



Harnessing Artificial Intelligence (AI) in Personalizing Learning at Palembang Vocational Schools: An Exploratory Study

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Abstract: This study investigates the application of artificial intelligence (AI) to enhance personalized learning in Vocational High Schools (SMKs) in Palembang City. The background of this research is based on the need for adaptive learning to accommodate the diverse characteristics of vocational students, as well as the challenges faced by conventional learning methods. This study employs a descriptive, qualitative approach with an exploratory design. Data was collected through in-depth interviews and observations of teachers and students in five vocational schools, both public and private. The results show that AI has been utilized as a Learning Management System (LMS), an Android-based application, and an automated evaluation system, allowing teachers to monitor individual student progress. The main obstacles faced include a limited understanding of technology among teachers, uneven network infrastructure, and concerns about teachers being displaced by automated systems. On the other hand, AI also opens up opportunities to enhance learning motivation, improve teaching efficiency, and provide a more adaptive learning experience. This research contributes to the understanding of AI's application in vocational schools and lays the foundation for developing a more inclusive and responsive digital education policy.

Keywords: Adaptive Learning; Artificial Intelligence; Educational Technology; Learning Personalization; Vocational High School.

1. INTRODUCTION

The rapid development of digital technology, particularly artificial intelligence (AI), has had a significant impact on various fields, including education. AI enables learning systems to be more intelligent, adaptive, and efficient. On the other hand, conventional learning methods, which are still dominant in many schools, are considered less effective in meeting the needs of students in the current digital era, particularly for specific majors. This integration demonstrates that AI is not only utilized in theoretical subjects but has also entered the realm of vocational skills, a primary characteristic of vocational schools. Although this implementation is going positively, there is a gap in digital infrastructure and competence among schools. Some vocational schools are still experiencing network constraints, limited devices, and a lack of training on using AI, which impacts the optimization of technology in learning.

However, behind these challenges, great opportunities arise from the application of AI, particularly in enhancing student learning motivation, improving teacher work efficiency, and creating a more interactive and enjoyable learning experience. AI is considered capable of actively encouraging student engagement and providing relevant feedback on their learning needs. Therefore, the use of AI in vocational school learning must continue to be developed through training support. (Holmes et al., 2019; Luckin & Holmes, 2016). The mismatch

between traditional methods and the learning needs of the digital generation has triggered the need for more personalized and technology-based learning innovations.

One of the primary challenges in conventional education is its inability to effectively accommodate the diverse abilities, interests, and learning styles of students. This is very relevant in Vocational High Schools (SMK), which have diverse student characteristics. Vocational school students come from diverse backgrounds and have varying practical learning tendencies, depending on the area of expertise they are pursuing. Thus, a learning approach that can adapt to the individual needs of students is needed (Chen et al., 2020; Holmes, 2019).

Personalization of learning is one approach that is being widely applied in various countries to address these needs. AI is a solution that enables the learning system to adjust the material, learning speed, and evaluation forms automatically based on data and student learning profiles. This makes the learning process more relevant, efficient, and meaningful. In this context, AI is not just a digital tool, but a transformative agent of learning and teaching. (Zawacki-Richter et al., 2019). AI is very promising in vocational schools because it can support project-based learning, digital simulations, and individual student performance analysis. AI-based applications, such as adaptive learning platforms, task recommendation systems, and AI-driven technical simulations, are being implemented in several vocational schools worldwide and have been proven to enhance learning effectiveness. (Bukartaite & Hooper, 2023; Hasa, 2023). However, its application in Indonesia, particularly at the vocational level, remains limited and has not been systematically documented.

Several previous studies have examined the implementation of AI in higher education or public schools, such as the one conducted by (Nasrullah et al., 2024). This shows that AI is effective in providing personalized feedback to students. Research by Chen et al. (2020) Additionally, it demonstrates that AI-based systems can enhance learning retention and student motivation. However, very few studies still specifically explore the application of AI in vocational learning, especially at the vocational school level in Indonesia.

This shows a significant research gap in the study of technology-based vocational education. Research on AI is still primarily focused on the context of higher education or STEM teaching in public schools. In contrast, the vocational world, which demands high personalization, has received little attention. Therefore, this study tries to fill this gap by exploring the practice of using AI in personalizing learning at Palembang City Vocational Schools in a more contextual and applicable manner.

The research gap is also evident in the lack of systematic implementation documentation, the challenges faced by teachers and students, and the long-term opportunities for applying AI in vocational schools. Learning in vocational schools requires a flexible and adaptive approach, as it is closely tied to the world of work. By exploring this reality, research is expected to make a practical and solution-oriented scientific contribution. With this background, it is essential to conduct an in-depth study of how AI is used in personalizing learning at Palembang City Vocational Schools, including the forms of implementation, the challenges and opportunities that arise during the implementation process, and the overall impact. This research departs from the urgency of changing the learning paradigm towards a more modern and data-based direction.

Based on the background described earlier, there is an urgent need to understand how artificial intelligence (AI) is used in vocational schools, especially in personalizing the learning process. Personalization is a critical need to encourage effective and meaningful learning in a vocational education environment that is very diverse in terms of students' abilities, interests, and learning speed. Therefore, this study addresses the central question: How can the use of AI support the personalization of learning in Palembang City Vocational Schools? This question examines how AI is utilized to tailor learning materials, methods, and evaluations to students' individual characteristics.

Furthermore, it is also important to identify various forms of AI implementation in schools, including software, learning platforms, and automated evaluation systems used by teachers and students. This research also aims to reveal the challenges faced in applying AI, such as limited infrastructure and a lack of technical understanding among teachers, as well as the opportunities that can be maximized, including increased teaching efficiency and student motivation. By formulating these three core questions, it is hoped that the research can provide a comprehensive overview of the practices, obstacles, and potential implementation of AI in vocational education.

