



Vocational High School Learning Management: Opportunities and Challenges in the Industrial Revolution 4.0 Era

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ABSTRACT

Education is a means to improve the quality of one's life. In taking education one is required to continue learning. Learning will change a person's three aspects: knowledge, attitudes, and skills. In terms of learning at Vocational Schools, students and teachers need to adapt to current global conditions so that graduates can compete. For this reason, the importance of management in learning and improving the quality of SMK graduates meets challenges and opportunities. This article discusses the opportunities and challenges in learning in Vocational Schools in general and specifically in Machining competencies. The method used is a literature review. Data analysis using descriptive statistics. In terms of knowledge of vocational high school students in the field of machining, they need basic knowledge of machines and good mathematical skills, to be able to understand how machines work and have good analysis. Student attitudes that need to be improved for vocational graduates such as critical thinking, discipline, independence, creativity, and innovation. Skills that need to be possessed include machining such as lathes, milling, and CNC. Opportunities arose from existing jobs such as data analysis, 3D printing, and robotics. The challenge is that Vocation School students need to be trained in mathematical skills for analysis and learning media at a fairly expensive price.

Keywords: *Vocational High School, Management, Skill, Industrial Revolution.*

1. INTRODUCTION

In Indonesia, formal education has vocational training to better prepare graduates for their majors, entrepreneurship, ready to work, or study in higher education. After a reform in 1998, the different schools were merged into one, namely vocational school (SMK) having 142 spectrums of skills. Furthermore, the development of vocational education was changed in 2008. The Indonesian government changed the ratio of senior high schools: vocational schools from 70%: 30% to 30%: 70%. The establishment of a new school was not balanced with a feasibility study, and this resulted in graduates finding it difficult to get a job [1].

Vocational education has an important role in the national development of every country. One of the most important roles of vocational education is its orientation towards the world of work and the curriculum's emphasis on the acquisition of employable skills[2]. Education is a means to improve the quality of one's life. In taking education one is required to continue learning. Learning

will change three aspects of a person, namely knowledge, attitudes, and skills.

Industry 4.0 will have a significant and widespread influence, particularly on the employment market because robots and machines will eliminate a big number of jobs globally. Of course, vocational education, which may address these difficulties, must have anticipated this[3]. With effective learning management, SMK graduates' issues can be anticipated. The learning process requires a good solution. Understanding the management of learning is an effort to regulate (manage, control) learning activities based on the concepts and principles of learning to make learning objectives successful so that they are achieved more effectively, efficiently, and productively. Education management is the management and implementation of a set of educational tasks, learning effectively and efficiently through the process of planning, organizing, implementing, assessing and evaluating to achieve school education goals.

This paper presents the opportunities and challenges in the industrial revolution 4.0 era with learning management in vocational education specifically in Machining competencies.

2. METHODS

In this study's research technique, a literature review was used. The keywords used to search were vocational education, learning management, industrial 4.0, and industrial 4.0 for vocational education. Theses, journal papers, proceeding papers, and book chapter all been used to collect the documents. Google Scholar, Science Direct, Garuda Portal, and the Google search engine itself were used in the search for the pertinent information. A paper that was written in both English and Indonesian was required.

In this study, the 31 manuscripts that emerged from the document search. The types of reviews of publications in the dataset were displayed in Table 1. The dataset's year of publication was summarized in Table 2.

Table 1. Overview of type publications

Type of Publication	N
Paper Journal	23
Paper Proceeding	7
Book Chapter	1

Table 2. Literature by year

Type of Publication	N
2018 - 2023	25
2012 - 2017	6

3. RESULT AND DISCUSSION

3.1. Learning, management, and skills

Learning orientation has been identified as an organizational value that influences creativity, invention, and knowledge transfer in addition to organizational development[4]. The transfer of knowledge from teachers to pupils is referred to as the learning process. Since students are exposed to change through tactics like gaining particular talents and altering some attitudes, learning can be seen as a change that is permanent in nature[5]. Learning will change three aspects of a person, namely knowledge, attitudes, and skills. In terms of learning at Vocational School, students and teachers need to adapt to current global conditions so that graduates can compete.

Management is used as a means of organizational operations in educational institutions. Education Management Objectives: (a) educator level, (b) ministry-departmental level, (c) institutional level. scope of education management: (a) management of human resources, (b) management of financial resources, (c)

management of material resources, (d) management of educational technology, (e) management of facilities or methods: planning and curriculum development, planning and management of co-curricular activities [6]. when a team combines people and material resources to supervise, plan, strategize, and put the structure of the education system into place, this is referred to as education management. In order to accomplish educational and learning goals, management abilities are required.

