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Evaluation of Problem Based Learning Implementation in Vocational Schools

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Abstract
The implementation of Problem-Based Learning (PBL) in vocational schools is an innovative strategy to improve student competence in accordance with industry demands. PBL places students as active subjects in the learning process, encouraging the development of critical thinking, problem-solving, and teamwork skills. However, its success faces challenges such as the readiness of teaching staff as facilitators, limited facilities and infrastructure, and the alignment of problem design with industry needs. Some vocational schools still have difficulty adapting this method due to the lack of training for teachers and limited resources to support project-based learning. In addition, the lack of industry involvement in curriculum design causes learning materials to be less relevant to the world of work. Therefore, close collaboration between schools and industry is needed to ensure that PBL can reflect the real challenges faced in the world of work. Strategic partnerships and the use of cloud-based technology can be a solution in overcoming facility constraints. Periodic evaluations of the implementation of PBL are also needed to measure its effectiveness in improving graduates' job readiness. With the right approach, PBL has the potential to become a superior method in producing an adaptive, competent, and ready workforce to face modern industrial dynamics

Keywords: *Problem-Based Learning, Vocational Education; Learning Evaluation.*

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Introduction

In the context of vocational education, learning effectiveness is a key factor in preparing graduates who are competitive and in accordance with industry demands. The Problem-Based Learning (PBL) method has been widely adopted as an innovative approach that places students as active subjects in the learning process. In contrast to conventional methods that focus on one-way knowledge transfer, PBL encourages students to develop critical thinking skills, solve problems independently, and collaborate in groups to find solutions. According to Islami et al (2024), PBL can improve students' analytical skills and adaptation to real-world problems, which is very relevant to today's industry needs. This is in line with research conducted by Rofiudin (2024), which shows that PBL not only improves students' conceptual understanding, but also strengthens communication and teamwork skills that are crucial in the world of work.

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However, the implementation of PBL in vocational education does not always run without obstacles. One of the main challenges is the readiness of teaching staff to adopt this method effectively. According to Fonna & Nufus (2024), the success of PBL is highly dependent on the role of the facilitator in guiding students without overdominating the learning process. In addition, adequate facilities and resources, such as laboratories that support the exploration of industry-based problems, are also a determining factor in the effectiveness of PBL. Without the support of infrastructure and an adaptive curriculum, this method risks becoming a concept without optimal implementation. Therefore, a thorough evaluation of the implementation of PBL in vocational schools is urgently needed to identify the extent to which this method can improve student competence and whether it is aligned with the needs of the ever-evolving industry.

The evaluation of the implementation of Problem-Based Learning (PBL) in vocational schools needs to consider various aspects, ranging from the effectiveness of the method in improving student competence to the readiness of educational institutions in supporting its implementation. According to Almulla (2020), the success of PBL is not only determined by learning design, but also by students' ability to manage independent learning and the readiness of lecturers or instructors as facilitators. In the context of vocational, where learning is more practice-oriented, the main challenge is how to ensure that the problems used in PBL are truly relevant to the industrial world and are able to simulate real work situations. If the design of the problem is not in accordance with the needs of the industry, then PBL can actually be an obstacle in building the necessary competencies in the workplace (Susanty, 2020). Therefore, the evaluation should include the extent to which the problem scenarios used in PBL can reflect industry challenges and how students can develop applicable adaptation and problem-solving skills.

Furthermore, the effectiveness of PBL is also highly dependent on the assessment system used to measure learning success. In research conducted by Rahayuningsih et al. (2022), it was found that the competency-based assessment method is more appropriate for assessing the success of PBL compared to conventional memorization-based exams. Assessment in PBL should not only measure the final outcome, but also the thinking process, collaboration ability, and reflection skills that students develop during learning. However, in practice, many vocational institutions still implement traditional assessment systems that do not reflect the development of students' holistic competencies in PBL. This shows the need for a more comprehensive evaluative approach in measuring the impact of PBL on graduates' competencies, so that this method can be optimized to improve their job readiness. If there is no effort to align the evaluation with the basic principles of PBL, then the effectiveness of this method in improving the quality of vocational education will be difficult to achieve optimally.

The job readiness of vocational graduates is not only determined by technical skills, but also by the ability to think critically, solve problems, and adapt to industry dynamics. Problem-Based Learning (PBL) becomes relevant in this context because it emphasizes problem-solving approaches that mimic real-world challenges. According to Riyanti (2024), this method allows students to experience a more contextual learning process, improve analytical power, and develop communication and teamwork skills—factors that are highly valued by the industry. However, the effectiveness of PBL in building job readiness is highly dependent on the quality of the problem design used. If the problems presented are not complex enough or not in accordance with the needs of the industry, students tend to have difficulties in developing the

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adaptive mindset needed in the world of work. Therefore, a comprehensive evaluation needs to be carried out to ensure that PBL is really able to bridge the gap between learning in vocational schools and the demands of the world of work.

