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STRENGTHENING VOCATIONAL LEARNING THROUGH TEACHING FACTORY IMPLEMENTATION IN VISUAL COMMUNICATION DESIGN

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Abstract
This study aimed to describe the implementation of the Teaching Factory (TEFA) learning model in Vocational High Schools (SMK), especially in the Visual Communication Design Study Program, using descriptive qualitative methods and purposive sampling techniques. Data were collected through observation, interviews, and documentation. Teaching Factory (TEFA) learning model is designed to integrate teaching and learning activities with real production processes in order to provide practical work experience to students through a production-based approach. The results of the study indicated that TEFA learning at SMK Al-Falah consists of seven systematic steps, namely: implementing design briefs, receiving orders, analyzing orders, stating order readiness, working on orders, conducting quality control, and submitting orders. One prominent characteristic is the "implementing the design brief" stage as a form of adjustment to the needs of the printing industry. This finding showed that the TEFA model not only bridged theoretical and practical learning but also provided a contextual, applicable learning experience that aligns with industry demands. Emphasizing TEFA learning not only represented the real production process but also bridged the gap between school learning and the world of work. Furthermore, it provided real-world work experience and improved students' overall competency, both in terms of technical skills (hard skills) and socio-professional skills (soft skills).

Keywords: industry, skill, teaching factory, TEFA, visual communication design, vocational high school, world of work

Introduction

The changes occurring in Indonesia's economic structure, especially in Jakarta, reflect the impact of increasingly complex technological developments and industrial dynamics. According to (Nurarifin et al., 2024), the Indonesian economy is experiencing growth that has led to changes in the structure of the Indonesian economy. This report shows that the Indonesian economy remains heavily dependent on three main sectors: agriculture, processing, and trade, which collectively account for nearly 45% of total economic activity. Although these sectors remain dominant, their growth is below the national average, indicating stagnation and the risk of premature deindustrialization. On the other hand, the transportation and warehousing sector experienced significant growth, reaching 8.64%, followed by the food and beverage sector with growth of 8.33%. To achieve sustainable and inclusive growth in the future, collaborative efforts between the government, the private sector, and the community are needed to address fundamental issues and maximize existing economic potential (Nurarifin et al., 2024).

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Data on the open unemployment rate (TPT) for Vocational High School (SMK) graduates, based on (Badan Pusat Statistik, 2025), are considered the highest compared to other educational levels over the past four years. In 2021, the TPT for SMK graduates reached 11.13%, then decreased to 9.42% in 2022, then slightly decreased again to 9.31% in 2023, and slightly decreased again to 9.01% in 2024. Although there has been a decline each year, this unemployment rate still indicates that Vocational High School (SMK) graduates experience significant difficulties in entering the workforce. This condition is evidence that the skills possessed by Vocational High School (SMK) graduates are not fully aligned with industry needs. This challenge is also related to the rapidly changing dynamics of the labor market, lack of work experience, and limited access to additional training. This indicates the need for improvement efforts, both from the government, schools, and industr(Presiden Republik Indonesia, 2016), to improve graduate skills to better align with the needs of the workforce.

Therefore, the education sector, particularly Vocational High Schools (SMK), plays a central role in responding to changing workforce needs by ensuring that the learning process is not only theoretical but also practically relevant through active collaboration with industry. Industry support is essential to improve graduate quality and ensure their competencies align with the needs of each specialty program (Sudiyono, 2020). In the above context, structural unemployment will become a critical issue. The way to address this problem lies in the world of education. It is crucial for the Indonesian education system, particularly Vocational High Schools (SMK), to involve industry in the learning process. This aims to align the curriculum with the ever-evolving needs of industry, as stipulated in Law Number 20 of 2003, Article 15 concerning the National Education System (Presiden Republik Indonesia, 2003), which states that vocational education is secondary education that prepares students primarily for work in specific fields. Furthermore, Article 35 states that national education standards encompass graduate competencies that align with the needs of the workforce. In the educational process at Vocational High Schools (SMK), the involvement of industry in the learning process is very important, because the development of technology and production/service procedures/processes is very rapid (Subdirektorat Kurikulum, 2017).

