ISSN: 2963-2536 (media online)
Proceedings of Malikussaleh International Conference on Multidisciplinary Studies (MICoMS)
Organized by center of Excellence of Technology Natural Polymer and Recycle Plastics

International Conference Proceedings 00058 (2024) DOI: https://doi.org/10.29103/micoms.v4.2024

Teaching Factory Learning Design for Vocational High Schools in Mechanical Engineering

Syamsul Bahri [1]*, Siraj [2], Wildan Zaqqi [3] and Bagas Suanri [4]

[1] Faculty of Engineering, Malikussaleh University, North Aceh, Indonesia; irsyamsulbahri@unimal.ac.id
[2] Faculty of Teacher Training and Education, Malikussaleh University, North Aceh, Indonesia; siraj@unimal.ac.id
[3] Faculty of Teacher Training and Education, Malikussaleh University, North Aceh, Indonesia.
[4] Faculty of Teacher Training and Education, Malikussaleh University, North Aceh, Indonesia.
* Correspondence: irsyamsulbahri@unimal.ac.id

Abstract: The research aims to understand and analyze how the Teaching Factory model can be implemented in vocational high schools, particularly in the field of mechanical engineering. The type of research used is descriptive qualitative research. The research was conducted at Vocational High School in Lhokseumawe, which has already implemented the teaching factory model. Data collection in this study used three techniques: in-depth interviews, participant observation and documentation study. The data analysis technique used is the interactive model which includes: data reduction, data presentation, and conclusion drawing. Teaching Factory model implemented at Vocational High School in Lhokseumawe in the Mechanical Engineering expertise program has proven effective in improving students' competencies and preparing them for the workforce. The integration of theory and practice provided in this model greatly helps students master the skills needed in the industry. However, to maximize the potential of Teaching Factory, improvements in facilities, curriculum, and industry partnerships are needed. With the right improvements, Teaching Factory can continue to make significant contributions in producing skilled and employable workers.

Keywords: Design; Teaching Factory; Vocational High School

1. Introduction

Vocational education still faces challenges in both qualitative and quantitative alignment. The qualitative gap occurs because technological advancements in the industry are progressing rapidly, creating a mismatch in the competencies needed in the industrial world. Meanwhile, the quantitative gap arises due to the between the number of job openings in the industry and the number of job seekers graduating from educational institutions [1]. The job seekers and available employment opportunities has become a issue, especially for those seeking jobs with Vocational High School qualifications [2].

The quality of Vocational High School graduates is considered inadequate and does not meet the requirements for performing high-skill jobs, leading to the highest open unemployment rate among other education levels, with rates of 9.27%, 8.92%, and 8.63%, respectively [3]. Similarly, in Aceh, according to data from the Central Statistics Agency 2023, Vocational High School graduates contribute the most to the open unemployment rate with details 10.55% [4].

Based on the data above, the unemployment of graduates is a significant issue, as it contradicts the purpose, which is to prepare graduates with the skills needed for specific jobs and expertise in certain fields. This problem arises from either the low competence of human resources or the insufficient job opportunities to accommodate all the workforce graduates produced. Vocational High Schools play a vital role in preparing their graduates as potential workers in their respective fields, capable of meeting the workforce demands of the industry. Quality, productive, and job-

ready graduates are expected to enhance the absorption of the workforce and compete in the rapidly changing job market [5-8].

The issues mentioned above, a learning design that combines theory and practice in a balanced way is needed. The Teaching Factory model is a solution to bridge the gap between theoretical knowledge and practical skills required in the workforce. Through the Teaching Factory approach, students can engage directly with real-world industry scenarios while still in school. This method provides opportunities for students to apply their theoretical knowledge in a controlled, practical environment, simulating real industrial conditions. By integrating practical work experience into the curriculum, students will develop the skills needed to meet industry standards, increasing their employability and reducing the skills gap that often contributes to high unemployment rates among Vocational High School graduates.

