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Design and Implementation of a Web-Based Internship Management Information System for Vocational Education

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Abstract: The integration of information technology in vocational education plays a vital role in improving the effectiveness and efficiency of practical learning programs such as Field Work Practice (PKL). This study aims to develop a web-based internship management information system that supports the organization, supervision, and evaluation of PKL activities in vocational high schools. The system was developed using the Laravel framework with PHP as the programming language and MySQL as the database management system. The Waterfall method was adopted to ensure a structured and systematic development process. Key features of the system include real-time student attendance tracking through selfie verification with geolocation, a digital daily journal, an integrated assessment mechanism, and automated certificate generation accessible by both school and industry mentors. The implementation of the system at SMK Negeri 2 Padang demonstrates its effectiveness in reducing the accumulation of physical documents and enhancing the monitoring and administration of internship activities. The results highlight the system's potential to improve the quality of internship management and provide a model for similar implementations in other vocational institutions.

Keywords: Internship Management System; Vocational Education; Laravel; Selfie Verification; Waterfall Model.

1. Introduction

Vocational education plays a crucial role in preparing skilled human resources aligned with the needs of industry, especially in developing countries. In Indonesia, Vocational High Schools (Sekolah Menengah Kejuruan/SMK) are designed to produce graduates who are ready to work, become entrepreneurs, or pursue higher education. These institutions provide specialized training programs in diverse fields such as engineering, technology, health, and business. Vocational education at the secondary level aims to equip students with the competencies required to work in specific industrial sectors [1]–[4].

One of the distinguishing features of SMK education is its strong emphasis on practical experience through programs such as Praktik Kerja Lapangan (PKL) or Industrial Internship. This internship program serves as a bridge between theoretical knowledge gained in school and real-world applications in industry. Under the Merdeka Curriculum introduced by the Indonesian Ministry of Education, Culture, Research, and Technology, the PKL program is now a compulsory component for all SMK students, with a minimum implementation duration of six months or 792 hours [5]. This underscores the strategic role of internships in forming independent, skilled, and work-ready graduates.

However, effective management of the PKL program presents a complex challenge. At SMK Negeri 2 Padang, the PKL process involves multiple stages: coordination with industry partners (DUDI), student placement, supervision, monitoring, and final evaluation. Based on field observations and interviews [3], the current system relies heavily on manual reporting and communication through messaging apps like WhatsApp. While convenient, this method has led to data management issues, such as storage limitations on mobile devices, loss of documentation, and difficulty in verifying attendance and performance.

Supervisors often face delays in grading due to the accumulation of physical documents such as student journals, attendance logs, and activity reports. Furthermore, the assessment process, which involves written reports, final presentations, and certification, is slowed down by administrative inefficiencies. This situation negatively impacts not only the accuracy and timeliness of evaluations but also the transparency and accountability of the internship program [6]–[8].

Given the increasing digitalization of educational administration globally, there is a pressing need for an integrated Management Information System (MIS) tailored specifically to internship management. A digital solution can enhance real-time data collection, streamline communication between students, teachers, and industry partners, and support better decision-making processes. Furthermore, such a system would improve data accuracy, facilitate documentation retrieval, and support long-term archiving for institutional reporting and accreditation purposes [9]–[13].

The development of a web-based internship management system is therefore a critical innovation to modernize and improve the quality of vocational education. By automating the PKL process—from industry engagement and student placement to evaluation and certification—schools can ensure a more efficient, transparent, and accountable implementation of vocational internships, aligning with global standards of work-based learning.

2. Material and methods

2.1 Methodology

The development of this management information system adopts the Waterfall model, a widely used and traditional software development methodology. The Waterfall model is characterized by a linear and sequential approach, in which each development phase must be completed before the next phase begins. This model consists of several stages: requirement analysis, system design, implementation, testing, deployment, and maintenance. The structured nature of the Waterfall model provides a clear documentation trail, making it suitable for systems with well-defined requirements [14]–[16].

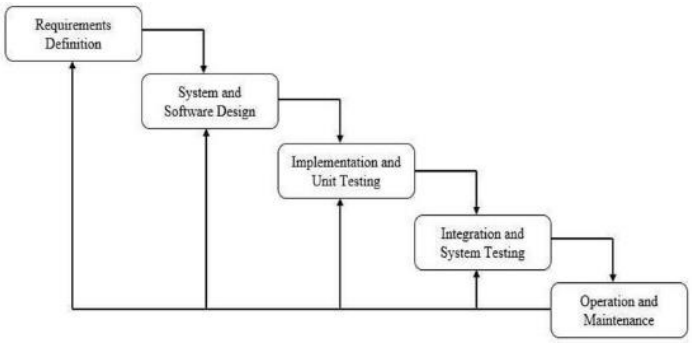

Figure 1. Waterfall Development Method

2.2 Unified Modeling Language (UML)

UML is used as a standard modeling language for visualizing, specifying, constructing, and documenting the artifacts of a software system. It facilitates communication among stakeholders and provides a clear representation of system functionality and business processes. UML supports detailed system analysis and helps identify system requirements before implementation.

2.3 System Modeling Using UML

The development of the internship management information system employed the Unified Modeling Language (UML) to model system behavior and structure during the design phase. UML was chosen due to its widespread adoption and ability to visualize the system's architecture and interactions clearly and comprehensively.

Among the various UML diagrams, the Use Case Diagram was prioritized and is presented in this paper to illustrate the core functionalities of the system. It describes how different users—such as administrators, students, supervising teachers, vice principals, instructors, and industrial partners (DUDI)—interact with the system. Each actor is linked to specific functional use cases that reflect their responsibilities within the internship process, such as managing student

data, monitoring internship activities, validating attendance, submitting reports, and issuing final evaluations or certificates.

