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THE RELEVANCE OF ELECTRONIC ENGINEERING SUBJECT IN VOCATIONAL HIGH SCHOOLS TOWARDS LAPTOP TECHNICIAN WORK TASKS

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KEYWORDS

Relevance Curriculum, Electronic Vocational Subject, Work Tasks.

ABSTRACT

The purpose of this study is to find the great relevance of the curriculum in the vocational high school electronics engineering to the work assignments of laptop technicians. This study uses a task analysis approach with percentage analysis to measure the level of relevance of the curriculum and tasks of laptop technicians in the service industry. The instrument for measuring the level of curriculum and task difficulty in industry refers to the book "A Guide to Job Analysis" by taking the General Education Development (GED) scale. The GED scale used is Reasoning Development. The matchmaking results found 16.6% of vocational engineering subjects in electronics in vocational high schools are highly relevant and have a major contribution to the implementation of laptop technician work tasks. There are 33.3% of vocational subjects that are highly relevant, but the contribution to their implementation is small towards laptop technician work tasks.

INTRODUCTION

Technical Vocational Education and Training (TVET) focuses on instilling practical skills that enable individuals to engage in certain work activities. TVET is not only important in providing job opportunities to individuals but also helps in increasing company productivity (Agrawal, 2013; Doherty, 2015). Developing countries are becoming increasingly aware of the role that TVET can play in promoting economic growth and reducing poverty. One of the challenges encountered was inadequate collaboration between TVET institutions and industry, so that the resulting TVET curriculum was of low quality and less relevant to industry needs (Albashiry et al., 2015). TVET curriculum that is not relevant to the needs of the workforce causes TVET programs to be ineffective. Curriculum designs that are relevant for vocational education especially in developing countries have an impact on programs that will link with the needs of the working class in those countries (Safitri & Suciati, 2018). Vocational education in developing countries must prepare students with basic skills that are strong, broad and related to the work they will face in order to be easily accepted by the world of work.

The curriculum at the Vocational High School is based on competencies that are relevant packages of knowledge, attitudes, skills, and experience needed to succeed in a particular job. To ensure curriculum relevance, a curriculum is needed where the basis of authentic practical work becomes the basis, and subjects are integrated with students' practical work experience (Hiim, 2017; Samara, 2018). Preparing a curriculum in the 21st century must be connected to the real world so that it can support the development of knowledge and encourage students to produce information that has value or meaning for them to develop new skills, and prepare for their future careers (Alismail & McGuire, 2015). The curriculum in Vocational High Schools must be relevant to specific disciplines according to market demand. In addition, the curriculum must provide experience to students so that it can be assessed on their learning (Mouzakitis, 2010).

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One of the challenges facing Indonesia in the ASEAN Economic Community is where a free labor market will occur, so the government seeks to encourage the creative economy (Asfiyanur et al., 2018a). This has implications for policy and strategy directions in the Strategic Plan of the Ministry of Education and Culture in Indonesia, namely the alignment of expertise programs and curriculum development of vocational high schools in accordance with the main economic activities in the district/ city and the needs of the labor market. One of the creative economies in several cities in Indonesia is the increase in the laptop repair service industry. Electronics engineering is the basis needed for the ability to repair laptop mainboards, so that graduates of electronics vocational school have the potential to work as laptop repair technicians.

The purpose of this study is to analyze the relevance of vocational subject in the Electronics Engineering Vocational High School with the work assignments of laptop mainboard repair technicians in Indonesia. Besides that, the writer also wants to know how the subjects in the Vocational School of Electronic Engineering and how the work assignments of Laptop technicians are reviewed using the GED level. Development General Educational Development (GED) is education of a general nature which contributes to the reasoning development and the acquisition of mathematical and language skills that are required of the worker to achieve average satisfactory job performance (Employment and Training Administration, 1982).

RESEARCH METHODS

This research is a descriptive study using curriculum data in Indonesia recently and the work assignments of laptop mainboard repair technicians in the service industry in the city of Yogyakarta. The research data were collected by analyzing documents for the Electronic Engineering Vocational High School curriculum, and interview instruments were used to identify work assignments from the laptop mainboard technicians. This research was analyzed by job analysis method through the General Education Development (GED) approach, limited only to the aspect of reasoning development. It was analzyed from the book "A Guide to Job Analysis : A How-To Publication for Occupational Analysts" (Employment and Training Administration, 1982).

