IJCEE Vol.10 No.1 July 2024, Page 57- 67 ISSN 2598-2931

Indonesian Teaching Factory: The Recent Breakthrough in Education at Vocational High Schools

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Received : 25 July 2024
Approved : 27 July 2024
Published : 30 July 2024

Abstract: *Vocational High Schools (VHS) were established to prepare students to work in specific fields. VHS previously used various learning models, but in recent years, they have focused on The Teaching Factory Learning Model. Some VHS that used other learning models previously produced VHS graduate results that did not meet expectations, contributing to a high unemployment rate in Indonesia. This research aims to assess the implementation of The Teaching Factory Learning Model in VHS in Indonesia. It uses a qualitative research approach with a literature study method. The results of this research are: (1) The Teaching Factory Learning Model is the primary choice of learning model implemented by VHS in Indonesia, (2) Vocational Education in Indonesia recognizes three types of TeFa implementation, including (a) VHS providing space for industrial partners, (b) VHS working with industrial partners to build a shared space outside their location, and (c) VHS conducting learning at the industrial partner's location. The Indonesian government has issued various regulations and revitalized the Teaching Factory to support the successful implementation of this learning model in VHS.*

Keywords: *graduate; models; students; Teaching Factory; VHS*

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INTRODUCTION

Vocational High Schools (VHS) were established to prepare students to work in specific fields, as stated in Article 15 of Law Number 20 of 2003 concerning the National Education System (Pemerintah Indonesia, 2003). The goal of VHS is to produce graduates who are ready to work independently, as entrepreneurs, or in companies or industries. VHS students are expected to meet the demands of society, schools, and the Business and Industrial World (BIW).

The number of prospective students is so large, and this is followed by the increasing emergence of new VHS, which is inversely proportional to the reputation of existing VHS graduates. Indonesian BPS data (2020) shows that VHS graduates have the highest open unemployment rate, reaching 8.49%, compared to other levels of education. This problem is of great concern to all policymakers in the education sector, especially in VHS.

Seeing the above phenomenon, the Indonesian government quickly anticipated the above things and issued Presidential Instruction No. 9 of 2016 concerning the Revitalization of VHS. This instruction includes ten concrete steps to create superior human resources: (1) Revitalize human resources, (2) Build a School Administration System (SAS) based on Management Information Systems (MIS), (3) Link and match with industry, (4) Industry-based curriculum, (5) Teaching Factory, (6) Use of video tutorial media and e-report skills video-based portfolios, (7) Professional Certificate Test, (8) Fulfilment of facilities and infrastructure, (9) Developing local wisdom, (10) The role of VHS as drivers of the local economy (Pemerintah Indonesia, 2016).

The Indonesian government also

issued subsequent policies that support the implementation of the Teaching Factory learning model in VHS. This policy is the launch of The New Teaching Factory (New TeFa) program in 2021. This New TeFa program is assistance intended for VHS that are ready to develop products with industry quality standards. The New TeFa program also provides assistance from the competent industrial world to selected VHS. In this way, it is hoped that the implementation of The Teaching Factory Learning Model will be successful in the selected schools.

One concrete step to revitalize VHS is implementing The Teaching Factory Learning Model. This model teaches theory and skills to students by involving the BIW. This helps students acquire essential competencies relevant to the work field and become entrepreneurial characters. One of Prosser's ideas (1925), which is still relevant and used in vocational education in Indonesia, is that effective learning can be achieved if the environment in which students are trained is similar to the environment in which they will work in the future. Thus, VHSs see the importance of collaborating with BIW. Various breakthroughs have been made, such as industrial work practices, industrial internships, creating production units, and applying The Teaching Factory Learning Model. Since the industry-based VHS development model was launched in 2005, several VHSs have been able to apply TeFa learning, but they have not succeeded. The number of VHSs in Indonesia that have used The Teaching Factory Learning Model continues to increase. Data from The Ministry of Education and Culture shows an increase of 7% in 2021 to 52% of VHS using The Teaching Factory Learning Model (Direktorat SMK, 2021).