The Use Case Diagram serves as a foundational model in capturing functional requirements and ensuring all key system interactions are well-represented before implementation. It also provides a shared reference point for both developers and stakeholders to verify that the system meets operational expectations.

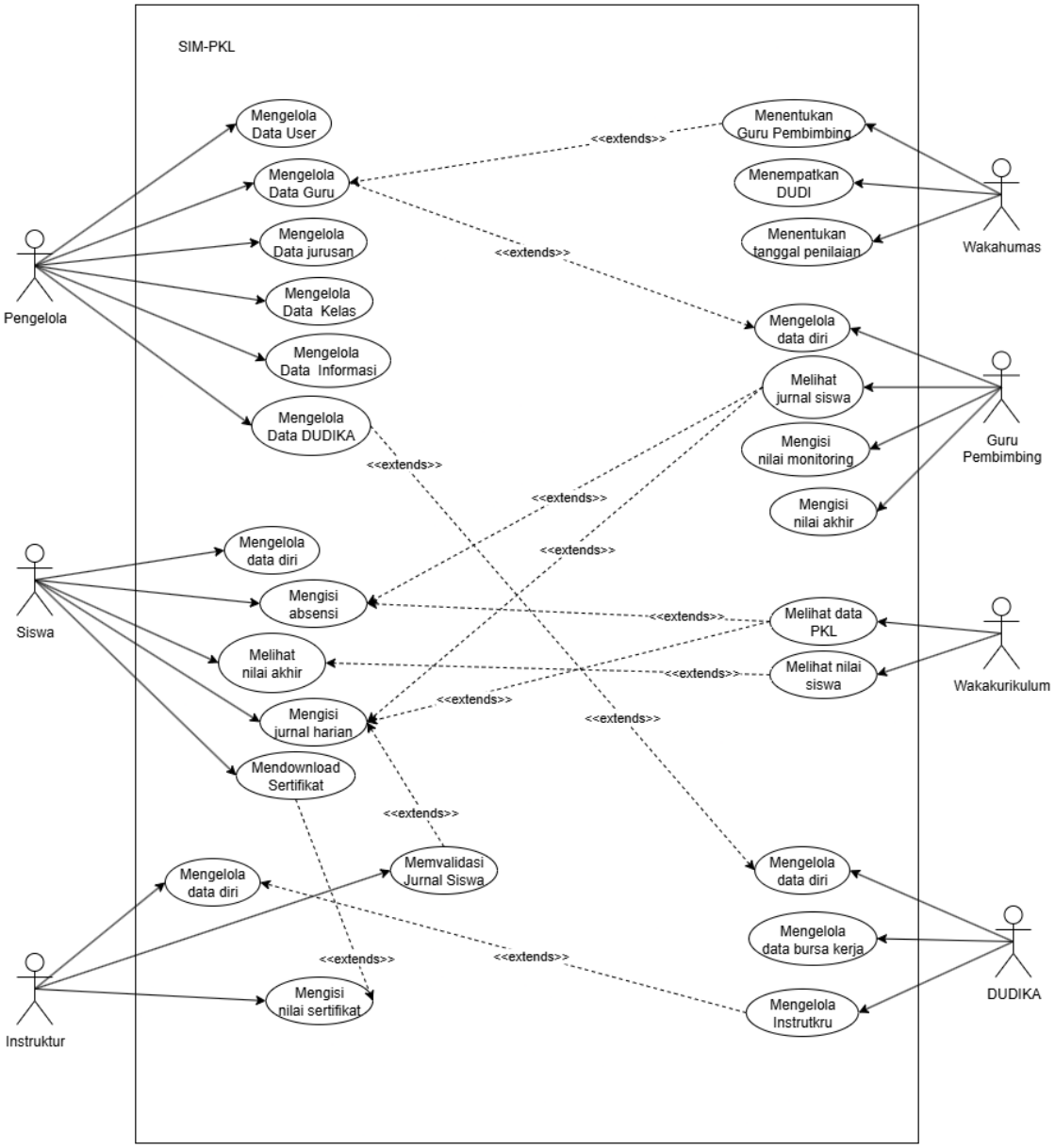

Figure 2. Use Case Diagram of the Internship Management Information System

In addition to the Use Case Diagram, other modeling tools—such as activity diagrams, class diagrams, and context diagrams—were utilized during internal design and validation processes. These diagrams supported the formulation of

logic workflows, data structures, and system boundaries. However, to maintain clarity and focus in this article, only the Use Case Diagram is presented due to limitations in image resolution and publication constraints.

2.4 Class Diagram

The Class Diagram describes the static structure of the system by illustrating classes, their attributes, operations (methods), and relationships among them. This diagram is essential for defining the database schema and system architecture. It provides a blueprint for both object-oriented programming and database design.

