



Vocational Skill Potential of Thinking and General Working Skills of Mechanical Engineering Associate Expert in Industries

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ABSTRACT

The Associate Expert (Diploma 3) education aims to prepare ready-to-work graduates, independently or dependent on the job market. Therefore, educational institutions must form Associate Experts students following the industries' requirements. This research aimed to observe whether the Associate Experts of Mechanical Engineering at the Universitas Negeri Malang had followed the industries' needs. This research studied the vocational skill potential of thinking and general skills and was correlational research using a quantitative approach.

Keywords: *Thinking Skill Capacity, General Working Skill, Industry Requirements.*

1. INTRODUCTION

The Associate Expert (Diploma 3) education aims to prepare ready-to-work graduates, independently or dependent on the job market. Therefore, educational institutions must form Associate Experts students following the industries' requirements. On a macro scale, educational institutions must prepare competent human resources following their expertise, who are adaptable with high competitiveness. Hence, the curriculum must be developed following the working world's conditions and requirements to make it perfect.

Education is a path to develop and improve human resources quality towards the challenging globalization era that becomes fundamental for each individual. Thus, education cannot be ignored in this century's increasing thought competition.

The global demands and the recent financial crisis made things more complex. The winners in this globalization era are determined by their quality. Indonesians must be ready to compete and prepare their quality as the primary key to winning the competition.

Reviewing Law number 25 of 2000 on National Development Program 2000–2004, it is stated that in the early 21st century, the world experienced huge challenge: 1) as a result of the financial crisis, education is required to maintain its achievements; 2) in anticipating the global

era, education is required to prepare competent human resource to compete in the global job market; and 3) in alignment with the local autonomy, it is necessary to make changes and adjustments to the national education system to realize a more democratic education process, considering the diversity, regional needs or conditions and students, and encourage community participation.

The Ministry of Research, Technology and Higher Education revitalized vocational education as referred to in the yearly report in 2018 due to: 1) university graduates that did not follow the industry requirements; 2) vocational education in Indonesia that is still very small, with only 5.4%, while developed countries have a similar number between vocational and non-vocational education institutions; 3) the government issued Presidential Decree No. 9 of 2016 concerning the revitalization of Vocational High Schools; 4) hence, the quantity and quality of vocational education need to be increased (revitalization of vocational education).

The data in figure 1 shows that the largest job vacancy percentage is 68.6%, demanding undergraduate, postgraduate, and professional education. In comparison, the lowest of 10% requires a diploma level, and the middle position is occupied by a high school education level of 21.4%. The working experience duration consists of six categories: no experience, 1 year of experience, 2 years of experience, 3 years of experience, 4 years of experience, 5 years of experience, and 6 years or more of

experience. The most can be found in 1 year of work experience, with a percentage of 29.6%, and the least is 6 years of work experience or more than 6 years of work experience, with a percentage of 1.8%.

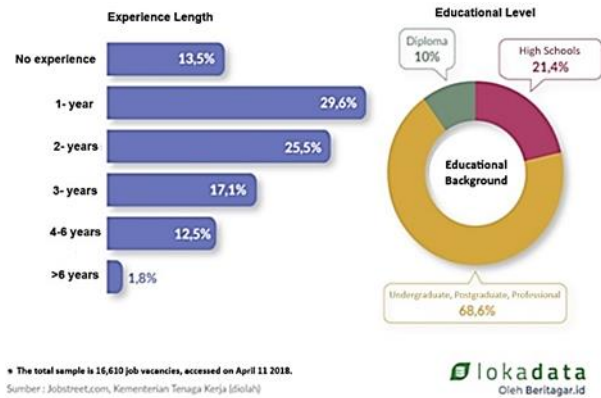


Figure 1 Job Vacancies According to Education Level and Work Experience Duration [1].

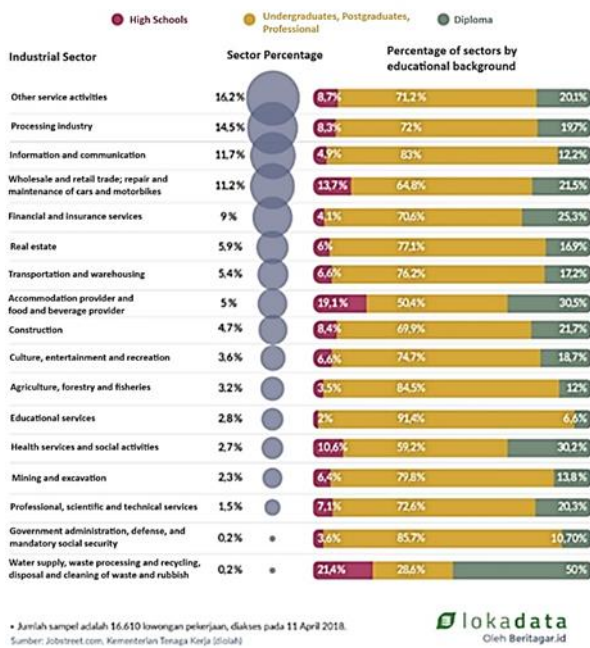


Figure 2 Job Vacancies Based on Industrial Sector and Educational Background [1].