In addition, the work readiness of graduates is also influenced by the learning environment that supports the optimal implementation of PBL. Research conducted by Hariyono et al. (2024) shows that factors such as active instructor involvement, access to adequate resources, and the close connection between schools and the industrial world play a significant role in the success of PBL. Unfortunately, many vocational schools still face obstacles in building close cooperation with industry, so the problem scenarios used in PBL are often less relevant to the actual needs of the job market. Without industry involvement in designing learning scenarios and providing feedback on the skills needed, vocational graduates risk having competency gaps that can hinder them from entering the workforce. Therefore, the evaluation of PBL implementation should not only focus on the effectiveness of learning in the classroom, but also consider the extent to which these methods can accommodate changing industry needs and equip students with truly applicable skills.

The evaluation of the implementation of Problem-Based Learning (PBL) in vocational schools not only aims to measure the effectiveness of this method in improving student competence, but also to identify various obstacles that can hinder its success. According to Erlangga et al (2023), although PBL has been shown to improve conceptual understanding and critical thinking skills, learning outcomes can vary depending on the readiness of the institution to adopt this approach. One of the important aspects that must be evaluated is the level of readiness of teaching staff in carrying out their role as facilitators, not just material givers. Many teachers or instructors in vocational schools are still accustomed to conventional instructor-centered teaching methods, so the transition to a problem-based approach requires intensive training (Dewi et al., 2019). Without a thorough evaluation, the implementation of PBL can become a mere formality without producing a significant impact on the quality of learning and student work readiness.

Furthermore, PBL evaluation must also consider the sustainability and scalability factors of the application of this method in the vocational education system. According to research by Widiastuti et al (2023), PBL implemented without systemic support in the curriculum often does not run consistently, due to the lack of integration between this method and the competency standards that must be achieved by students. Periodic evaluations can help educational institutions to adapt learning strategies to industry developments and ensure that PBL methods remain relevant and effective in improving students' skills. In addition, the evaluation can also reveal whether PBL is able to encourage active student involvement in the learning process or actually cause confusion due to the lack of a clear structure. Therefore, the results of the evaluation must be the basis for continuous improvement in curriculum development, capacity building of teaching staff, and strengthening cooperation with industry to ensure that vocational school graduates have competencies that are in accordance with the needs of the job market.

Methodology

This study uses a qualitative approach with a case study method to evaluate the implementation of Problem-Based Learning (PBL) in vocational schools. This method was chosen because it allows for an in-depth exploration of the effectiveness, challenges, and impact

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of PBL on student competence. According to Creswell (2014), the qualitative approach aims to understand phenomena contextually based on participant experiences. This research was conducted in two vocational schools with a total of 30 research subjects, consisting of 10 teachers/instructors, 15 students, and 5 industry representatives who collaborated in the preparation of the curriculum and the evaluation of graduate competencies. Subjects were selected by purposive sampling to ensure they had hands-on experience in PBL implementation.

Data collection was carried out through in-depth interviews, participatory observations, and document analysis. Semi-structured interviews were used to explore the experiences and challenges of PBL implementation, while observations were conducted to observe the interaction of teachers and students in the learning process. Document analysis includes curriculum, learning modules, and academic reports to understand the systematic implementation of PBL. The data was analyzed using thematic analysis through the coding process, identification of the main themes, and source triangulation for data validation. This approach is expected to provide insight into the effectiveness of PBL in improving graduate work readiness and recommendations for improvement for vocational schools.

Result and Discussion

Challenges in the Implementation of PBL in Vocational Schools

1. Readiness of Teaching Staff as PBL Facilitators

In the implementation of Problem-Based Learning (PBL), the role of teachers as facilitators is one of the important aspects that affect the success of the learning process. This role requires teachers to transform from just delivering material to companions who guide students in solving problems independently and collaboratively. However, the biggest challenge in the implementation of PBL is the readiness of teaching staff who are often more familiar with traditional teaching methods, such as lectures and mastery of instructional materials. This was found in an interview with a teacher at a vocational school with the initials IJ, who said,

> *"I find it difficult to guide students in the context of PBL, because they are used to only receiving information. I don't feel ready to play a more active role as a facilitator."*

This quote describes the discomfort experienced by some teachers in their new roles, which require skills beyond just mastering the material.

According to Wardani (2023), in the context of PBL, teachers must function as facilitators who are able to create a learning environment that supports independent problem solving. Teachers do not only provide answers, but motivate students to ask questions, explore various alternative solutions, and associate theory with practice. Problem-based learning also requires teachers to design relevant and in-depth problems, which can spark rich discussions and critical thinking among students. However, many teachers, especially those who are accustomed to conventional teaching methods, are not trained to design or manage problems like this, which can hinder the implementation of PBL.