The Teaching Factory model encourages collaboration between schools and industry partners, offering students hands-on training, internships, and exposure to current industry practices. This not only enhances their technical competencies but also equips them with soft skills such as problem-solving, teamwork, and adaptability, which are highly valued in the workforce. Teaching Factory provides a comprehensive and effective learning environment, ensuring that Vocational High School graduates are more prepared and competitive in the labor market. The research aims to understand and analyze how the Teaching Factory model can be implemented in vocational high schools, particularly in the field of mechanical engineering.

2. Materials and Methods

The type of research used is descriptive qualitative research. The research was conducted at Vocational High School in Lhokseumawe, which has already implemented the teaching factory model. The subjects of this research are the principal, vocational teachers, and students. The data and data sources in this study include both primary data and secondary data.

Data collection in this study used three techniques: in-depth interviews, participant observation and documentation study [9]. The data analysis technique used is the interactive model which includes: data reduction, data presentation, and conclusion drawing [10]. The validity of the data in this study was examined using triangulation techniques. Triangulation is a method of validating data by using something external to the data for verification or comparison purposes. This technique involves seeking other sources related to the focus of the study. To establish data validity, a verification technique is required. Implementation of the verification technique is based on four criteria: credibility, transferability, dependability, and confirmability [11].

3. Results and Discussion

Based on the research conducted at Vocational High School in Lhokseumawe, several significant findings were obtained regarding the implementation of this model, which provide insights into its effectiveness in improving the competencies of graduates and linking education to industry needs.

Effective Integration of Theory and Practice

One of the main findings of this study is the success in integrating theoretical and practical learning. Through the Teaching Factory model, students at Vocational High School in Lhokseumawe are given the opportunity to directly engage in real industrial projects, allowing them to apply the theories they learned in class. This model not only teaches technical knowledge but also practical skills that meet industry standards. It reduces the gap between the theory taught in school and the practical applications needed in the workforce.

Curriculum Relevance to Industry Needs

The curriculum implemented at Vocational High School in Lhokseumawe has been tailored to meet the needs of the industry in the field of Mechanical Engineering. In the Teaching Factory framework, SMK collaborates with various companies to ensure that the material taught in school aligns with the latest technological advancements and industry standards. This curriculum includes the teaching of specific and relevant skills, such as the operation of advanced machinery, production process management, and the application of the latest technology used in the mechanical engineering industry. This helps students not only understand the basic concepts of mechanical engineering but also become proficient in using equipment and technology commonly employed in the industry.

Better Development of Student Competencies

The research findings indicate that students involved in the Teaching Factory model show significant improvements in their competencies, especially in practical skills. Students are not only taught the basic theory but are also given the chance to work directly in real industrial settings. They are involved in production processes, machine maintenance, and solving technical problems encountered on the ground. Through this hands-on experience, students gain skills that are more relevant and directly applicable in the workplace, improving their readiness to enter the labor market.

The Role of Teachers in Competency Development

The success of implementing the Teaching Factory model is also closely related to the role of competent and skilled teachers. Teachers at Vocational High School in Lhokseumawe under go various training and certifications to continuously update their knowledge about the latest technological developments and practices in the industry. This study shows that teachers who have strong industry experience and skills can provide high-quality, relevant learning experiences. Therefore, the professional development of teachers is a key factor in the successful implementation of the Teaching Factory model.

Challenges in Implementation

Although the Teaching Factory model has many advantages, this study also identified several challenges that need to be addressed. One of the main challenges is the limitation of facilities and infrastructure to support industry-based learning. Some of the machines and equipment used in the school do not fully reflect the latest technology available in the industry. Therefore, there needs to be more investment in acquiring equipment and technology that aligns with the current industry requirements.

Additionally, while there is collaboration with some industries, the number and types of industries involved are still limited. Expanding partnerships with more sectors will provide students with a wider variety of experiences and ensure they are better prepared for different challenges in the field.

