Employability skills of state vocational high school students on welding engineering expertise competency

Hafiidhiya Janata Areisy *, Putu Sudira (ID)
Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: fiidhiyareisy.2017@student.uny.ac.id

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ABSTRACT

This study aims to: 1.) Describe the mastery level of employability; and 2.) Find out the order of mastery of the employability skills of vocational high school (VHS) students. This study was a survey research with quantitative approach. The research was conducted at a vocational high school in Madiun Regency with A accreditation. Data collection instrument was a questionnaire that had been tested for content validity by the experts. The construct validity test used the product-moment formula and was declared valid. The results that 56 items were declared valid and reliable. The questionnaire was given to 149 students of class XII of welding engineering expertise competency. Data were analyzed using descriptive statistical analysis technique. The results of the study are as follows: 1.) The mastery level of employability skills is in the high category with the mean score 168.61 greater than the ideal mean score of 132.5; and 2.) The order of mastery on aspects of employability skills, from the highest to the lowest achievement using technology skill, keeping occupational health and safety skill, learning skill, self-management skill, initiative and enterprise skill, planning and organizing skill, communication skill, and problem-solving skill.

INTRODUCTION

Vocational High School (VHS) is one educational institution that shaped and created manpower. Vocational education focuses on developing and preparing students to have specific skills to be able to carry out certain jobs well. This is reinforced in Law of the Republic of Indonesia No. 20 of 2003, article 15 concerning the National Education System. It is stated there that vocational high schools are established to prepare students especially for entering a workplace with a certain field. The purpose of establishing vocational schools according to Sudira (2017) is to improve the relevance of education and vocational guidance in line with the rapid need for manpower in workplaces. Coherently, the outcome is expected to result in a prosperous society that is competitive and oriented towards sustainable development.

In 2017 and 2018, the tendency of unemployment rate increased among high school/vocational high school graduates. Based on the data from the Badan Pusat Statistik Republik Indonesia (2017), the unemployment rate in vocational high school was the highest among other education levels, at 11.41%. Even though in 2018 it declined, it was still recorded as the highest rate among other levels of educational institutions, numbering 8,92%. It takes one hundred thousand welders that are internationally certified, and currently, there is still a shortage of fifty thousand

skilled welding workers, so this is an opportunity for prospective Indonesian workers in the welding sector (Safuan, 2019).

The government's policy to build infrastructure and maritime really needed workers in the welding sector (Kementerian Perindustrian Republik Indonesia, 2015). This workforce is part of the industrial sector, ranging from shipping, mining, oil and gas, and power plants. Thus, the acceleration of the growth of the welding workforce must be maximized. One of the skills competencies of interest to students entering vocational schools in Madiun is the competency of welding engineering skills. Manpower in this sector is more needed than in other ones. There are several profound companies such as PT. Industri Kereta Api (INKA), Inka Multi Solusi (IMS), and other industries in Madiun that need a welding engineer or welding operator. Besides, one of VHS has a collaboration with PT. Japan Indonesian Economic Center (JIAEC) in which the welding sector is much needed there.

One of the implementations of mastering hard skill competencies is based on the mastery of the Indonesian National Competency Standards (SKKNI). The implementation of SKKNI is also the benchmark of achievement assessment level in the KKNI level II certification scheme. The BNSP certification scheme committee constructs it with the Directorate of Vocational Development. The application of SKKNI in welding techniques includes basic competencies, advanced welding techniques 1, and advanced welding techniques 2. Welding techniques as operators include metal, manual arc, and welding with oxy-acetylene welding processes. However, this does not affect the results of implementing hard skills in the business and industrial world. In the industrial work practice program for the 2016/2017 academic year, only 63.8% of students at SMKN 1 Kebonsari obtained the results of mastering hard skills in the good category.