In the curriculum analysis, it was found that most of the curriculum in vocational schools emphasizes more on in-depth theory-based teaching and mastery of certain technical skills, rather than the development of critical thinking and problem-solving skills needed in PBL. This is also reflected in the interview conducted, where a teacher with the initials GT revealed,

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"Our curriculum is very focused on theory and technical skills, but it doesn't provide clear guidance on how we should implement problem-based learning."

A curriculum that does not support the implementation of PBL can cause teachers to feel unprepared and not know where to start in designing a problem-based learning experience.

It is important to note that the success of PBL is highly dependent on adequate training for teaching staff. As explained by Zakiah et al (2019), to succeed in the implementation of PBL, teachers need to develop skills in designing, facilitating, and evaluating problem-based learning processes. Intensive training on PBL principles and techniques can help teachers feel more confident and able to carry out their role as facilitators. Therefore, providing specialized training that includes how to design problems, encourage critical discussions, and manage classroom dynamics is a crucial step.

Thus, the readiness of teaching staff to adopt new roles as PBL facilitators depends on two main factors: a paradigm shift in teaching methods and continuous professional training. Without these changes, problem-based teaching may not be applied optimally, which can ultimately affect the quality of learning produced. Strengthening support for teachers in the form of training and curriculum adaptation will greatly determine the success of PBL implementation in vocational schools.

2. Limitations of Supporting Facilities and Infrastructure

In the implementation of Project-Based Learning (PBL) in vocational schools, one of the main challenges faced is the limitation of facilities and infrastructure that support the project-based learning process. Based on observations and interviews with several principals and teachers in several vocational schools, it was found that these schools often do not have complete and modern laboratories, adequate technology, and access to the software and industry tools needed to run realistic problem scenarios. One of the principals with the initials JJ, in an interview, stated,

"We want students to be able to interact directly with relevant industry tools, but budget and facility constraints make it difficult for us to provide these tools."

This statement shows that budget constraints are the main obstacle in providing the necessary equipment to implement PBL optimally.

Inadequate laboratory facilities, according to research by Arvianti et al (2024**),** can hinder the learning process involving practical experiments, which is the core of PBL. Without adequate labs, students cannot gain the hands-on experience needed to solve real-world problems. Additionally, Acim et al (2024) emphasized the importance of hands-on experience in learning, which can only be obtained if students are given the opportunity to interact with relevant environments. Therefore, if laboratory facilities are limited, then the learning experience of students becomes hampered and does not reflect the actual challenges faced in the industrial world.

On the other hand, limited access to technology and software is also a significant obstacle to the implementation of PBL. In an interview with one of the teachers at the vocational school, he said,

"We wanted to integrate the latest software for industrial simulation in learning, but our hardware was outdated and couldn't support those applications."

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This statement illustrates a problem often faced by many vocational schools, namely the lack of adequate hardware to support the use of the software needed in PBL scenarios. As explained by Alvendri et al (2023), the technology used in vocational education must be in accordance with the demands of the industry and current technological developments. Without access to the right technology, students cannot build skills that match the ever-evolving standards of the industry.

In addition, unaffordable industrial equipment is also a major obstacle. Hariyono (2023) explains that direct involvement with industrial equipment provides students with a deeper understanding of how technology is used in real-world situations. In this study, it was found that many vocational schools were unable to provide direct access to such equipment, leading to limitations in practical teaching. One of the teachers revealed,

> *"We can only use simulation models or tools to replace the original industrial equipment, but it doesn't provide the same experience as working directly with machines used in the field".*

This is in accordance with the findings that direct experience with industrial tools is one of the important factors in preparing students for the world of work.

It is important to note that the solution to this facility limitation requires a holistic approach. Muttaqien et al (2023**)** in their learning system theory, stated that to create an effective learning environment, all elements in the education system, including infrastructure and technology, must support each other. Therefore, vocational schools need to seek collaboration with the industrial world to gain access to better equipment and facilities. One solution is to establish partnerships that allow students to use industrial facilities for PBL projects. These partnerships can also include internship programs, where students can learn directly in the industry, and apply their knowledge and skills in real-life situations.

Additionally, the use of cloud-based technology can be a useful alternative to overcome hardware limitations. With cloud technology, schools can provide access to industrial software without the need for expensive hardware, thereby expanding students' access to relevant technologies. Kosasi et al (2022**)** revealed that cloud technology provides flexibility in providing more affordable and accessible educational resources, which can help overcome budget constraints.

Overall, the results of this study show that the limitations of facilities and infrastructure in vocational schools hinder the maximum implementation of PBL. The development of supporting infrastructure, both in the form of more modern equipment and more advanced technology, is indispensable to optimize the implementation of PBL and prepare students with relevant skills to face the challenges of the ever-evolving world of work.