The General Education Development approach to analyzing the level of reasoning development in electronic engineering vocational subjects in vocational high schools and laptop technician work assignments, so that the level of competency development in schools and the level of development of laptop technician tasks can be clearly known. Reasoning development aspect has several levels that are measurable based on the tasks performed, starting from the low level to the high level. Each level of development has indicators to facilitate the placement of the level of tasks received.

The research data is presented in the form of a matrix table that contains the analysis of the work assignments of laptop technicians in the service industry and vocational engineering electronics subjects which are analyzed descriptively. Based on the analysis of the task of the technician and vocational subject, the next step is to arrange a match between the task of the technician and the vocational subject to determine the level of relevance with the following methods: 1) Comparing the results of vocational analysis with the results of task analysis. 2) Comparisons are made for each task. 3) Each analysis result is compared by means of smaller numbers divided by larger numbers in percentages. 4) Percentage figures are referred to as matchmaking results. 5) Sign equal to (=) given to the results of the analysis of vocational subject the same as the results of the analysis of the task, a positive sign (+) is given to the results of the analysis of vocational subject higher than the results of the analysis of the task, a negative sign (-) is given to the results of the analysis of the subject vocational lower than the results of the task analysis.

Relevance standards to measure task analysis with vocational subject using normative relevance standards based on the range of values of the upper quartile, middle quartile and lower quartile. The relevance of normative standards is categorized into three parts, they are very relevant if the matchmaking results are greater than 66.6%; quite relevant if matchmaking results are between 33.3% -66.6%; and less relevant if matchmaking results are less than 33.3%.

RESULTS AND DISCUSSION

1. Results of Analysis of Vocational Subject in Electronic Engineering

Analysis of Electronic Vocational subject based on aspects Reasoning Development, shown in table 1 which is described based on basic competencies. Analysis of vocational subject in the field of Electronics in the group development of reasoning 50% of the subject is located at level 3. This shows that there are 50% of Electronic Engineering subject at the level of applying general understanding through written, oral or diagrammatic instructions. 30% of the subject matter of Electronic Engineering is located at level 4. This shows that 30% of

the subject matter applies rational principles in interpreting standard standards, varying orders and making work sequences. 20% of Electronic Engineering subject is located at level 5. This shows that 20% of the material applies scientific thought in defining problems, collecting data, finding facts and presenting conclusions.

Table 1. Analysis of Vocational Subject in Electronic Engineering

No	Basic Competencies	Reasoning Development (Level)					
		1	2	3	4	5	6
1	Measuring passive components			√			
2	Measuring active components			√			
3	Measuring series, parallel and mixed circuits of resistors and voltages			√			
4	Install electrical components according to data specifications				√		
5	Soldering components on the PCB and desoldering			√			
6	Make a flow chart repair and maintenance of various electronic equipment				√		
7	Calibrate measurement instruments before the repair and maintenance process of electronic equipment				√		
8	Using work safety tools in the field of work			√			
9	Repair damage to the power supply					√	
10	Make improvements from the results of the evaluation of electrical and electronic measuring instruments					√	
	Total	0	0	5	3	2	0
	Percentage (%)			50	30	20	

2. Results of Analysis of Work Tasks

Table 2. Analysis of Work Tasks of Laptop Technician

No	Basic Competencies	Reasoning Development (Level)					
		1	2	3	4	5	6
1	Measuring passive components: R-L-C			√			
2	Measuring active components: Transistors, Diodes, Integrated Circuits			√			
3	Measuring important voltage points on the Laptop mainboard				√		
4	Install components on the Laptop mainboard based on the specifications				√		
5	Soldering / blowering and deslodering components on the Laptop Mainboard				√		
6	Read the block diagram of the Mainboard Laptop system					√	
7	Operate multitester measurements on the laptop mainboard repair process				√		
8	Using work safety devices when repairing a laptop			√			
9	Analyzing and Repairing Damage to the Laptop Mainboard					√	
	Total	0	0	3	4	2	0
	Percentage (%)			33,3	44,4	22,2	

Task Analysis of Laptop Mainboard Repair Technicians based on Reasoning Development. Table 2 shows the levels of competency used by a laptop technician. Table 2 shows that the Mainboard Laptop Repair Technician Task in the reasoning development group with a value of 33.3% is located at level 3. This shows that there are 33.3% Laptop Mainboard Repair Technician Task at the level of applying general understanding through the command form in written, oral or diagram. 44.4% of the tasks located at level 4 indicate that 44.4% of the tasks of Laptop Mainboard Repair Technicians at the level of applying rational principles in interpreting standard standards, various commands and making work sequences. 22.2% of the tasks located at level 5 indicate that 22.2% of the subject applies scientific thought in defining the problem, collecting data, finding facts and presenting conclusions.