According to the (UNESCO, 2024), the quality of education in Indonesia shows the need for improvement in various important aspects. Aspects that need attention are educational infrastructure, teacher training, and monitoring and evaluation of learning quality. Meanwhile, the "Production Learning" concept of Teaching Factory aims to transfer the real production/manufacturing environment into the classroom through the adoption of industrial projects in the context of academic practice (Rentzos et al., 2014). Therefore, by implementing a holistic and integrated approach, it is hoped that Indonesia can achieve national and global targets in quality education.

The transformation of vocational education, particularly at the Vocational High School (SMK) level, needs to be directed at efforts to improve and align the curriculum with competencies that are in line with the needs of the world of work (link and match), and supported by the active involvement of the business world and the industrial world in the development of teaching factories and the provision of supporting infrastructure (Presiden Republik Indonesia, 2016).

The importance of flexibility in the national education system cannot be overlooked. The government needs to periodically reform the education system to ensure it meets the needs of the times and provides equal learning opportunities for all students. A well-designed education system will impact the quality of education received by students, enabling them to gain learning experiences tailored to their individual needs and potential. An appropriate education system will result in students not only gaining relevant knowledge and skills but also being better prepared to face challenges in the workplace and making a positive contribution to society. This demonstrates the importance of

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developing an education system that is responsive and adaptive to the needs of the times to create a competent and competitive generation.

During his working visit to Karawang, the Minister of Education, Culture, Research, and Technology, Abdul Mu'ti, expressed his hope that vocational schools (SMK) would become educational institutions capable of producing a generation of creative, superior, and character-driven students. He emphasized three main policy directions in strengthening vocational education. First, the importance of competency certification as a preparation for vocational school graduates entering the workforce. Second, the development of specific skills programs that are adaptive to industry needs. Third, strengthening an entrepreneurial mentality in students so they can create job opportunities independently and not solely rely on available employment opportunities (Direktorat Jenderal Pendidikan Tinggi, 2023).

According to Charles Prosser's theory in the book "Vocational Education in a Democracy, (Prosser & Quigley, 1950) in (Usman & Darmono, 2016), it states that there are 16 principles of vocational education and vocational education states that there are 16 basic principles of implementing effective and efficient vocational education, one of which is the importance of establishing partnerships between vocational schools and the business/industrial world (Usman & Darmono, 2016). In line with this principle, the Teaching Factory (TEFA) learning model has its own learning syntax designed to replicate the industrial environment into the world of education, through the stages of production planning, production implementation, evaluation of work results, and reflection on learning. These stages not only instill technical skills, but also ensure that students' learning experiences take place systematically and contextually in accordance with the real world of work.

Therefore, the implementation of Teaching Factories in Vocational High Schools (SMK) is a crucial step in addressing these challenges. Through this learning model, students not only learn theory but also engage directly in production-based work processes that mimic the industrial world. The TEFA learning model will operate like a factory within the school, bringing a hands-on approach related to actual industry standards and procedures. The implementation of teaching factories in vocational high schools will encourage the development of mutually beneficial collaboration mechanisms between vocational high schools and the industrial and industrial sectors. This will ensure that vocational high schools automatically align with industry/service developments in managerial transfers, curriculum developments, technology, and other areas. Synergy between vocational high schools and industry is a key focus of teaching factories, where teaching factories will act as a bridge for collaboration between schools and industry. The development of the Teaching Factory model in vocational schools needs to be based on student competencies and the principle of linking and matching schools to the industrial world. To be effective, this development must also involve the active involvement of the government as a policymaker in vocational education (Wahjusaputri & Bunyamin, 2022).

The Chairperson of Commission X of the Indonesian House of Representatives, Hetifah Sjaifudian, expressed her high appreciation for the Teaching Factory (TEFA) program which is now increasingly being implemented in Vocational High Schools (SMK) and vocational colleges (Anonim, 2024). According to Hetifah, the assumption that vocational high schools contribute to unemployment is no longer relevant. In recent years, the unemployment rate among vocational high school graduates has continued to decline. More graduates are now employed, and some have even become entrepreneurs. According to Haijakarta.com (Kusuma, 2024), the Acting Head of the Jakarta Education Agency, Purwosusilo, explained that there are currently 559 vocational high schools in

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Jakarta, comprising 73 public schools and 486 private schools. Of these, 110 have implemented industrial classes in collaboration with 281 industries.