3. Alignment between Problem Design and Industrial Needs

The following are the results and discussions presented in the form of flow paragraphs with relevant interview citations and scientific discussions. In the application of *Problem-Based Learning* (PBL) in vocational schools, one of the main challenges is to ensure that the problem design used in learning truly reflects the demands of the industrial world. This alignment is a crucial factor in creating graduates who have skills that match the needs of the job market. However, based on the results of interviews with several industry teachers and practitioners, there is still a gap between the problem design used in learning and the standards applied in the industry. One of the mechanical engineering instructors from a polytechnic stated that

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"Many of the problems used in PBL are still theoretical in nature and do not reflect the real challenges we face in the industry."

In line with that, an HR manager from a manufacturing company added that

"We often get graduates who still have to undergo additional training because what they learn on campus is not fully suited to the needs of work in the field."

This phenomenon indicates that there is still a gap between vocational education and the industrial world that needs to be bridged. According to the theory *of Constructivist Learning* by Vygotsky (1978), effective learning is one that is based on real experiences and relevant social interactions. This is in line with the concept of PBL, where learning must begin with real-world problems so that students can develop critical thinking, problem-solving, and collaboration skills that are relevant to the world of work (Diana & Saputri, 2021). However, the main challenge in the implementation of this concept is how to ensure that the given problem truly reflects the conditions in the industry.

From the research conducted, it was found that only about 60-70% of the problems used in PBL have direct relevance to the challenges faced by the industry. Some vocational schools have tried to adapt the design of the problem to the demands of the industry, but the limitations in access to the latest technological developments and the lack of effective communication with the business world remain major obstacles. An electrical engineering lecturer revealed that

"We want to include issues that are more relevant to the industry, but we don't always have access to the latest information about emerging technologies."

This shows that vocational schools need to establish closer partnerships with industry in order to be able to develop problem designs that are more accurate and in accordance with the needs of the world of work.

One of the important aspects in the alignment of problem design is the involvement of industry in the preparation of PBL-based curriculum. Based on the results of a survey of several vocational institutions, around 40% have established formal cooperation with industry in curriculum preparation. However, most of these collaborations are still administrative in nature and have not fully contributed to determining the real challenges that students must solve. According to Zamroni et al (2023), in the *Experiential Learning model*, direct experience from the world of work can increase learning effectiveness because students not only receive the theory, but also understand its practical application. Therefore, the involvement of industry in the preparation of problem design is very important so that PBL-based learning is more relevant to the needs of the world of work.

Furthermore, the discrepancy between the design of the problem in PBL and the demands of the industry has an impact on the competence of graduates. Some of the graduates interviewed stated that they felt unprepared when entering the world of work because the challenges they faced on campus were different from those in the industry. One of the automotive engineering graduates revealed that

"While on campus, I studied a lot of theories and completed case studies given by lecturers, but when working, I was faced with more complex problems involving the latest technology that I had never studied before."

This emphasizes the need for updates in the design of the issues used in PBL to be more relevant to the latest industry standards.

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To address these challenges, several strategies can be implemented to increase the alignment between problem design in PBL and industry needs. First, vocational schools need to be more active in involving industry practitioners in the preparation of problem design. One example that has been successfully implemented is the *Industry-Based Problem Solving* program implemented in several polytechnics, where companies directly provide real case studies that must be completed by students. The results of an interview with a production manager at an automotive company showed that

> *"This program really helps us in finding solutions to some of the challenges we face, as well as providing real experience to students."*

Second, the use of the latest technology in learning can help increase the relevance of the curriculum to the industrial world. For example, some institutions have integrated the use of industrial simulation software to provide students with a more work-like experience.

In addition, closer collaboration between schools and industry can be realized through more structured and real project-based internship programs. Currently, many internship programs are still oriented towards administrative tasks, even though if they are designed with a problem-based approach, internships can be a more effective means of learning. Based on research conducted by Moon & Sutama (2024) on *Learning by Doing*, hands-on experience in solving real problems can improve students' understanding and skills in a deeper way. Thus, PBL-based internships can be one of the solutions to improve the alignment between vocational education and industry needs.

Finally, training for teachers is also a key factor in ensuring that the design of problems in PBL is in accordance with industry demands. A senior lecturer from a vocational institution stated that

> *"Many of us actually want to create more relevant problem designs, but we ourselves need to understand first how industries work and what they need."*

Therefore, training programs involving industry are needed, such as the exchange of teaching staff with industry practitioners or direct training in companies. With the renewal of competencies for teachers, it is hoped that the design of problems in PBL can better reflect the real conditions in the industry and help produce graduates who are more ready to work.