3. Analysis Result of the Relevance of Vocational Subject toward Work Tasks

After obtaining all the values of the analysis on the material, the next step is arranged as in table 3.

$$\text{Matchmaking analysis} = \frac{(\textbf{Smaller analysis results})}{(\textbf{Bigger analysis results})} \times 100\%$$

Table 3. Analysis of Matching Subjects with Work Tasks

No	Basic Competencies	Reasoning Development (Level)					
		1	**2**	**3**	**4**	**5**	**6**
1	Analysis of Electronics Engineering Subjects (%)	0	0	50	30	20	0
2	Laptop mainboard Technician Job Analysis results (%)	0	0	33,3	44,4	22,2	0
3	Pair of Work Tasks with Subjects	100	100	66,6	67,5	90,1	100
	Type of Sign	**=**	**=**	**+**	**-**	**-**	**=**

$$\text{Analysis Results} = \frac{(\textbf{Number of sign pairs})}{(\textbf{Overall mark items})} \times 100\%$$

The pair of work assignments with subject matter marked with (-) in the Reasoning Development level 4 and 5 group has 2 pairs.

Analysis Results = 2/6 × 100% = 33.3%

The pair of work assignments with subject matter with a (+) sign in the Level 3 Reasoning Development group has 1 pair.

Analysis Results = 1/6 × 100% = 16.6%

At level 3, the matching value is 66.6%, then all of them fall into the very relevant category.

In table 3 it can be seen, the results of pairing with the sign (=) found similarities in the results of the analysis of work tasks and the results of analysis of subjects with the acquisition rate of 0% each by 3 pairs. The similarity is very strong but in this case it did not make a positive contribution to its implementation because there were both no basic competencies in the subject matter and work tasks. Matching results with the sign (+) found in the results of the analysis of subjects and the results of the analysis of the work task of 1 pair. Based on the reference normative standard relevance, there are 16.6% of highly relevant subject matter. This finding provides information that subject matter has a larger portion capacity. These results indicate that the depth and breadth of the material presented has the same suitability as the industry needs. The results of matchmaking with the sign (-) were found in the results of the analysis of the subject matter and the results of the task analysis there were 2 pairs, so it was known that 33.3% had a very relevant standard. This finding means that even though there is a smaller capacity of subject matter presentation than the industry needs. There are 33.3% of the material that has a small gap in the level of depth and breadth of the material.

The relevance between the curriculum in vocational schools with skills and work needs in the industry is very important. From the research (Asfiyanur et al., 2018) also explained that the work competency of vocational education graduates has not been able to meet the work competency standards set by the industrial world because the vocational education curriculum is not yet relevant to the needs of the industrial world. The greater the relevance, the greater the potential for absorption of vocational school graduates in the world of work. The curriculum should be dynamic and developing so that vocational education graduates are also more flexible and able to keep up with developments in the world of work. To face the challenges of vocational high schools in the era of disruption, it is necessary to evaluate programs, content, implementation, and curriculum renewal (Schlingensiepen, 2014). Vocational high schools need to integrate theoretical or practical vocational materials with competencies in the industrial world (Hsiao et al., 2008). Vocational education must be able to teach competencies that meet the needs of graduates in the future by looking at the reality of the workplace and developing technology.

CONCLUSION

Based on the data analyzed in the Reasoning Development aspect of the GED, the vocational materials in Electronic Engineering in vocational secondary education by 50% of subjects are at level 3; 30% at level 4; and 20% at level 5. In the work tasks of laptop repair technicians has a value of 33.3% of the tasks are level 3; 44.4% are at level 4; and 22.2% are at level 5. The matching results obtained a value of 50% similarity between the results of the task analysis and the results of the subject analysis, but the similarity does not have the basic competency content at that level so it does not make a positive contribution to its implementation. There are 16.6% of subject matter which is highly relevant to work tasks and greater subject capacity. There are 33.3% of subject matter which is highly relevant to work tasks, but the capacity of subject matter is smaller than what is needed by industry.

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