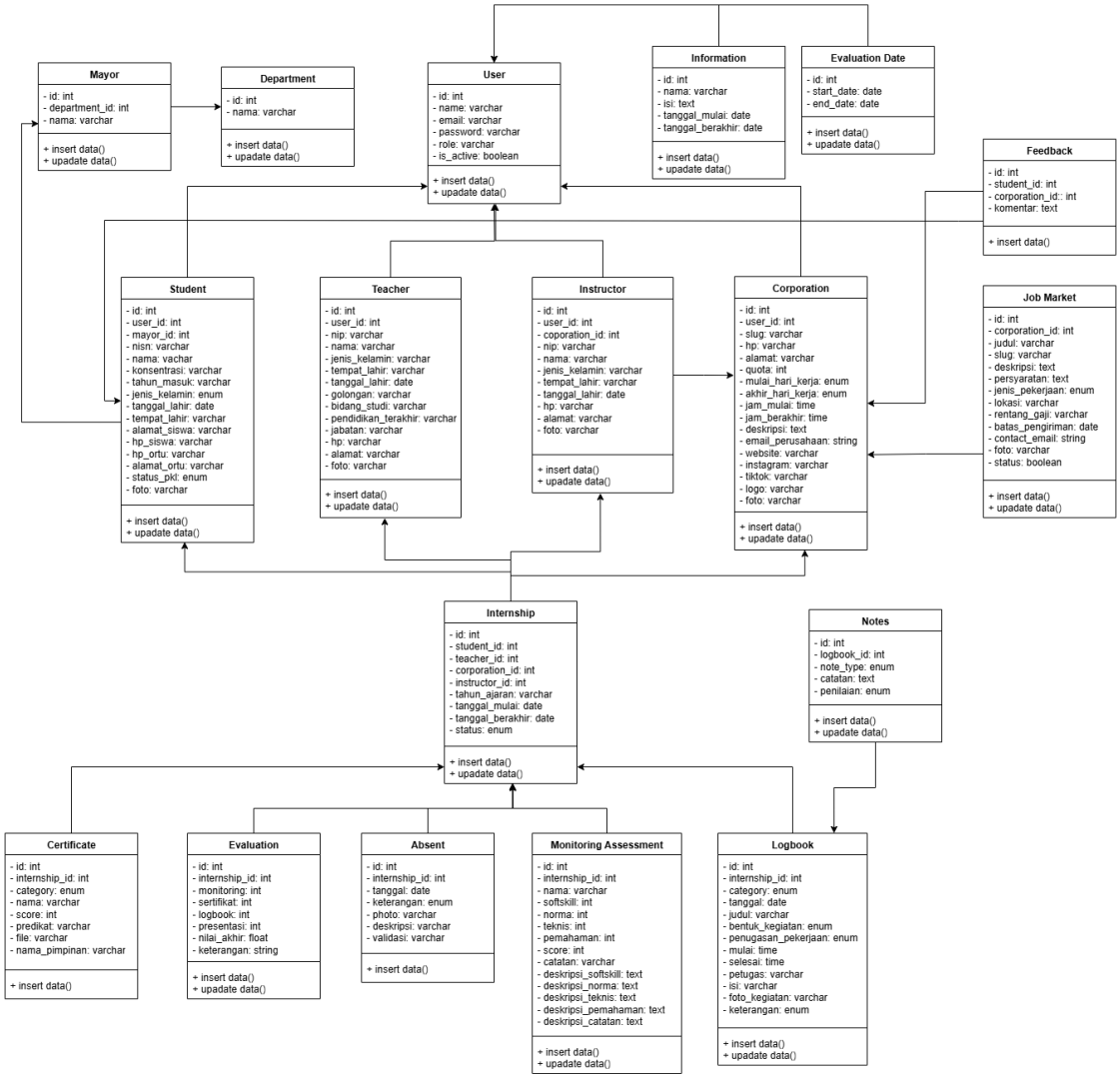

Figure 3. Class Diagram

2.5 Context Diagram

The Context Diagram is a high-level representation of the system's interaction with external entities. It defines the system's boundaries and the flow of data

between the system and its stakeholders. The proposed system interacts with seven external entities: (a) Administrator; (b) Vice Principal of Public Relations; (c) Vice Principal of Curriculum; (d) Student; (e) Supervising Teacher; (f) Industrial Partner (DUDI); (g) Instructor.

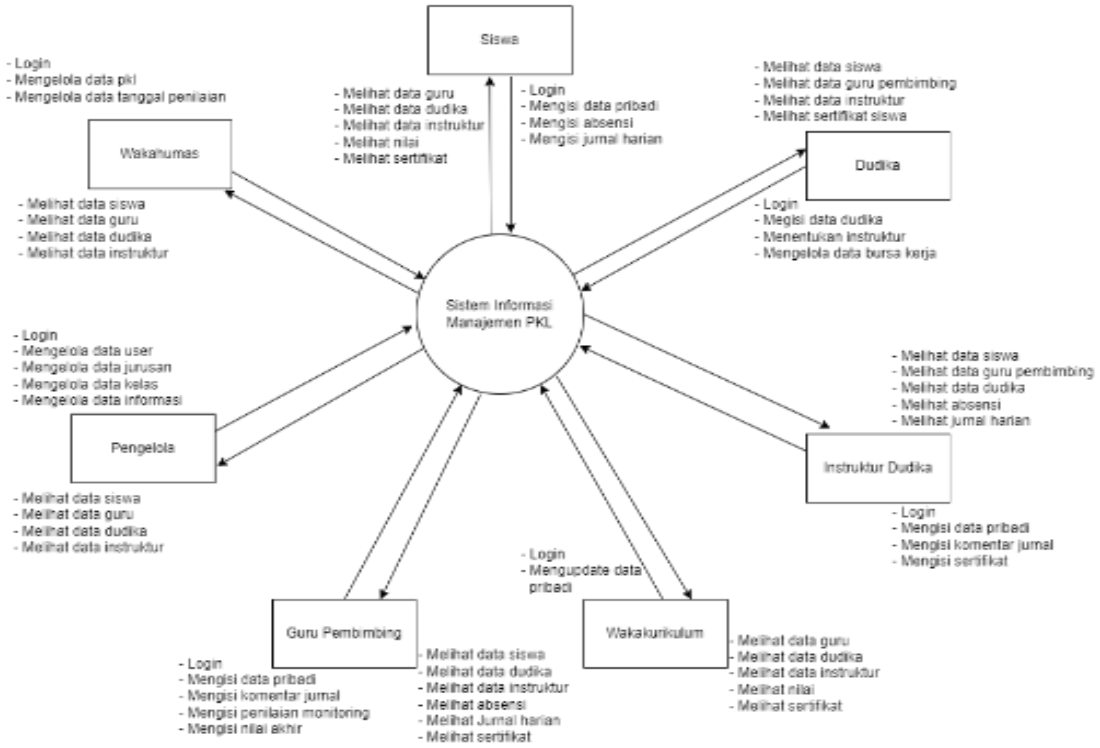

Figure 4. Context Diagram

2.6 Entity Relationship Diagram (ERD)

The Entity Relationship Diagram (ERD) models the logical structure of the database, illustrating entities, their attributes, and relationships. This system's ERD consists of 18 tables, including: user, student, teacher, corporation, instructor, department, major, internship, absent, logbook, note, monitoring_assessment, evaluation, certificate, jobmarket, information, evaluation_date, and feedback. Among these, the primary master tables are user, department, and evaluation_date.