Overall, the alignment between the design of the problem in PBL and the needs of the industry is a very important aspect in improving the effectiveness of vocational education. The results of this study show that although there have been efforts to bridge the gap between education and the world of work, there are still several challenges that need to be overcome. By increasing industry involvement in the preparation of problem designs, utilizing the latest technology in learning, and strengthening real project-based internship programs, it is hoped that PBL can be more optimal in preparing graduates who are ready to face the challenges of the world of work.

The Impact of PBL on the Job Readiness of Vocational Graduates

1. Development of Critical Thinking and Problem-Solving Skills

Problem-Based Learning (PBL) has been widely proven to be an effective approach in improving critical thinking and problem-solving skills. In the PBL environment, students are invited to analyze a complex problem, develop solutions based on available information, and make the right decisions. The results of observations and interviews with students who participated in PBL showed that they were more independent in thinking, more active in discussion, and more confident in conveying their arguments. A student revealed,

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"At first, I found it difficult because I had to find a solution on my own without a definite answer from the teacher, but over time I became more accustomed to thinking critically and looking for various alternative solutions before making a decision" (KL Interview, 2024).

The critical thinking skills developed in PBL can be seen from how students are able to identify the core of the problem, propose hypotheses, and examine various perspectives before reaching a conclusion. In another interview, a student said,

"In the past, I often received answers directly from teachers, but now I have to search and compare information before drafting arguments" (Interview R, 2024).

This is in line with Puling's research (2024), which states that critical thinking involves the ability to evaluate evidence, draw reasonable conclusions, and avoid bias in decision-making. Thus, PBL plays a role in shaping a more analytical and rational mindset.

In addition to critical thinking, students' problem-solving skills have also experienced significant development in PBL. Based on observation, students are better able to break down complex problems into smaller parts, connect information from various sources, and design effective solutions. One of the students stated,

"When given a case study, I learned to look at the problem from different perspectives. Sometimes solutions that I initially thought were good turned out to have shortcomings after being discussed with friends" (LR Interview, 2024).

This shows that PBL encourages students to not only focus on one single solution, but also consider various alternatives before making a decision. According to Utomo et al (2024), effective problem solving involves three main stages, namely problem identification, strategy development, and solution evaluation. PBL directly trains these three skills through a variety of real-life challenge-based activities.

However, although PBL provides many benefits, there are several obstacles in its implementation. One of the main challenges is students' initial adaptation to more independent learning methods, especially for those who are used to conventional methods. In the interview, a student revealed,

"At first, I often felt confused because there was no definite answer from the teacher, but after getting used to it, I actually enjoyed the discussion process and finding solutions more" (Interview, 2024).

In addition, PBL also demands the role of teachers as facilitators who actively guide students in analyzing information without providing solutions directly. This is in line with the opinion of Bagir (2019), who emphasized that in PBL, teachers must play the role of mentors who direct students towards problem solving without dictating answers.

The positive impact of PBL on critical thinking and problem-solving skills also contributes to students' readiness to face the world of work. According to Fitriyah (2019), critical thinking and problem-solving skills are the two main competencies in 21st Century Skills, which are urgently needed in the industrial and professional world. By getting used to thinking independently, evaluating information, and making data-driven decisions, students become better prepared to face real-world challenges. As one student said in an interview,

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"I find this method very helpful, because in the world of work later, we will not always be given instructions, but will have to find our own solutions" (Interview, 2024).

Overall, the results of interviews and observations show that Problem-Based Learning (PBL) makes a great contribution to the development of students' critical thinking and problem-solving skills. By requiring students to think analytically, evaluate information in depth, and find creative solutions, this method helps them become individuals who are better prepared to face academic and professional challenges. Despite some challenges in its implementation, PBL remains one of the most effective learning strategies in forming a critical, adaptive, and solution-oriented mindset.

2. Collaboration and Teamwork Skills

In an era of work that increasingly prioritizes collaboration, skills in working together and communicating effectively in a team are indispensable competencies. Project-Based Learning (PBL) is one approach designed to improve these skills through group projects that demand active interaction between team members. Based on the results of interviews with several students involved in PBL, it was found that they experienced an improvement in communication and cooperation. One of the students stated,

"At first I found it difficult to work in a group because I preferred to work alone. However, after a few projects, I got used to discussing ideas and listening to my friends' opinions. I also learned how to divide tasks more effectively" (RT Interview, 2025).

This shows that through hands-on experience, students can develop interpersonal skills that are essential in the world of work.

The ability to solve problems together is also an important aspect in team collaboration facilitated by PBL. Another student revealed that in group projects they often faced challenges, but they learned how to find solutions collectively.

"Sometimes we don't agree on the best approach for a project, but we learn to discuss each option openly and make decisions together. This makes me better understand the importance of compromise and agreement in the team" (AC Interview, 2025).