This study aims to describe the practice of using artificial intelligence (AI) in supporting personalized learning in Palembang City Vocational Schools. Additionally, this research seeks to identify various forms of AI implementation and assess their impact on the teaching and learning process. Furthermore, this study examines the challenges and opportunities encountered by teachers, students, and schools in the adoption of AI technology.

This research is expected to provide practical benefits for schools, teachers, and education policymakers, particularly in developing strategies for integrating AI into vocational education. The information generated from this research can serve as a reference for formulating digital

transformation policies in vocational schools, enhancing teachers' readiness to face future learning technologies, and providing the basis for developing relevant and applicable AI-based training programs at the vocational level.

2. METHODOLOGY

Research Approach

This study employs a descriptive, qualitative approach with an exploratory design. This approach was chosen to gain a deep understanding of the phenomenon of using artificial intelligence (AI) in personalizing learning within the vocational school environment. Qualitative research is naturalistic, allowing researchers to capture informants' meanings, perceptions, and direct experiences through intensive interaction. (Creswell, 2014; Suharsaputra, 2012). Descriptive research aims to describe and interpret field conditions in a factual, systematic, and accurate manner.

Exploratory studies are employed because the application of AI in personalizing learning at the vocational school level is still relatively new and has not been extensively explored academically, particularly in the city of Palembang. Through an open and flexible approach, this research can capture various variations of practices, constraints, and the potential applications of AI in schools. This approach allows researchers to explore phenomena without rigid presumptions, thus making room for the discovery of significant new findings. (Lotto, 1986; Yin, 2015).

Population and Sample

This research was conducted in five Vocational High Schools (SMK) in Palembang City, comprising three State Vocational Schools (SMK Negeri 1; SMK Negeri 3, and SMK Negeri 4) and two Private Vocational Schools (SMK Bistek and SMK Swakarya). These schools were selected purposively based on the criteria that these schools have begun to implement AI-based technology in the learning process, either independently or in collaboration with digital education platform providers.

The research subjects consisted of subject teachers and students, selected using purposive sampling techniques, which considered their level of involvement in the program or the use of AI applications in teaching and learning activities. The choice of teachers as informants in this study is based on their experience and direct involvement in using artificial intelligence (AI) technology in the learning process. The selected teachers have integrated various AI-based platforms or applications into teaching and learning activities, such as using adaptive Learning Management Systems (LMS), educational chatbots, and automated evaluation systems. Their

experience is key to understanding how AI is applied in the field, the extent of its effectiveness, and the challenges faced in its implementation in the vocational high school environment.

Meanwhile, students are selected based on their active involvement in using AI applications integrated into the school's learning system. Students' experiences with various forms of learning personalization, such as adaptive assignments, AI-based speaking aids, and automated correction applications, are essential to evaluating the impact of this technology on their learning process. All informants, including both teachers and students, have received a comprehensive explanation of the research objectives and benefits, and have expressed their willingness to provide information through interviews and observations conducted by the researchers.

Table 1. Research Sample Distribution

School Name	Number of Teachers	Number of Students	Total
SMK Negeri 1 Palembang	2	2	4
SMK Negeri 3 Palembang	2	2	4
SMK Negeri 4 Palembang	2	2	4
SMK Bistek Palembang	2	2	4
SMK Swakarya Palembang	2	2	4
Total	10	10	10

Table 2. Sample Teacher Profile (10 Persons)

Code	Initials	School Name	Subjects taught	Experience Using AI	Role
G1	NS (PR)	SMK N 1	Productive RPL	2 years (using an AI-based LMS)	AI User Teacher
G2	TH (LK)	SMK N 1	English	1 year (using an educational chatbot)	Initiator Teacher
G3	MA (Pr)	SMK N 3	Mathematics	1.5 years (using an adaptive AI platform)	Literacy Teacher
G4	SR (Lk)	SMK N 3	Multimedia	2 years (integrating AI in graphic design)	Entrepreneurship Teacher
G5	WY (Pr)	SMK N 4	Productive TKJ	2.5 years (developing AI-based modules)	Multimedia and Network Teacher
G6	HA (Lk)	SMK N 4	Indonesian Language	1 year (using an AI grammar checking platform)	Language Teacher
G7	DR (Pr)	SMK Bistek	Creative Economy	1 year (using AI business simulations)	Economics Teacher

G8	LF (LK)	SMK Bistek	Religious Education	1 year (AI experiment for automated Q&A)	Guru PAI
G9	TM (PR)	SMK Swakarya	English	2 years (using AI speaking tools)	Language Teacher
G10	RJ (LK)	SMK Swakarya	Productive Accounting	1.5 years (AI in digital accounting training)	Technology Teacher

Table 2. Student Sample Profile (10 Persons)

Code	Initials	School Name	Class	Membership Programs	Experience Using AI	Motivation Range
S1	RA	SMK N 1	XI	RPL	1 year (adaptive AI platform)	High
S2	MM	SMK N 1	XII	TKJ	1.5 years (AI coding tutorial)	Very High
S3	WR	SMK N 3	XI	Multimedia	2 years (AI design tools)	High
S4	TY	SMK N 3	XII	Broadcasting	1 year (AI speech-to-text)	Medium
S5	NM	SMK N 4	XI	Computer Engineering	1.5 years (AI grammar checker)	High
S6	DV	SMK N 4	XII	TKJ	2 years (AI task recommendation)	Very High
S7	TR	SMK Bistek	XI	Marketing	1 year (AI business assistant)	High
S8	EE	SMK Bistek	XII	Multimedia	1 year (AI content design tools)	High
S9	UY	SMK Swakarya	X	Accountancy	1.5 years (AI learning financial statements)	High
S10	OL	SMK Swakarya	XI	Accountancy	1.5 years (AI learning financial statements)	Very High

Data Collection Techniques

The primary technique used in data collection was in-depth interviews with teachers and students at five vocational schools in Palembang City. Interviews are semi-structured, allowing researchers to explore information flexibly according to the dynamics of the informant's responses. The questions in the interview focused on their experience with using artificial intelligence (AI) technology in the learning process, their perception of its effectiveness, the forms of personalization they experienced, and the obstacles and opportunities associated with the application of AI. The interview was recorded (with permission) and then transcribed for further analysis.