Based on the statistical data above, the largest sector is occupied by 'other service activities' with 16.2%, while the lowest percentage is in 'water supply, waste processing and recycling, waste and garbage disposal and cleaning industry' with 0.2%. Observed from the educational background, the largest sector with diplomas occupies the 'water supply, waste processing and recycling, waste and garbage disposal and cleaning industry' with 50%. In comparison, the industrial sector with the least diploma background is the educational services, with a percentage of 6.6%.

2. METHOD

This study used quantitative research by defining and categorizing variables related to the proposed hypothesis as the research starting point. Data collection was done using vocational skills instruments and categories. The analysis was carried out at the end of the study after all data were collected using standard statistical techniques. This study aimed to determine the potential for vocational skills possessed by prospective Associate Experts in Mechanical Engineering, Universitas Negeri Malang, with limitations on the three aspects.

The three aspects were entrepreneurship and leadership, thinking skill capacity, and general working skill. These three aspects were further developed into several indicators. Entrepreneurship and leadership were divided into two indicators: 1) entrepreneurship and 2) leadership. Thinking skill capacity had three indicators: 1) critical thinking, 2) creativity, and 3) innovative way of learning. Whereas general working skills have six indicators: 1) utilizing resources; 2) processing information; 3) utilizing a system that understands new technology; 4) coordinating with others; 5) working in teams; and 6) managing and resolving conflicts.

3. RESULTS

3.1. Entrepreneurship and Leadership

In entrepreneurship and leadership, prospective Associate Experts in Mechanical Engineering had abilities as described in Table 1 below.

Table 1 Entrepreneurship and Leadership Aspects.

Criteria	Score Range	Frequency	Percentage
Very High	17–20	25	41.67%
High	14–16	34	56.67%
Moderate	11–13	1	1.66%
Low	8–10	0	0%
Very Low	5–7	0	0%
Total		60	100%

The responses distributions are very high criteria with 25 respondents or 41.67%, high criteria with 34 respondents or 56.67%, and moderate criteria with 1 respondent or 1.66%. It indicates that the Diploma of Mechanical Engineering students already have entrepreneurship and leadership abilities.

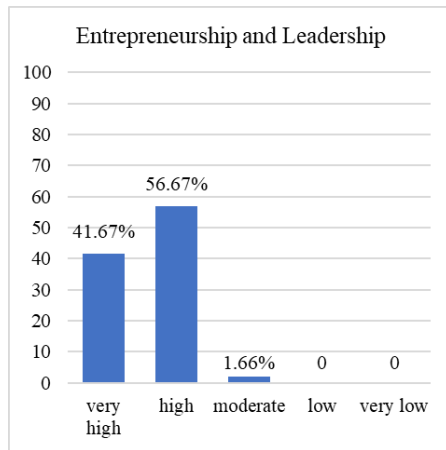


Figure 3 Entrepreneurship and Leadership Aspects Results in Charts.

3.2. Thinking Skill Capacity

For the thinking skill capacity, prospective associate expert mechanical engineering students can be described in the following table.

Table 2 Thinking Skill Aspect.

Criteria	Score Range	Frequency	Percentage
Very High	28–32	17	28.33%
High	23–27	39	65%
Moderate	18–22	4	6.67%
Low	13–17	0	0%
Very Low	8–12	0	0%
Total		60	100%

The response distributions for this second aspect are very high criteria with 17 respondents or 28.33%, high criteria with 39 respondents or 65%, and moderate criteria with 4 respondents or 6.67%. It indicates that the Diploma of Mechanical Engineering students already have the ability of thinking skills.

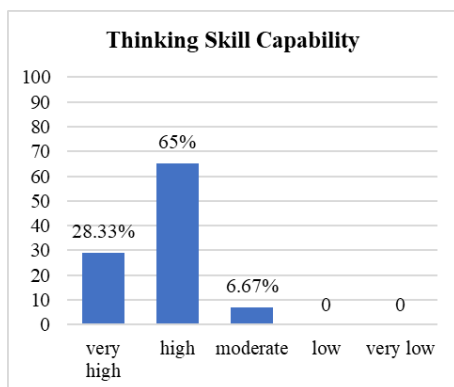


Figure 4 Thinking Skill Capability in Charts.