Because, the collaboration between vocational schools and industry in the Teaching Factory learning model has a significant positive impact. Through this model, a systematic and planned partnership mechanism is established, based on the principle of mutual benefit (win-win solutions). The Teaching Factory serves as a bridge between vocational education and industry, thus creating a balance (checks and balances) in the educational process at vocational schools. Thus, the alignment between what is taught in schools and the needs of the job market (link and match) can be continuously maintained and improved (Purnamawati et al., 2022).

One of the private vocational schools in South Jakarta that has implemented TEFA with rapid development is SMK Al Falah. The above is supported by the statement that the researcher obtained when the researcher was conducting a preliminary study at SMK Al Falah. When the researcher conducted an interview with the Principal of Public Relations, Mr. Muklis, regarding the implementation of the Teaching Factory (TEFA) learning model at the school. Mr. Muklis explained that it was true that the government had recommended that all vocational schools implement the TEFA learning model. Mr. Muklis also explained the benefits felt by the TEFA, namely in the absorption of graduates into the workforce. Before the implementation of TEFA, SMK Al Falah faced difficulties in helping their graduates find jobs. However, after TEFA was implemented, the school has a special strategy to help graduates enter the workforce, namely by utilizing the collaboration that has been established with several partners/companies. These companies will routinely ask SMK Al Falah graduates to work at their place every year because these companies have directly seen the competency of SMK Al Falah students during their visits to the school. Mr. Muklis also stated that each major at Al Falah Vocational School has its own opportunities for implementing TEFA learning, including AKL, MPLB, TJKT, and DKV.

Based on the background compiled and supported by primary and secondary data, this study aims to answer the following research question: How is the implementation of the Teaching Factory (TEFA) learning model in the DKV study program at Al Falah Vocational School?

Literature review

Teaching Factory (TEFA)

The Teaching Factory (TEFA) learning model emerged in response to the need for vocational education to be more relevant to the evolving demands of industry. TEFA learning emphasizes the importance of linking the school curriculum to the needs of the business and industrial world (DUDI), necessitating regular evaluation to ensure this alignment is maintained (Sunaryo et al., 2023). Conceptually, a Teaching Factory is a learning activity in which students are directly involved in the production process, whether producing goods or services, within the educational institution. This activity not only provides real-world experience for students but also creates added value and benefits for all parties involved (Putra & Suyanto, 2021). TEFA is understood as a learning model that integrates curriculum competency achievement with actual production processes in accordance with industry procedures and standards. This process aims to produce graduates who are not only technically competent but also possess strong character. The resulting products, whether goods or services, serve as the primary learning medium (Directorate of Vocational Secondary Education (DIKMENJUR, 2023).

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In its implementation, TEFA aims to align the development of skills, knowledge, and attitudes holistically, in line with what is suggested by Directorate of Vocational Secondary Education (2021) that TEFA can be achieved through thematic integration in normative, adaptive, and productive learning, thereby making the learning process more contextual and meaningful (Khurniawan, 2016). also emphasized that this concept is a form of real synergy between vocational education units and the industrial world, where the learning process is not only theory-based but also oriented towards industrial products and services. Thus, graduates will be better prepared to face competition in the job market because they have been trained directly in the context of the real world of work. Hidayat (2015) explains that the Teaching Factory learning model follows a systematic syntax that guides the learning process step by step, beginning with receiving the order, analyzing the order, declaring readiness to work, working on the order, conducting quality control, and finally submitting the order to the customer.

This sequence is illustrated in the following flowchart, which shows how students are actively involved in theoretical and practical understanding in an authentic industrial context.