In addition to interviews, the researcher also conducted direct observations of learning activities using AI-based systems inside and outside the classroom. The observation aims to capture students' interaction with AI platforms, how teachers utilize personalization features, and the learning dynamics. The researcher used an observation sheet to record the participants' behavior, habits, and responses to the technology used. These observational data were then compared and confirmed with the interview results to enhance the validity of the findings.

Data Analysis Techniques

The data obtained from interviews and observations were analyzed using qualitative analysis techniques according to the Huberman & Miles (2002). The model included three stages: data reduction, data presentation, and conclusion/verification. This technique organizes and simplifies data, allowing researchers to focus on information relevant to formulating the research problem. The first stage is data reduction, which involves selecting, streamlining, and transforming raw data into a more organized form. At this stage, the researcher identifies key themes, codes the results of interviews and observations, and discards any irrelevant information. Data reduction helps researchers compile thematic categories that make understanding patterns that emerge from various data sources easier.

The second stage is data presentation, which involves compiling the data from reduction into a matrix, thematic narrative, or chart for further analysis. This presentation enables researchers to visualize the relationship between data, identify trends, and discern differences or similarities among informants. At this stage, the researcher also conducts a cross-checking process between data from interviews and observations to improve the validity of the results. The final stage is conclusion drawing and verification, in which the researcher compiles an interpretation of the findings that have been presented previously. Conclusions are drawn based on consistent and relevant patterns in formulating the research problem. Verification is carried out continuously during the analysis process by comparing data, referencing the theories used, and reflecting on the field data, ensuring that the final results are credible, consistent, and scientifically accountable.

3. RESULT

This research yielded essential findings regarding the use of artificial intelligence (AI) to personalize learning in five vocational schools in Palembang City. Based on in-depth interviews and observations conducted with teachers and students, it was found that the use of AI technology has positively impacted the learning process, which is more adaptive, interactive, and tailored to students' individual needs. Although the implementation rate still

varies from school to school, most informants show an understanding and enthusiasm for the potential of AI to support more effective learning. The findings of this study are systematically described based on the problem formulation that was previously determined.

The Utilization of AI in Personalization of Learning in Vocational Schools

Artificial intelligence (AI) in learning personalization has begun to be implemented in several vocational schools in Palembang City by integrating technology into the Learning Management System (LMS) platform and online student admissions.

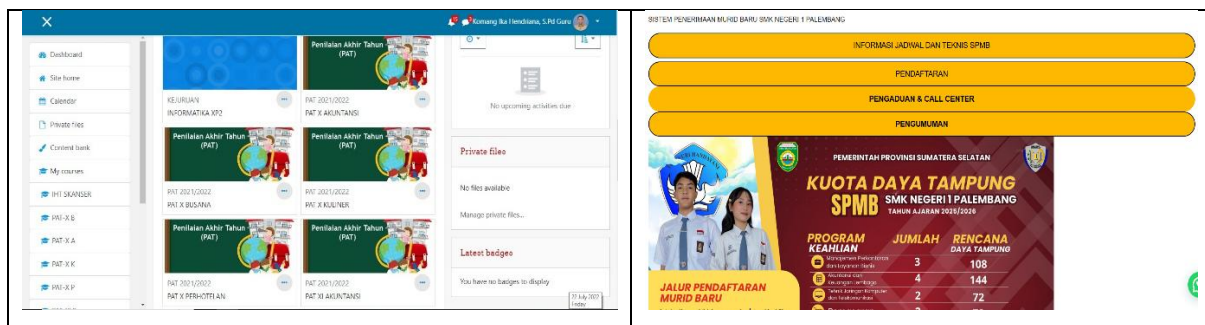


Figure 1. Utilization of AI in Learning and New Student Admissions

Figure 1 shows the official information page of the New Student Admission System (SPMB) at SMK Negeri 1 Palembang, which includes details of the expertise program, the number of classes, and the capacity plan. This information illustrates how schools have grouped students based on specific skill competencies, providing the initial foundation for implementing personalized learning. With this classification, AI-based systems can be used to tailor learning materials and methods to the specific needs of each department, such as Network Computer Engineering, Accounting, or Hospitality. AI contributes to distributing relevant, adaptive, and data-based material based on students' initial abilities during the entrance selection process. Teachers and students use the Learning Management System (LMS) platform at SMK Negeri 1 Palembang. The platform features a variety of virtual classes and subjects tailored to students' levels and needs, as well as the implementation of Year-End Assessments (PATs). In this context, AI integrated into the LMS system can automatically analyze student performance in evaluations, provide recommendations for material enrichment or remedial tasks based on each student's learning outcomes. This indicates that learning has led to a personal and data-driven approach.

Teachers play an essential role in leveraging the data generated by AI systems. Through the analytics dashboard available on the platform, teachers can view students' progress in real-time, including the time spent working on assignments, the level of difficulty they encounter, and the most frequently repeated topics. This data is used as a reference in determining the necessary

learning interventions, such as providing additional guidance or modifying teaching strategies. Teachers no longer rely solely on manual assessment, but instead have objective data support from AI systems.

This provides visual evidence of the application of AI-based personalized learning in vocational schools. AI helps schools manage student data from the enrolment stage to the implementation of learning evaluations, allowing teachers to access specific and accurate progress reports. With features such as learning analytics, student grouping, and outcome-based assignment automation, the system reflects the use of AI as an essential tool in realizing adaptive, efficient, and relevant learning to the individual needs of students at SMK Kota Palembang.