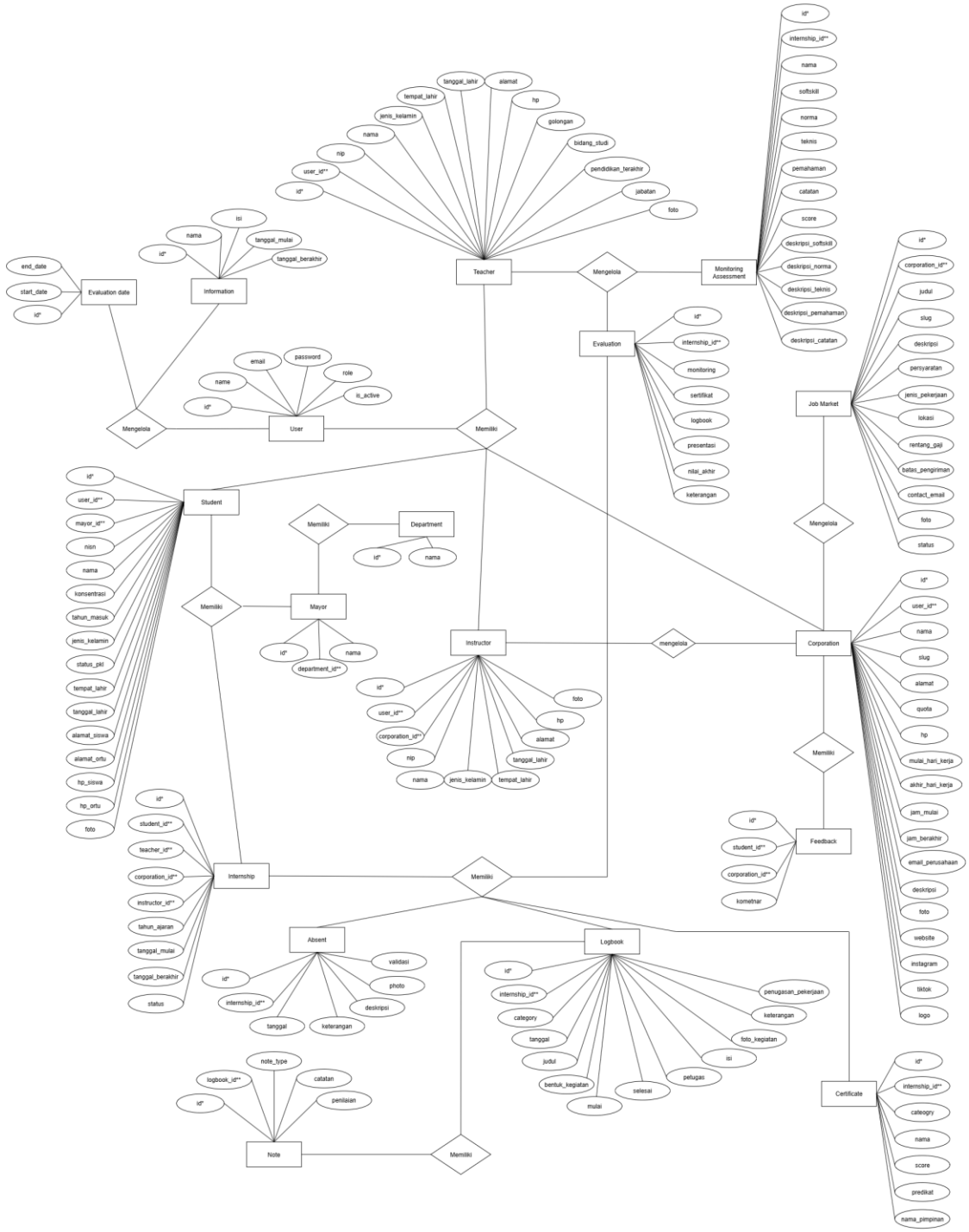

Figure 5. Entity Relationship Diagram

3. Results and discussion

3.1 Results

The implementation phase translated the system design into an interactive and functional web-based interface. This interface enables users from different roles to access, manage, and monitor the internship process based on their respective

permissions and responsibilities. Below are the key user interfaces resulting from the development of the Internship Management Information System for SMK Negeri 2 Padang.

3.1.1 Login Page

The login page serves as the system's entry point for all users. It authenticates user credentials and redirects each user to the appropriate dashboard based on their role (e.g., administrator, teacher, student, industry partner).

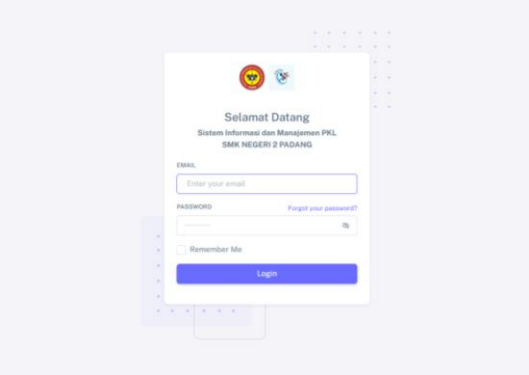

Figure 6. Login Page

Figure 16 displays the login page interface, which functions as the system's primary authentication gateway. All users, including administrators, students, teachers, instructors, and industry partners, are required to enter their credentials on this page. Upon successful authentication, users are redirected to their respective dashboards, ensuring role-based access control throughout the system.

