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Curriculum innovation at SMKN 3 Bandung: Bridging education and industry

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ABSTRACT

A well-structured vocational curriculum should prepare students not only with academic knowledge but also with practical skills and competencies that align with industry standards. This study focuses on analyzing curriculum innovation at SMKN 3 Bandung, with an emphasis on the integration of the Teaching Factory (TeFa) program, which bridges the gap between education and real-world industry practices. Tefa involves collaboration with industry partners to create a simulated industrial environment, where students gain hands-on experience while still in school. Through qualitative research methods, including interviews and observations with the school's curriculum staff, this study reveals how SMKN 3 Bandung applies the Merdeka Curriculum in line with industry needs. The curriculum structure incorporates a combination of technical skills and soft skills development, ensuring students are well-prepared for future employment. Industry partners play a crucial role in shaping the curriculum and offering students opportunities to obtain industry certifications. Despite challenges such as adapting to rapidly changing industry demands, SMKN 3 Bandung has successfully integrated practical learning experiences that enhance students' employability and equip them better to succeed in the workforce.

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ABSTRAK

Kurikulum vokasi yang baik tidak hanya membekali peserta didik dengan pengetahuan akademik, tetapi juga keterampilan dan kompetensi praktis yang sesuai dengan standar industri. Penelitian ini berfokus pada analisis inovasi kurikulum di SMKN 3 Bandung, dengan menekankan integrasi program Teaching Factory (TeFa) yang menghubungkan dunia pendidikan dengan praktik industri nyata. Tefa melibatkan kolaborasi dengan mitra industri untuk menciptakan lingkungan industri simulasi, di mana peserta didik mendapatkan pengalaman langsung saat masih di sekolah. Melalui metode penelitian kualitatif, termasuk wawancara dan observasi dengan staf kurikulum sekolah, penelitian ini mengungkapkan bagaimana SMKN 3 Bandung menerapkan Kurikulum Merdeka yang disesuaikan dengan kebutuhan industri. Struktur kurikulum menggabungkan pengembangan keterampilan teknis dan soft skills, memastikan peserta didik siap menghadapi dunia kerja. Mitra industri memiliki peran penting dalam membentuk kurikulum dan memberikan kesempatan bagi peserta didik untuk memperoleh sertifikasi industri. Meskipun ada tantangan seperti menyesuaikan dengan tuntutan industri yang berkembang pesat, SMKN 3 Bandung berhasil mengintegrasikan pengalaman belajar praktis yang meningkatkan daya saing peserta didik di dunia kerja.

Kata Kunci: *inovasi kurikulum; kolaborasi industri; Kurikulum Merdeka; teaching factory*

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INTRODUCTION

Vocational education plays a crucial role in preparing competent and work-ready human resources, which directly contributes to economic growth and national competitiveness in the era of globalization, as stated in Undang-Undang Nomor 20 Tahun 2003 concerning the Sistem Pendidikan Nasional. Vocational High Schools/Sekolah Menengah Kejuruan (SMK) in Indonesia hold a strategic position as institutions that bridge the gap between the world of education and industry, producing graduates who are expected to possess specific skills relevant to the dynamic needs of the labor market (Prasetya et al., 2025). However, the reality on the ground shows that many graduates are not fully prepared to face the complexities of modern industry demands, ranging from mastery of the latest technology to soft skills such as communication and collaboration abilities (Utomo, 2021). This situation creates pressure on curriculum developers to create a more holistic learning approach, focusing not only on technical knowledge but also on character, ethics, and students' problem-solving abilities.

Innovative curricula that are adaptive and responsive to changing industry needs become essential to enhance the effectiveness of vocational education and ensure graduates' relevance in the labor market. The curriculum, as the heart of the education process, functions not only as a guideline for delivering learning materials but also as a framework that shapes competencies and character, especially in vocational high schools (SMK) oriented towards practical skills (Triani et al., 2025). Curriculum development in SMK is a critical issue in the context of national education because it directly affects the quality of graduates and their contribution to economic development. Furthermore, a modern curriculum must be able to integrate aspects of digitalization and Industry 4.0, such as basic programming, automation, and data analysis, so that graduates become not only workers but also innovators in their fields (Abdullah, 2024). The Merdeka Curriculum emphasizes project-based learning, cross-disciplinary collaboration, and the integration of the Profil Pelajar Pancasila to foster 21st-century skills such as critical thinking, collaboration, and creativity (Syawalia et al., 2023).