To support the findings of this study, researchers conducted in-depth interviews with teachers and students at five vocational schools in Palembang City that have utilized artificial intelligence (AI) technology in their learning processes. The results of these interviews provide a realistic picture of the informants' firsthand experience with using AI, starting from their perceptions, perceived benefits, and the challenges they faced in implementing personalized learning. Some of the following quotes from informants were chosen because they represent key findings and reinforce the interpretation of the data previously outlined.

"I use an LMS with AI features to map students' abilities. The results were beneficial because I was able to know who needed reinforcement without having to wait for the midterm exam." (G1)

"The task recommendation feature is handy. The AI adjusts the assignment to the results of the previous exercise, so students do not feel like all tasks are the same." (G10)

The results of interviews with G1 teachers from SMK Negeri 1 Palembang and G10 teachers from SMK Swakarya Palembang can be drawn to the central theme regarding the role of AI in helping teachers map abilities and individual learning adjustments. The G1 teacher emphasized that the AI-based LMS platform's analytics feature helps her find out which students need reinforcement without waiting for the results of the formal exam. This demonstrates that AI has been a valuable tool in supporting learning decision-making, enabling teachers to provide interventions more quickly and accurately. Thus, AI contributes to creating a more responsive learning monitoring system based on actual data. Meanwhile, G10 teachers highlighted the role of AI systems in providing recommendations for various tasks based on

student learning outcomes. The teacher stated that AI offers a variety of assignments based on previous students' performance, so that each student feels they are receiving treatment tailored to their needs and abilities. This confirms the role of AI in learning personalization, where the system not only delivers general material but also adjusts content based on historical student performance data. Both teachers gave a strong impression that AI is not just a technological tool, but has become an integral part of more adaptive and individualistic learning strategies.

"I like it because the system can give me an additional video if I answer the wrong question. So, I learned faster than I made mistakes." (S3)

"The AI knew I was slow in accounting lessons, so I often got extra practice. At first, it made me tired, but it turned out that it made me understand." (S7)

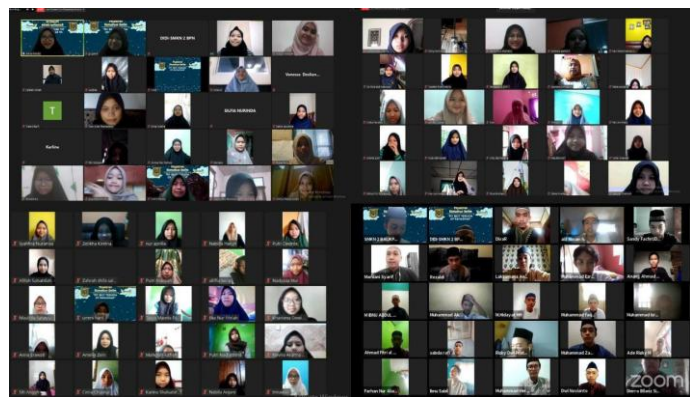
The results of interviews with S3 students show the central theme, namely, reflective learning based on automated feedback from AI. S3 revealed that the AI system provided an additional video when it answered the question incorrectly. This illustrates how AI creates a learning environment that allows students to learn from mistakes directly and instantly. This process repeats the material and provides contextual and personalized learning scaffolding, which significantly helps students understand concepts more deeply. Meanwhile, from S7 students, the theme of AI support in overcoming learning weaknesses through structured additional exercises emerged. This student acknowledged that the AI system identified his weaknesses in accounting lessons and automatically provided him with further exercises to address them. Although initially overwhelmed, the student realized that the extra tasks helped improve his understanding of the material. This shows that AI is an adaptive tutor that detects students' difficulties and provides targeted solutions to fix them.

Both students' experiences show how AI plays an active role in shaping learning experiences tailored to individual needs, through material customization, direct feedback, and personalized practice support. AI is a medium for delivering material and a system that learns from student behavior to develop effective learning strategies. This reinforces the idea that personalization of learning occurs not only on the teacher's side but is also experienced directly by learners through their interaction with the system.

Based on the results of interviews with teachers and students, it can be concluded that the application of AI in vocational schools has provided a more adaptive, reflective, and targeted learning experience. Teachers are assisted in mapping abilities and making learning adjustments, while students experience the real benefits of a learning system that adapts to their individual skills and needs. AI has enhanced the personalization dimension in teaching and learning, becoming an essential tool for increasing learning effectiveness in the digital era.

Forms of AI Implementation in Schools

Implementing artificial intelligence (AI) in vocational schools in Palembang City is carried out in various forms, integrated with teaching and learning activities. Some schools utilize a Learning Management System (LMS) platform with AI features to assess students' abilities, provide personalized assignments, and present supplementary materials tailored to individual learning outcomes. Additionally, some teachers utilize mobile applications like WhatsApp and Zoom for meetings. Teachers create subject groups based on what is being taught in the class. This is useful for bridging the gap in the provision of learning materials or work and collecting exercises/assignments, if they do not meet the effectiveness of face-to-face learning. In the vocational field, AI is also implemented through digital simulations, error prediction systems in practice, and machine intelligence-based training. These forms demonstrate that AI is applied to general subjects and students' skill competencies, tailoring the curriculum to meet the needs of vocational practice and job skills.