In the era of turbulent and rapid advancement of technology, industrial development shows massive changes, for instance, in the service sector. It proves that the demands of human resources in the workplace continue to prefer highly qualified and competent ones. The characteristics of 21st-century work are changing from individuals to collaborations. 21st-century skills are based on 4C competencies, which include communication, collaboration, critical thinking, and creativity. Sudira (2018) states that problems in the 21st-century require mental and thought-based solutions. This is because the development of work activities and career life in the 21st-century is increasingly complex and requires thinking and mental abilities to develop a good career. Regarding that issue, Suarta et al. (2017) research found that business and industrial work prefer to employ graduates who can manage changes and desire to grow. Besides, flexible and adaptive employees are more favorable. Furthermore, those skills in vocational education are considered employability skills.

The characteristics of the world of work and the qualifications of the workforce required by industry are also changing rapidly. In this regard, the context of the demands of the world of work should have local, national, regional, and international attitudes (Sudira, 2017). Changes in the demands of the world of work have an impact on work patterns in the workplace and work environment. The competence of the workforce develops so that in the 21st century, it is determined by four main aspects, work skills, moral skills, knowledge skills, and work attitudes (Sudira, 2018). The involvement of those four aspects will build the competence of candidates and workers at a good level of capability. Work skills that are balanced with good knowledge create satisfying work. Creating good work outcomes needs to be accompanied by moral skills. The works should be done through inspiration and carried out with surviving spirit to improve careers for candidates and workers.

In accordance with Sudira (2018), International Labour Organization (ILO) and United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002) stated that it is not enough for a workforce only to develop their vocational skill. Young graduates also need soft skill workshops such as vision determination, problem-solving, and leadership training. New and innovative learning programs help young graduates develop soft skills for success on the job. Graduates who have vocational workforce character improve and instill in themselves to be a reliable workforce candidates along with the development era. Therefore, the performance and competence of vocational high school graduates do not have a gap with the competencies needed in the world of work.

The level of absorption of graduates must remain the focus of attention of vocational education stakeholders. In addition to the demands for basic skills and technical skills in the field of

work they engaged in, the research results of Shyamalee et al. (2013) recommend that vocational education should pay great attention to improving students' skills, including personal and work attitudes, communication skills, and intellectual skills. Those skills complement basic engineering knowledge developed from ordinary knowledge-based engineering programs. International Labour Organization (ILO) & United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002) defined those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economic and social life. Hence, the implementation of vocational education varies widely and is based on public policy, the educational environment there, and stakeholders.

Employability skills are indispensable and needed by the 21st-century workforce demands. The findings of Suarta et al. (2017) research mentioned that communication skills, problem-solving and decision-making skills, and teamwork skills are the job skill attributes with the highest importance. In addition, graduates are expected to possess many personal attributes, including self-awareness, self-confidence, independence, emotional intelligence, flexibility and adaptability, stress tolerance, creativity, initiative, willingness to learn, reflectivity, lifelong learning, and professional behavior. Suarta (2011), in his dissertation, stated that employability skills are a set of non-technical and transferable skills needed to acquire, maintain, and develop one's career in the workplace. As transferable skills, employability skills can be used in any circumstances according to the prevailing conditions. It is believed that these skills will support workers in carrying out their roles as best as they can. Department of Education Science and Training (DEST) et al. (2002) explained that employability skills are defined as 'skills required not only to gain employment but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions.

Employability skills by National Centre for Vocational Education Research (2003) are also known as core skills, key skills, essential skills, generic skills, necessary skills, workplace know-how, critical enabling skills, transferable skills, and key qualifications. A study by Kubler and Forbes (in Lowden et al., 2011) found that employability skills are abilities with a good workability level. It includes good knowledge, specific competencies, self-compatible abilities, and technical skills and can work well in an organization that requires critical thinking to evaluate and give good impact. Employability skills help someone to get a job, keep his job, and develop his career to success in carrying out his role to benefit himself and the company (Yorke, 2004).

Studies by Department of Education Science and Training (DEST) et al. (2002) state that there are eight main skills, including communication skills, team collaboration skills, problem-solving skills, ideas, and business skills, skills planning and organizing activities, self-management skills, learning skills and skills using technology. Employability skills consist of the ability to collect, analyze and organize information, communicate ideas and information, plan and organize activities, work with others and in teams, use mathematical ideas and techniques, solve problems, and use technology (Department of Education Science and Training (DEST) et al., 2002).

