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Vocational Education Model in Indonesian Vocational High Schools Based on Teaching Factory

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ABSTRACT

The Vocational education in Indonesian Vocational High Schools (Sekolah Menengah Kejuruan or SMK) has long been expected to produce graduates who are immediately ready to enter the workforce. In practice, however, this expectation has not always been fully realized. Rapid changes in industrial technology, work culture, and competency standards have created a persistent gap between what students learn at school and what industries actually require. One learning approach that has gained increasing attention in recent years is the Teaching Factory model. Teaching Factory refers to a vocational learning model that integrates real production processes into the school environment by adopting industrial standards, workflows, and management practices. Rather than treating practice sessions as simulations, Teaching Factory positions students as active participants in producing real goods or services that respond to market or industry demands. This article aims to explore the Teaching Factory based vocational education model in Indonesian SMK by examining its conceptual foundations, key characteristics, implementation strategies, and educational impacts. Using a qualitative literature-based approach, this article synthesizes findings from peer-reviewed journal articles related to vocational education, work-based learning, and Teaching Factory practices. The discussion suggests that Teaching Factory can significantly enhance students' technical competencies, work attitudes, soft skills, and entrepreneurial awareness when implemented consistently and supported by strong industry collaboration. At the same time, the article acknowledges several practical challenges, including teacher readiness, infrastructure limitations, and sustainability concerns. Overall, Teaching Factory is presented not as a quick fix but as a promising long-term strategy to strengthen the relevance and quality of vocational education in SMK.

Keywords: Vocational education, SMK, teaching factory

INTRODUCTION

Vocational education has always occupied a unique and somewhat complicated position within national education systems. It sits at the intersection of education and employment, carrying the dual responsibility of nurturing learners while also preparing them for very concrete occupational roles. In Indonesia, this responsibility is largely carried by Sekolah Menengah Kejuruan, commonly known as SMK. These schools are designed with a clear mission: to equip students with specific skills so that they can transition smoothly into the world of work after graduation.

Yet, despite this clear mandate, questions about the effectiveness of SMK graduates continue to surface. Employers frequently report that many graduates lack not only technical competence but also basic workplace attitudes such as discipline, communication skills, and problem-solving ability. This issue becomes even more pronounced as industries undergo rapid technological transformation. Automation, digitalization, and data-driven decision-making have reshaped how work is organized and performed. As a result, the skills demanded by industry today look quite different from those required even a decade ago.

At the school level, learning processes have not always kept pace with these changes. Practical lessons often remain limited to controlled simulations using outdated equipment. Production targets, quality standards, and time pressures, which are normal features of industrial work, are rarely experienced by students in authentic ways. Learning, in many cases, becomes detached from reality. Students may pass exams and complete practice modules, yet still feel unprepared when faced with real workplace demands.

Recognizing this persistent gap, policymakers, educators, and industry stakeholders have searched for learning models that can bring school environments closer to actual industrial settings. One approach that has gained increasing prominence is the Teaching Factory model. The idea behind Teaching Factory is relatively straightforward, though its implementation is anything but simple. Schools are encouraged to function, at least partially, like small-scale factories or service units. Students learn not only by practicing skills, but by participating in real production processes that meet external demands.

In the Indonesian context, Teaching Factory is often associated with broader policy initiatives such as link and match and SMK Pusat Keunggulan. These initiatives emphasize stronger collaboration between schools and industry, curriculum alignment with labor market needs, and learning models that are grounded in real work situations. Teaching Factory, in this sense, is not merely a pedagogical technique. It represents a shift in how vocational education is conceptualized and delivered.

This article explores the Teaching Factory based vocational education model in Indonesian SMK in a comprehensive and reflective manner. Rather than presenting it as a flawless innovation, the discussion aims to unpack both its potential and its limitations. By drawing on findings from relevant journal literature, this article seeks to provide a nuanced understanding of how Teaching Factory can contribute to improving vocational education quality, while also acknowledging the conditions required for its success.

RESEARCH METHOD

This article is based on a qualitative literature review approach. Instead of collecting primary data through surveys or experiments, the study focuses on analyzing and synthesizing existing academic research related to vocational education, Teaching Factory, and industry-based learning models. This approach was chosen because Teaching Factory has been widely discussed in different contexts, and valuable insights can be gained by examining patterns and findings across multiple studies.