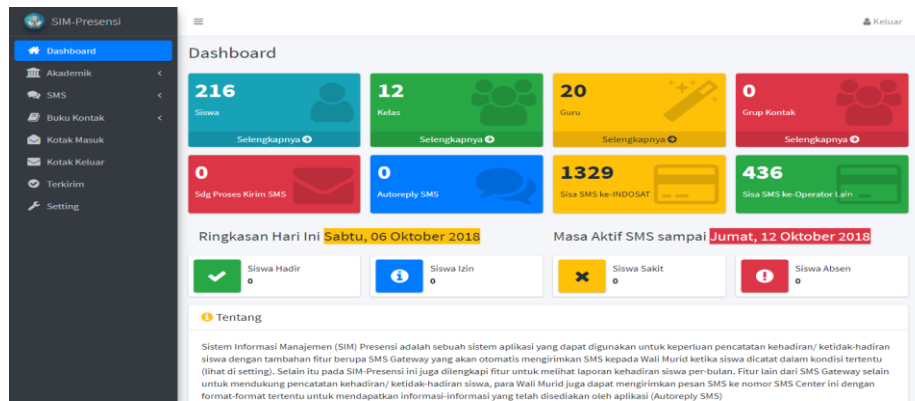


Figure 2. Integration of AI in teaching and learning activities

Figure 2 explains various forms of information technology implementation integrated with teaching and learning activities at Palembang City Vocational Schools. The first image shows the display of SIM-Presensi, a digital-based attendance management information system equipped with the SMS Gateway feature. This system simplifies student attendance recording and automatically sends notifications to parents/guardians when students are absent. Such a system reflects the early use of simple AI technology and automation to support education administration and real-time student monitoring. The second image shows online learning based on video conferencing via Zoom involving many students. This indicates the integration of digital technology in the implementation of distance learning, supported by the management of attendance data, learning activities, and interaction between students and teachers. The third image shows communication between school residents via WhatsApp, which is used to convey essential and emergency information quickly and efficiently. Although informal, the platform is an integral part of the modern educational communication ecosystem. These three forms demonstrate that integrating technology in Palembang City Vocational Schools encompasses learning, school management, and community communication on a broader scale.





Figure 3. Learning Support AI Applications

Figure 3 describes the various AI applications used to support the learning process at Palembang City Vocational Schools. The first and second photos show the MYOB Accounting and computer-based graphic/drawing applications. In the MYOB picture, students are instructed to follow digital accounting procedures using a computerized system, which is a crucial skill in the accounting department. Meanwhile, in the third picture, students use laptops to create visual designs or run graphic applications, which shows the use of digital tools in the creative field. These activities show the integration of AI-based learning applications, which provide automated feedback, adaptive exercises, and easy tracking of learning outcomes.

Meanwhile, the third photo shows vocational school students showing the Android-based Heavy Equipment Engineering (TAB) learning application on their mobile phone screens. The app is designed to provide an interactive learning experience through educational games, level-based quizzes, and virtual simulations. This demonstrates that mobile technology, combined with AI and animated graphics, has increased students' interest in learning vocational materials, particularly in engineering and automotive majors. The interactivity and personalization in this application also make it easier for students to learn independently at their own pace and according to their abilities.

AI implementation in Palembang City's vocational schools includes Android-based learning applications, computerized accounting programs, and creative software that supports vocational skills. These systems are informative, interactive, and adaptive to each student's abilities. AI helps strengthen the learning process by providing personalized, predictive, and supportive experiences effectively according to the characteristics of vocational education.

Challenges and Opportunities in AI Deployment

One of the primary challenges in applying artificial intelligence (AI) in the Palembang City Vocational School environment is the teachers' limited understanding of the concepts and techniques of utilizing AI in the learning process. Many teachers still consider AI a complex

technology that is challenging to integrate into daily teaching and learning activities. The lack of training and socialization often limits educators to utilizing only the basic features of digital platforms, without fully exploring the potential of AI. As a result, AI has not been optimally used to support personalized learning.

Another challenge is the limited network infrastructure and digital devices in some schools, mainly private vocational schools with limited operational funds. Unstable internet access, limited computer or tablet devices, and a lack of technical support cause AI implementation to be uneven. This exacerbates the digital divide between schools and presents a significant obstacle to encouraging the digital transformation of inclusive education. Some teachers state that even though schools already have an LMS or supporting software, their implementation is often limited and cannot be used simultaneously.

Additionally, teachers are concerned that AI will replace their role in the educational process. Some teachers are worried that their role will become increasingly limited with a system that can automatically assess, assign assignments, and recommend material. These concerns arise from a lack of understanding that AI is supportive, not replaceable. Therefore, it is essential to cultivate a new perspective that technology is a tool that strengthens teachers' capabilities in managing learning more effectively and efficiently.

To explore the challenges faced in applying artificial intelligence (AI) at the Palembang City Vocational School, the researcher conducted direct interviews with several teachers and students who are involved in using AI-based learning systems. The results of this interview provide a concrete picture of the obstacles they experience, both in terms of technical knowledge, infrastructure, and perception of the role of technology in education. Some of the following quotes are representations of field voices that show the reality of the challenges of AI implementation in the world of vocational education.

"I do not understand how AI works. If it is just a regular LMS, I can., but if you have to manage AI, it is still unfamiliar to me." (G3)

"The obstacle is precisely in the network. Sometimes, when you want to use AI features, the system is slow or even inaccessible. Finally, we went back to the usual method." (G5)

"My friends said that later teachers do not need to teach anymore because everything can be done from the system. So, it is like we are learning from machines." (S6)

From the interview results above, three dominant themes emerged: lack of AI technology literacy among teachers, limited supporting facilities, and negative perceptions of the role of technology. All three are indicators that the implementation of AI requires more than just device installation; It takes continuous training, infrastructure improvement, and mindset transformation from the entire school ecosystem. Concerns about replacing teachers' roles underscore the need for improved communication about the role of AI as an aid, not a substitute for educators.

On the other hand, applying AI in vocational schools for learning opens up great opportunities, one of which is increasing student learning motivation. AI-based learning applications, packaged in interactive and adaptive forms, can capture the interest of students who previously found conventional learning methods boring. Students are more motivated because they feel treated as individuals with their own pace and learning style. This makes the learning process more fun and meaningful.

