

Conference Paper

The Analysis of Cognitive and Psychomotor Domains in Basic Competence in the Subject of Land Measurement Engineering in Curriculum Vocational Schools - Area of Expertise Construction and Property

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Abstract

This study considers the cognitive and psychomotor domains on basic competency, specifically those related to land measurement techniques taught in vocational schools. Qualitative research methods are combined with the content analysis approach. The results showed that there were 20 basic competencies which students had to learn for land measurement. As a cognitive domain, there are 10 competencies with details of 7 basic competencies referring to the C3 level (applying), 1 basic competency at the C4 level (analyzing), and 2 basic competencies at the C5 level (evaluating). In the psychomotor domain, there are 7 basic competencies at level P2 (manipulation), 2 basic competencies at P3 (precision) and 1 basic competency at level P4 (articulation). It can be concluded that there is a balance in the ability of the cognitive and psychomotor domains on the basic competencies of subjects in land measurement techniques in Curriculum vocational school area of expertise Construction and Property.

Keywords: (Competence, Cognitive and Psychomotor)

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1. Introduction

Based on the instruction of President No. 9 of 2016 concerning the revitalization of Vocational High Schools in the framework of improving the quality and competitiveness of Human Resources (HR) in Indonesia, needs to be developed and aligned curriculum in vocational schools with competencies according to the needs of graduate users (link and match). In line with efforts to increase the competency of vocational high school graduates in Indonesia, Bukit [1] stated that from several evaluations that have been carried out on vocational education and training, it can be said that vocational education and training both in content and process still lacks the competency area. That is, vocational education and training are difficult to capture the essence of a job or they cannot integrate the learning process properly with the demand for work.

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Burke the opinion that [2] Competency about statements describes outcomes expected from the performance of professionally related functions, or those pieces of knowledge, skills, and attitudes thought to be essential to the performance of those functions. From this definition, it is known that competency is a picture of the performance or the results of the ability of knowledge, skills and attitudes obtained professionally for a particular job. Mulyasa [3] expressed competence is a combination of knowledge, skills, and values and attitudes that are reflected in the habits of thinking & acting.

In determining the labour competency benchmarks, the Government issues work competency standards set out in the Indonesian National Work Competency Standard No. 49 of 2015 as an expression of quality joins three aspects of competence consisting: aspects of knowledge, aspects of abilities/skills and aspects of a work attitude [4]. Bukit [1] declared that competence can be defined as a description of key skills, attitudes of knowledge needed to achieve effective performance in carrying out work.

at competence is contained the main function of group skills in a job. Basic competence in the study at schools is used implementation from as a curriculum to achieve learning objectives, And this about the cognitive, affective and psychomotor domains. Cognitive aspects related to the ability to think including the ability to understand, memorize, apply, analyze, synthesize and evaluate abilities. According Kratwholl [5] cognitive ability is the ability to think hierarchically, the achievement of more complex abilities consisting of levels of remembering, understanding, applying, analyzing, evaluating and creating and affective domains are those relating to attitudes and values. The affective domain includes behavioural traits such as feelings, interests, attitudes, emotions, and values. Explained by Muslich

[6] The affective domain becomes even more detailed into five levels, namely: (1) receiving (2) responding (3) valuing (4) organization (5) characterization by value or value complex. Psychomotor domains are those related to skills or ability to act after a person has received certain learning experiences. Psychomotor domains are those related to physical activities, such as running, jumping, painting, dancing, hitting, and so on [6]. The learning outcomes of the psychomotor domain were presented by Basuki dan Hariyanto [7] characterized by physical activity and performance skills by students and does not require the use of paper and pens. R.H Dave in Basuki [7] dividing the stages of the results of learning psychomotor domains into five stages, namely: imitation, manipulation, precision, articulation, and naturalization.