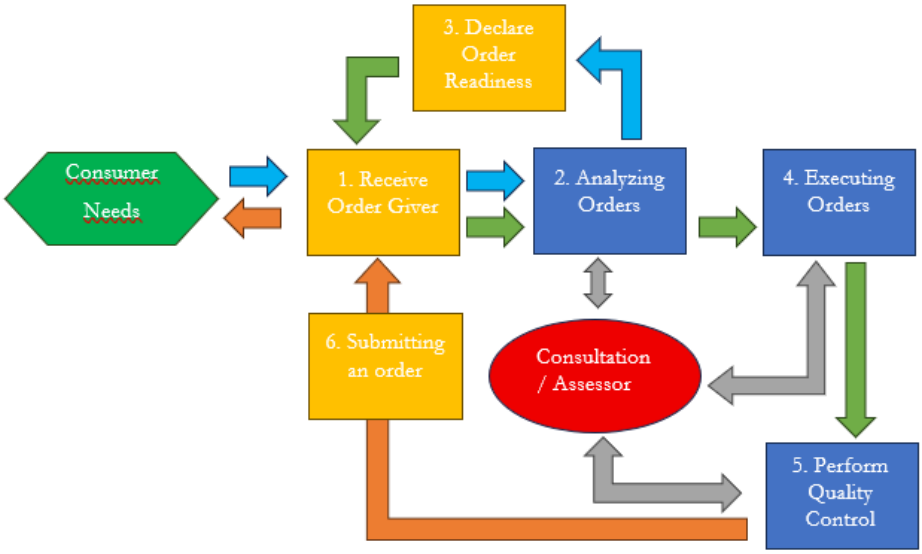

Figure 1: *Teaching Factory Learning Model Syntax*
Note adapted from Hidayat, D (2015). Model TF-6 (2nd ed.).

The image shows the Teaching Factory (TeFA) process flow, which begins with customer needs and continues with the school or production unit receiving an order. Once the order is received, an analysis is conducted to assess feasibility and resource readiness. If deemed ready, the order is processed by students under the guidance of teachers and in accordance with industry standards. The finished product then undergoes a quality control process involving consultants or assessors as quality control. Once the product is deemed suitable, the order is returned to the customer. This entire process is designed to train students in real-world work situations, familiarize them with industry standards, and enhance the skills and competitiveness of vocational school (SMK) or other vocational education graduates.

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Receiving the order giver

The step of receiving the order giver is in the form of a communication activity. This means that students act as employees/workers receiving and serving guests who have requests. In the process of communication about orders, a relationship will be established between workers and order givers so that they can be mutually beneficial. This stage emphasizes communication interactions, where students acting as service staff receive work requests from clients and responsively convey their readiness to follow up and complete the task (Riwayani et al., 2024).

Analyzing orders

The step of analyzing orders is the activity of analyzing orders given by the order giver with the hope that the order can be processed into finished goods according to the demands of the description of the order giver. As workers, students are required to be able to provide answers in a short time, so they require high confidence to provide answers. Based on this, students are required to have adequate knowledge to be able to analyze orders correctly and precisely. In this step, students can consult with their teachers to strengthen their confidence between accepting or rejecting orders.

Declaring readiness to work

The step of stating readiness to work on an order is a statement of readiness from students to work on an order according to the specifications or wishes of the person giving the order. If students are not sure they are able to fulfill the request, this statement is impossible. However, if students state their readiness to accept an order, then students directly make a promise that must be kept with the person giving the order. Therefore, commitment and ability or work competence are needed in order to be able to raise motivation, responsibility, and work ethic from students.

Working on an order

The step of working on an order is the process of making a product that includes carrying out tasks according to the work specification requirements that have been produced from the previous order analysis process. Students who work as employees/workers must comply with the work procedures that have been determined in order to produce products that are in accordance with the specifications of the orderer. In addition, students must seriously comply with work safety protocols and work procedures in order to get maximum products.

Conducting quality control

The steps to conduct quality control are where students who act as workers assess the products they have worked on. The method of assessing the products produced is by comparing the products with the specifications of the orders received after analyzing the previous order. This step requires students to be honest, careful, and precise in their work. What students must understand is that dishonesty will harm the trust of the order giver and will also have an impact on the loss of trust in the next order giver. The supervision process is implemented as part of an evaluation involving various

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stakeholders. TEFA's performance assessment takes into account cost efficiency and is also aimed at strengthening an industry-oriented work culture (Casmudi et al., 2022).