3.1.2 Administrator Dashboard

The administrator dashboard displays summary data and key controls for managing users and monitoring system-wide activities. It acts as a central hub for administrative oversight.

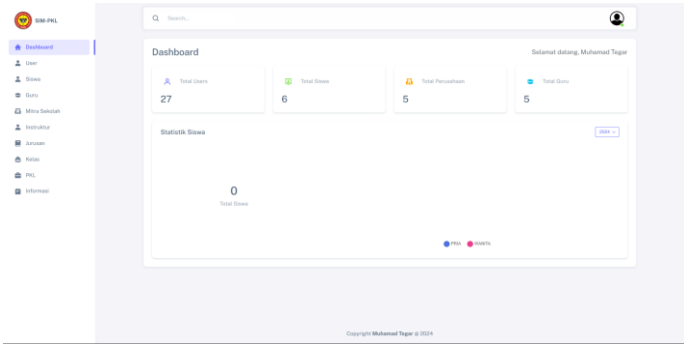

Figure 7. Administrator Dashboard

Figure 7 shows the dashboard interface for the administrator. This page provides a comprehensive overview of the system, including user statistics, data summaries, and administrative tools. It serves as a central control panel that enables the administrator to oversee operations and manage all user-related data efficiently.

3.1.3 User Management Page

This page allows the administrator to manage user accounts, including adding, editing, deactivating, and deleting users based on institutional requirements.

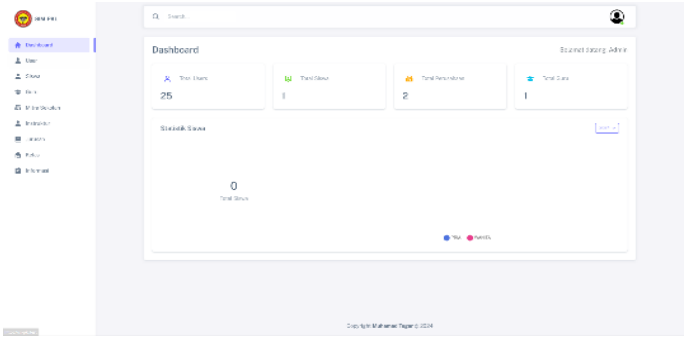

Figure 8. User Management Page

Figure 8 illustrates the user management page, where administrators can perform various operations such as adding new users, editing existing user information, deactivating accounts, and removing users from the system. This page ensures that user data remains accurate, up to date, and secure.

3.1.4 Internship Data Management Page

This page is managed by the Vice Principal of Public Relations and is used to assign students to companies and assign supervising teachers. It supports CRUD (Create, Read, Update, Delete) operations for internship placement data.

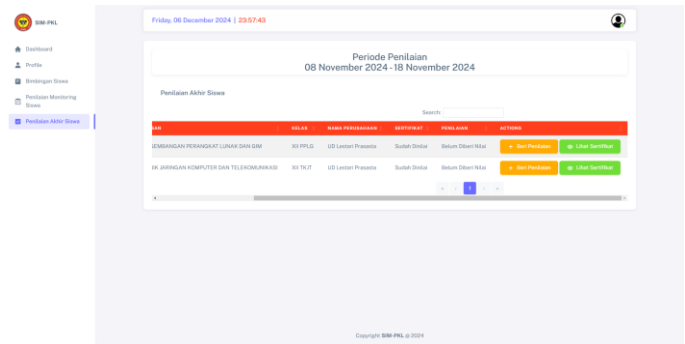

Figure 9. Internship Data Page

Figure 9 presents the interface used by the Vice Principal of Public Relations (Wakahumas) to manage internship data. It includes features for assigning students to companies, linking them with supervising teachers, and updating or removing placement records. This interface is crucial for coordinating and validating internship assignments.

3.1.5 Supervision Page

This page can be accessed by both supervising teachers and instructors from partner industries. It provides a list of students under their guidance and allows monitoring of student progress during the internship period.

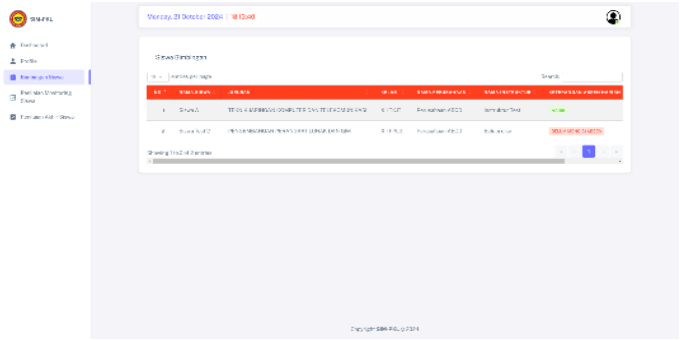

Figure 10. Supervision Page

Figure 10 demonstrates the supervision interface accessible to supervising teachers and industry instructors. This page provides a list of students under their guidance and enables them to monitor progress, view logbook entries, and provide timely feedback. It supports real-time supervision and ensures accountability during the internship process.

3.1.6 Monitoring Assessment Page

Supervising teachers use this page to perform periodic assessments of student activities during the internship. Monitoring is conducted five times during one internship cycle.