The sources reviewed consist primarily of peer-reviewed journal articles published in national and international academic journals. Databases such as Google Scholar, Scopus, and SINTA were used to identify relevant literature. Keywords used in the search process included vocational education, vocational high school, teaching factory, industry-based learning, work-based learning, and school-industry collaboration.

To ensure relevance and quality, several selection criteria were applied. First, only articles that explicitly discussed vocational education at the secondary level were included. Second, studies had to address Teaching Factory or closely related concepts such as production-based learning or learning factories. Third, priority was given to articles published within the last ten years, although several older foundational studies were included where necessary to strengthen conceptual understanding.

Once the articles were collected, they were analyzed thematically. Key ideas related to Teaching Factory concepts, implementation strategies, learning outcomes, and challenges were identified and grouped into broader themes. These themes then formed the basis for the results and discussion sections. While this method does not allow for statistical generalization, it provides a rich and contextualized understanding of Teaching Factory as a vocational education model.

RESULTS AND DISCUSSION

Understanding Teaching Factory as a Vocational Education Model

At first glance, the term Teaching Factory may sound technical, even slightly intimidating. In reality, the core idea is rooted in a simple educational philosophy: students learn best when they engage in meaningful work that resembles real life. Teaching Factory refers to a learning model where vocational schools organize their learning activities around actual production processes. These processes can involve manufacturing products, delivering services, or fulfilling real orders from external clients.

Unlike conventional practical lessons, Teaching Factory activities are not primarily designed for demonstration or skill drills. They are structured to meet quality standards, deadlines, and customer expectations. Students are expected to follow standard operating procedures, manage resources, and take responsibility for outcomes. In this setting, mistakes are not merely academic errors; they have real consequences, although still within a controlled educational environment. Several studies highlight that Teaching Factory draws inspiration from industrial learning systems and work-based learning theories. Learning does not happen in isolation but emerges through participation in social and technical systems. Students gradually move from peripheral roles to more central responsibilities as their competence grows. This mirrors how learning typically occurs in real workplaces.

Key Characteristics of Teaching Factory in SMK

Teaching Factory in SMK is distinguished by several defining characteristics. One of the most important is the integration of learning and production. Learning objectives are embedded within production activities rather than separated into theory and practice blocks. For example, students in a machining program may produce actual mechanical components ordered by local businesses, while simultaneously learning about material properties, measurement techniques, and quality control. Another characteristic is the application of industry standards. Teaching Factory does not rely solely on school-based criteria for success. Instead, product quality, efficiency, and customer satisfaction become part of the evaluation process. This exposes students to the realities of industrial performance expectations, which are often more demanding than classroom assessments.

Industry involvement also plays a crucial role. In many Teaching Factory implementations, industry partners contribute by providing design specifications, raw

materials, technical guidance, or even market access. This collaboration helps ensure that learning activities remain relevant and up to date. At the same time, it introduces students to professional networks and workplace norms. Equally important is the emphasis on work culture. Punctuality, teamwork, responsibility, and communication are not taught as abstract concepts but practiced daily. Over time, students begin to internalize these values as part of their professional identity.

Impact on Students' Technical Competence

One of the most frequently reported benefits of Teaching Factory is its positive impact on students' technical skills. Because students repeatedly engage in real production tasks, they gain extensive hands-on experience with tools, machines, and processes. Unlike short practice sessions, Teaching Factory activities often require sustained effort over longer periods. This repetition and continuity help students develop procedural fluency and confidence.

Moreover, students learn to troubleshoot problems that arise during production. Machines do not always function perfectly, materials vary in quality, and design specifications may need adjustment. Dealing with these issues requires more than technical knowledge. It demands critical thinking and adaptability, skills that are highly valued in modern industries.

Several studies note that graduates who have experienced Teaching Factory learning adapt more quickly during internships or early employment. They are familiar with workplace routines and require less initial supervision. While this does not mean they are fully competent professionals, it does suggest a smoother transition from school to work.