This research aims to determine the implementation of The Teaching Factory Learning Model, which has been implemented in VHS in Indonesia. It is hoped that the results of this study can be used as evaluation material for all stakeholders, namely the government, schools, and the industrial world, in improving the quality of The Teaching Factory Learning Model.

RESEARCH METHOD

This research uses a qualitative research approach with a literature study method. Researchers use theoretical studies in the form of articles, books, and other literature related to the values, culture, and norms that develop in the social situation studied (Sugiyono, 2022). The use of a qualitative descriptive approach is carried out with the aim of describing the research results clearly in detail to support and increase the reader's understanding of the research study being conducted. Data collection techniques are carried out by understanding and analyzing data sources originating from scientific articles, papers, proceedings, and books that are appropriate to the research focus. Research data collection will be analyzed in stages. The first stage is reading and understanding all the literature found. Second, collect abstracts from articles and review the contents of reference books. The third stage is constructing essential points found in the literature and adapting them to research studies. The fourth stage is drawing conclusions based on the literature found.

RESULTS AND DISCUSSION

Vocational Education in Indonesia

In 1737, when the Dutch Vereenigde Oostindische Compagnie (VOC) controlled Indonesia, a sailing academy was established, the first vocational school with college status. However, the school was closed in 1755. Around 1853, after more than two centuries of rule, the Dutch reopened vocational schools in Indonesia. This vocational school, known as Ambachts School van Soerabaja or Surabaya Carpentry School, accepts students from Indonesia and the Netherlands.

During Japanese colonialism, everything related to the Netherlands had to be removed. At that time, the Secondary Technical School (STS) in Ciroyom, Bandung, reopened carpentry courses. This school, founded during the Japanese era, received 360 students for three years.

Since Indonesia's independence,

vocational education has improved since implementing the Five-Year Development Plan (Repelita) in 1969. After following vocational education models from other countries, vocational education has gradually gained a place in the Indonesian education system. This started with Repelita V, Law no. 2 of 1989 concerning the National Education System, and continued with PP No. 29 of 1990 concerning Secondary Education, which stipulates several provisions regarding the development of vocational education.

In this period, Minister of Education and Culture Decree no. 490/1992 concerning VHS includes developing production units into the VHS learning process. This production unit produces goods and services using all the resources available in the school and its environment. Starting in 1997, the government implemented Dual System Education (DSE) through the Link and Match concept (Ministerial Decree No. 323/U/1997), which was the beginning of efforts to involve business and industry in vocational education (Pemerintah Indonesia, 1997). With some adjustments, this system adopts the German Dual System model. Theoretically, DSE is considered an ideal education system to increase the relevance and efficiency of VHS. In this application, students' practices in industry are included in the activities. VHS has done a lot to involve the business world. This includes conducting vocational education promotions, signing collaborations with businesses and industries, building internal organizations in schools, and regularly conducting teacher visits to businesses and industries. The formation of the National Vocational Education Council (NVEC) and the Provincial Vocational Education Council results from this effort. Based on Article 15 of Law 20/2003 concerning the National Education System, VHS are intended to prepare students to work in certain fields. This shows that vocational education aims to produce graduates ready to work, both independently and in certain industries.

Vocational education in Indonesia will then enter a new and quite challenging era. The government issued Presidential Instruction Number 9 of 2016 concerning the Revitalization of Vocational High Schools, followed by a memorandum of understanding between relevant ministries to encourage the development of vocational education (Pemerintah Indonesia, 2016). This revitalization is expected to be able to anticipate the development of technology 4.0 and the accompanying disruption so that vocational education must be ready to face it. The next goal is to develop regional potential advantages in Indonesia as a national advantage in creating national competitiveness. VHS Revitalization steps focus on the areas: Human Resources, SAS/SIM, Link and Match with DuDi, Curriculum, Teaching Factory, eReport Skills, Certification Test, Infrastructure, Local Wisdom, and Economic Collaboration.

