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Development Of A Digital-Based Field Work Practice Information System (Sip-Palvo) To Improve Administrative Management For Students At SMK Teknik PAL Surabaya

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Abstract:
This study developed and evaluated SIP-PALVO, a web-based Field Work Practice (FWP) administration system for SMK Teknik PAL Surabaya. Research and Development followed the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) framework. The needs assessment involved 11 students, four school supervisors, and four industrial mentors; the subsequent purposively selected user trial involved 34 students, five school supervisors, and three industrial mentors. Two media experts and two vocational curriculum experts assessed feasibility. Descriptive percentage analysis of Likert-scale validation and user questionnaires yielded media and content validation scores of 97% and 94%, respectively; user responses were 87.5% (students), 91.75% (school supervisors), and 86% (industrial mentors). Industrial-mentor administrative performance scores increased from 48.3 before implementation to 76.5 afterward, equivalent to a relative increase of 58.4% [(76.5 − 48.3)/48.3 × 100]. School-supervisor scores separately increased from 62 to 76. These descriptive findings indicate favorable feasibility and promising improvements in recorded administrative performance; they do not establish statistical significance or causal effectiveness. The system integrates digital logbooks, monitoring, and assessment across school and industry stakeholders.

Introduction (مقدمة)

Vocational High Schools (SMKs) are educational institutions that specifically implement a dual education system by combining theoretical learning at school with practical training in the industrial sector (Irwanto, 2025). One of the crucial components of the vocational education curriculum that serves as a bridge between learning and professional competence is Field Work

Practice (FWP) (Efendi, 2025). FWP is designed to develop students' psychomotor skills by enabling them to actualize and apply the competencies they have acquired in real workplace settings (Sari et al., 2024). Through FWP, it is expected that students' practical skills will become more aligned with and relevant to ongoing technological developments in the business and industrial sectors (Habibi et al., 2026). Furthermore, this program aims to foster a professional, independent, and adaptable work ethic among students before they graduate.

To ensure that these educational objectives are achieved optimally, vocational schools are required to manage FWP programs effectively and systematically, encompassing planning and mapping, placement, implementation, regular monitoring, and final evaluation (Mamesah et al., 2024). Close supervision is essential to prevent problems or potential losses that may affect students or partner schools and companies (Ngindana et al., 2022). However, in practice, the operational management of FWP programs still largely relies on conventional systems based on physical documents and paper-based administration (Aswad et al., 2026). This conventional approach creates various administrative and supervisory challenges, including limited monitoring by school supervisors due to delays in receiving regular updates from students' workplaces (Hermawan, 2026). These problems are further compounded by physical limitations, as students' daily journals or logbooks are susceptible to damage, dirt, and loss due to demanding industrial working environments, particularly in manufacturing facilities and shipyards (Fitriyani et al., 2023). Consequently, real-time monitoring of student performance remains difficult to achieve.

Developments in information technology during the Industry 4.0 era offer significant opportunities to transform education systems into more effective and efficient processes (Sabaruddin, 2022). The use of web-based technology can improve accessibility, enhance interaction, and centralize administrative data within an integrated system (Ambara et al., 2024). Previous studies have demonstrated the effectiveness of digitalization in FWP management. For example, research conducted by Ro'if et al. (2024) on a website-based FWP information system demonstrated a high level of user acceptance and effectiveness in facilitating school administration. Similarly, Hisbih et al. (2023) emphasized that implementing a system based on the CodeIgniter framework could improve data accessibility and simplify interactions among users in a structured and secure manner.

Although previous studies have proposed digital solutions, most of the systems developed still have certain limitations, as they primarily focus on comprehensive internal school data recording or employ development models that are insufficiently adaptive to the dynamic nature of industrial environments (Icha et al., 2025). One significant gap is that existing systems do not fully integrate daily activity monitoring with real-time validation by industrial supervisors. They also do not adequately accommodate students' administrative and academic obligations at school while they are undertaking workplace assignments (Febriani et al., 2022). Therefore, this study seeks to address these limitations by developing an innovative digital-based Field Work Practice Information System called SIP-PALVO. The novelty and main advantage of SIP-PALVO lie in its integrated platform design using the CodeIgniter framework. The system not only provides digital logbook functionality but also incorporates a three-way monitoring feature involving students, school supervisors, and industrial mentors, along with centralized synchronization of administrative assessments.

The primary objectives of this development study are to design, evaluate the feasibility of, and implement the SIP-PALVO platform as a valid and practical digital tool for managing FWP activities. The expected contributions of this study include improved administrative efficiency, more transparent remote monitoring, and enhanced student work performance and administrative discipline throughout their industrial placement. This digital transformation is expected to serve as a practical reference for vocational schools seeking to optimize collaboration between educational institutions and the world of work in the modern era.