This study analyzes the ability of cognitive and psychomotor domains on the basic competencies of subjects in land measurement techniques as an implication of fulfilling

the competencies of land measurement jobs obtained by graduates. Cognitive is a process of knowledge that is based more on its development from student's perception, introspection, or memory. And psychomotor is based on how students work in doing the learning given.

2. Methods

The research method used in this study was a qualitative method with content analysis design. This research was conducted with a content analysis method for basic competency documents to understand the content of cognitive and psychomotor competencies as the content of basic competencies in land measurement techniques taught in schools. According to Eriyanto [8] Content analysis was analytical research that was intended to describe in detail a message or a particular text. In this study, research subjects were carried out on curriculum documents in Vocational Schools which contained basic competencies as a reference for learning objectives to be achieved as well as Learning Implementation Plan documents. The instrument of this study was a checklist containing basic competencies compiled based on the contents of cognitive domains and psychomotor domains. The data analysis technique used of this study was the content analysis scheme according to Krippendorff [9] namely starting from determining the data, determining the sample, observing, reducing data and drawing conclusions. In determining the validity of the research data obtained, face validity and content validity were used. To prove validity, semantic validity was used [9] that was validation by looking at the level of material content that shows analytic categories in accordance with the meanings of competence as the context of the research conducted.

3. Results

The following are the results of the analysis of cognitive and psychomotor levels based on essential competencies in subjects in soil measurement techniques.

From the researched that has been done, it is obtained that in the basic competency the land measurement technique contains 20 competencies which are divided into 10 cognitive domain competencies and 10 psychomotor domain competencies.

The description in the table above shows that the cognitive domain of basic competence consists of 7 (seven) basic competencies referring to the C3 level (applying), 1 (one) basic competency at the C4 level (analyzing), 2 (two) basic competencies at the

TABLE 1: Cognitive and Psikomotorik levels of basic competence in subjects in land measurement techniques.

Kode	Element Kompetensi	Domain Kompetensi Kognitif	Psikomotorik
3.1	Applying the principles of land measurement techniques.	C3 Aply	
4.1	Carry out measurements by the principles of land measurement		P2 Manipulation
3.2	Implement occupational safety and health procedures and the environment	C3 Aply	
4.2	Implementing occupational safety and health and the environment K3LH		P2 Manipulation
3.3	Implement operating procedures for types of survey and mapping equipment.	C3 Aply	
4.3	Operate survey and mapping equipment.		P3 Presisi
3.4	Implement a simple survey and mapping work procedures.	C3 Aply	
4.4	Implement a simple survey and mapping work procedures.		P2 manipulation
3.5	Applying the technique of operating a flat snail (leveling) and a space snail (theodolite).	C3 Aply	
4.5	Carry out measurements with a flat snake (leveling) and a space sniffer (theodolite).		P2 manipulation
3.6	Applying maintenance techniques and optical type checking.	C3 Aply	
4.6	Performing maintenance and checking of optical type devices.		P2 manipulation
3.7	Implement the process of checking the correctness of measurement data.	C5 Evaluated	
4.7	Check the accuracy of measurement data.		P2 manipulation
3.8	Applying measurement and staking out techniques.	C3 Aply	
4.8	Measuring and staking out according to construction work drawings.		P2 manipulation
3.9	Analyzing measurement data.	C4 Menganalisis	
4.9	Make a report on the measurement results.		P4 Artikulasi
3.10	Evaluate measurement results in the form of working drawings for construction work	C5 Evaluated	
4.10	Make corrections to the results of measurements in the form of working drawings for construction work		P3 Precision

C5 level (evaluating) as a cognitive domain. In the psychomotor domain, there are 7 (seven) basic competencies at level P2 (manipulation), 2 (two) basic competencies at P3 (precision) and 1 (one) basic competency at level P4 (articulation).

4. Discussion

Based on the description above, it can be seen that the basic competency of subjects in land measurement techniques in vocational school is based on balanced cognitive and psychomotor level competencies. In Law of Republik Indonesia, number 20 of 2003 concerning the national education system aims to develop the potential of students to become people who believe, and devote to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens democratic and responsible which are described as learning outcomes include three domains, namely cognitive, affective, and psychomotor [10]. Sukardi [11] stated at least two of the three domains can affect students' professional levels.