Various studies have highlighted the importance of synergy between educational institutions and the industrial world in designing and implementing a relevant SMK curriculum. Research on curriculum synchronization with industry needs consistently highlights the importance of conducting regular and systematic alignment to ensure that the competencies taught in schools align with current workplace demands (Nurcahyono et al., 2020). Furthermore, the active involvement of industry professionals as resource persons, mentors, or guest lecturers in SMK has been proven to provide practical insights and enhance students' understanding of the real-world applications of the skills they learn (Sobari et al., 2023). In addition, the implementation of learner-centered and project-based learning methods (PjBL) has proven effective in developing 21st-century skills, such as problem-solving, collaboration, and critical thinking, which are highly sought after in the workforce (Marfianti & Hariyati, 2020).

Previous studies have highlighted the need to align the curriculum with the demands of the business and industrial world, as well as to analyze the impact of curriculum revisions on students' overall competency achievements (Saputro et al., 2021). However, most prior research has been macro in nature and has not explored in detail the implementation of the Merdeka Curriculum at the vocational high school level (SMK), particularly the mechanisms for integrating the Teaching Factory (TeFa) model and cross-industry partner collaboration in the learning process. Furthermore, there is limited research examining the role of learning resources, including libraries, in supporting project-based learning and the development of students' digital literacy. Interviews at SMKN 3 Bandung revealed innovative practices, such as regular teacher-industry discussion forums and the collaborative development of teaching modules, which have not been widely addressed in previous literature. Therefore, this study aims to analyze the curriculum innovation process at SMKN 3 Bandung, including the mechanisms for industry alignment, industry partner involvement in

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learning, and the implementation of the TeFa model in efforts to bridge the gap between vocational education and the production of graduates who meet industry needs.

LITERATURE REVIEW

Merdeka Curriculum in Vocational High School/Sekolah Menengah Kejuruan (SMK)

The Merdeka Curriculum is a policy implemented by the Kementrian Pendidikan, Kebudayaan, Riset, and Teknologi Indonesia in Indonesia, aiming to create a more flexible, adaptive, and student-centered learning system (Rosa et al., 2024). The concept of the Merdeka Curriculum inspires innovative approaches in the field of education, providing schools, teachers, and students with freedom and autonomy to adapt learning to local needs and foster close collaboration in realizing an educational process that is both competitive and relevant (Fuaida et al., 2024). Unlike the previous curriculum, which was more focused on rigid learning materials, the Merdeka Curriculum emphasizes the development of student competencies that align with the needs of the workforce (Nahdiyah et al., 2023).

At the vocational high school (SMK) level, the Merdeka Curriculum is designed to bring students closer to the industrial world through project-based learning, collaboration with business and industry (DUDI), and the adjustment of more relevant and applicable materials. The Merdeka Curriculum grants teachers the flexibility to design learning according to the needs of students and to integrate the Profil Pelajar Pancasila as the foundation of student character. In practice, SMKs in Indonesia utilize the Merdeka Curriculum to develop a flexible curriculum that equips students with technical skills and life skills relevant to the rapidly evolving workforce (Risna, 2023).

Link and Match between the Education World and the Industrial World

The concept of "link and match," or the connection and alignment between the education world and the industrial world, is a crucial component in vocational education, especially in Vocational High Schools (SMK). This approach aims to ensure that the curriculum taught in schools is relevant to industry needs so that students possess competencies that can be directly applied in the workforce (Fauzi et al., 2022). This is reflected in the efforts of SMKs to align practical training in schools with industry-accepted standards, such as the implementation of internships, industrial visits, and the development of certification programs. A good link and match can create greater opportunities for students to secure jobs after graduation, as they have been equipped with skills sought by the labor market (Sila et al., 2022). On the other hand, strong cooperation between schools and industries can also help schools regularly update their curricula to align with technological advancements and the latest industry trends.

The link and match efforts in the revitalization of vocational education are expected to produce graduates who are in their productive age and ready to work, with skills or expertise competencies that are ready to use and needed by companies and the industrial world (Irwanto, 2021). Considering that the business and industrial sectors (DUDI) greatly require skilled labor with strong character and a strong work ethic, vocational education institutions need to establish strategic partnerships with industries in their surrounding environment. This aims to ensure a strong relevance between the material studied at school and the actual needs in the current workforce. Additionally, the environment in which students undertake practical work should ideally replicate industrial conditions, so that students become accustomed to professional work standards and culture. Therefore, various collaborations and adjustments are continuously pursued to bridge the gap between education and industry, including strengthening practical facilities, developing internship programs, and integrating curricula based on labor market needs.