Based on the previous explanation, employability skills are important for graduates of vocational high school majoring in welding engineering skills competencies. However, based on observations of the employability skills of vocational high school students, the welding engineering skills competency has not been mapped. So, this gap becomes a significant aspect of research. Therefore, research needs to be carried out to obtain an overview and describe the employability skills of vocational high school students in Madiun, which have been applied in schools and mastered by students.

RESEARCH METHOD

This research is a survey research with a quantitative approach. The research was conducted at the State vocational high school for welding engineering expertise in Madiun Province with A accreditation. The population of this research was 149 students in XII grade. This is because the class of XII has implemented industrial practices so that they have experience in the real world of work. The population was taken as the source of data. Determination of the sample using a saturated sample

technique. The use of the technique by taking the entire population is the reason that each school has less than 100 students. The research instrument used to obtain data was a questionnaire validated by the experts. The construct validity test used the product moment formula and was declared valid with a value of r > 0.344 (R table with 33 respondents). The instrument test was carried out on 33 other students, and the results obtained on 56 items were declared valid. The reliability test used the Cronbach alpha formula and was declared reliable with an alpha value of 0.994 > 0.05. The data analysis technique used descriptive statistical analysis.

Aspects being emphasized in the research of Department of Education Science and Training (DEST) et al. (2002) and Suarta (2011) include (1) communication skills; (2) teamwork skills; (3) problem-solving skills; (4) Making decision or idea and effort skills; (5) planning and organizing activities; (6) self-management skills; (7) skills in learning; (8) skills in using technology; and (9) occupational safety and health. The descriptive statistical method aims to present and analyze data to make it meaningful. Furthermore, it is to determine each aspect's category by categorizing the data's trend with the formula in Table 1.

Table 1. Calculation Formula of Category

Calculation Formula	Category
(Mi – 3 SD) < x ≤ (Mi – 1.5 SD)	Low
(Mi – 1.5 SD) < x ≤ (Mi)	Medium
(Mi) < x ≤ (Mi + 1.5 SD)	High
(Mi + 1.5 SD) < x ≤ (Mi + 3 SD)	Very High

RESULT AND DISCUSSION

The description of the research data is presented in the form of calculation results, including mean, median, mode, and standard deviation values. After calculation of the data, it is obtained that the ideal average value (Mi) of 132.5 and the ideal standard deviation (Sdi) of 26.5. The results of the employability skills data analysis of 149 students obtained a minimum score of 136 employability skills, a maximum score of 191, a mean of 168.61, a median of 169, a mode of 168, and a standard deviation of 11.03. Based on these data, students' employability skills tend to be high because it has an average arithmetic value greater (168.61) than the ideal average value (132.5). The level of employability skills of students in detail seen from the nine aspects of employability skills are presented in Table 2.

Table 2. Distribution of Employability Skills Score Categories

Category	Calculation Formula	f	Precentage (%)
Low	53 < X ≤ 92.75	0	0%
Medium	92.75 < X ≤ 132.5	0	0%
High	132.5 < X ≤ 172.25	91	38.9%
Very High	172.25 < X ≤ 212	58	61.1%

Based on Table 2, it is shown that students tend to possess employability skills ranging from high to very high of 100%. The achievement of employability skills level is also seen from the comparison between the total score achieved from the research data and the maximum expected total. The total score of employability skills based on empirical data is 25.123 (79.5%) of the expected score of 31.588. The average statement items for each aspect are described based on the research indicators.