Cognitive levels based on Bloom's Kratwhol revised taxonomy on basic competencies are found in different percentages, there are varying amounts ranging from C3 to seven Competencies, C4 to one competency, and C5 to two competencies. Therefore, cognitive competence in geographic subjects is based on how students are able to manage the given subject matter to be able to apply the correct measurement procedures, analyze and provide an evaluation of the learning material provided. At the psychomotor level, levels were found to be more oriented in P2 levels by seven competencies, P3 by 2 competencies, and P4 by one competency. The psychomotor competency is based on how students' work movements in implementing the given practice emphasize certain actions by remembering or following instructions (written procedures) that have been set by the subject teacher in using the tools provided.

Based on the results of the analysis shows that from the cognitive realm in the basic competencies of subjects in land measurement techniques, 7 of them are lower-order thinking skills consisting of cognitive levels applying. Only 3 competencies that refer students to Higher Order Thinking Skill (HOTS) with the level of analyzing measurement data and evaluating the data. according to Kunandar [12] the ability of students can be classified into two namely high level and low level. described by Kratwhol [5] Low-level capability consists of knowledge, understanding and application, while high-level capability includes analysis, evaluation and creation.

The teacher not only tests memory, so sometimes it is necessary to provide the information needed to answer questions and students show understanding of ideas, information and manipulating or using that information. Other activities techniques can develop students' critical and creative thinking skills in the form of answering innovative questions. The subject of soil measurement is a subject that requires understanding, accuracy, especially in the use of measuring instruments, taking notes, evaluating,

making reports. According to Mart Budiono, the domain of knowledge on the basic competencies of land measurement techniques is more focused on a procedural understanding of how the work steps will be carried out.

This illustrates that the expected level of competence of this subject refers to the application by showing an understanding of information and reasoning rather than just remembering information. In basic competencies, there are also stages of the Higher-Order of Thinking Skill (HOTS) ability with critical, logical, reflective, metacognitive, and creative thinking abilities which are high-level thinking abilities to analyze measurement data obtained from the ability to apply previously. Higher-Order of Thinking Skills (HOTS) is the ability to think that not only requires the ability to remember but requires other higher abilities, such as the ability to think creatively and critically.

While for the psychomotor level, 7 (seven) basic competencies at the P2 (manipulation) level, Manipulation at the psychomotor level places the second level namely Emphasizing the development of the ability to follow directions, appearances, choice movements that determine an appearance through practice. At this level, students present something according to instructions not only imitating behaviour. In other words, students take measurements based on instructions and then practice. For other competencies, there are 2 (two) basic competencies at P3 (precision) and 1 (one) basic competencies at level P4 (articulation). This illustrates that the level of student skills contained in the competence of land measurement techniques at the level of students' thought processes to carry out skills in work to completion with the good work quality. The aspects contained in the competence of the psychomotor domain are the basic competencies of land measurement techniques are the skills to use tools that are useful in the performance completion well and in accordance with standard operating procedures. according to Suwandi [13] in evaluating existing performance on students need to pay attention to students' knowledge of what needs to be done and how long it takes.

5. Conclusion

The level of competence found in the subject of soil measurement techniques is expected to be able to spur students in critical thinking skills with levels C3 to C5 in the cognitive domain and levels P2 to P4 in the psychomotor domain. Students are expected to be able to provide identification in the process of earth surveying which will be carried out after graduation later with the competencies obtained at the Vocational School. The psychomotor and cognitive domains determine the success of students in

achieving the expected competence as the completeness of the learning carried out. Cognitive and psychomotor learning processes provided to students through material in subjects are expected to be able to develop students' abilities in accordance with the demands that will be faced after graduation later.

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Conflict of Interest

The authors have no conflict of interest to declare.

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