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The Role of the Library in Learning

The school library plays a crucial role in supporting the learning process, particularly in the context of the Merdeka Curriculum, which emphasizes independent and project-based learning. The library serves not only as a repository for books but also as an information center, providing access to a range of learning resources, including textbooks, journals, articles, and digital materials relevant to the topics being studied (Budiarto, 2023). A well-managed school library can support learning by providing in-depth and comprehensive teaching materials to explore various fields of study. Information literacy programs in the library, which involve teaching skills to search for and evaluate information sources, are essential in equipping students with the necessary skills to find accurate and relevant information, especially in the digital era. In the context of the Merdeka Curriculum, the library can enrich learning by providing teaching materials that students can access at any time (Oktapiani et al., 2025).

The library can serve as a collaborative space for students to work in groups, conduct research, and engage in Project-Based Learning (PBL). This supports a curriculum based on practical skills and solving real-world problems relevant to the industrial world. As mandated by Law Number 20 of 2003 concerning the National Education System, Article 35, every school is required to have a library as part of its educational support facilities. The library is not only a center of information resources but also plays an important role in fostering an independent learning culture and cultivating reading habits among students (Desiana et al., 2024). By providing a variety of reading materials tailored to different educational levels, the library also helps students explore their interests and potential. In addition, the library's role also includes supporting the development of innovative and contextual learning methods, in accordance with the principles of modern teaching that characterize the Merdeka Curriculum (Khasiati, 2021).

Project-Based Learning and Collaboration with Industry

PjBL is an approach aligned with the principles of the Merdeka Curriculum, especially in the context of vocational education, such as in Vocational High Schools (SMK). PjBL emphasizes the active involvement of students in completing projects that are authentic, meaningful, and relevant to real-world needs in the workforce. Through this approach, students are trained to think critically, work collaboratively, and integrate theoretical knowledge with practical skills needed in professional life (Handayani et al., 2023). The implementation of PjBL is considered effective in developing 21st-century skills because students not only passively receive material but also actively engage in the learning process through direct experience. PjBL provides opportunities for students to gain a deep understanding of the curriculum content and reflect on what they have learned, thereby encouraging more meaningful learning (Kartikasari et al., 2023).

PjBL has significant benefits in developing students' critical thinking skills, as they are directly involved in a learning process that involves real-world challenges (Novitasari, 2023). Students can design and implement projects related to industry needs, while enriching their experience with insights into the working world through PjBL (Athaya et al., 2024). At SMKN 3 Bandung, the implementation of PjBL is supported by the presence of TeFa, which enables students to carry out projects directly related to industrial production processes, thereby creating a learning environment that closely resembles the real working world. Guidelines from the Kementrian Pendidikan, Kebudayaan, Riset dan Teknologi state that TeFa aims to facilitate and accelerate vocational high schools in implementing production-based learning that aligns with industry needs

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METHODS

This research was conducted at SMKN 3 Bandung on April 11, 2025. The method used in this study is qualitative. This method focuses on gaining an in-depth understanding of individuals' experiences, opinions, and perspectives regarding the event being studied. In data collection, this research employs in-depth interviews, focusing on sources who possess in-depth knowledge and are relevant to the research focus. Interviews were conducted with parties directly related to the relevant sources, namely the Vice Principal responsible for the curriculum and the library manager at SMKN 3 Bandung. The interview was conducted to gather information related to the innovation and implementation of the Merdeka Curriculum at SMKN 3 Bandung, as well as to understand how the curriculum is adapted to meet industry needs.

The interview process began with the preparation of a list of questions that had been previously arranged, which were then further explored during the interview. The interview questions focused on eliciting information regarding the relevance of the curriculum to the needs of the workforce, as well as the implementation of the TeFa model as part of efforts to integrate education and industry. Additionally, the data obtained from the interviews will be combined with a literature study to support analysis and conclusions. The literature study method was used to review scientific literature relevant to curriculum innovation in vocational high schools, as well as to provide additional insights into the relevance of vocational curricula to the workforce. The data analysis procedure involved validating the interview results through comparison with existing literature to provide a more comprehensive picture of the effectiveness of Merdeka Curriculum implementation at SMKN 3 Bandung. This study aims to provide recommendations for the development and alignment of vocational high school curricula that are more relevant to industry needs and capable of producing work-ready graduates.