The next opportunity is time efficiency for teachers in the administrative process and teaching decision-making. With AI support, teachers can access automated reports related to student performance, save time on assessments, and focus more on developing teaching strategies. AI also provides recommendations for materials or exercises tailored to the needs of students, which would otherwise require a significant amount of time to complete manually. This allows teachers to play a more active role as facilitators and mentors in the learning process.

Ultimately, AI provides students with a more adaptive and engaging learning experience, particularly in vocational settings that emphasize practical skills. Through digital simulations, adaptive quiz systems, and automated feedback, students can engage in a learning process that is less rigid and more tailored to their individual learning needs and abilities. With a system that can recognize individual needs, learning personalization is no longer an ideal concept but has become an applicable reality in vocational classrooms.

In addition to the challenges, the interviews revealed various positive opportunities from applying artificial intelligence (AI) in learning at SMK Kota Palembang. Teachers and students described how this technology can strengthen the learning process, improve teachers' work efficiency, and create a more engaging and personalized learning experience. The following excerpts from interviews highlight the potential of AI in supporting the transformation of vocational education in a more adaptive and sustainable manner.

"Now I can immediately know which students need remedial and which ones already understand. The AI instantly gives you complete data." (G5)

"Learning is like a game. So, you do not get bored, and it even makes you excited to learn." (S2)

"I feel that the system understands my weaknesses. The task I was given was very fitting with what I did not know." (S9)

From this interview, three main opportunities for utilizing AI are highlighted: increased student motivation through gamification, enhanced efficiency in learning management by teachers, and the ability of AI systems to accurately recognize individual learning needs. All three show that AI technology is a transformative tool in creating a more responsive, personalized, and fun education. This implementation lays the groundwork for future learning models that are more inclusive and adaptable to the diverse needs of students.

From the results of interviews with teachers and students from various vocational schools in Palembang City, as mentioned above, it can be concluded that applying artificial intelligence (AI) in learning offers two complementary sides: challenges and opportunities. In terms of challenges, significant obstacles remain, including the teachers' limited understanding of AI technology, the limitations of school infrastructure, and concerns about the shift in teachers' roles resulting from digital systems. This indicates that the readiness of human resources and the support of technological facilities remain decisive factors in successfully integrating AI into learning systems.

On the other hand, the interviews also reveal that AI has great potential to impact the teaching and learning process positively. This technology is considered to enhance student learning motivation through an interactive approach, making it easier for teachers to manage the classroom and adjust learning to meet the individual abilities of each student. AI can also speed up the evaluation process and provide automated recommendations, which helps improve time efficiency. Therefore, if these challenges can be overcome through training, infrastructure provision, and continuous mentoring, then the application of AI in vocational schools will present a strategic opportunity to achieve more effective, adaptive, and competitive vocational education.

4. DISCUSSION

Based on research conducted in five vocational schools in Palembang City, the use of artificial intelligence (AI) in personalized learning has demonstrated a significant contribution to enhancing the quality of the learning process. AI integrated into platforms such as Learning Management Systems (LMS) can automatically analyze student performance, provide additional materials, and adjust learning rhythms to individual needs. This creates a more adaptive learning model that supports the independent development of students' abilities. Teachers are also assisted in mapping student needs through analytical data provided by AI systems, enabling their role as learning facilitators to be more optimal and data-driven.

In terms of implementation, AI is applied in various forms and learning media through Android applications, expert software such as MYOB for accounting, and applications for graphic design and technical simulation, catering to specific majors. This integration demonstrates that AI is not only used in theoretical subjects but has also entered the realm of vocational skills, a primary characteristic of vocational schools. Although this implementation is going positively, there is a gap in digital infrastructure and competence among schools. Some vocational schools are still experiencing network constraints, limited devices, and a lack of training on using AI, which impacts the optimization of technology in learning.

However, behind these challenges, great opportunities arise from the application of AI, particularly in enhancing student learning motivation, improving teacher work efficiency, and creating a more interactive and enjoyable learning experience. AI is considered capable of actively encouraging student engagement and providing relevant feedback on their learning needs. Therefore, the use of AI in vocational school learning must continue to be developed through training support for teachers, strengthening digital infrastructure, and school policies oriented towards the digital transformation of education. This approach will enhance the competitiveness of vocational school graduates, preparing them to succeed in the technology-driven world of work.

The implications of this study suggest that integrating artificial intelligence (AI) into vocational learning enhances the effectiveness of the learning process and opens up opportunities for more adaptive, data-driven, and student-centered learning. (Bond, 2024; Reiser & Dempsey, 2012; Tuomi, 2019). This has an impact on changing the role of teachers, who are no longer only as material presenters, but as facilitators and managers of learning experiences. Schools as educational institutions also need to adjust their policies and infrastructure to adopt an AI-based learning system optimally. Therefore, the results of this study can serve as a basis for policymakers in education to consider developing a sustainable

digital transformation roadmap at the vocational secondary education level. (Klassen, 2025; Zawacki-Richter et al., 2019).

Reflections on the implementation of this study reveal that the success of AI in the SMK environment is highly dependent on the readiness of human resources and their supporting ecosystems. (Marone, 2025; Vafaei-Zadeh et al., 2025). Although technology is available, the full potential of AI will not be realized without an adequate understanding from teachers and students, as well as the support of suitable digital facilities (Rodríguez-Sabiote et al., 2022; Wang & Huang, 2023). The researcher recognizes the importance of collaboration among educational institutions, technology developers, and local governments to ensure that this innovation effectively addresses the needs of today's vocational education (Çela et al., 2025; Hasan et al., 2024). The experience during the study also showed that teachers' openness to technological updates is a crucial factor in encouraging changes in the learning system to move in a more flexible and personalized direction. (Nasar et al., 2023; Purwanto et al., 2024).