Vocational Education Governance

Through the national education system in Indonesia, vocational education is defined as secondary education that prepares students to work in certain fields (Pemerintah Indonesia, 2003). This is stated in the National Education System Law of the Indonesian Government Number 20 of 2003 and is valid until now. Vocational education is held at Vocational High Schools (VHS) and Vocational Aliyah Madrasah (VAM), which is confirmed in the government regulations of the Republic of Indonesia, which regulate the management and implementation of education, namely PP Number 17 of 2010 and refined by PP Number 66 of 2010.

In its development, vocational education has experienced changing management from the central government, provincial government, and district/city regional governments. Along with the issuance of Law Number 23 of 2014 concerning Regional Government, the management of vocational high schools was changed back to being under the authority of the provincial government from previously being managed by the district/city government. Management by the provincial government aims to ease the burden on

district/city governments to focus more on managing basic education, early childhood education, and community education. Meanwhile, the provincial government focuses on managing and developing secondary education and contributing to the success of the central government's program in making the 12-year compulsory education program a success.

The provincial education office faces a challenge in carrying out the transition process for managing vocational education. This law focuses on aspects of funding, development, planning, and evaluation. It is hoped that the preparation of several aspects above will run well, will not affect the teaching and learning process, and will, on the contrary, improve the quality of vocational education in the future.

The transition process for managing vocational education can run well in its development. The quality of vocational education has also improved. The Vocational School revitalization program issued by the President in 2016 also stimulated the management of VHS in a better direction. Among other things, there is professional and competency certification for prospective VHS graduates. In the previous national education system law, only higher education had the right to issue professional degrees. Through this change, recognition of the competence of VHS graduates will become more credible, and it is hoped that they will be able to meet the expectations of the business and the industrial world (BIW).

Improving the management of vocational education is also carried out through several steps. The first step is to strengthen the internship program in BIW. It is hoped that the school and BIW will strengthen mutually beneficial cooperation for both parties so that the link and match process can occur well. The process of internship activities has also experienced developments that have given rise to 4-year and 4.5-year VHS programs or what are usually called fast-track VHS. The striking difference is the length of time prospective vocational school graduates take internships and the recognition that the competency of these vocational school graduates is equivalent to D1 and/or D2. Fast-track VHS graduates will receive a VHS certificate, D1/D2 certificate, competency certificate, and internship completion certificate. This program was launched in 2020 and has been tried in 10 vocational schools in Indonesia.

The second step, which is a strategy to improve the management of vocational education, is to organize a Teaching Factory in VHS. Teaching Factory is a development of a production unit, industry is actually present in the middle of the school so that the presence of a factory or company that produces a product is managed by the school. Through Teaching Factory activities, this factory or company becomes a place for students to hone their skills and, at the same time, apply the theories learned in the classroom.

The third step is increasing the human resources of VHS teachers and employees. Good-quality human resources will determine the quality and competence of VHS graduates, who will become better and more competent in facing the industrial world. Improving human resources for teachers and employees in general will also accelerate the achievement of VHS's vision and mission.

The fourth step is to build a school administration system based on a management information system. This step will make VHS management more effective, up-to-date, and professional. Through this step, the quality of VHS graduates becomes the focus of attention and their competence increases.

The next step is to create an industry-based curriculum. One way to achieve the goal of vocational education, which is to produce graduates who have competencies in accordance with BIW, is to adapt the curriculum to be industry-based. Vocational education administrators, including the government and schools, also involve industry in determining the education curriculum.

The sixth step is using video tutorials and e-report skills video-based portfolios. This step is intended so that VHS management also follows the latest developments, namely technological aspects. The Industrial

Revolution 4.0 has resulted in the use of technology and information becoming an inevitability that must be faced. This is in line with the future of BIW, which is the ultimate goal of VHS graduates.