RESULTS AND DISCUSSION

Implementation of the Merdeka Curriculum at SMKN 3 Bandung

Based on the results of the interviews conducted, SMKN 3 Bandung is one of the vocational high schools that has fully implemented the Merdeka Curriculum, especially at the X and XI grade levels. According to information from the Vice Principal for Curriculum, the implementation of the Merdeka Curriculum at this school began in 2022 at the X grade level, which was then gradually expanded to include XI grade in 2023. This step reflects the school's commitment to integrating the national curriculum with the needs of students as well as relevance to the demands of the workforce. The implementation of the Merdeka Curriculum at SMKN 3 Bandung emphasizes flexibility in the learning process, character building, and the development of competencies that align with industry needs.

The principal and the curriculum team actively facilitate teachers through internal training, such as In-House Training (IHT), to ensure all teachers understand and are ready to implement the new curriculum tools and approaches. In addition, the school formed a curriculum development team consisting of core teachers from each expertise program to design independent teaching modules, tailored to the characteristics of the students and the real needs of the industry. This approach aims not only to transmit theoretical knowledge but also to encourage contextual learning that aligns with the workforce. As a form of implementation readiness, SMKN 3 Bandung develops the Operational Curriculum of the Education Unit/Kurikulum Operasional Satuan Pendidikan (KOSP) by considering local needs as well as the potential of each expertise program.

The KOSP is prepared based on the Learning Outcomes/Capaian Pembelajaran (CP) set by the Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, and is designed to be flexible, allowing for adjustments to the industry's dynamics. The Vice Principal in charge of Curriculum stated that this flexibility

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allows teachers to design project-based learning that suits the conditions of the students. The learning process is not limited to the classroom but is also conducted through direct work practice, industrial visits, and collaboration with business actors. As stated in the policy of the Kementrian Pendidikan, Kebudayaan, Riset dan Teknologi, the Merdeka Curriculum provides room for innovation for educational units to develop local potential (Efendi et al., 2023). This is reflected in SMKN 3 Bandung's efforts to integrate learning with contextual issues in the surrounding environment, such as environmental problems, social issues, and entrepreneurship development.

Teaching Factory (TeFa) as a Means of Implementing Link and Match

The Teaching Factory (TeFa) is one of the flagship strategies for implementing the Merdeka Curriculum at SMKN 3 Bandung. TeFa functions not only as a production-based learning facility but also as a bridge between the world of education and the industrial world. Students are actively involved in real production processes according to their expertise competencies, thereby gaining direct experience in a work environment that resembles actual industry conditions. Observations and interviews indicate that school business units, such as screen printing services and digital printing, are optimally utilized in the implementation of Tefa. This activity encourages students to develop technical skills, build a strong work ethic, and enhance their soft skills, including communication abilities and responsibility. Vocational teachers collaborate with industry partners to design teaching materials that are practical and aligned with workforce needs.

In the Multimedia Expertise Program, students participate in creating digital designs for school promotions as well as for external clients. Meanwhile, in the Computer and Network Engineering/Teknik Komputer dan Jaringan (TKJ) department, students are responsible for managing the school's internal network as part of their real-world work practice. The Fashion Design department also actively engages students in producing finished garments, which are then marketed through online platforms and exhibitions. The products produced by students in the Tefa unit not only contribute to the school's income but also serve as a learning medium related to production management, marketing strategies, and customer service. The implementation of Tefa is supported by a portfolio-based assessment system that comprehensively emphasizes both the process and outcomes of students' work. The head of the expertise program stated that the assessment is not only conducted based on theoretical aspects but also reflects the skills demonstrated by students during the production process.

Role of Teachers and Curriculum Coordination

The Vice Principal for Curriculum, along with their team, plays a strategic role in planning and developing the curriculum at SMKN 3 Bandung. This development process is carried out continuously through discussion forums, monthly evaluations, and internal training. Based on interviews, teachers are encouraged to provide input regarding the challenges and needs they encounter in the field, thereby creating a collaborative climate that aligns with the spirit of the Merdeka Curriculum. The role of teachers has also transformed, from initially serving as material deliverers to now becoming facilitators in the learning process. Teachers are directed to implement the Project-Based Learning (PBL) model, which requires students to be more active, think critically, and be creative in solving problems (Nababan et al., 2023).