The results of this study reinforce the findings from Holmes (2019), who stated that AI has great potential in supporting personalized learning through real-time analysis of student data and the provision of individualized feedback. Their research emphasizes that this technology can increase student engagement and accelerate the achievement of competencies, provided it is balanced with pedagogical support from teachers. The results of this study are also in line with a survey conducted by Zawacki-Richter et al. (2019), which concluded that the success of AI implementation in schools depends on the technological literacy of teachers and the readiness of school infrastructure, especially in the context of developing countries. In addition, research from Cihuy (2019) and Saragih (2025) Highlights that one of the advantages of AI is its ability to identify students' learning styles and tailor material based on those preferences. These findings align with the results of this study, where students reported that AI systems assign materials and tasks according to their weaknesses, which has a direct impact on increased learning motivation. In the context of vocational schools, this adjustment is significant, considering the diverse character of vocational students who require a contextual and practical learning approach. The study also complements findings from Bukartaite & Hooper (2023), which explored the application of AI in vocational education in Southeast Asia, found that AI can be a catalyst for improving students' job readiness through simulation-based learning and digital practices. However, they also emphasized the importance of the government and policymakers in bridging the digital divide between schools, particularly between public and private vocational schools. The findings in Palembang show a similar thing,

where the implementation of AI is smoother in schools with better infrastructure and educators who are familiar with technology.

This research makes a significant contribution to the development of modern, technology-based vocational education. The use of AI in learning personalization can facilitate the creation of an education system that is not uniform, but rather more tailored to the individual needs of students. This is important to address the challenges of the Industrial Revolution 4.0 and Society 5.0, which require vocational school graduates to be skilled and adaptable to technological changes. (Declaration, 2015; Tohani & Aulia, 2022; Williams, 2000). In the context of professionalism, students who are accustomed to using AI-based systems will be better prepared to face the world of work, which is also increasingly reliant on automation and data-driven decision-making. (Nasar et al., 2024; Purwanto et al., 2020, 2023). In addition, this research serves as a reference for the development of digital education policies, particularly in the procurement of technology literacy training for teachers and the provision of AI-supporting devices in the school environment. This support will create a learning ecosystem that is not only digital but also intelligent and responsive to the times. (Purwanto et al., 2025). This research opens up further discussion on how AI can be adapted into the national vocational curriculum model and how AI-based learning success measurement can be combined with a more complex and contextual evaluation approach. For further research, it is recommended that a longitudinal study be conducted to explore the long-term impact of AI application on student competency achievement, including its effects on job readiness and productivity after graduation (Hadiansah et al., 2021; Kessler, 2018). Quantitative research is also necessary to assess the effectiveness of AI-based learning personalization on the academic and non-academic grades of vocational school students. Furthermore, future studies can focus on developing collaborative models between teachers and AI systems, thereby creating a harmonious integration between humanistic approaches and technology in the teaching and learning process. (Kramsch, 1995; Marek, 2014; Suryadi, 2007)

5. CONCLUSION

This study concludes that the use of artificial intelligence (AI) in learning at several vocational schools in Palembang City has begun to be implemented, albeit on a limited scale. AI is used primarily in digital learning platforms such as LMS, Android-based educational applications, and automated evaluation systems that help personalize the learning process. The existence of AI can provide a more adaptive learning experience, allowing students to receive material according to their abilities and needs. Teachers are also assisted in mapping students'

skills and making data-driven teaching decisions, although not all teachers have a sufficient understanding of how to operate this technology. While it shows great potential, the success of AI adoption is highly dependent on systemic support, including infrastructure readiness, teacher and student technology literacy, and education policies that support comprehensive digital transformation. To realize a broader and more sustainable use of AI, synergy is needed among schools, governments, and technology providers. This synergy encompasses digital competency training, enhanced access to networks and devices in schools, and the integration of AI into curricula and evaluation systems tailored to the needs of vocational education in the digital age. From a methodological perspective, the strength of this research lies in its exploratory approach, which enables researchers to capture a comprehensive picture of AI use in the field through in-depth interviews and observations. The study also involved different informants (teachers and students) from five schools, so the results were quite representative of the local context. However, the weakness of this study lies in its limited generalizability, as the research was conducted only in the Palembang City area and employed a qualitative approach without quantitative measurement of the impact of AI on learning outcomes. Furthermore, the dynamics of rapid technological change necessitate that these findings be continually updated to remain relevant in the context of future AI applications.

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REFERENCES

- Bond, M. (2024). *The International Journal of Educational Technology in Higher Education: Content and authorship analysis 2010–2024. International Journal of Educational Technology in Higher Education*, 21(1), 60. <https://doi.org/10.1186/s41239-024-00492-z>
- Bukartaite, R., & Hooper, D. (2023). *Automation, artificial intelligence, and future skills needs: An Irish perspective. European Journal of Training and Development*, 47(10), 163–185. <https://doi.org/10.1108/EJTD-03-2023-0045>
- Çela, E., Vajjhala, N. R., Eappen, P., & Vedishchev, A. (2025). *Artificial intelligence in vocational education and training. In Transforming vocational education and training using AI* (pp. 1–16). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8252-3.ch001>
- Chen, L., Chen, P., & Lin, Z. (2020). *Artificial intelligence in education: A review. IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Cihuy, P. G. (2019). *Mencari peluang di revolusi industri 4.0 untuk melalui era disrupsi 4.0*. Queency Publisher.
- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE Publications.
- Declaration, I. (2015). *Education 2030: Towards inclusive and equitable quality education and lifelong learning*. World Education Forum.
- Hadiansah, D., Setiawardani, W., & Sholeh, M. (2021). *Digital literacy proficiency of elementary school students in the era of the industrial revolution 4.0. PrimaryEdu: Journal of Primary Education*, 5(1), 80–87. <https://doi.org/10.22460/pej.v5i1.2034>
- Hasa, K. (2023). *Examining the OECD's perspective on AI in education policy: A critical analysis of language and structure in the “AI and the future of skills” (AIFS) document and its implications for higher education*. University of British Columbia. <https://open.library.ubc.ca/collections/24/items/1.0435494>
- Hasan, M. Z., Abidin, R. A. Z., Hashim, H. I. C., Yaacob, T. Z., & Fuzi, N. M. (2024). *Revitalizing education in the 21st century: The evolution of the flipped classroom. In Flipped classrooms and learning* (p. 63).
- Holmes, W. (2019). *Artificial intelligence in education. In Encyclopedia of education and information technologies* (pp. 1–16). Springer. https://doi.org/10.1007/978-3-319-60013-0_107-1
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
- Huberman, M., & Miles, M. B. (2002). *The qualitative researcher's companion*. Sage Publications. <https://doi.org/10.4135/9781412986274>
- Kessler, G. (2018). *Technology and the future of language teaching. Foreign Language Annals*, 51(1), 205–218. <https://doi.org/10.1111/flan.12318>