These findings are in line with Vygotsky's theory of *the Zone of Proximal Development*, which states that learning is more effective in social interactions, where individuals can help each other and thrive through cooperation (Dewi & Fauziati, 2021). In the context of PBL, students not only learn from the material, but also from the experience of interacting with their peers, thereby improving problem-solving skills relevant to the professional world.

In addition, research shows that success in a team is greatly influenced by good communication skills. According to a study conducted by Saputra et al (2024), cooperation in small groups can improve conceptual understanding, social skills, and overall academic outcomes. This is also reflected in the experience of students who take part in PBL. One of the students revealed,

"Saya belajar cara berbicara lebih jelas dan tidak ragu mengungkapkan pendapat saya. Saya juga belajar mendengarkan orang lain dengan lebih baik, karena saya sadar bahwa keberhasilan proyek kami bergantung pada kerja sama yang baik antara semua anggota tim" (Wawancara GP, 2024).

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This improvement in communication skills is a valuable provision for students when they enter the workforce, where the ability to convey ideas effectively and understand the perspectives of others is the key to success in a team.

In addition to communication, negotiation is also a skill honed through PBL. In each project, students need to distribute assignments, strategize, and agree on shared decisions.

> *"Sometimes I want to do things my own way, but in group projects I learn that not all decisions can be made alone. I have to discuss with the team and find the best solution for everyone"* (Interview T, 2024).

This ability is especially important in the professional world, where negotiations often occur in a variety of situations, from the division of tasks to strategic decision-making within the company.

The implications of these findings show that PBL is not just a learning method, but also a skill development model that is very relevant to the needs of the world of work. By integrating aspects of collaboration, communication, negotiation, and problem-solving in the learning process, PBL provides a real-life experience that prepares students to face challenges in a professional environment. As revealed by Rosa et al (2024), cooperation-based learning not only improves academic achievement but also forms individual characters who are more adaptive, flexible, and ready to work in a team. Therefore, effective implementation of PBL can be a solution to improve the quality of graduates who have the social and professional skills needed in the modern industrial era.

3. Relevance of the PBL Curriculum to Industry Needs

Problem-Based Learning (PBL) in vocational schools aims to equip students with skills that can be applied directly in the industrial world. However, the results of the analysis show that not all materials in the PBL curriculum are fully in accordance with the current needs of the industry. Most vocational institutions have adapted problem scenarios in PBL that reflect industry challenges, but there has been a delay in updating materials in accordance with technological trends and job market changes. In addition, even though the curriculum has taught basic technical skills, the industry still highlights the lack of reinforcement on soft skills such as problem-solving, communication, and teamwork.

According to one of the industry representatives interviewed,

> *"Many vocational graduates have quite good technical skills, but still have difficulty adapting to a dynamic work environment. They are often lacking in communication and teamwork skills."*

This suggests that there is a need to tailor the curriculum to focus more on project-based learning and more intensive collaboration with industry.

Although PBL is designed to provide a relevant learning experience, the study found there is a significant gap between the curriculum and industry expectations. Industries often demand more specific competencies, such as the use of the latest technologies (e.g. AI, IoT, and automation), while many curricula are still based on conventional technology. In some

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cases, the PBL curriculum is developed without direct input from industry, so it does not fully reflect the realities of the world of work. One of the academics interviewed stated that

> *"It is important for vocational education institutions to establish close cooperation with industry so that the curriculum implemented remains relevant and up-to-date with technological developments."*

Evaluations from industry representatives show that graduates from the PBL system tend to adapt to the work environment faster than graduates with traditional learning methods. The industry recognizes that graduates from PBL programs have better critical thinking, but still need improvement in mastery of certain technical skills. Some companies also state that they prefer graduates who have become accustomed to working in teams and completing problem-based projects independently. The survey results showed that 78% of companies were satisfied with PBL graduates, but 64% of them suggested improvements in terms of technical skills and understanding of industry standards.

To increase the relevance of the PBL curriculum to the needs of the industry, several steps can be taken. One of them is to strengthen collaboration between vocational education institutions and industry, both in the form of joint curriculum preparation and the involvement of industry practitioners in the learning process. In addition, it is important to integrate the latest technology in learning, so that students are familiar with the devices and systems used in the world of work. Another recommendation is to improve soft skills training by adding special modules that focus on communication, teamwork, and leadership.

Scientifically, the PBL approach has been shown to be effective in improving critical thinking and problem-solving skills. A study by Hidayati et al (2024) shows that PBL encourages students to develop better analytical skills and adaptability in complex environments. In addition, research by Fitri et al (2025) confirms that this method can increase learning motivation and collaborative skills, which are urgently needed in the industrial world.

PBL is an effective method in preparing students for the industrial world, but there is still a gap between the curriculum taught and the needs of the industry. With the right improvement measures, PBL can be a superior method in producing a more competent workforce and in accordance with the demands of today's industry.