Submitting the order to the order giver

The step of submitting an order is an activity that prioritizes communication. In order to be able to communicate well, students must have confidence that the products they produce will be accepted by the order giver, because they have met the specifications of the order giver's wishes. This will allow workers to communicate without feeling pressured, thus allowing productive communication to occur.

Methodology

Research design and approach of the study

This study employed a qualitative research design with a descriptive approach, which was appropriate for examining the implementation of the latest learning model in vocational high schools (SMK) (Sugiyono, 2018). In this study, the researcher functioned as the primary instrument (Sugiyono, 2018), directly collecting data through observation, interviews, and field documentation. The researcher was actively involved at all critical stages, from receiving client orders to conducting quality control and delivering the final product. This direct engagement not only enhanced the researcher's contextual understanding but also strengthened the credibility and accuracy of the data, enabling rich, real-time, and valid observations.The results of this study emphasized meaning rather than generalization (Sugiyono, 2018), with the aim of gaining an in-depth understanding of the production-based learning process, which consists of the following steps: implementing a design brief, receiving an order, analyzing the order, confirming order readiness, executing the order, conducting quality control, and delivering the order. The data collected are presented descriptively to provide a clearer understanding based on the findings obtained in the field.

Research site and participants

This research was conducted at SMK Al-Falah Jakarta and involved four groups of informants: the principal of SMK Al-Falah, the deputy of public relations, two DKV teachers, and fifteen students. The principal played a key role as the coordinator, overseeing the planning, implementation, and development of the Teaching Factory program. The deputy of public relations acted as an intermediary between the school and external partners, as the Teaching Factory learning model requires collaboration with industry and clients. The DKV teachers were identified as important data sources because they serve as facilitators and supervisors of all Teaching Factory learning activities. Since this learning model is specifically applied in the DKV study program, the DKV teachers function as facilitators, mentors, and main instructors in every Teaching Factory activity at SMK Al-Falah. In addition, the study included representatives from the tenth-grade DKV students, as they have directly experienced Teaching Factory learning, either through practice sessions or by serving real clients.

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Data collection and analysis

Data sources were selected using purposive sampling to ensure a comprehensive representation of perspectives. Data were collected through interviews, observations, and documentation. The validity of the data was tested using source triangulation and technique triangulation. Data analysis was conducted by organizing the data into categories, breaking them down into units, synthesizing the information, arranging it into patterns, identifying key findings, and drawing conclusions.

Data were collected through semi-structured interviews to gain deeper insights into students' experiences with the Teaching Factory (TEFA) learning model. The interview guide consisted of ten questions, categorized as follows: questions 1–6 addressed the systematic steps of TEFA learning, questions 7–8 explored the skills students acquired through these steps, and questions 9–10 focused on the role of each learner in the TEFA process. The interviews were conducted directly in the TEFA room at SMK Al-Falah.

Data analysis in this study employed a thematic analysis approach. Referring to Sugiyono (2018), the process consisted of three stages: (1) data reduction, (2) data display, and (3) conclusion drawing and verification. In the reduction stage, the researcher carefully selected and simplified interview transcripts to focus on information relevant to the research objectives. In the display stage, the reduced data were organized into themes and subthemes to highlight emerging patterns. Finally, in the conclusion drawing and verification stage, the researcher interpreted the findings, compared them with existing theories, and verified their consistency to ensure validity. Through these steps, the researcher systematically identified key themes, particularly the systematic steps in the Teaching Factory (TEFA) learning process.

Results

This study addresses three main focuses: (1) how the syntax of the Teaching Factory learning model is implemented at Al-Falah Vocational School, (2) what skills students acquire through this model, and (3) what roles students play in Teaching Factory learning. The findings are presented based on a thematic analysis of data collected through interviews, observations, and documentation.