Indicators from the communication aspect include (1) listening and understanding other people's conversations; (2) openness to receive information and share the latest technological knowledge; (3) developing attitudes and styles of conveying ideas in writing and orally; and (4) using calculations. The average value of each communication aspect indicator is presented in Figure 1. Figure 1 shows that the highest score was generated from the statement items related to openness to

receiving information and sharing the latest technological knowledge, while the lowest score was related to listening and understanding other people's conversations.
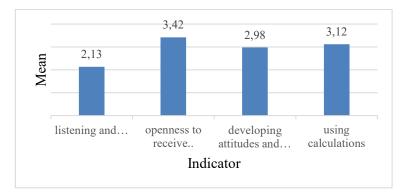

Figure 1. Bar Chart of Mean Score of Communication Aspect Indicator

The result shows that the eighth order of employability skills is the communication aspect. Complaints from employers are the lack of communication skills at the age of millennial workers. Fresh graduates have a low verbal communication level but quite a high level of communication through technology (Vasel, 2016). This is also supported by research conducted by Suarta (2011), showing that the communication aspect also has the lowest mean score of importance. It means that schools must create an atmosphere and environment that facilitates students to maintain intensive communication, share ideas, and manage information.

Communication skills need to be nurtured, practiced, and strived continuously because it greatly impacts networking and maintaining good relationships with fellows, especially in communicating with heads at work. Besides, learning another language is a plus point. It not only improves students' communication skills but also shows employers that they strive for commitment, motivation, and awareness commercially about global economics. The focus of education in vocational high school should not only emphasize technological prowess and skills to operate technology but also balance learning related to soft skills. In the context of preparing vocational high school graduates to be ready for entering the working world, according to Afandi (2017), 21st-century learning needs to insert digital age literacy, effective communication, and inventive thinking, and high productivity. Rightfully, learning indicators should contain good communication skills indicators needed in the workplace.

Indicators from the aspect of teamwork include (1) supporting other members, (2) sharing knowledge, opinions, and ideas in the decision-making process within a team, and (3). The average value of each indicator of the cooperative aspect is presented in Figure 2. Figure 2 shows that the highest averages resulted from statement items related to sharing knowledge, opinions, and ideas in the decision-making process within a team, while the lowest scores from statement items related to upholding teamwork and team decisions in various conditions.
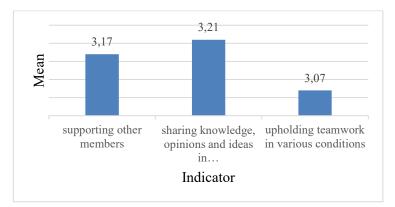

Figure 2. Bar Chart of Average Score Team Work Aspect

Furthermore, indicators from the aspect of problem-solving include (a) using calculation management to make decisions, (2) identifying problems, and (3) applying various strategies to make decisions quickly and accurately. The average value of each problem-solving aspect indicator is presented in Figure 3. Figure 3 shows the highest score resulting from the statement items related to using calculation management to make decisions.
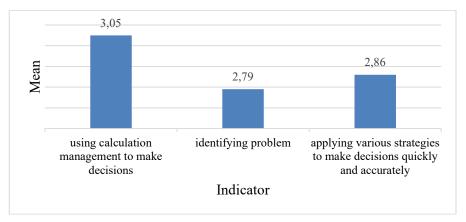

Figure 3. Bar Chart of Mean Score of Problem-Solving Aspect Indicator

Based on the research finding, the aspect of problem-solving skills is shown to be in the lowest order. Even though it is still considered a high category, problem-solving skill is lacking in mastery compared to other skill. Problem-solving skills are still less mastered than other aspects. The findings, if associated with the research findings of Abas and Imam (2016), should be further improved. That stated, although basic skills is related with performance context as a worker, but in problem-solving skill is necessary and useful for a worker.

Although it is still in the high category, His research conclusion is that graduates' competence for employability skills provides advantages when implemented in the workforce. According to their job sheet, students who have ability alongside skills tend to show immense allure and attract employers in the working world. Regarding that issue, students are required to possess significant and substantial skills. The skills include personal traits and competence, and basic skills. Moreover, these job skills are needed for manufacturing education.