Development of Soft Skills and Work Attitudes

Technical competence alone is rarely sufficient for workplace success. Employers often emphasize the importance of soft skills, and Teaching Factory appears to provide a fertile ground for their development. Working in production teams requires communication, coordination, and conflict resolution. Students learn to express ideas, negotiate responsibilities, and support one another under time pressure. Responsibility also becomes more tangible. When students know that their work will be delivered to real customers, their sense of accountability increases. Deadlines matter. Quality matters. This sense of responsibility is difficult to cultivate through simulated practice alone.

Teaching Factory also encourages discipline and time management. Production schedules must be followed, and delays can affect the entire workflow. Students gradually learn to manage their time more effectively and to anticipate potential bottlenecks. These habits, once formed, tend to carry over into professional settings.

Teaching Factory and Entrepreneurial Learning

An interesting dimension of Teaching Factory is its potential to foster entrepreneurial thinking. When schools operate production units, students are exposed not only to technical processes but also to basic business considerations. They may learn about pricing, cost calculation, marketing, and customer relations. In some cases, students are involved in promoting products or services through social media or local networks.

This exposure can spark interest in entrepreneurship, particularly among students who may not immediately seek employment after graduation. Teaching Factory does not

turn every student into an entrepreneur, but it helps demystify business operations and shows that self-employment is a viable option.

In the Indonesian SMK context, this aspect aligns well with national efforts to promote entrepreneurship as a response to limited formal employment opportunities. By embedding entrepreneurial learning within vocational education, Teaching Factory contributes to broader economic resilience.

Challenges in Implementing Teaching Factory

Despite its many advantages, Teaching Factory is not without challenges. One of the most frequently mentioned issues is teacher readiness. Many vocational teachers are highly skilled in technical instruction but have limited experience managing production-based learning environments. Teaching Factory requires teachers to balance educational goals with production demands, a task that can be demanding and stressful.

Infrastructure is another significant challenge. Setting up and maintaining production facilities requires substantial investment. Machines, materials, maintenance, and safety systems must all be considered. For schools with limited funding, sustaining Teaching Factory operations over time can be difficult.

There are also organizational challenges. Production schedules must align with academic calendars, and assessment systems must accommodate both learning outcomes and production performance. Without careful planning, Teaching Factory risks becoming either too focused on production at the expense of learning or too academic to function as a genuine factory environment.

Institutional and Policy Support

Successful Teaching Factory implementation does not depend solely on individual teachers or schools. Institutional leadership and policy support play a crucial role. School principals need to provide strategic direction, allocate resources, and foster a culture that values innovation and collaboration. At the policy level, clear guidelines, funding mechanisms, and evaluation frameworks are essential. In Indonesia, Teaching Factory initiatives are often linked to national vocational education policies. While this provides legitimacy and support, it also introduces bureaucratic requirements that schools must navigate. Striking a balance between accountability and flexibility remains an ongoing challenge.

Teaching Factory as a Long-Term Educational Strategy

Perhaps the most important insight from the literature is that Teaching Factory should be viewed as a long-term educational strategy rather than a short-term program. Its benefits emerge gradually as schools, teachers, and students adapt to new ways of learning and working. Quick implementation without adequate preparation often leads to disappointing results.

When implemented thoughtfully, Teaching Factory has the potential to transform vocational education. It brings learning closer to real work, fosters professional identity, and strengthens ties between schools and industry. At the same time, it demands commitment, reflection, and continuous improvement.

CONCLUSION

Teaching Factory represents a meaningful shift in how vocational education is organized and experienced in Indonesian SMK. By integrating real production activities into the learning process, it addresses long-standing concerns about the relevance and effectiveness of vocational education. Students gain not only technical competence but also work attitudes, soft skills, and entrepreneurial awareness that are difficult to develop through conventional classroom instruction.

However, Teaching Factory is not a universal remedy. Its success depends on teacher competence, institutional readiness, adequate infrastructure, and sustained industry collaboration. Without these supporting conditions, Teaching Factory risks becoming symbolic rather than transformative.

Viewed realistically, Teaching Factory offers a promising pathway toward more relevant and resilient vocational education. It invites schools to rethink their role, teachers to expand their professional identity, and students to engage more deeply with their learning. In an era of rapid industrial change, such adaptability may be the most valuable outcome of all.

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