Table 1. *Learning Outcomes with the Teaching Factory Learning Model*

Themes	Sub-themes
Systematic steps in learning/ Syntax of learning models	Implementing design brief, Receiving order, Analyzing order, Declaring order readiness, Working on order, Performing quality control, and Submitting order
Skills acquired	Hardskill and Softskill
The role of students in learning	Operator and designer

Note: data processed by researchers on July 4, 2025

Systematic steps in learning

The implementation of the TEFA model at Al-Falah Vocational School consists of seven main stages that represent the syntax of production-based learning. The difference lies in the inclusion of

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the initial stage of implementing the design brief, which is not found in references such as (Hidayat, 2015). This syntax describes the production process from the preparation stage to the delivery of the product to the client. The results are described as follows:

Table 2. *Syntax and Learning Implementation in TEFA SMK Al-Falah*

No	Learning Steps (Syntax)	Description
1	Implementing design brief	Translating client expectations into concept designs through brief interpretation and planning.
2	Receiving order	Discussing capability and order deadline based on brief difficulty.
3	Analyzing order	Checking materials, machines, and feasibility. Includes partnership model inspired by China's business strategy.
4	Declaring order readiness	Declaring ability or rejecting order if time constraints and capacity don't match.
5	Working on order	Core production process using machinery, under teacher supervision, adhering to SOPs.
6	Conducting quality control	Quality check before delivery, especially color, layout, accuracy.
7	Submitting order	Done via pickup or shipping (at client's expense), depending on client preference.

Note data processed by researchers on July 11, 2025

Implementing the design brief

The activities in this syntax are that the customer who provides the Pre-order is only a brief (Verbal) where students will be asked to translate the brief into the form of a design expected by the client/customer. The activities carried out in this syntax are: Understanding the Contents of the Brief where students are able to identify the needs of the client/customer and understand the target audience, main message, and desired visual style. Planning the Design Process such as in the timeline or work stages in the design process

Creating an Initial Concept (Sketch/Rough Design) where students are able to express ideas based on the brief and do not forget that each idea is matched again with the important points of the brief. This is where the students' abilities are tested, because they will be ordered by the teacher to design according to their own level of imagination without having to see recommendations from the internet or anywhere else. Start designing and continue with testing and Reviewing the Design. Where students will compare the results of their designs with the contents of the brief. Revision or finalization, communicating again regarding whether it is appropriate or the need for improvements that may not be appropriate between the design and the brief from the client/customer.

Receiving orders

Activities in this syntax are carried out after students declare themselves capable of implementing the design brief from the client/customer because the level of difficulty in the brief varies. Before accepting, they must first discuss the ability to complete this order. After that, if they are able to do it, they will proceed to the stage of discussing and negotiating the order deadline.

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Analyzing orders

Activities in this syntax are by conducting an analysis as much as possible to receive incoming orders, starting from the availability of materials and ink. TEFA at this vocational school also applies a business system from a neighboring country, namely China. If the order is outside the list of products offered, they will still accept orders through cooperation with external parties to produce their products. They apply this to minimize disappointment from a client/customer.

Declare order readiness

After various discussions and analysis related to incoming orders, then students will declare their readiness to work on orders. The category of rejected orders is if the client/customer gives a deadline that is too fast but on the one hand the student is busy with activities at school, after bargaining the deadline does not find a way then the order will be rejected.

Work on Orders

Producing goods is the core activity of Teaching Factory learning. In using machines or printing tools, students will always be accompanied by teachers. This aims to minimize work accidents and ensure that students always follow the SOP in operating the machines.

Conduct Quality Control

This activity is carried out while students are operating the machines and after the product printing is complete. Ensure that before being given to the client/customer, the product is in accordance with the order, from color to design

Submitting orders

In the submission of orders, the client/customer picks up directly at the SMK. Submission can also be done by expedition, but the shipping costs are borne by the client/customer. This is according to the request of the client/customer, willing to pick up directly or through a shipping service. SMK Al-Falah decided to add 1 step in the Teaching Factory learning process because TEFA at this SMK is engaged in printing, where receiving brief designs will also be one of the reasons for people to order here. Helping to suggest a design to be printed or finding a solution together will create a sense of comfort from clients/customers for the service at TEFA SMK Al-Falah.