As part of the Merdeka Curriculum implementation, teachers are encouraged to participate in Learning Communities/Komunitas Belajar (Kombel), both at the school level and beyond. This activity enables teachers to share best practices, develop effective teaching strategies, and discuss the challenges they face. This activity aligns with the emphasis on the importance of collaboration among teachers to improve

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the quality of learning. In implementing differentiated learning, teachers at SMKN 3 Bandung conduct surveys to map student characteristics, including interests and learning styles. The results of these surveys serve as the basis for developing teaching modules that are responsive to the needs of each learning group. This approach enables increased active student engagement and facilitates teachers in providing targeted learning interventions (Cantika et al., 2022).

Challenges in the Implementation of the Merdeka Curriculum

Although the implementation of the Merdeka Curriculum at SMKN 3 Bandung is supported by strong structural backing, several challenges remain. One of these is the variation in students' levels of independence in carrying out the self-directed learning model. Some teachers report that not all students can effectively manage their time and learning responsibilities, especially in project-based learning environments. Additionally, there are challenges in aligning the ideal learning approach advocated by the Merdeka Curriculum with the demands of the industrial world. On the one hand, the Merdeka Curriculum emphasizes the importance of an approach that nurtures and understands the individual characteristics and learning styles of each student.

This gap demands the teacher's acuity in designing learning experiences that not only accommodate the students' needs according to the philosophy of the Merdeka Curriculum but also prepare them with the mental resilience and professionalism required by the industry. Furthermore, the removal of the Minimum Competency Criteria/Kriteria Ketuntasan Minimal (KKM) system in the Merdeka Curriculum has caused confusion among teachers regarding assessment standards (Dinanty, 2024). Teachers must develop success indicators more flexibly and based on competencies, yet they still face difficulties in determining objective and fair minimum achievement thresholds.

Curriculum Evaluation and Adjustment

Evaluation of the curriculum implementation at SMKN 3 Bandung is conducted regularly each semester through coordination forums and learning reflections. The evaluation results serve as a basis for formulating curriculum adjustments in the following period. For example, when a gap is found between learning outcomes and industry needs, the curriculum team involves partners from the Business and Industrial World/Dunia Usaha dan Dunia Industri (DUDI) to provide input on the relevance of the learning content. In addition to internal evaluation, SMKN 3 Bandung also invites industry stakeholders to assess graduate readiness, one of which is through the Field Work Practice/Praktik Kerja Lapangan (PKL) program and industrial project collaborations. Curriculum adjustments are made so that graduates possess both the technical competencies and professional ethics that align with industry expectations. As an adaptive measure to technological developments, the school has begun integrating a simple learning management system (LMS) based on Google Classroom to monitor students' learning progress. This initiative promotes transparency in the evaluation and documentation of learning data, aligning with the digital transformation efforts in the education sector as mandated by the Kementrian Pendidikan, Kebudayaan, Riset, dan Teknologi.

The Role of the Library in Supporting Learning

Observations and interviews suggest that the SMKN 3 Bandung library plays a crucial role in supporting the implementation of the Merdeka Curriculum, particularly in promoting independent learning and enhancing student literacy. The library not only provides textbooks but also complements its collection with digital and non-digital reference sources that support project-based learning and differentiated instruction. The library actively participates in learning activities by providing a conducive reading space,

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internet access, and loan services for additional teaching materials. Furthermore, the library contributes to shaping students' character through literacy programs that are integrated with the development of soft skills. The library management plays a crucial role in guiding students to seek and utilize information critically and responsibly, in line with the spirit of strengthening the Profil Pelajar Pancasila, the primary target of the Merdeka Curriculum.

The library serves not only as a repository for books but also as a learning resource center that fosters independence, creativity, and innovation. As an adaptation to technological developments, the SMKN 3 Bandung library has developed a digital catalog based on Google Sites, allowing students to access the book collection from home. According to the administrator, this initiative aims to support independent learning needs and expand access to references. Additionally, the library collaborates with Indonesian language teachers and vocational teachers to organize thematic literacy programs, where students are asked to read and review books relevant to their learning projects. As part of implementing the Profil Pelajar Pancasila, the library also hosts activities such as book discussions, literacy corners, and creative writing sessions. These various activities encourage students to develop critical thinking skills and gain broader insights.

