International Journal of Engineering & Technology, 7 (3.25) (2018) 395-398

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Designing Affective Domain Evaluation Instrument for Basics Electrical Subject in Vocational High School

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Abstract

In general, in the learning process, teachers only perform the evaluation of the cognitive and psychomotor domains. So often affective areas less attention. Affective domains include feelings and emotions as well as the typical behavior of a person that impacts the learning process, because a person performing a learning activity is affected by a typical behavior. The objective of the research is to design the instrument of evaluation of the affective domain in the learning of Electrical Basics in Vocational High School (SMK). This instrument is required in order to know the students' affective behavior. Benefits of the research is to produce an instrument that can measure affective behavior as a reference for teachers to guide and direct the behavior of students in Basics Electrical learning activities so that students are directed to follow the learning process. The process of guidance and guidance of this behavior can continue until they plunge in the business and industry and socialize with the community. The research location is in North Sulawesi Province. The method used in this research is research and development.

Keywords: *Affective domain instrument; Basic Electrical; Indonesia; Manado; Vocational High School*

1. Introduction

Affective Domain is very important in learning activities. Generally, teachers and parents only focus on cognitive and psychomotor learning so that affective learning is neglected. Since students enter primary school, parents and teachers expect the child to master science, especially certain subjects such as mathematics, physics, biology, chemistry, etc. Mastering these subjects is often used as a measure that students are considered to have the ability to perform. Lack of attention to affective domains leads to students' social behavior in uncontrolled learning.

Subject Basics electrical is one of the subjects on electrical engineering courses in vocational schools. This subject includes relatively complex science lessons for studying the natural phenomena of physical quantities of charge, voltage, resistance, electrical current, etc. Because of the complexity of learning Basics electrical, students need an affective field in order to enable them to learn independently. Affective domain determines the success of one's learning, therefore all educators must be able to design a learning program with respect to the affective domain [1]. The use of affective instruments by teachers in the learning process, to assess students' behavior then shape their character through the Basics electrical learning process.

Bloom's Taxonomy or Taxonomy of Education was first proposed by Benjamin Semuel Bloom. Taxonomy of education consists of three domains, namely Cognitive Domain, Affective Domain and Psychomotor Domain. These three domains are needed in the learning process [2] [3] [4]. Cognitive Domain, which contains behaviors that emphasize the intellectual aspects, such as knowledge, understanding, and thinking skills; Affective Domain contains behaviors that emphasize aspects of feelings and emotions, such as attitudes, interests, self-concept, values, and morals; and Psychomotor Domain contains behaviors that emphasize aspects of motor skills such as handwriting, typing, swimming, and machine operation.

2. Literature Review

In the process of learning, in general, teachers only pay attention to aspects of thinking or cognitive aspects of students in theoretical and psychomotor learning activities or skills on practical activities. While the affective domain of behaviors concerning feelings and emotions in learning activities [2] [3] [4] [5] [6] [7]. Assessment of affective domains to assess behaviors in the implementation of theoretical learning that includes knowledge (cognitive domain) and practice (psychomotor domain) [5]. Smith and Ragan say there is actually a close alignment between Bloom's taxonomy for cognitive domain and Krathwohl's taxonomy for affective domain [8].

According to Krathwohl et al. Affective domain is very important in the learning process because it involves behaviors that emphasize the aspects of feelings and emotions. If this is less attention then less than the maximum learning process. This is because in the learning activities, the behavior of the students just listening to teacher explanation without taking the lessons seriously [3].

Affective domain needs to be developed in the learning activities so that students can follow the presentation of the material seriously. This is supported by several studies that have been done and found that students encouraged by the development of affective domain tends to obtain higher learning levels [9] [10] [11] [12].

In the simplest form, affective learning characterizes the emotional areas of learning reflected in beliefs, values, interests and behaviors. [3] Assessment of affective domains concerns individual behavior in theoretical and practical learning activities [6]. Krathwohl et al said affective domain have five levels: receiving or attending, responding, valuing, organization, and characterization by a value or value complex [3].
According to Alkin's evaluation, it is "The therm evaluation references to the activity of systematically collecting, analyzing and reporting information that can be used to change attitude or to improve the operation of a project or program. The word systematic stipulates that the evaluation must be planned "[13]. Tyler says evaluation is the process of determining the extent to which changes in actual behavior occur [14].
To perform the measurement of the affective aspect of them using the observation instrument. This instrument concerns the observation of student behavior directly in the learning activities [15] [16] [17] [18] [19].

3. Method

3.1. Time and Place

This research was conducted starting from January 2017 until March 2017. Place of research in SMK technology in North Sulawesi Province.

3.2. Research Design

The research design used the Borg & Gall model [20] with the following stages: (1) Research and information collecting, (2) Planning. (3) Preliminary field testing, (5) Main product revision, (6) Main field testing, (7) Operational product revision, (8) Operational field testing, (9) Final product revision, and (10) Dissemination and implementation.