3.3. General Working Skill

In this section the results are described in Table 3 below.

Table 3. General Working Skill Aspect.

Criteria	Score Range	Frequency	Percentage
Very High	58–68	17	28.33%
High	47–57	36	60%
Moderate	37–46	7	11.67%
Low	27–36	0	0%
Very Low	17–26	0	0%
Total		60	100%

Based on the above table, it can be seen that there are very high criteria with 17 respondents or 28.33%, high criteria with 36 respondents or 60%, and moderate criteria with 7 respondents or 11.67%. It indicates that the Diploma of Mechanical Engineering students have the ability in general working skills.

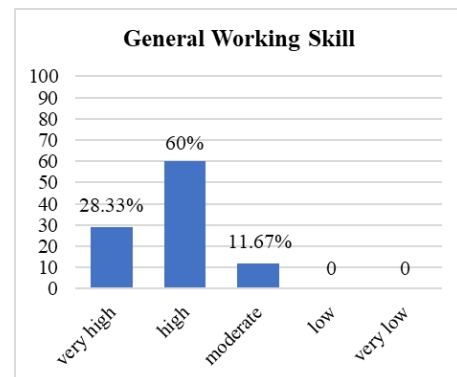


Figure 5 General Working Skill Chart.

4. DISCUSSION ON VOCATIONAL SKILL POTENTIAL

4.1. Entrepreneurship and Leadership Aspect

4.1.2. Entrepreneur

An entrepreneur is a person who dares to take risks to open a business on various occasions. Having the courage to take risks means having an independent mentality and daring to start a business without being overwhelmed by fear or anxiety, even in uncertain conditions [2-4].

4.1.3. Leadership

Wirjana et al. [5] define leadership as a complex process in which a person influences others to achieve a mission, task or goal and directs the organization in a way that makes it more cohesive and makes sense.

Entrepreneurship and leadership have two indicators, and according to the results in the previous section, the Diploma of Mechanical Engineering students at Universitas Negeri Malang have the abilities of both indicators.

4.2. Thinking Skill Capacity Aspect

4.2.1. Critical Thinking

Critical thinking is reasoned, reflective thinking emphasizing decision-making about what to believe and do [6].

4.2.2. Creativity

According to Munandar [7], creativity is essential for personal growth and success and vital for Indonesia's development which parents, teachers, and society also determine.

4.2.3. Innovation

Suryana [8] argues that innovation is the ability to apply creativity in order to solve problems and opportunities to improve and enrich life.

The thinking skills capacity has three indicators, as previously mentioned, and the results stated that the Diploma of Mechanical Engineering students at Universitas Negeri Malang have these abilities.

4.3. General Working Skill Aspect

1. Utilizing Resources

The Webster Encyclopedia, cited by Fauzi [9], defines resources as 1) the ability to fulfill or handle something, 2) sources of supply, support or assistance, and 3) means produced by one's abilities or thoughts. Grima and Berkes [10] define resources as assets for fulfilling human satisfaction and utility.

2. Processing Information

Information processing theory pioneered by Gagne [11] states that learning is a significant factor in development.

3. Utilizing Systems that Understand New Technology Task-Technology Fit, a theory developed by Goodhue and Thompson, states that the fit level between tasks and technological support will affect performance

4. Coordination with Others

According to Terry in Hasibuan [12], coordination is a synchronous and regular effort to provide the right amount and time and direct the implementation to produce a uniform and harmonious action on predetermined targets.

5. Working in Teams

According to Sopiah [13], a working team is a group whose individual efforts produce a performance greater than the sum of the individual inputs.

6. Managing and Solving Conflicts

According to the Gerasimox [14], managing is organizing and managing (organizations, governments, companies, projects, etc.).

Following the above description, general working skills have six aspects with dominant results in high criteria, indicating that the Diploma of Mechanical Engineering students at Universitas Negeri Malang have the abilities.

5. CONCLUSION AND RECOMMENDATION

The Associate Expert of Mechanical Engineering students already own some vocational skills such as entrepreneurship and leadership thinking skills, including critical thinking, creativity, and innovation how to learn.

Students also had skills in general working skills, including utilizing resources, processing information, utilizing new technology to understand the system, coordinating with others, working on teams, and managing and resolving conflict.

For educators, the results of this study indicate that the vocational skills possessed by the Diploma of Mechanical Engineering students were predominantly in high criteria; thus, educators are expected to provide programs that study or examine more deeply the vocational skills to hone their abilities.

For students, this study provided the information that they already had the skills, although no program examines these abilities more deeply.

For future researchers, it is expected that the variables will be more specific regarding vocational skills or aspects that can be replaced and added, not only entrepreneurship and leadership, capacity thinking skills, and general working skills.

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