Discussion

The implementation of the Merdeka Curriculum at SMKN 3 Bandung has shown positive results in efforts to strengthen the relationship between education and the workforce. One important point from these findings is the school's success in implementing the Teaching Factory (TeFa) as a form of project-based learning that simulates real industrial conditions. This approach provides students with the opportunity to gain hands-on experience in completing tasks or projects relevant to their areas of expertise. Students not only master theoretical aspects but also practical skills needed in the workforce. Additionally, Project-Based Learning (PjBL) helps students enhance their critical thinking abilities and independence (Syawalia et al., 2023). The Merdeka Curriculum offers considerable flexibility for schools to develop contextual teaching materials, including the creation of teaching modules and learning outcomes tailored to students' needs and industry demands (Farliana & Sakitri, 2023).

At SMKN 3 Bandung, the development of teaching materials is carried out collaboratively by subject teachers and vocational teachers, taking into account input from industry partners. This strengthens the implementation of the link and match concept, tangibly bridging education and the workforce. Furthermore, the library's involvement in supporting the implementation of the Merdeka Curriculum is a crucial part of the learning process. The SMKN 3 Bandung library not only provides collections of books and digital references aligned with the curriculum but also serves as a learning space that supports literacy activities and the development of students' creativity. Facilities such as reading rooms, computer access, and literacy corners are essential complements to the independent and exploratory learning emphasized in the Merdeka Curriculum. However, challenges arise in its implementation, particularly regarding teachers' readiness to independently develop teaching materials and apply differentiated learning. The adaptation process to this new curriculum requires ongoing training and a considerable amount of time. Additionally, a shared commitment between the school and the teaching staff is needed to continuously evaluate and develop the learning process, keeping it relevant to the evolving world of work (Rahmah & Candradewini, 2023).

Besides internal factors such as teacher readiness and collaboration among school parties, support from external parties like the Dunia Usaha dan Dunia Industri sector (DUDI) also plays a crucial role in the successful implementation of the Merdeka Curriculum at SMKN 3 Bandung. This school has established active cooperation with several industry partners, who not only provide input in curriculum development

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but also offer practical work placements for students as well as training and skill certification. Direct industry involvement strengthens the alignment between learning materials and real-world needs, providing students with a more comprehensive understanding of the challenges and professional work standards they will encounter. This initiative also serves as tangible evidence of the “link and match” spirit emphasized in Indonesia's vocational education policy. Overall, this study shows that SMKN 3 Bandung is capable of implementing the Merdeka Curriculum with a contextual, adaptive, and collaborative approach. Strengthening cooperation with industry, applying the Teaching Factory (TeFa) model, and optimizing the library's role are the main strengths in supporting students' readiness for the workforce. This experience can serve as an inspiration for other vocational schools in designing curriculum implementation strategies that cater to students' needs and the demands of the times.

CONCLUSION

The curriculum innovation implemented at SMKN 3 Bandung through the Merdeka Curriculum has proven to have a positive impact on improving students' readiness for the world of work. This study demonstrates that the Teaching Factory (TeFa)-based approach, when integrated into curriculum implementation, can bridge the gap between school learning and industry needs. Collaboration with the Business and Industrial World/Dunia Usaha dan Dunia Industri (DUDI), as well as contextual curriculum adjustments according to the characteristics of each major, are key factors in this innovation process. Furthermore, involving teachers and library managers in curriculum development also demonstrates that the integration of information literacy and vocational skills is increasingly strengthened. These efforts support the balanced development of hard skills and soft skills, including the formation of students' character to be independent, adaptive, and ready to compete in a real work environment. This study also emphasizes the importance of a flexible approach in designing and implementing curricula that can quickly and effectively respond to the dynamic needs of the industry. SMKN 3 Bandung needs to continue developing more systematic and sustainable curriculum evaluation mechanisms, as well as expanding collaboration with DUDI in the form of developing learning modules, certification programs, and direct training in the industrial world. Strengthening digital infrastructure, including optimizing the library as a technology-based learning resource center, must also be a priority to support an adaptive and innovative learning process. Further research is recommended to explore more deeply the involvement of various parties in curriculum development as well as the effectiveness of project-based and real-work learning approaches in the context of vocational high schools.

AUTHOR'S NOTE

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