Impact on Student Job Readiness

One positive outcome of the Teaching Factory model is the increased job readiness of students. By gaining direct experience in the industry, students not only master technical skills but also learn how to work in a professional environment, such as time management, teamwork, and problem-solving. The research shows that graduates who participated in the Teaching Factory program have a higher success rate in securing employment after graduation compared to those who did not undergo similar programs. This indicates that Teaching Factory is effective in preparing graduates who are ready to work in the industry.

Based on the findings, several recommendations have been proposed to improve the effectiveness of the Teaching Factory model:

a. Expanding Industry Partnerships: Vocational High School should expand partnerships with more industries to provide students with a broader range of practical experiences. This will also open more opportunities for students to find jobs after graduation.

b. Investment in Facilities and Equipment: Schools need to improve the quality of facilities and equipment used in learning to ensure they are aligned with the latest technological developments in the industry.
c. Regular Curriculum Updates: The curriculum should be continuously updated by involving feedback from industry partners to ensure that students acquire the skills that meet labor market demands.

By implementing the steps outlined above, the Teaching Factory model can become more effective in preparing vocational high school (SMK) students in the field of mechanical engineering, equipping them to better face the challenges in the industrial world and improving their competitiveness in the job market.

4. Conclusions

Teaching Factory model implemented at Vocational High School in Lhokseumawe in the Mechanical Engineering expertise program has proven effective in improving students' competencies and preparing them for the workforce. The integration of theory and practice provided in this model greatly helps students master the skills needed in the industry. However, to maximize the potential of Teaching Factory, improvements in facilities, curriculum, and industry partnerships are needed. With the right improvements, Teaching Factory can continue to make significant contributions in producing skilled and employable workers.

References

[1] Rojaki et al., Manajemen Kerja Sama Sekolah Menengah Kejuruan dengan Dunia Usaha dan Dunia Industri. *Jurnal Pendidikan Tambusai*, 2021, *volume 5 (3)*, pp. 6337- 6349.
[2] Ixtiarto, B. & Sutrisno, B. Kemitraan Sekolah Menengah Kejuruan dengan Dunia Usaha dan Dunia Industri. *Jurnal Pendidikan Ilmu Sosial*, 2021, *volume 26*, pp. 57-69.
[3] Khurniawan. Priority Strategy For Improving The Effectiveness Of Management in Vocational School of Regional Public Service Agency. *Jurnal Pendidikan dan Kebudayaan*, 2001, volume *6*,pp. 93-106.
[4] Badan Pusat Statistik. *Provinsi Aceh dalam Angka*. Banda Aceh: Badan Pusat Statistik Aceh, 2023.
[5] Dewi, S. S., & Sudira, P. The Contribution of Teaching Factory Program Implementation on Work Readiness of Vocational High School Students in Makassar. *Journal of Educational Science and Technology*, 2021, *volume 4 (2)*, pp. 126–131.
[6] Ismayati, E., Muslim, S., Kusumawati, N., Rahmadyanti, E., Hilmi, M., & Wrahatnolo, T. Critical study of research results about TVET and TEFA's role in social, economic, and education development in the country. *Journal of Education, Teaching and Learning*, 2020., *volume 5 (1)*, pp. 106-113.
[7] Okolie, U. C. A critical perspective on TVET teachers' pedagogical practices: insights into the guiding pedagogical principles in practice. *Journal of Vocational Education & Training*, 2021, *volume 9*, pp. 1-20.
[8] Rianti, A. *Model Pengawasan Keuangan Pada Badan Layanan Umum Daerah* (BLUD). *Jurnal Dialog Islam dengan Realitas*, 2021, *volume 6 (2)*, pp. 239-256.
[9] Bogdan, R.C. & Biklen, S.K. *Qualitative Research for Education: An Introduction to Theory and Methods*. Boston: Allyn & Bacon, 1998.
[10] Miles, M. B. & Huberman, A. M., Qualitative Data Analysis, CA: Sage Publication, 1994.
[11] Lincoln, Y. S. & Egon G.G. *Naturalistic Inquiry*. California: SAGE Publications, 1985.