 students less good and 1 student had a low score. In total, practical skills of electrical installation of Vocational High School students of electrical major in Manado North Sulawesi Province is good or high categorized.

Students of electrical study program should have practical skills of electrical installation as a main subject to be mastering. Student with low competency of practical skills electrical installation will take a risk in building. It means, a building will have a risk of fire burning.

According to observation when the students doing electrical installation who had a good and low score. They are (i) unplan (ii) cable and low components of electrical dan (iii) low character if work discipline.

Low categorized and low students' skill of practical skills of electrical installation related to 3 education objective which integrated each other as follows:

(1) Unplan, when students should able to understand aspects to be planed, in ways component of electrical installation based on shape and wide of a building. These aspects included in cognitive students from level 1 till 4. They are knowledge, understanding, application and analysis. [2] [6] [17] [18]

(2) Cable connecting and component installation as students' skill. This is included as psychomotor aspect related to individual skill of part of body as muscle movement [19] [20] [21].

(3) Characteristic of practical job include affective related to emotion. [22] [23] with indicators of character, interest, convince, value and moral academic [24].

V. CONCLUSION

According to research result it is found skill competency internship students of electrical study program in Vocational High School of Manado North Sulawesi province, Indonesia categorized good and high. Evaluation result towards the subject of research in 68 students as follows: (i) There are 19 students who have practical skill of internship categorized very good or very high, (ii) 32 students categorized good or high, 13 students categorized good, (iv) 3 students categorized good and (iv) 1 student categorized very low skill.

This research result will be a guideline for a teacher of Vocational High School in Manado to increase learning and training activities related to electrical installation with minimum good or high score according to industrial specification. To enrich the goal, it is needed to implement development research related to teaching method and electrical installation training.

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