Vocational education is a type of educational program that gets students ready for both formal and informal employment. Vocational education is unique in that it emphasizes the relationship between information, skills, and competence as well as the mindset that students need to enter the workforce [7]. Hard skills aid in finding work, while soft talents guarantee employability. To advance in a job, it is crucial to combine hard skills with soft skills. People skills, social skills, and personal professional traits are the three major functional parts that make up soft skills [8]. Therefore, skill is an important factor in a person obtaining a successful goal, including learning goals and work goals. Student attitudes that need to be improved for vocational graduates such as critical thinking, discipline, independence, creativity, and innovation.

Critical thinking is a crucial component of modern educational techniques and frameworks [9]. Students must develop critical thinking abilities if they want to succeed and be independent in the future [10]. Lack of critical thinking skills will be a problem in education [11].

Discipline has an influence on success [12]. The discipline of the students is crucial. Particularly, the principal, the vice principal of academic and student affairs, the counselling instructors, as well as parents, should play their roles in helping to develop the students' sense of discipline and character[13]. Self-respecting human capital can be created through strong self-discipline. Both in the classroom and at home, students can develop their sense of self-worth[14].

The evolution of education at the current stage of social development entails a shift in emphasis from passive knowledge absorption to independent learning[15]. There are a number of aspects that can improve learning independence, and one of them is self-concept. A person's self-concept is their view or perception of themselves, which includes their physical, psychological, social, emotional, moral, and cognitive characteristics[16].

One of the abilities pupils need in the twenty-first century is the ability to think creatively. The 4Cs (communication, collaboration, critical thinking, and creativity) are frequently used to refer to 21st-century talents. The ability to think creatively is helpful in

navigating the fourth industrial revolution. The quick and significant advancement of science and technology during the fourth industrial revolution was a defining feature[17]. The ability to be creative is crucial to learning. Creativity improves the student's attitude toward learning and makes studying more enjoyable. The learner uses imagination to transform the passive information into a product, so activating it. People can more easily manage their daily life challenges and become more productive in adulthood because to the creativity they learn at a young age [18]. Research, discovery, development, study, and exploration of new ideas and breakthroughs in the realm of science and technology require the ability to think creatively. This requires power, energy, and strength.

In today's globalized society, innovation is considered as a crucial personal trait. Research on this phenomenon has been conducted in many fields of study, including administration, education, economics, psychology, and sociology, among others, and is considered to be of multidisciplinary importance [19].

Someone who has the capacity to think critically, independently, creatively, and innovatively can get employment with ease and experience future success.

3.2. An opportunity achieved learning in vocational education

The requirements of the employment market are not specified in training programs or curricula. Employers also found that graduates needed to improve their collaboration, attitude, honesty, and work discipline. Instructors place restrictions on theoretical lessons, which causes graduates to lack expertise in their fields, which has an impact on the employment market. Another challenge is that teachers lack experience in the industry and have minimal skills. Train students in solving problems that exist in the world of work.[20].

As a result, businesses embracing Industry 4.0 begin to value skilled labor differently. The following best describes the trends:

Companies without Industry 4.0 is Trend A. No modifications to direct manufacturing, but effects on indirect production (such as workspaces for Industry 4.0 deployment in the future). Companies with little "Industry 4.0" depth represent Trend B. stagnation or a modest increase in the number of highly trained workers, such as technicians, master craftsmen, and skilled laborers, as well as a discernible rise in productivity. Companies with significant "Industry 4.0" depth represent Trend C. Increase the number of well-qualified skilled employees, master craftsmen, and technicians by 20–30%. Significant decline in the number of semi-skilled, and unskilled workers with low qualifications[21][22].

The opportunities that are currently available for the development of education in the Industrial 4.0 era, among vocational education, must have the following qualities: critical-thinking, problem-solving skills, communication, collaboration, creativity, innovation, information and communications technology literacy, and contextual learning skills [3]. Opportunities arose from existing jobs such as data analysis, 3D printing, and robotics[23][24][25][26].

3.3. Challenging vocational school in industrial era 4.0.

The challenges of vocational school include: (a) uncontrollable establishment of vocational schools; (b) a lack of numerous study programs in higher education; (c) a lack of qualified teachers; (d) facilities and infrastructures; (e) vocational learning; (f) cost; (g) principal's management; and (h) industry involvement [1].

In general, the following difficulties confront vocational education in the 4.0 era: (a) information technology security concerns; (b) production machine dependability and stability; (c) a lack of necessary skills; (d) stakeholders' resistance to change; and (e) the loss of a lot of labor due to automation [3]. The relative cost of equipping vocational classes and workshops and training of technical trainers is very high[27]. In specific, vocational high school graduates in the field of machining have the opportunity to find jobs that require lathe, milling and CNC machining skills [28][29][30][31].

4. CONCLUSION

The industrial era 4.0 had an impact on education in vocational schools. There is a need for competency skills such as critical thinking, discipline, independence, creativity, and innovation. Specific skills include lathe, milling, and CNC competencies. Opportunities and challenges need to be expected by increasing teacher competence as a resource capable of transferring knowledge and skills.

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