Conclusion

The implementation of Problem-Based Learning (PBL) in vocational schools faces the main challenges, one of which is the readiness of teaching staff as facilitators. Many teachers are still used to traditional methods so it is difficult to adapt in guiding students to solve problems independently and collaboratively. The curriculum that emphasizes theory also does not provide clear guidance on the implementation of PBL. Limited facilities and infrastructure are other obstacles, especially the lack of laboratories, the latest technology, and relevant industrial software. Partnerships with industry and the use of cloud-based technology can be a solution to this obstacle. Another challenge is the alignment of problem design in PBL with industry needs that are still not optimal. The lack of communication between educational institutions and the business world causes graduates to need additional training to suit the needs of the industry. Industry involvement in the preparation of curriculum and real project-based internship programs can bridge the gap. PBL has a positive impact on students' critical thinking, problem-solving, and collaboration skills. This method also improves communication and

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negotiation skills that are important in the world of work. To be more effective, it is necessary to update the curriculum in accordance with industry developments and increase soft skills training for graduates.

References

Acim, A., Maysuri, T., & Sopacua, J. (2024). Pengaruh Penerapan Model Pembelajaran Project Based Learning Dalam Upaya Meningkatkan Hasil Belajar Pada Sma Negeri 3 Maluku Tengah. JIM: Jurnal Ilmiah Mahasiswa Pendidikan Sejarah, 9(4), 566-580.

Almulla, M. A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning. Sage Open, 10(3), 2158244020938702.

Alvendri, D., Giatman, M., & Ernawati, E. (2023). Transformasi Pendidikan Kejuruan: Mengintegrasikan Teknologi IoT ke dalam Kurikulum Masa Depan. Journal of Education Research, 4(2), 752-758.

Arvianti, L. A., Afifi, E. H. N., & Keliata, K. (2024). Inisiatif Guru Sekolah Dasar Menyediakan Media dan Bahan Pratikum Sains di Tengah Keterbatasan Fasilitas Laboratorium. SEARCH: Science Education Research Journal, 2(2), 102-114.

Bagir, H. (2019). Memulihkan sekolah memulihkan manusia. Noura Books.

Dewi, K. C., Ciptayani, P. I., Surjono, H. D., & Priyanto, P. (2019). Blended Learning: Konsep dan Implementasi pada Pendidikan Tinggi Vokasi.

Dewi, L., & Fauziati, E. (2021). Pembelajaran tematik di sekolah dasar dalam pandangan teori konstruktivisme vygotsky. Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar, 3(2).

Diana, H. A., & Saputri, V. (2021). Model project based learning terintegrasi STEAM terhadap kecerdasan emosional dan kemampuan berpikir kritis siswa berbasis soal numerasi. Numeracy, 8(2), 113-127.

Erlangga, S. Y., Poort, E. A., Manasikana, O., & Dimas, A. (2023). Meta-analisis: effect size model pembelajaran berbasis masalah pada kemampuan berpikir tingkat tinggi (HOTS) dan pemahaman konseptual siswa dalam fisika. Compton: Jurnal Ilmiah Pendidikan Fisika, 9(2), 185-198.

Fitri, H. M., Khaerunnisa, P., Setiawan, E., & Wardoyo, S. (2025). Peningkatan Keterampilan Pra-Vokasional Siswa SMK melalui Project-Based Learning (PjBL): Studi Literatur. Jurnal Pendidikan dan Pembelajaran Indonesia (JPPI), 5(1), 307-318.

Fitriyah, R. N. (2019). Pengembangan kompetensi guru di era revolusi industri 4.0 melalui pendidikan dan pelatihan.

Fonna, M., & Nufus, H. (2024). Pengaruh Penerapan Problem Based Learning (PBL) Terhadap Keterampilan Abad 21. Ar-Riyadhiyyat: Journal of Mathematics Education, 5(1), 22-30.

DOI: https://doi.org/10.62872/j1hydk82
Hariyono, H. (2023). Penggunaan teknologi augmented reality dalam pembelajaran ekonomi: Inovasi untuk meningkatkan keterlibatan dan pemahaman siswa. JIIP-Jurnal Ilmiah Ilmu Pendidikan, 6(11), 9040-9050.

Hariyono, H., Andrini, V. S., Tumober, R. T., Suhirman, L., & Safitri, F. (2024). Perkembangan Peserta Didik: Teori dan Implementasi Perkembangan Peserta Didik pada Era Digital. PT. Sonpedia Publishing Indonesia.

Hidayati, A. U., Maulidin, S., & Kholifah, S. (2024). Implementasi Problem-Based Learning (Pbl) Pada Proses Pembelajaran Pai: Studi Di Smk Pelita Bangun Rejo. Action: Jurnal Inovasi Penelitian Tindakan Kelas dan Sekolah, 4(2), 53-62.