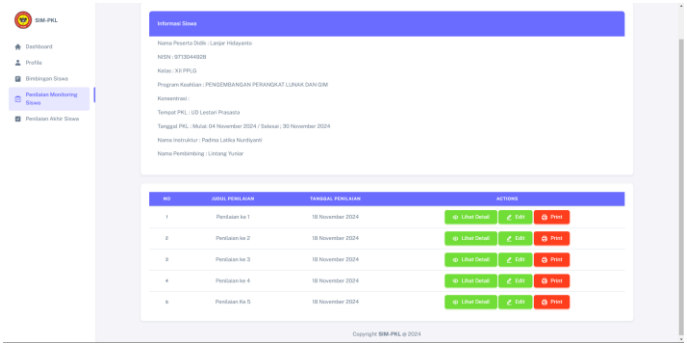

Figure 11. Monitoring Assessment Page

Figure 11 showcases the monitoring assessment page, which allows supervising teachers to conduct periodic evaluations of student activities. The system supports five monitoring sessions per internship cycle, each contributing to the student's overall assessment and helping track developmental progress.

3.1.7 Final Evaluation Page

This page allows supervising teachers to assign final grades to students based on internship performance, including journal submissions, activity reports, and feedback from industry mentors.

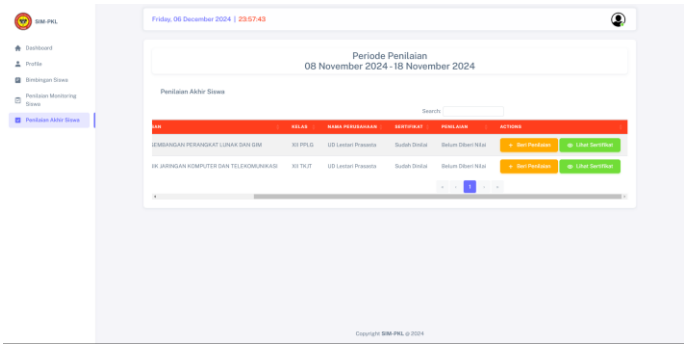

Figure 12. Final Evaluation Page

Figure 12 displays the final evaluation interface, where supervising teachers assign conclusive scores to students based on internship reports, logbooks, attendance, and feedback received from industry mentors. The final evaluation determines whether the student has successfully completed the internship program.

3.1.8 Student Dashboard

The student dashboard provides access to relevant information, including the assigned supervising teacher, instructor, and the company where the internship is conducted.

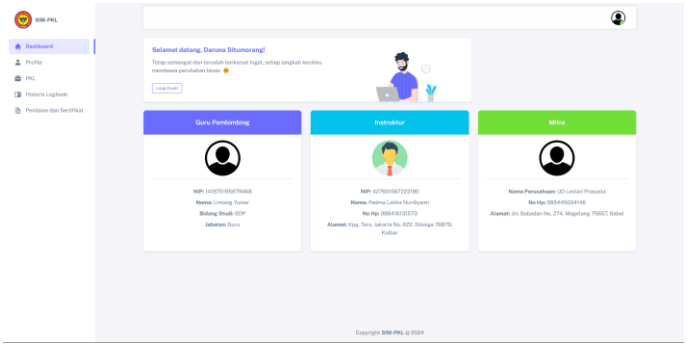

Figure 13. Student Dashboard

Figure 13 shows the student's personalized dashboard. This page displays essential information such as the student's assigned supervisor, instructor, and the company where the internship is conducted. It also serves as a central location for accessing other features like daily logs and communication channels.

3.1.9 Profile Page

This page is accessible by all user roles (students, teachers, instructors, and industry partners) to view and update their personal information.

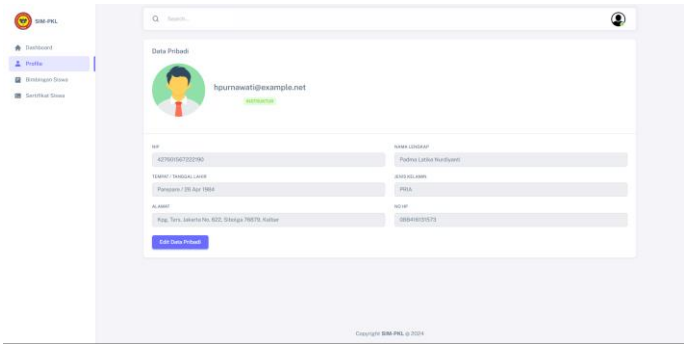

Figure 14. Profile Page

Figure 14 presents the profile page, which can be accessed by all user roles. It allows users to update personal information, such as contact details, profile pictures, and institutional affiliations. This ensures data accuracy and personalization across the system.

3.1.10 Student Internship Page

Students use this page to submit daily attendance and maintain a daily journal of internship activities. It supports continuous documentation and accountability during the internship.

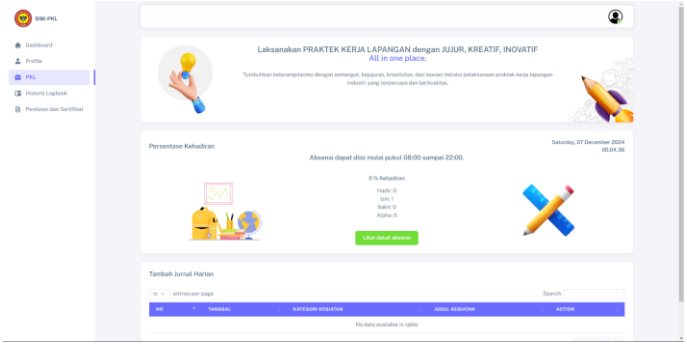

Figure 15. Student Internship Page

Figure 15 displays the student internship interface. Through this page, students can record daily attendance, submit journal entries, and upload supporting documentation related to their internship tasks. It serves as a digital replacement for manual logbooks and enhances reporting transparency.

3.1.11 Industry Partner Dashboard

This dashboard is used by industry partners (DUDI) to monitor student placement, view instructor assignments, and allocate instructors to specific students.