The implementation of Field Work Practice (FWP) at SMK Teknik PAL Surabaya has continued to face persistent challenges due to the use of conventional paper-based administrative tools, such as logbooks, daily journals, and physical attendance sheets. Since most students undertake their FWP placements in heavy industrial environments, including construction companies, manufacturing facilities, and shipyards, paper-based documents are highly susceptible to physical damage and moisture. Furthermore, one of the most significant limitations of this manual system is the inability of school supervisors to monitor students' activities in real time, combined with students' tendency to postpone completing their daily journals. These issues hinder the evaluation of whether students' actual workplace assignments align with their areas of specialization and competencies.

To address these problems, this study focuses on developing an integrated digital FWP administrative system called SIP-PALVO (PAL Vocational Field Work Practice Information System). This web-based system is designed to facilitate interactive communication and intensive three-way supervision among students, school supervisors, and industrial workplace mentors through a centralized platform. Through this digital transformation, SIP-PALVO is expected not only to optimize operational management efficiency and reduce paper consumption at school but also to foster student discipline and improve the quality of students' administrative performance throughout their industrial placements.

The study addresses three research questions: (1) How can SIP-PALVO be developed through the ADDIE stages to respond to the documented FWP administrative constraints at SMK Teknik PAL Surabaya? (2) What level of expert-assessed feasibility and stakeholder-reported practicality does the resulting system achieve? (3) What changes in recorded student administrative performance are observed between pre-implementation and post-implementation assessments? The specific contribution is a context-sensitive, three-party workflow combining student reporting, school supervision, industrial verification, and consolidated assessment; it is not a claim that web-based internship administration itself is unprecedented. This distinction follows information-system success research, which separates system quality, user perceptions, and observed outcomes (DeLone & McLean, 2003), and technology acceptance research, which treats perceived usefulness and ease of use as distinct constructs (Davis, 1989).

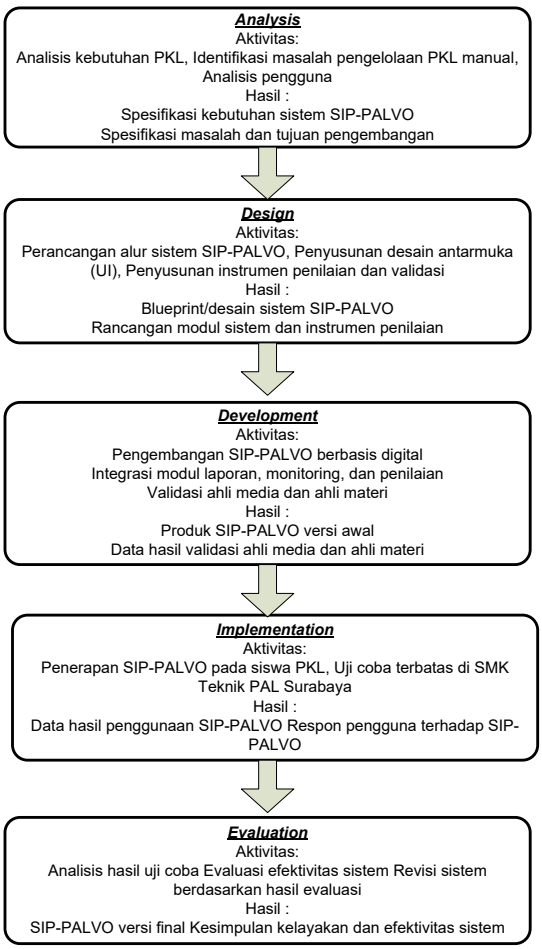
Method (منهج)

This Research and Development (R&D) study used the ADDIE framework. Analysis comprised preliminary observation and needs questionnaires administered to 11 students placed at four companies, four school supervisors, and four industrial mentors; its output was a set of administrative requirements concerning logbook durability, reporting timeliness, and remote supervision. Design translated these requirements into role-specific workflows and a responsive interface for students, school supervisors, and industrial mentors. Development produced a CodeIgniter/PHP/MySQL web prototype, digital journals, monitoring and assessment functions, followed by expert review and revisions. Implementation comprised a purposively selected field trial with 34 eleventh-grade students, five school supervisors, and three industrial mentors. Evaluation combined expert feasibility judgments, stakeholder practicality responses, and descriptive comparisons of administrative records before and after implementation. The ADDIE stages were iterative rather than a controlled experimental intervention (Branch, 2009).