Indicators from the aspect of self-management include: (1) having faith in one's own ideas and vision; (2) being responsible for the actions taken; (3) making a work plan systematically; and (4) conducting self-evaluation and seeking improvements to improve performance. The average value of each indicator of self-management is presented in Figure 4. Figure 4 shows that the lowest score was obtained from items related to belief in one's own ideas and vision. The highest score was obtained from self-evaluation and seeking improvements to improve performance.
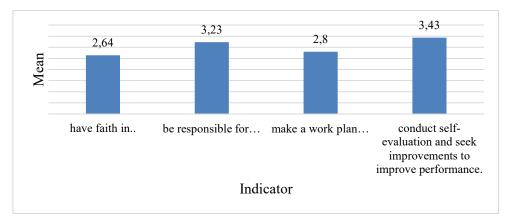

Figure 4. Bar Chart of Mean Score of Self-Management Aspects Indicator

Indicators from the aspect of planning and organizing activities include (1) managing time and priorities for self and team, (2) clearly defining project objectives, and (3) adapting the use of resources and people to address issues. The average value of each of these indicators is presented in Figure 5. Figure 5 shows the varying averages. The highest scores from the indicator about managing time and work priorities, while the lowest scores related to adapting the use of resources and people to address issues about managing time to improve welding skills.
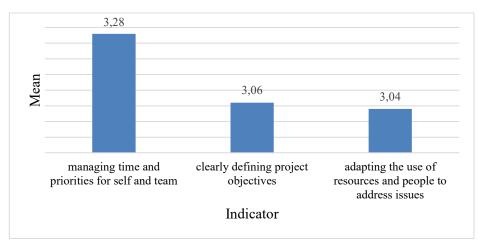

Figure 5. Bar Chart of Mean Score of Planning and Organizing Indicator

Indicators of the aspect of being able to learn include (1) applying what has been learned and using new skills and knowledge in a practical, calm, and easy manner; and (2) desiring to receive new knowledge and skills. The average value of each of these indicators is presented in Figure 6. Figure 6 shows the highest score is desiring to receive new knowledge and skills. Indicators from the initiative and enterprise include (1) Adaptation to new situations, (2) developing strategy, creativity, and long-term vision, (3) identifying opportunities, and (4) manifesting ideas into action. The average value of each indicator of this aspect is presented in Figure 7. Figure 7 shows that the highest score was generated from the statement items regarding the ability to adapt to the characteristics in the workplace or practice, while the lowest score was generated from the item about developing strategy, creativity, and long-term vision or developing strategies in the workplace.
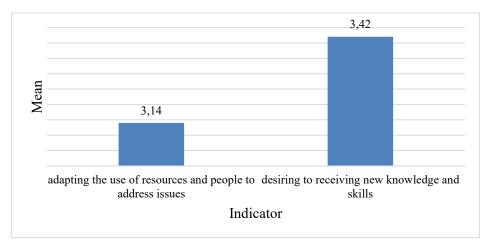

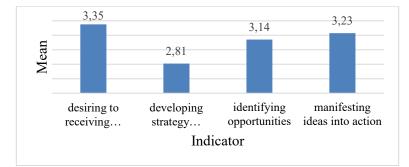Figure 6. Bar Chart of Mean Score of Learning Indicator

Figure 7. Bar Chart of Mean Score of Initiative and Enterprise

Indicators from the aspect of using technology include: (a) maintaining equipment, hardware, or software to ensure it is well-functioning, and (b) being willing to learn new IT skills and use the latest technology. The average value of each of these aspect indicators is presented in Figure 8.
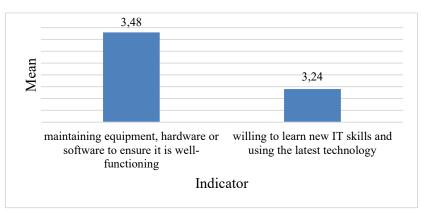