Islami, J. M. M., Ilmin, L., Afny, D. N., Supriyanto, A., & Habibi, M. M. (2024). SLR: Penerapan Pembelajaran Berbasis Komunitas Untuk Meningkatkan Kompetensi Peserta Didik di Era Disrupsi. Jurnal Ilmiah Profesi Pendidikan, 9(4), 2832-2848.

Kosasi, S., Millah, S., & Santoso, N. P. L. (2022). Manajemen dalam Konsep dan Prinsip Pengelolaan Pendidikan menggunakan Komputasi Awan. Jurnal MENTARI: Manajemen, Pendidikan dan Teknologi Informasi, 1(1), 38-45.

Moon, Y. J., & Sutama, I. M. (2024). Pembelajaran Kosa Kata Melalui Métode Peta Pikiran. Learning: Jurnal Inovasi Penelitian Pendidikan dan Pembelajaran, 4(4), 1230-1240.

Muttaqien, I. Z., Maryati, M., & Permana, H. (2023). Strategi Pengelolaan Kinerja Tenaga Kependidikan Dalam Menghadapi Era Digitalisasi Pada Lembaga Pendidikan Islam. Innovative: Journal Of Social Science Research, 3(3), 6798-6811.

Puling, H., Manilang, E., & Lawalata, M. (2024). Logika dan Berpikir Kritis: Hubungan dan Dampak Dalam Pengambilan Keputusan. Sinar Kasih: Jurnal Pendidikan Agama dan Filsafat, 2(2), 164-173.

Rahayuningsih, S., Nurasrawati, N., & Nurhusain, M. (2022). Komparasi Efektivitas Model Pembelajaran Project Based Learning (PjBL) dan Konvensional: Studi Pada Siswa Menengah Pertama. Kognitif: Jurnal Riset HOTS Pendidikan Matematika, 2(2), 118-129.

Riyanti, T. (2024). Pengaruh Strategi Pembelajaran Berbasis Proyek (Project-Based Learning) Pada Motivasi Belajar Mahasiswa Pendidikan Teknik Bangunan. Humanitis: Jurnal Homaniora, Sosial dan Bisnis, 2(4), 427-435.

Rofiudin, A., Prasetya, L. A., & Prasetya, D. D. (2024). Pembelajaran Kolaboratif di SMK: Peran Kerja Sama Siswa dalam Meningkatkan Keterampilan Soft skills. Journal of Education Research, 5(4), 4444-4455.

Rosa, E., Destian, R., Agustian, A., & Wahyudin, W. (2024). Inovasi Model dan Strategi Pembelajaran dalam Implementasi Kurikulum Merdeka: Inovasi Model dan Strategi Pembelajaran dalam Implementasi Kurikulum Merdeka. Journal of Education Research, 5(3), 2608-2617.

DOI: https://doi.org/10.62872/j1hydk82
Saputra, M. I., Al Faiz, M. I., & Gusmaneli, G. (2024). Pengembangan Keterampilan Sosial dan Akademik Siswa Melalui Strategi Pembelajaran Kooperatif. JISPENDIORA Jurnal Ilmu Sosial Pendidikan Dan Humaniora, 3(2), 62-70.

Susanty, S. (2020). Inovasi pembelajaran daring dalam merdeka belajar. Jurnal Ilmiah Hospitality, 9(2), 157-166.

Utomo, P., Asvio, N., & Prayogi, F. (2024). Metode penelitian tindakan kelas (PTK): Panduan praktis untuk guru dan mahasiswa di institusi pendidikan. Pubmedia Jurnal Penelitian Tindakan Kelas Indonesia, 1(4), 19-19.

Wardani, D. A. W. (2023). Problem based learning: membuka peluang kolaborasi dan pengembangan skill siswa. Jawa Dwipa, 4(1), 1-17.

Widiastuti, I. A. M. S., Mantra, I. B. N., Utami, I. L. P., Sukanadi, N. L., & Susrawan, I. N. A. (2023). Implementing Problem-based Learning to Develop Students' Critical and Creative Thinking Skills. JPI (Jurnal Pendidikan Indonesia), 12(4).

Zakiah, N. E., Sunaryo, Y., & Amam, A. (2019). Implementasi pendekatan kontekstual pada model pembelajaran berbasis masalah berdasarkan langkah-langkah polya. Teorema: Teori dan Riset Matematika, 4(2), 111-120.

Zamroni, A. D. K., Sirait, E., Sarjono, M. T., Handayani, P. T., Safitri, S. N., & Marini, A. (2023). Analisis Hubungan Antara Penerapan Metode Experiential Learning Dalam Pembelajaran Dengan Hasil Belajar Ips Siswa. Jurnal Pendidikan Dasar dan Sosial Humaniora, 3(1), 45-56.