The seventh step is a professional certification body at VHS. The professional certification body (LSP) is a BNSP-supporting institution responsible for carrying out professional competency certification. VHS LSP has the task of developing competency standards, carrying out competency tests, issuing competency certificates, and verifying competency test locations. According to the government, a VHS LSP certificate is mandatory for every VHS graduate. However, the certification itself is not a requirement for VHS graduation. With competency and professional certification, VHS graduates become more recognized and in line with the latest developments in the world of work.

The eighth step is to fulfill the facilities and infrastructure. Improving educational facilities and infrastructure in VHS is one way to produce professional staff who can keep up with advances in science and technology. This will make VHS managers better and ready to achieve achievements and support VHS graduates in becoming more competent.

The next step is to develop local wisdom and drive the local economy. Local wisdom will provide opportunities for community creativity and giving rise to creative industries. This will also enable VHS graduates to optimize local potential in their area and help boost the economy in the area where they live.

The tenth step in improving the management of vocational education is to become a motor for all existing stakeholders. These stakeholders include 12 ministries, 34 governors through provincial education offices, heads of Indonesian National Board of professional certification, and all VHSs in Indonesia. Under the umbrella of Presidential Instruction Number 9 of 2016, the VHS revitalization to improve the governance of vocational education can be carried out comprehensively and successfully to produce VHS graduates who are competent and professional and have an independent and entrepreneurial spirit.

Teaching Factory Learning Philosophy Foundation

In Indonesia, the national education system includes vocational education. Vocational education is secondary education that prepares students to work in specific fields, according to the National Education System Law (Pemerintah Indonesia, 2003). The essentialism philosophy states that vocational education aims to improve intellectual and academic abilities through a specific curriculum (scientific discipline). The vocational education curriculum at VHS is designed to meet the needs of BIW. They provide learners with the knowledge, skills, and attitudes needed to enter the industrial job market. The Indonesian Government Regulation on National Education Standards states that the Competency Standards for Graduates of Vocational Secondary Education Units are to improve intelligence, knowledge, personality, noble morals, and skills to live independently and undertake further education according to their vocational field (Pemerintah Indonesia, 2005).

Pragmatism is the foundation of education, which aims to educate students to become independent. Learning based on a pragmatic philosophy is also based on the knowledge and experience obtained during VHS to face the dynamics in the world of work.

Strand reconstructionist pragmatism is the development of an additional pragmatic philosophy that supports independent vocational education, does not depend on employers, and is ready to become an entrepreneur to create work (Sudira,2016). Based on current practice guidelines, vocational education can change society towards more democratic, proactive, and non-static educational organizations. Justice and equal employment are also part of this philosophy.

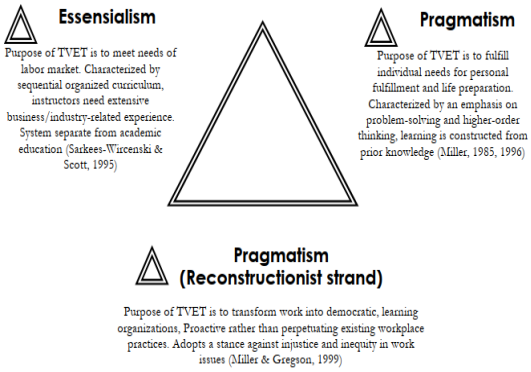


Figure 1. TVET Philosophical Foundation (Rojewski, 2009)

The three philosophical foundations of vocational education in Figure 1 above may be used in the Teaching Factory learning model. This philosophical foundation is also used in vocational education globally, known as technical and vocational education or TVET. Sudira (2016) believes that the three TVET philosophical foundations above can be chosen eclectically and adopted in vocational education in Indonesia. Applying these three philosophical foundations allows applied vocational education to adapt to current developments and is always relevant. For example, in a society with a new order requiring the latest skills, stakeholders can use the philosophical foundation of essentialism. Likewise, in conditions that require the role of creativity in Human Resources (HR), educational institutions and various parties can use the philosophical foundation of pragmatism. Meanwhile, the reconstructionist strain of pragmatism philosophy can be used to accommodate future vocational education needs.