- Klassen, J. (2025). *International organisations in vocational education and training: A literature review*. *Journal of Vocational Education & Training*, 77(3), 792–818. <https://doi.org/10.1080/13636820.2024.2320895>
- Kramsch, C. (1995). *The cultural component of language teaching*. *Language, Culture and Curriculum*, 8(2), 83–92. <https://doi.org/10.1080/07908319509525192>
- Lotto, L. S. (1986). *Qualitative data analysis: A sourcebook of new methods*. *Educational Evaluation and Policy Analysis*, 8(3), 329–331. <https://doi.org/10.2307/1163741>
- Luckin, R., & Holmes, W. (2016). *Intelligence unleashed: An argument for AI in education*. UCL Knowledge Lab. <https://www.pearson.com/content/dam/corporate/global/pearson-dot-com/files/innovation/Intelligence-Unleashed-Publication.pdf>
- Marek, M. W. (2014). *The integration of technology and language instruction to enhance EFL learning*. Online Submission. <https://eric.ed.gov/?id=ED545477>
- Marone, J. (2025). *High school teachers' perspectives on the components of a quality online structure for remote learning in digital and media art classes*. Walden University.
- Nasar, I., Nurdianingsih, F., Rahmi, E., & Purwanto, M. B. (2024). *Values of character education: Study of strengthening the culture of digital literacy for youth in the disruptive 5.0 era*. *Gema Wiralodra*, 15(1), 596–604. <https://doi.org/10.31943/gw.v15i1.688>
- Nasar, I., Uzer, Y., & Purwanto, M. B. (2023). *Artificial intelligence in smart classrooms: An investigative learning process for high school*. *Asian Journal of Applied Education (AJAE)*, 2(4), 547–556. <https://doi.org/10.55927/ajae.v2i4.6038>
- Nasrullah, N., Rosalina, E., Umar, V., Ningsih, R. P., Nor, H., Fauziah, S., & Fadillah, A. S. N. (2024). *Technology integration in English language teaching and learning*. In D. E. Winoto (Ed.), *Eureka Media Aksara*. Eureka Media Aksara.
- Purwanto, M. B., Devi, D., & Nuryani, N. (2020). *Pembelajaran era distrustif menuju masyarakat 5.0*. In *Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang*.
- Purwanto, M. B., Hartono, R., & Wahyuni, S. (2023). *Essential skills challenges for the 21st century graduates: Creating a generation of high-level competence in the industrial revolution 4.0 era*. *Asian Journal of Applied Education (AJAE)*, 2(3), 279–292. <https://doi.org/10.55927/ajae.v2i3.3972>
- Purwanto, M. B., Yuliana, Y., Agustin, A., & Despita, D. (2025). *Utilization of information and communication technologies (ICT) in English learning to improve language literacy*. *INTERACTION: Jurnal Pendidikan Bahasa*, 12(1), 72–85. <https://doi.org/10.36232/interactionjournal.v12i1.1182>
- Purwanto, M. B., Yuliasri, I., Widhiyanto, W., & Rozi, F. (2024). *Primary school English education in the age of Industry 4.0: Tackling challenges, expanding horizons*. *Proceedings of Fine Arts, Literature, Language, and Education*, 859–873.

- Reiser, R. A., & Dempsey, J. V. (2012). *Trends and issues in instructional design and technology*. Pearson.
- Saragih, M. A. T. S. (2025). *Kajian komprehensif globalisasi pendidikan di era digital*. UMSU Press.
- Suharsaputra, U. (2012). *Metode penelitian: Kuantitatif, kualitatif, dan tindakan*. PT Refika Aditama.
- Suryadi, A. (2007). *Pemanfaatan ICT dalam pembelajaran*. *Jurnal Pendidikan Terbuka dan Jarak Jauh*, 8(2), 83–98.
- Tohani, E., & Aulia, I. (2022). *Effects of 21st century learning on developing critical thinking, creativity, communication, and collaboration skills*. *Journal of Nonformal Education*, 8(1), 46–53. <https://doi.org/10.15294/jne.v8i1.33334>
- Tuomi, I. (2019). *The impact of artificial intelligence on learning, teaching, and education: Policies for the future*. JRC Science for Policy Report. European Commission.
- Vafaei-Zadeh, A., Nikbin, D., Wong, S. L., & Hanifah, H. (2025). *Investigating factors influencing AI customer service adoption: An integrated model of stimulus-organism-response (SOR) and task-technology fit (TTF) theory*. *Asia Pacific Journal of Marketing and Logistics*, 37(6), 1465–1502. <https://doi.org/10.1108/APJML-05-2024-0570>
- Williams, H. S. (2000). *Integrating reading and computers: An approach to students' SL reading skills*. *Reading Improvement*, 37(3), 97.
- Yin, R. K. (2015). *Qualitative research from start to finish*. Guilford Publications.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). *Systematic review of research on artificial intelligence applications in higher education: Where are the educators?* *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>