3.3. Data Collection Technique

The instrument used for the collection of research data is in the form of a questionnaire consisting of statements using the Likert scale. Practitioners or teachers as users to measure students' behavior in Basics electrical learning.

3.4. Technical Testing and Data Analysis

Techniques to test the product of the design consist of validity test, practical test, and effectiveness test [21]. Practical test consist of feasibility test and practicality is a test to know feasibility and practicality to be practiced in Basics Electrical learning activity. To test the product, the experiments include: design, test subjects, data types, data collection instruments, and data analysis techniques [22].

Validity test
Instruments are developed based on the theories of experts and researchers on the affective domain [3] [6] [8] [23] [24] [25]. Grid and then create statement points. For content validity testing using Aiken's V (validity) formula [26]. To calculate the content validity coefficient is based on the assessment of the expert panel as much as n people against an item (item) in terms of the extent to which the item represents the measured construct [27]. Aiken proposed Aiken's V [26] formula as follows:

$$V = \Sigma S / [n (C-1)] \quad (1)$$

Where: V = coefficient of validity; S = r - lo; Lo = lowest validity score (given value 1); C = highest validity score score (5); and r = score given by the appraiser.
Practical Test
The practical test consists of a feasibility test and a practicality test.
Feasibility test
The feasibility test is performed after the design result has fulfilled the validity requirements. This test is a test of a product that is told to the teachers of Basics electrical subject in vocational schools in North Sulawesi Province. The formulas used for data testing are:

$$FS = VO / Vm \times 100\% \quad (2)$$

Where: FS = final score (final score); VO = value obtained; and Vm = maximum value (maximum value).
The categorization of the content validity assessment was modified from [27] as shown in table 1 below.

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$$V = \Sigma S / [n (C-1)] \quad (3)$$

Where: V = coefficient of validity; S = r - lo; Lo = lowest validity score (given value 1); C = highest validity score score (5); and r = score given by the appraiser.

Practical Test
The practical test consists of a feasibility test and a practicality test.

Feasibility test
The feasibility test is performed after the design result has fulfilled the validity requirements. This test is a test of a product that is told to the teachers of DDL subjects in vocational schools in North Sulawesi province. The formulas used for data testing are:
FS = V_O / Vm x 100%
Where: FS = final score (final value); VO = value obtained; and Vm = maximum value (maximum value).
The categorization of the content validity assessment was modified from [27] as shown in table 1 below.

Table 1. Product feasibility categories

No	Scores	Categories
1	80% < x ≤ 100%	Very Feasible
2	60% < x ≤ 79%	Feasible
3	40% < x ≤ 59%	Sufficient
4	20% < x ≤ 39%	Less Feasible
5	x ≤ 19%	Not Feasible

Test of practicality
This practicality test is performed after it is stated that the instrument has met the eligibility requirements. An instrument to be used to know the practicality to use The practicality level of the use of an instrument should be known for the instrument is practical to use. According to Nieveen, measure the practicality of an instrument is to know whether the teacher considers that the instrument can be used by teachers and students [28].
For a modified practicality category assessment from Riduwan [27] as shown in table 2 below.

Table 2. Product Practically Categories

No.	Score	Category
1	80% < x ≤ 100%	Very Practical
2	60% < x ≤ 79%	Practical
3	40% < x ≤ 59%	Practical Enough
4	20% < x ≤ 39%	Less Practical
5	x ≤ 19%	Not Practical

Test effectiveness
Conducted effectiveness testing is to determine whether the design of the instrument of evaluation affective student field effective to

use. Learning outcomes include cognitive, affective, and psychomotor domains [2] [3]. The formula used for effectiveness testing is the same as applied to feasibility and practicality testing.
For the assessment of effectiveness categories are shown in table 3 below.

Table 3. Category of Product Effectiveness

No.	Score	Category
1	80% < x ≤ 100%	Very Effective
2	60% < x ≤ 79%	Effective
3	40% < x ≤ 59%	Effective Enough
4	20% < x ≤ 39%	Less Effective
5	x ≤ 19%	Not Effective

4. Results and Discussion

Based on field studies at several vocational schools in North Sulawesi, it shows that teachers who teach DDL lessons have no instruments to evaluate students' affective spheres. From the results of field observations obtained a description of the design model of affective domain instrument required.After the planning of the research activity then in the next stage conducted a study of litaratur from various sources of reference so that the indicators obtained affective domain consists of attitudes, interests, self-concept, values, and moral. Aspects assessed by student behavior are presented in Table 4.