Teaching Factory concept

Sema Alptekin (2001) introduced the concept of teaching factory at Cal Poly State University as a learning strategy for prospective graduates. In the Teaching Factory, small-scale manufacturing factories are replicated as effective and organized places of learning for students in actual conditions in BIW. Teaching Factory learning was then adopted in vocational education as a production/service-based learning model in VHS that adopted industry standards and procedures and was carried out in an atmosphere similar to that which occurs in industry.

The implementation of TeFa must involve the industry as a whole as a relevant party in assessing the quality of educational outcomes in VHS. Implementation of TeFa must also involve the central government, regional governments, and parties involved in making regulations, planning, realization, and evaluation. TeFa-based learning encourages students to become entrepreneurs and involves BIW as the main partner. This makes the factory-based learning concept demand-oriented rather than supply-oriented. Using TeFa, education can be optimized by collaborating with industry so that the learning process increasingly focuses on industry needs. TeFa functions as a liaison between the world of education and business or industry. Collaboration built systematically and based on profitable solutions will encourage technology transfer to improve teacher quality and student soft skills.

TeFa-based learning, or a school theory learning and production-based approach, synchronizes vocational education requirements and standards with industry needs. Zainal Nur Arifin (2014) stated that the Indonesian vocational education system has three known TeFa models as seen in Figure 2.

The first model is that VHS or vocational institutions provide space for industrial partners to build teaching factories in local institutions. The Teaching Factory is a replica of an actual mini factory. VHS students learn to assemble and produce goods for industrial partners, with VHS or vocational institutions responsible for managing the Teaching Factory. For example, a VHS collaborates with the industry through a teaching factory to assemble notebooks.

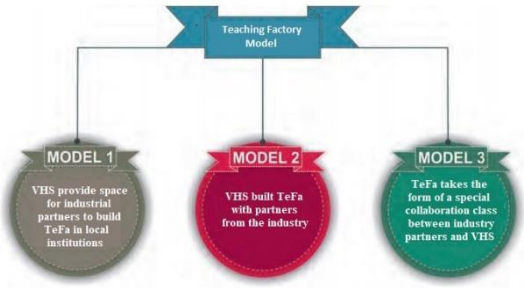


Figure 2. Teaching Factory Learning Model (Arifin, 2014)

The second model is that VHS builds a Teaching Factory with industrial partners located inside or outside the school. The Teaching Factory operates as a separate business unit from VHS, and its management differs from that of VHS. This model focuses on the needs of vocational programs. It is also more expensive to build and operate compared to previous models.

Meanwhile, the third model, Teaching Factory, is a particular collaboration class between industrial partners and VHS. Thus, students practice their skills in two places: laboratories owned by VHS and factories owned by industrial partners. Operational costs for this particular collaboration class can be paid in whole or in part by the company's industrial partners (CSR). Of the three types of Teaching Factory models proposed by Arifin (2014), the first model is the most often applied in VHS. So, the Teaching Factory is a learning model for industry-based students in making a product that will later be returned to the partner industry or can also be sold and distributed through the department's production unit. The production unit has a legal basis, namely Government Regulation Number 29 of 1990 article 29, paragraph 2: "To prepare VHS students to become workers, at VHS a production unit can be established that operates professionally" (Pemerintah Indonesia, 1990).

Objectives of the Teaching Factory Learning Model

As a learning concept at the real level, the TeFa learning model must be implemented. Several essential reasons why TeFa should be in schools include improving the abilities of teachers and students as well as encouraging the creation of an industrial and business culture in schools. Another aim of the TeFa learning model is to create an industrial culture in schools, increase creativity and innovation for teachers and students, as well as a means to develop entrepreneurship. Schools can function as internships and shelters for graduates who have not yet found work in business or industry by implementing the TeFa learning model. This learning can also prepare VHS graduates for work or entrepreneurship. The TeFa learning model will help students choose a field of work that suits their abilities. The school will achieve the goal of increasing students' creativity through learning by doing and providing them with the skills needed in the world of work, thereby expanding the scope of recruitment opportunities for VHS graduates. Another aim of implementing this learning model is to help VHS students prepare themselves to become workers and help them work together with people in the world of work. In addition, it allows VHS students to practice their skills so they can make decisions about the career they will choose.