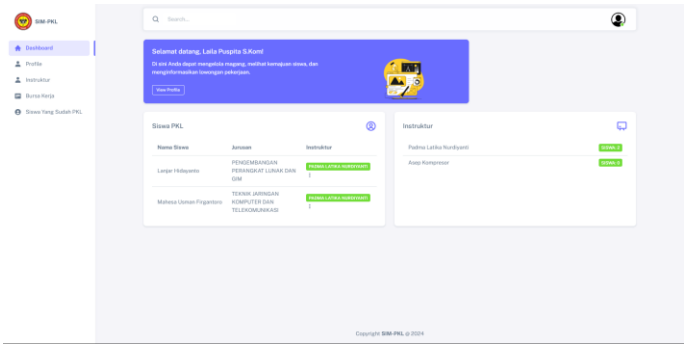

Figure 16. Industry Partner Dashboard

Figure 16 illustrates the dashboard for industry partners (DUDI). This interface provides information about assigned students, instructors, and allows the partner to manage supervisor allocations. It strengthens communication between school and industry while ensuring proper mentorship is in place.

3.1.12 Certificate Evaluation Page

Managed by instructors, this page is used to input performance scores which will later be converted into official internship certificates for the students.

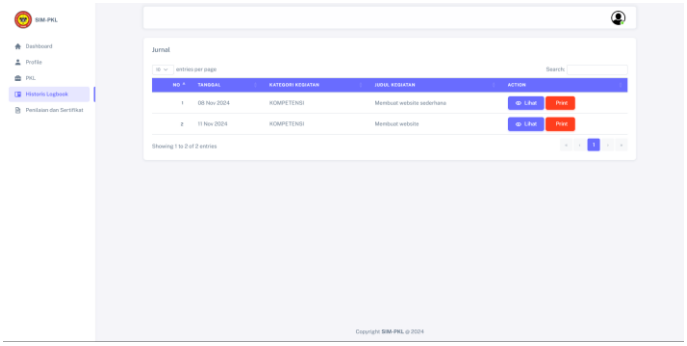

Figure 17. Certificate Evaluation Page

Figure 17 depicts the certificate evaluation page managed by instructors. This page is used to input final performance grades that will form the basis of the

official internship certificate issued to each student. It integrates evaluation data from various stakeholders to generate a standardized outcome.

3.2 Discussion

The implementation of the internship management information system provides a more structured and transparent platform for managing vocational internships at SMK Negeri 2 Padang. Compared to previous manual procedures, this system enables real-time access to data, reduces administrative workload, and improves the accuracy of student performance tracking [17]–[19].

Prior to the system's implementation, internship monitoring relied heavily on WhatsApp groups and manual journals. This led to issues such as limited file storage, difficulty validating student attendance, and slow processing of student grades due to the accumulation of physical documents [20]–[22]. By digitizing the entire workflow—ranging from student placement, supervision, monitoring, to final assessment—the system significantly reduces dependency on fragmented communication tools and manual archives.

From a pedagogical perspective, the system aligns with the principles of vocational education, which emphasize competency-based, experiential learning. Real-time feedback mechanisms, digital documentation, and structured evaluation tools support students in becoming more autonomous and reflective during their fieldwork [23]–[27]. The involvement of industry instructors and teachers is streamlined through shared interfaces, enhancing collaborative supervision.

Technically, the system architecture follows a modular and role-based access control model, which ensures data privacy and task efficiency for each user type. The use of a centralized database and user interface design adhering to usability principles ensures that both internal stakeholders (teachers, curriculum staff) and external partners (industry mentors) can interact with the system without requiring advanced technical knowledge.

Compared to similar systems implemented in other vocational contexts [28][29], the proposed system introduces several strengths: a) A centralized supervision system involving both school and industry actors; b) A 5-stage monitoring and evaluation process that reflects progressive student development; c) Direct linkage between internship activities and digital certification processes [30], [31].

However, the system still presents opportunities for further improvement. For instance, the integration of mobile platforms could enhance accessibility for users in the field. Furthermore, implementing data analytics tools could allow schools to evaluate internship trends, student performance metrics, and

industry satisfaction in more detail. Future research can also focus on the usability testing of the platform across multiple institutions to determine its scalability and adaptability.

4. Conclusion

This study has successfully designed and implemented a management information system for student internships at SMK Negeri 2 Padang using the Waterfall development model and Unified Modeling Language (UML). The system provides an integrated platform that facilitates key processes such as student placement, supervision, daily reporting, evaluation, and certificate generation. By digitizing these processes, the system addresses common issues found in traditional internship administration, such as fragmented communication, manual data handling, and delayed grading.

The system improves the efficiency and transparency of vocational internship programs by providing role-based dashboards tailored to the needs of administrators, supervising teachers, students, industry partners, and instructors. The use of real-time data entry, centralized logbooks, and systematic evaluation tools promotes accountability and enhances collaboration between schools and industry stakeholders. Furthermore, the system supports competency-based learning objectives by enabling continuous performance monitoring and structured documentation.

Despite its advantages, the current version of the system has several limitations. First, it is primarily accessible via desktop browsers and does not yet offer a mobile-responsive or dedicated mobile application, which may restrict accessibility for users in field locations. Second, the system does not yet include analytics features to evaluate aggregate internship performance data or industry feedback. Lastly, user testing was limited to a single institution, which may affect the generalizability of the system design.

Future research should focus on expanding the system's features to include mobile access, automated report generation, and integrated analytics dashboards. Usability testing across multiple vocational schools would also help validate the system’s adaptability and scalability in diverse educational environments. In addition, future work may explore integration with national vocational certification platforms and the development of AI-driven recommendation tools to optimize student placement based on their interests and performance history.