Figure 8. Bar Chart of Mean Score of Using Technology Indicator

Figure 8 shows the highest scores obtained from statement items regarding maintaining equipment, hardware, or software to ensure it is well-functioning, while the lowest scores for items related to utilizing the latest technology. Indicators from the aspect of maintaining occupational health and safety include (a) understanding occupational security, health, and safety procedures and (b) understanding the threat of danger at work. The average value of each of these aspect indicators is presented in Figure 9. Figure 9 shows the average, which varies from 2.51 to 3.8. The highest score is obtained regarding understanding threats and dangers at work, while the lowest is understanding work procedures. The order of levels of each aspect of students' employability skills is presented in Table 3.
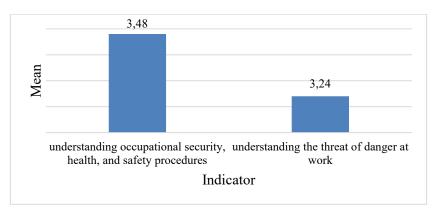

Figure 9. Bar Chart of Mean Score of Occupational Security, Health, and Safety Indicator

Table 3. The Order of Levels of Employability Skills

Interval	Mean per Item	Precentage of skor (%)	Rank
Using technology	3.39	84.7	1
Moccupational health and safety	3.37	84.3	2
Learning	3.36	83.6	3
Team work	3.21	80.3	4
Self management	3.2	80.2	5
Initiative and enterpise	3.15	78.8	6
Planning and organising	3.1	77.6	7
Communication	2.99	74.9	8
Problem solving	2.87	71.7	9

Table 3 shows the ranking of each aspect of employability skills. The average of the statement items for each aspect is described based on the research indicators. The order of mastery on aspects of employability skills, from the highest to the lowest achievement is the use of technology, occupational health and safety, learning abilities, self-management skills, the ability to take the initiative and try, the ability to plan and organize activities, the ability to communicate, the ability to solve problems. The study results indicate that students have a high skill level in the aspect of using technology by 84.7% of the expected score achievement with an average score of 3.39. The result shows that problem-solving is the lowest order of students' employability skills, with a calculated 71.7 % of the expected criteria score. When viewed from the research questionnaire statement items, the average in the high category is that each item has an average of 2.87 from a maximum score of 4.

Based on Table 3, the highest order in students' employability skills is the aspect of using technology. In today's generation, learning with the means of technology is very popular. The young generation or now widely known as the millennial generation is a creative and hardworking generation with large access to abundant information (Ardianto et al., 2020). In fact, the millennial generation grows along with technological advancement, making them very dependent on technology. Another privilege is that they are always connected to social networks and multitask with online products and advanced technology (Hariadi et al., 2016). However, an interesting phenomenon is observed in problem-solving skills, which contrasts with other skills.

In this study, the aspects of communication and solving deep problems were found in the last two sequences. Problem-solving is the process of identifying the differences between actual and desired states and then taking action to overcome deficiencies or make the most out of opportunities. Problem-solving begins with recognizing that a problem situation exists and building an under-standing of the nature of the situation. Problem-solving is used to identify specific problems to be solved, plan and implement solutions, and monitor and evaluate progress during activities (Organisation for Economic Co-operation and Development, 2013). Supporting the points above, the findings of research by Baharom and Palaniandy (2013) also suggest improving learning outcomes and developing generic skills, so students' active participation in the project-based learning (PBL) learning process is required. The PBL model allows students to solve authentic problems and work in teams to find effective solutions to problems. Sunardi's et al. (2016) research also found that scientific learning can develop students' employability skills.

Concerning the employability skills aspect by the conference board of Canada, the mastery of students' employability skills includes several aspects that are in the high and above average category, which of those related to personal management skills. The ability of students to manage themselves is very important in the present and future, either when engaging in activities with other people, alone, or within an organization. This ability strongly influences feelings and emotional management and carries an individual's role in both personal and organization.

CONCLUSION

Based on the descriptions above, the level of employability skills of vocational students in Welding Engineering Competence is in the medium to high category. The mastery level of employability skills is in the high category with a mean score of 168.61, greater than the ideal mean score of 132.5. Aspects included in the high and above average category are those related to personal management skills. The ability of students to manage themselves is very important in the present and future, either when engaging in activities with other people, alone, or within an organization. The order of mastering employability skills is using technology, maintaining occupational health and safety, learning, teamwork, self-management, initiative, enterprise, planning, organizing, communications, and problem-solving skills.

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