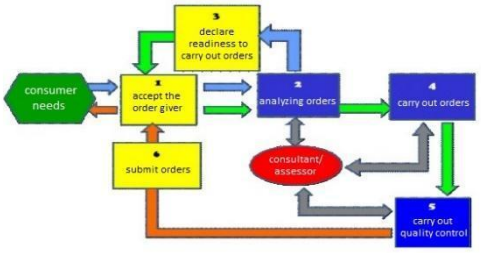
Teaching Factory can achieve aligned learning goals, namely preparing more professional graduates through instilling modern manufacturing concepts to compete in the industry (Alptekin et al., 2001). Apart from that, they can also improve the implementation of the VHS curriculum by focusing on modern manufacturing concepts and providing viable solutions to the technological dynamics of integrated businesses. Receiving technology and information transfer from partner industries, especially in student and teacher activities during learning, is an additional goal of implementing the TeFa learning model. Apart from that, it prepares VHS graduates to work or become entrepreneurs.

Teaching Factory Syntax

The Teaching Factory learning syntax can use PBET/PBT syntax or the syntax

implemented at Cal Poly – San Luis Obispo USA (2001) with steps adapted to skill competencies. The first step is product design; at this stage, students develop new products, create recipes or daily necessities (consumer goods), and design contemporary shows by drawing, creating scripts, or designing on a computer or manually with specification data. The second step is to create a prototype. According to specification data, it contains activities to develop new products/creations/testers as prototypes. The third step is validating and verifying the prototype. Students validate and verify the dimensions of specification data from prototypes/new creations/testers created to obtain approval to be suitable for production/performance. The fourth step is to make mass products. The activity allows students to develop a schedule and number of products/performances according to the specified time.

The research results conducted by Hidayat (2011) succeeded in developing a separate version of the Teaching Factory Learning Model steps. These steps are known as the TF-6M model scheme, as seen in Figure 3.. The first step is to receive the order. In this learning step, students act as order recipients and communicate with the order giver regarding the desired order/service. Effective and polite communication occurs and records the wishes/complaints of the order giver, for example, at smartphone repair outlets or hotel room reservations. The second step is to analyze the order. In this second step, students act as technicians to carry out an analysis of the order giver's order regarding product/service items concerning detailed drawings, specifications, materials, processing time, and price under the supervision of the teacher who acts as a supervisor. The next step is the third, stating readiness to carry out the order. In it, students express their readiness to work based on the analysis results and competencies, fostering motivation and responsibility. The fourth step is executing the order. It is carried out according to the demands of work specifications generated from the order analysis process. Students, as workers, must comply with predetermined work procedures. They must strictly adhere to work safety and work steps to produce workpieces that meet the specifications specified by the customer. The fifth step is evaluating the product. The work item/service is assessed by comparing the resulting work item/service parameters with the parameter data in the order specifications or specifications in the service manual. The sixth step is to submit the order. In this final step, students submit orders for work items/services after ensuring all order specification requirements have been met, resulting in productive communication with customers.



Picture 3. TF-6M Model Schematic (Hidayat, 2011)

Teaching Factory Development

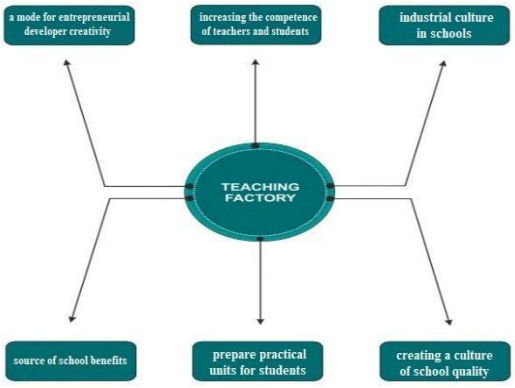


Figure 4. Teaching Factory Development Objectives (Direktorat PSMK, 2017)

The learning objective in the TeFa Learning Model is to improve the character and work ethic (discipline, responsibility, honesty, cooperation, and leadership) needed in BIW as seen in Figure 4. This learning objective can change the quality of learning

outcomes from learning based on competency to learning based on the ability to produce goods and services. This learning facility is also used to develop technopreneur creativity and build a culture of entrepreneurship.