This study employed a Research and Development (R&D) approach using the ADDIE development model, which consists of five systematic stages: Analysis, Design, Development, Implementation, and Evaluation (Botutihe et al., 2025). During the analysis stage, questionnaires were distributed to assess the need for digitalization of Field Work Practice (FWP), involving 11

students from four different companies, four school supervisors, and four industrial mentors. The design and development stages were carried out using the CodeIgniter framework, the PHP programming language, and a MySQL database to develop a web-based platform with an adaptive dashboard interface for both PCs and smartphones (Choirudin et al., 2023). Data on system feasibility were collected using Likert-scale validation instruments completed by media and subject-matter experts. Meanwhile, data on practicality and effectiveness were obtained through user response questionnaires and student administrative performance assessment sheets administered before and after the system was implemented (Mahalena et al., 2026).

This study aimed to develop a practical information system as a learning support tool and evaluate its feasibility (Mahmudi et al., 2022). The development model used in this study was the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), adapted from Dick and Carey's instructional design theory and supported by Winaryati et al.'s (2021) procedural model for media development. The ADDIE model was selected because of its systematic and adaptive structure, as well as its emphasis on problem-solving through continuous evaluation at each stage (Setyosari, 2024). The systematic process of developing the SIP-PALVO information system in this study is presented in detail in Figure 1.



Gambar 1. Alur Prosedur Penelitian dan Pengembangan Media SIP-PALVO dengan Model ADDIE.

Participants were selected purposively on the basis of their direct involvement in FWP administration and access to the prototype. The preliminary needs-assessment group consisted of 11 students from four companies, four school supervisors, and four industrial mentors. The field-trial group consisted of 34 grade-eleven students undertaking or having completed FWP, five school supervisors, and three industrial mentors. Expert validation was performed by two media/information-system experts and two vocational-curriculum experts. These are distinct roles and phases; the source records do not establish whether any individuals participated in both phases. The study does not report a random sample or a control group.

Four instruments were used: (1) a content-validation sheet covering relevance of information, FWP guidance, and curriculum alignment; (2) a media-validation sheet covering interface, navigation, accessibility, and database-security considerations; (3) user questionnaires covering accessibility, clarity, and practicality of reporting and communication; and (4) pre- and post-implementation administrative-performance records covering data completeness, reporting timeliness, and reporting consistency. Expert and user responses were summarized as percentages of obtainable Likert-scale scores. The manuscript does not provide the item-level instruments, response anchors, scoring thresholds, or reliability coefficients; therefore, the reported category of "highly feasible" should be interpreted as the authors' descriptive classification, not an independently verified psychometric conclusion.

The research instruments used to collect data on product feasibility and effectiveness were systematically designed using a Likert scale (Fadillah et al., 2023). These instruments consisted of: (1) a content validation sheet to assess the suitability of the information, guidelines, and curriculum alignment; (2) a media validation sheet to evaluate the quality of the user interface, navigation, accessibility, and system database security; (3) a user experience questionnaire administered to students, teachers, and industrial mentors to assess the practicality of the platform; and (4) student administrative performance assessment sheets completed before and after system implementation (*pre-test* and *post-test*), focusing on compliance with logbook completion requirements and the accuracy of daily work reports (Sutini et al., 2026).

Data were collected through three main techniques: preliminary observation, questionnaire administration, and administrative performance assessment documentation (Ardiansyah et al., 2023). Preliminary observation was conducted to identify user needs during the analysis phase. Expert validation questionnaires were administered after the product prototype had been developed during the development phase. Field testing was conducted during the implementation phase, in which users completed practicality questionnaires after directly interacting with the SIP-PALVO information system (Afandi et al., 2025). Student administrative performance data were collected through the compilation of periodic assessment records provided by industrial supervisors throughout the workplace training period (Tony Santiko et al., 2025).

The feasibility percentage score was calculated using Formula (1).

$$Persentase\ \ Kelayakan = \frac{\sum Skor\ yang\ diperoleh}{\sum Skor\ maksimal}\ X\ 100\%$$

Feasibility and practicality percentages were interpreted descriptively from obtained scores relative to the maximum possible questionnaire scores. For performance, point change was calculated as post-implementation score minus pre-implementation score, and relative percentage change as [(post − pre)/pre] × 100. The industrial-mentor comparison (48.3 to 76.5)

yields 28.2 points or 58.39% relative improvement; the school-supervisor comparison (62 to 76) yields 14 points or 22.58%. These figures represent different assessment perspectives and must not be combined. Although the original report refers to pre- and post-implementation records, it does not identify the number of paired student observations, assessment dates, dispersion statistics, or inferential tests. No p-value, confidence interval, or statistically significant effect can therefore be asserted from the available summary data.