Skills gained

Students realized the difference in learning when using the Teaching Factory learning model, because through Teaching Factory they feel required to develop and are much more active during learning. The practical learning experience in the Teaching Factory is far more extensive than the theoretical learning. Students gain many new skills ranging from soft skills and hard skills, which are the skills that are needed later in the real world of work.

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"I find it much easier to understand the material being studied. Like when in class, I only hear the teacher's explanation about what the printing machines look like, while in the TEFA Room, I can see and even operate the machines. The learning and working experience that I get becomes much more real and visible." (P1 student)

"If in class learning feels more boring and the knowledge gained will be quickly forgotten, while learning at TEFA feels more serious because I feel the real industrial conditions when learning using the Teaching Factory learning model at TEFA." (P2 student)
"I learn various software needed in the industrial world and learn how to operate various types of printing machines," (P9 student grade 10)

"I was asked to think about how to consider various materials for various printing machines and learn how a design is applied through visuals (P7, grade 10 student)"
"I learned the form of good communication when I was asked to receive a design brief. I also learned how to adapt and lower my ego to be able to work in a team so that all work feels easier and faster." (P4, grade 10 student)

With a learning model designed to mimic the real world of industry, students will be challenged to be much more confident in serving clients/customers. They will indirectly experience the challenge of real-world practice, which sharpens knowledge far more than simply learning theory in class. The statements above demonstrate that students truly take their studies seriously. If they were in TEFA but were not serious about studying and working, they would experience significant delays. These experiences help build each student's confidence, preparing them for the real world of work.

Overall, the interviews revealed that many students experience experiences they wouldn't have gained solely in the classroom. The advantage of this production-based learning is that it prepares students to face the realities of the future workplace, from problems and obstacles to self-confidence to forms of business communication. They truly experience these experiences firsthand, not just what teachers typically teach in class. The findings indicated that students developed not only technical skills (hard skills) such as operating machinery and graphic design software, but also social and professional skills (soft skills) such as communication, teamwork, and problem-solving.

Table 2. *Skills acquired through TEFA learning*

No	Skill Types	Examples from Student Interviews
1	Hard Skills	Operating a printer, editing graphics, creating layouts, operating various printing machines
2	Soft Skills	Client communication, leadership, time management, collaboration, problem-solving

Note data processed by researchers on July 11, 2025

The role of students in learning

The influence of social persuasion in the field of academic writing has received considerable attention, especially with the emergence of artificial intelligence (AI) devices designed to support the writing process. Participants said,

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"I act as a photo and video editor, I also act as a designer for clients/customers who order without a design" (P10 and P12, grade 11 students)

"I act as an operator for printing machines" (P11, grade 11 students)

"I act as an operator as well as for juniors or friends who do not understand how to operate the machine" (P13 and P15, grade 11 students)

"I hold TEFA's software needs or it can be said that I am an engineer at TEFA" (P14, grade 11 students)

Students expressed their participation or role in TEFA. They will take turns to try one job and another but what they mentioned was the main role or focus of their work while at TEFA

"The students that I activate to determine themselves to study at TEFA are grade 11, while grade 10 will only have a few opportunities not to study at TEFA" (P3 DKV teacher)

"I divide grade 11 students so that they have one focus on one job. I set this division after seeing from each student who is more expert and understands which job. But they can also try the work of other friends" (P4 DKV teacher)

To better illustrate the distribution of roles and responsibilities undertaken by students in the TEFA program, the following table categorized their primary functions and tasks.

Table 3. *Student roles in the teaching factory*

Roles	Tasks Involved
Operator	Handles machines, printing, production
Designer	Receives design brief, creates artwork
Engineer	Maintains and manages software/hardware infrastructure
Mentor	Guides peers in using tools and completing tasks

Note data processed by researchers on July 11, 2025

Through the integration of thematic analysis, this study systematically revealed how the TEFA learning model is implemented in practice and how it contributes to the development of students' skills and roles. Unlike conventional models, TEFA at SMK Al-Falah adopts a highly contextualized learning approach that aligns closely with industry demands and fosters active student involvement. Teachers assign each student a specific task to ensure that learning runs effectively. By having individual responsibilities, students can work more efficiently and productively in the TEFA room, avoid overlapping tasks, and simplify the evaluation process. When an order is received, students immediately assume their designated roles and complete their respective tasks.