TeFa-based learning must be based on several essential components that support the learning process. Block schedules, lesson plans, job sheets, products, and VHS graduates are elements of the Teaching Factory initiated by the German Agency for International Cooperation (GIZ) in Indonesia. The block system learning model supported by lesson plans and job sheets can be used to implement the Teaching Factory. Products are made according to industrial partners' requests based on this lesson plan and job sheet. The learning process at TeFa is related to making this product. The creation of competent VHS graduates is significant apart from the aim of creating products that meet industry demand. The Factory Teaching scheme is shown in the Figure 5.

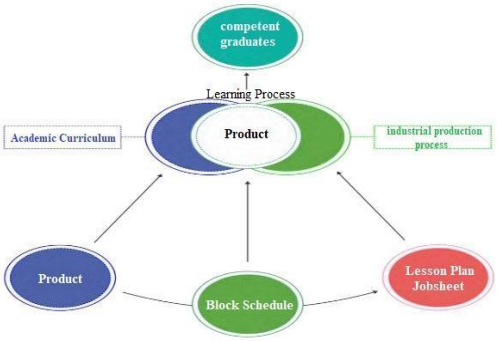


Figure 5. TeFa-GIZ component schematic (Direktorat PSMK, 2017)

The basic components required for TeFa-based learning have been described in Figure 6. Each school can flexibly complete which parts are considered important for its success. Alternative options for TeFa-based learning components can be implemented.

The first component is competency standards. These competency standards are used to run the Teaching Factory and meet industry requirements. With teaching based on industrial competencies, students are expected to be able to adapt to the needs of the industrial world.

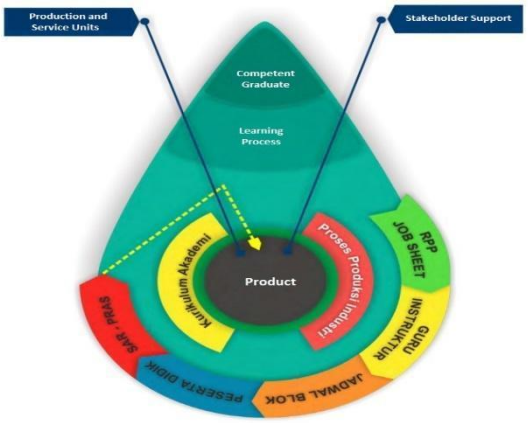


Figure 6. Alternative components in TeFa (Direktorat PSMK, 2017)

The second component is the instructor or teacher. They must have academic qualifications and experience in the industry. They must also be able to transform knowledge and "know-how" while supervising processes so they can deliver finished products on time.

The third component is students. In TeFa learning, students are classified based on their academic quality, talents, and interests. Students who balance academic quality with skills, talents, and interests will be enthusiastic about participating in this program. Meanwhile, students with less than one of these qualities are advised to take the easiest part.

The fourth component is learning resources. The learning process at TeFa uses production work. Industrial orders or standard products can be a type of production work. First, instructors must understand this product as a tool to increase competency through its function, dimensions, tolerances, and turnaround time.

The fifth component is equipment and tools, or toolkits. In this component, things that need to be considered are optimal tool and equipment maintenance, investing in procuring equipment for teaching factory activities, utilizing these tools and equipment to help students improve their skills, and ensuring that production work is completed with the best quality.

The sixth component is the

assessment of learning achievement. The Teaching Factory assesses competent students through product completion. The assessment standards must refer to the industry producing the component or equipment.