The resulting percentage score was then converted into a product feasibility criteria table to determine the level of practicality and operational feasibility of the SIP-PALVO information system before its wider implementation at the school. Furthermore, improvements in administrative performance were analyzed by comparing the average completion rates of administrative report documents before (*pre-implementation*) and after (*post-implementation*) the digital platform was introduced to assess the effectiveness of the system.

Result (نتائج)

Feasibility of the SIP-PALVO Information System Based on Expert Evaluation

The development of the Digital-Based Field Work Practice Information System (PAL Vocational Internship Information System, or SIP-PALVO), built using the CodeIgniter framework and the ADDIE development model, underwent a rigorous feasibility assessment by experts. The validation results revealed that integrating a structured web-based information system architecture could produce a vocational education management tool categorized as highly feasible. Quantitatively, the media experts assigned an average score of 97%, while the subject-matter experts assigned an average score of 94%. These findings demonstrate that product validity is not solely determined by the visual appeal of the interface but also by the functional accuracy of monitoring features, MySQL database synchronization, and user-friendly navigation for the vocational education community. The alignment of SIP-PALVO's assessment instruments with the official guidelines of the Directorate of Vocational High Schools contributed to the high content validity, as the system is conceptually consistent with national curriculum policies.

User Acceptance and Responses to the Digitalization of Field Work Practice

Following revisions based on expert feedback, the product was implemented in the field to assess its practicality. The user trial results consistently demonstrated very high acceptance levels among the three main FWP stakeholders: students (87.5%), school supervisors (91.75%), and industrial mentors (86%). These high positive response rates can be attributed to the shift in workload from a redundant manual system toward centralized digital efficiency. Students considered the digital daily journal feature highly practical because it could be accessed in real time through their smartphones. From the perspectives of school supervisors and industrial mentors, this effectiveness resulted from the elimination of geographical and bureaucratic barriers, allowing student activity logs to be validated and assessment records to be compiled with just a few clicks, without the need to accumulate physical documents.

The available pre- and post-implementation records suggest improved administrative performance after SIP-PALVO deployment. School-supervisor assessments report an overall average increase from 62 to 76 (14 points; 22.58% relative to baseline). Table 1 presents three specific indicators from the supervising teacher's perspective. These values are distinct from the

industrial-mentor aggregate (48.3 to 76.5), which is the source of the headline 58% relative increase. Neither comparison alone establishes causality or statistical significance.

The Impact of SIP-PALVO Implementation on Student Administrative Performance

The most significant finding of this study was the substantial improvement in students' administrative performance and discipline during their FWP placements following the implementation of SIP-PALVO. Based on the assessment data provided by school supervisors, students' overall administrative performance increased from an average score of 62 to 76, representing an improvement of 14 points. Improvements in each performance indicator are presented in Table 1.

Table 1. Improvement in Student Administration Performance Indicators (From the Supervising Teacher's Perspective)

Assessment Indicator	Pre-Implementation Score	Post-Implementation Score	Point Increase	Percentage Increase
Data Completeness	61	80	19	31%
Timeliness	62	77	15	24%
Reporting Consistency	57	71	14	25%

Industrial-mentor assessment records separately indicate an increase in data completeness from 46 to 79 (33 points; 71.74% relative increase) and reporting consistency from 50 to 82 (32 points; 64% relative increase). The industrial-mentor aggregate increased from 48.3 to 76.5, equivalent to 58.39% relative improvement. Because the underlying student-level paired scores and aggregation rules are not included in the source report, the aggregate cannot be independently reconstructed from these two indicator scores alone. These results should be treated as descriptive before–after observations, not proof of an intervention effect.

These positive impacts are further supported by questionnaire assessment data collected from industrial mentors. Industry representatives recorded a substantial improvement in student data completeness, with scores increasing from 46 at baseline to 79, representing a 72% increase. Meanwhile, consistency in reporting daily activities in industrial workplaces increased from a score of 50 to 82, reflecting an improvement of 64%. The transition from paper-based journal reporting to encrypted digital data ensures that records of students' workplace activities are documented transparently and can be objectively verified.