Tabel 4. Grid of Affective Domain Instruments

No.	Indicator	Aspects Assesed	Number of Items
1.	Attitude	Positive or Negative Response in following Basics electrical learning activities	1, 4, 5, 6, 7, 29
2.	Interest	Happy, like, want and interested in Basics electrical lessons	10, 11, 12, 18, 19, 20, 21
3.	Self-concept	Confident and responsible in Basics electrical learning activities	8, 9, 13, 14, 15, 16, 23, 26
4.	Values	Have academic values in Basics electrical learning activities	17, 24, 25, 27, 30, 31
5.	Moral	Ethics, courteous and honest	2, 3, 22, 32, 28, 33, 34
	Total		34

Table 5 shows the attitude aspect = 5 items, interest = 6 items, self concept = 8 items, value = 6 items, and moral = 7 items so that the number of instrument is 36 items.
Content validity to define contents that reflect the full range of attributes studied and usually performed by seven or more experts [29]. To determine the validity of the test results it is necessary to compare the validity benchmark values calculated by the formula:
V_np = (n (C-1)) / (n (pg-1))
Where: Vnp = benchmark value of validity; Cmax = C maximum; pg = good enough scale value; and n = number of appraisers.
Because Cmax = 5, pg = 3, and n = 7 then the value of validity to determine the validity of the instrument item is:
V_pg = (7 x (5-1)) / (7 (3-1)) = 0.5
Thus, the valid grain criteria is Vnp ≥ Vpg (0.5). Based on the criteria, then the validity test results there are 2 items are invalid, ie items 7 and 18 (see table 5).
After analysis of research data, obtained value of validity coefficient (Vnp) each item is presented in table 5.

Table 5. Coefficient of Validity (Vnp)

No.	Vnp	Categories	No.	Vnp	Categories
1	0.71	Valid	19	0.61	Valid
2	0.64	Valid	20	0.64	Valid
3	0.57	Valid	21	0.68	Valid
4	0.85	Valid	22	0.57	Valid
5	0.61	Valid	23	0.54	Valid
6	0.54	Valid	24	0.61	Valid
7	0.43	No valid	25	0.93	Valid
8	0.64	Valid	26	0.71	Valid
9	0.68	Valid	27	0.64	Valid
10	0.68	Valid	28	0.71	Valid
11	0.71	Valid	29	0.82	Valid
12	0.54	Valid	30	0.54	Valid
13	0.76	Valid	31	0.61	Valid
14	0.61	Valid	32	0.68	Valid
15	0.57	Valid	33	0.57	Valid
16	0.89	Valid	34	0.76	Valid
17	0.64	Valid	-	-	-
18	0.39	No valid	-	-	-

Feasibility instruments are consulted with a panel of experts comprised of educational measurement and evaluation experts, and linguists. The result of data analysis, obtained graph in figure 1.

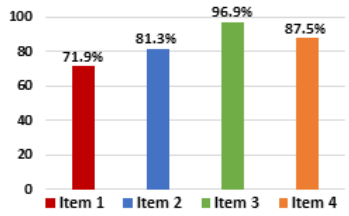

Figure 1. Graph of Eligibility Data

Based on the results of data analysis, the feasibility value of 84.4% which is included in the range of 80% < x ≤ 100% is categorized as "very feasible".
The graph of the results of the analysis is shown in Figure 2. The results of the analysis to determine the practicality of the product obtained value of 71.9%. The value is in the range of 60% < x ≤ 79%. This shows that the design of the instrument product is categorized as practical.

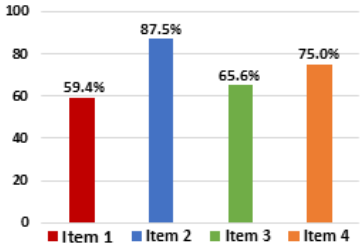

Figure 2. Graph of Practical Data

The subjects being tested for effectiveness were carried out on the gifted teacher as van den Akker said that effectiveness refers to the level of experience and the result of consistent intervention with the intended purpose [30].
The graph in figure 3 is the result of research data obtained value of 83.1%. This value is within the range of 80% < x ≤ 100% which is categorized as "effective".

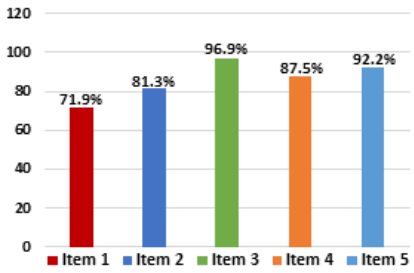

Figure 3. Graph of Product Effectiveness Data

5. Conclusion

Based on the results of the research it can be concluded:
SMKs that have electrical engineering studies programs in North Sulawesi province do not yet have an affective domain evaluation instrument in Basics electrical instruction;
The results of the design of the instruments of evaluation of the affective domain in the learning of Electricity Basics consisted of indicators of attitude, interests, self-concept, values, and morals with 32 points. From the indicators are obtained each item that is 5 (attitude), 6 (interest), 8 (self concept), 6 (value), and 6 (moral).
The product of this instrument is feasible, practical, and effective for use in evaluating students' affective domains in Basics electrical Subject.

Acknowledgement

Special thanks to Recky Sendouw for assisting in this work.

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