Recognition of competence is the seventh component. TeFa uses the National Competency Assessment to assess student abilities. Certified assessors evaluate students' abilities to complete work tasks regulated by the Competency Standards Agency (CSA). The Department Production Unit (DPU) is the eighth component. This unit is a forum for Teaching Factory products that can be distributed to the community. The department production unit (DPU) is responsible for TeFa's production results, which enable VHS students to become technopreneurs.

CONCLUSION

Based on the study results and discussion, The Teaching Factory Learning Model is the learning model of choice implemented by VHS in Indonesia. Vocational Education in Indonesia recognizes three types of TeFa implementation, including (1) VHS provides space for industrial partners, (2) VHS, together with industrial partners, builds shared spaces outside their locations, and (3) VHS conducts learning at industrial partner locations. The Indonesian government has issued various breakthroughs in the form of regulations and the revitalization of the Teaching Factory to support the successful implementation of this learning model in vocational schools.

SUGGESTIONS

The Indonesian government, industry partners, and VHS have implemented The Teaching Factory Learning Model in Indonesia. However, the close cooperation that has been established and is clearly stated does not guarantee the success of implementing this learning model. Further research is still needed to explore various obstacles and formulate strategies so that education in VHS achieves the target, namely, preparing students to work in specific fields.

REFERENCES

Alptekin, S. E., Pouraghabagher, R., Mcquaid, P., & Waldorf, D. (2001). Teaching Factory. *Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition*. https://digitalcommons.calpoly.edu/ime_fac/17/

Arifin, Z. N. (2014). *Model Teaching Industri PNJ*. https://perpustakaan.pnj.ac.id/readmore/5ee2f30690e21444815e3ec5/model-teaching-industri-pnj

BPS. (2020). *Keadaan Ketenagakerjaan Indonesia Februari 2020*. https://www.bps.go.id/pressrelease/2020/11/05/1673/agustus-2020--tingkat-pengangguran-terbuka--tpt--sebesar-7-07-persen.html

Direktorat PSMK. (2017). *Strategi Implementasi Revitalisasi SMK: Vol. I*. Direktorat PSMK.

Direktorat SMK. (2021). *Data Pokok SMK 2021*. https://datapokok.ditpsmk.net/

Hidayat, D. (2011). Model Pembelajaran Teaching Factory Untuk Meningkatkan Kompetensi Siswa Dalam Mata Pelajaran Produktif. *Jurnal Ilmu Pendidikan*, *17*(4), 270–278. http://journal.um.ac.id/index.php/jip/article/view/2729

Pemerintah Indonesia. (1990). *PP 29/1990 tentang Pendidikan Menengah* (pp. 1–20). https://jdih.kemdikbud.go.id/detail_peraturan?main=3135

Pemerintah Indonesia. (1997). *SK_Mendikbud_no_323_U_1997_ttg_PSG* (pp. 1–14). https://www.scribd.com/document/378447379/SK-Mendikbud-no-323-U-1997-tentang-PSG-docx#

Pemerintah Indonesia. (2003). *UU 20/2003 tentang Sistem Pendidikan Nasional* (pp. 1–26). https://pusdiklat.perpusnas.go.id/regulasi/download/6

Pemerintah Indonesia. (2005). *PP 19/2005 tentang Standar Nasional Pendidikan*

(pp. 1–95). https://www.regulasip.id/book/741/read

Pemerintah Indonesia. (2016). *Inpres 9/2016 tentang Revitalisasi SMK*. https://www.kemdikbud.go.id/main/index.php/files/download/e451d9ec3a04121

Prosser, C. A., & Allen, C. R. (1925). *Vocational Education in a Democracy*. Century Co.

Rojewski, J. W. (2009). A Conceptual Framework for Technical and Vocational Education and Training. In *International Handbook of Education for the Changing World of Work*. Springer Netherlands. https://doi.org/10.1007/978-1-4020-5281-1

Sudira, P. (2016). *TVET Abad XXI Filosofi, Teori, Konsep dan Strategi Pembelajaran Vokasional* (1st ed.). UNY Press.

Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Alfabeta.