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Discussion

The implementation of TEFA at SMK Al-Falah began with an initiative from the Directorate of Secondary Education (DIKDASMEN) to standardize vocational high school learning in accordance with industry qualifications. The first TEFA program at SMK Al-Falah was established in the Computer and Network Engineering (TJKT) department. After submitting a funding proposal to the Directorate of Secondary Education (DIKDASMEN), the school received approval along with technical guidelines (Directorate of Vocational High Schools, 2021). SMK Al-Falah was granted IDR 1.125 billion in teacher and student strengthening funds, which were used to purchase machines to support learning across all departments. The school's first industry partner was PT Tera Data Indonesia, which assisted in building a dedicated Teaching Factory room in line with the Technical Guidance Activity Guide (Vocational Secondary Education [DIKMENJUR], 2021). Finally, in 2023, TEFA at SMK Al-Falah was officially established.

Teaching Factory (TEFA) is an innovative learning model that emphasizes the link and match between vocational high schools (SMK) and the world of work. This is regulated in the Regulation of the Minister of Industry of the Republic of Indonesia No. 03/M-IND/PER/I/2017, Chapter I, Article 2 (Kementerian Perindustrian Republik Indonesia, 2017), which requires SMKs in Indonesia to collaborate with industry partners in establishing a Teaching Factory. TEFA is essentially an industry or business unit within schools, involving all elements of vocational education and selected companies. Previous researchers (Mavrikios et al., 2018) have also highlighted that TEFA demonstrates and verifies the feasibility of integrating learning and working environments.

Companies that collaborate with vocational high schools (SMKs) often provide grants in the form of machines and workshops for students to use. According to Mourtzis et al. (2023), TEFA serves as an intermediary that connects industrial actors (factories) with academics (schools), facilitating collaborative production training projects that align with common business interests. Vocational high school students reported that they not only apply theoretical knowledge but also gain valuable experiences by solving real-world problems. This study underscores the importance of engaging students in client-based projects to foster communication, teamwork, and critical thinking—skills that are often overlooked in traditional classroom settings. As noted by Aryana et al. (2023), TEFA also helps students develop interpersonal and problem-solving skills that are essential in the workplace. Based on data analysis and supported by previous research (Rohmah et al., 2019), it can be concluded that Teaching Factory is an innovative learning model that is easy to implement and capable of improving student competence through varied learning activities, while also making industry a benchmark for both product outcomes and skills currently demanded in the labor market. However, this study was conducted at a single vocational school, which may limit the generalizability of the findings to institutions with different contexts or program focuses.

Conclusion and recommendations/implications

This study explored the implementation of the Teaching Factory (TEFA) learning model in the DKV study program at Al Falah Vocational School. Based on the findings, three main conclusions were drawn in line with the research questions. First, regarding the syntax of the TEFA learning model, the results indicate that the process is carried out systematically, beginning with receiving briefs, preparing designs, executing production, and delivering products. This sequence reflects real industrial

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workflows and provides students with structured, practice-oriented learning experiences. Second, in terms of student skills, TEFA has proven effective in strengthening both practical and soft skills. Students acquire technical abilities such as operating equipment, editing designs, and producing outputs according to client needs, while also developing soft skills including discipline, responsibility, teamwork, and communication. Third, concerning the role of students in TEFA, learners assume multiple responsibilities that resemble professional roles in industry, such as working as designers, production operators, editors, and even peer mentors for younger students. Such involvement fosters independence and nurtures an entrepreneurial mindset.

Overall, the implementation of TEFA at SMK Al Falah has been shown to positively influence students' competencies and workplace readiness. It bridges the gap between school and industry by providing authentic learning experiences aligned with the goals of vocational education. For future research, comparative studies across different vocational schools are recommended to explore variations in TEFA implementation and their impact on learning outcomes. In addition, longitudinal studies would be valuable for examining the long-term effects of TEFA on graduate employability and career success.

Disclosure statement

No potential conflicts of interest were reported by the authors.

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