Discussion (مناقشة)

Scientific Discussion and Comparison with Relevant Studies

Theoretically, the success of SIP-PALVO in supporting the initial hypothesis that digitalization can optimize management efficiency and student performance aligns with the fundamental principles of Educational Technology, which emphasize the use of digital systems to facilitate learning processes and improve human performance. These findings are strongly consistent with the research conducted by Liana et al. (2024), who emphasized that implementing digital information systems in internship or Field Work Practice (FWP) programs is essential for reducing bureaucratic procedures and eliminating delays in administrative data flows commonly encountered in manual management systems. By reducing the administrative burdens associated with manual processes, students' cognitive resources are no longer excessively occupied by paper-based bureaucratic tasks, allowing them to focus more effectively on demonstrating their best performance in terms of both hard and soft skills in industrial environments. By integrating data management, periodic attendance records, supervisor monitoring, and grade calculation into a single centralized platform, SIP-PALVO has been empirically demonstrated to serve as an effective and reliable digital bridge between vocational education institutions and the business and industrial sectors.

Based on the needs analysis conducted during the initial stage of the study, there was strong support for developing a digital information system among all prospective user groups, reaching 88% among students, 83% among school supervisors, and 80% among industrial mentors. In response to these findings, the SIP-PALVO product was validated by experts before being tested in the field. The media experts assigned an average score of 97%, while the subject-matter experts assigned an average score of 94%. These percentages indicate that, in terms of interface design, menu functionality, workflow, and system-level benefits, SIP-PALVO falls into the "Highly Feasible" category for implementation to support administrative management and coordination between schools and industry partners.

The industrial-mentor assessment average rose from 48.3 before implementation to 76.5 after implementation: $(76.5 - 48.3)/48.3 \times 100 = 58.39\%$, rounded to 58%. This is a relative change in average score, not a 58-percentage-point gain. School-supervisor ratings provide a separate comparison (62 to 76, or 22.58% relative improvement). Expert validation scores (97% media; 94% content) concern product feasibility, while stakeholder questionnaires (87.5%, 91.75%, and 86%) concern perceived practicality; neither measure directly establishes effectiveness. Without paired raw data, sample-specific variance, a comparison group, or an inferential procedure, the findings support a promising descriptive association with implementation rather than a statistically significant or causally attributable improvement.

The significant impact of SIP-PALVO implementation is evident in the improvement of students' administrative performance during their FWP placements in industry. Based on a comparative assessment, the average student administrative performance score increased substantially from 48.3 before system implementation to 76.5 after the introduction of the digital system. Thus, students' average performance improved by 58%, based on objective assessments by industrial mentors. The most substantial improvements were observed in task completion speed and the accuracy of daily portfolio data. These improvements may be attributed to the system's ability to encourage students psychologically to become more disciplined and responsible in completing their assigned tasks.

Conclusion (خاتمة)

The first research question was addressed through development of SIP-PALVO using ADDIE: needs analysis identified vulnerable paper records and delayed supervision; design and development produced a responsive CodeIgniter/PHP/MySQL system integrating digital logbooks, three-party monitoring, and centralized assessment; implementation and evaluation yielded user and expert feedback. Regarding the second question, two media experts and two

curriculum experts reported feasibility percentages of 97% and 94%, while students, school supervisors, and industrial mentors reported practicality scores of 87.5%, 91.75%, and 86%, respectively. These percentages support a favorable descriptive appraisal of the product, subject to the limitations of the reported validation instruments.

Regarding the third question, industrial-mentor records showed an increase in mean administrative performance from 48.3 to 76.5 (28.2 points, or 58.39% relative to baseline), whereas school-supervisor records separately showed an increase from 62 to 76 (14 points, or 22.58%). These findings are descriptive pre–post comparisons; expert validation and user satisfaction are not evidence of statistically established effectiveness. The absence of student-level paired scores, a control group, and inferential analysis limits causal interpretation and generalizability.

The methodological contribution of this study is the integration of school–industry administrative workflows into one FWP platform and the separate reporting of product feasibility, user practicality, and observed administrative outcomes. Future development should prioritize role-based access auditing, data-protection testing, reliable offline or low-bandwidth access, and documented usability assessment. Replication in other vocational schools should begin with local workflow analysis and be accompanied by transparent indicator definitions, item-level validation evidence, matched pre–post data, and where feasible a comparison group and appropriate statistical tests before broader effectiveness claims are made.

Based on the development and testing results, it can be concluded that the Digital-Based Field Work Practice Information System (SIP-PALVO) has achieved a high level of feasibility, with validation scores of 97% for media and 94% for content. The platform has proven to be effective and practical in replacing conventional paper-based administrative systems at SMK Teknik PAL Surabaya and has improved students' administrative performance by 58%, based on assessments conducted by industry representatives. SIP-PALVO has successfully integrated logbook recording, remote monitoring, interactive communication, and centralized assessment into a unified digital ecosystem that is adaptable to the needs of vocational education institutions.

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