Author's declaration

Author contribution

Muhamad Tegar Putra Perdana was responsible for system design and article writing. **Geovanne Farell** contributed to software development and system testing. **Titi Sriwahyuni** assisted in data analysis and preparation of research findings. **Lativa Mursyida** provided supervision, academic review, and final editing of the manuscript.

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Competing interest

The authors declare that there is no conflict of interest related to the publication of this article.

Ethical clearance

This study did not involve any experiments on humans or animals. All procedures carried out in this research followed ethical standards and institutional guidelines. Permission to conduct system implementation and testing was obtained from the school management.

AI statement

Artificial intelligence tools, including ChatGPT by OpenAI, were used solely to assist with language refinement and formatting of the manuscript. All content, ideas, and interpretations presented in this article are the original work of the authors.

Publisher's and Journal's note

Universitas Negeri Padang as the publisher and Editor of Jurnal Vokasi Informatika state that there is no conflict of interest towards this article publication.

References

[1] V. Kovalchuk, S. Maslich, N. Tkachenko, S. Shevchuk, and T. Shchypska, "Vocational Education in the Context of Modern Problems and Challenges," *J. Curric. Teach.*, vol. 11, no. 8, pp. 329–338, Jun. 2022, https://doi.org/10.5430/jct.v11n8p329.

[2] S. McGrath and S. Yamada, "Skills for development and vocational education and training: Current and emergent trends," *Int. J. Educ. Dev.*, vol. 102, p. 102853, Oct. 2023, https://doi.org/10.1016/j.ijedudev.2023.102853.

[3] F. Dahalan, N. Alias, and M. S. N. Shaharom, "Gamification and Game Based Learning for Vocational Education and Training: A Systematic Literature Review," *Educ. Inf. Technol.*, vol. 29, no. 2, pp. 1279–1317, Feb. 2024, https://doi.org/10.1007/s10639-022-11548-w.

[4] C. F. Yeap, N. Suhaimi, and M. K. M. Nasir, "Issues, Challenges, and Suggestions for Empowering Technical Vocational Education and Training Education during the COVID-19 Pandemic in Malaysia," *Creat. Educ.*, vol. 12, no. 08, pp. 1818–1839, Jul. 2021, https://doi.org/10.4236/ce.2021.128138.

[5] I. Suseno, "An Evaluation of Graduates' Employment of Courses and Vocational Training Institutions," *J. Educ. Res. Eval.*, vol. 7, no. 1, pp. 23–34, Mar. 2023, https://doi.org/10.23887/jere.v7i1.47594.

[6] D. Bender, "Internship assessment in professional program accreditation: a 10-year study," *Educ. Train.*, vol. 63, no. 2, pp. 256–270, Jan. 2021, https://doi.org/10.1108/ET-11-2019-0251.

[7] F. Moeinzadeh, S. Ayati, B. Iraj, M. Mortazavi, and V. Vafamehr, "Designing, implementation, and evaluation of internship comprehensive system for assessment and monitoring," *J. Educ. Health Promot.*, vol. 10, no. 1, Jan. 2021, https://doi.org/10.4103/jehp.jehp_626_20.

[8] P. W. Dandeniya Arachchige, "Students' perceptions on auditing as a mechanism for enhancing the reliability and transparency in financial statements," 2024, Accessed: Jul. 03, 2025. [Online]. Available: http://www.theseus.fi/handle/10024/864186.

[9] A. Jahir, A. Mu, amar Wahid, T. Titis Sufranto, and K. Kunci, "Optimizing Higher Education Performance Through Data Integration Using the Zachman Framework: A Case Study on LAM Infokom Accreditation Criteria," *J. Nas. Teknol. dan Sist. Inf.*, vol. 10, no. 3, pp. 201–215, Jan. 2024, https://doi.org/10.25077/TEKNOSI.V10I3.2024.201-215.

[10] S. Chaudhari and M. Shirole, "Blockchain-Driven Academic Learning Record Management in Higher Education: A Comprehensive Review of Methodologies, Applications, Benefits, and Challenges," *SN Comput. Sci.*, vol. 6, no. 5, pp. 1–33, Jun. 2025, https://doi.org/10.1007/s42979-025-03952-z.

[11] Z. He and W. Fang, "Research data management in institutional repositories: an architectural approach using data lakehouses," *Digit. Libr. Perspect.*, vol. 41, no. 1, pp. 145–178, Jan. 2024, https://doi.org/10.1108/DLP-02-2024-0022.

[12] Y. Javed and M. Alenezi, "A Case Study on Sustainable Quality Assurance in Higher Education," *Sustain.*, vol. 15, no. 10, p. 8136, May 2023, https://doi.org/10.3390/su15108136.

[13] K. J. Nyitray and D. Reijerkerk, "Digital Repository Legacies: A Case Study in Assessing Organizational Trustworthiness," *J. Libr. Adm.*, vol. 61, no. 7, pp. 793–812, 2021, https://doi.org/10.1080/01930826.2021.1972729.

[14] D. Naga Malleswari, M. P. Kumar, D. sathvika, and B. A. Kumar, "A study on SDLC for water fall and agile," 2018. https://doi.org/10.14419/ijet.v7i2.32.13516.

[15] S. Sanatang and M. F. B, "Sistem Tes Interaktif Berbasis Computerized Adaptive Testing (CAT)," *J. Mediat.*, vol. 4, no. 1, p. 30, 2021, https://doi.org/10.26858/jmtik.v4i1.19726.

[16] A. Huda, Firdaus, D. Irfan, Y. Hendriyani, Almasri, and M. Sukmawati, "Optimizing Educational Assessment: The Practicality of Computer Adaptive Testing (CAT) with an Item Response Theory (IRT) Approach," *Int. J. Informatics Vis.*, vol. 8, no. 1, pp. 473–480, Mar. 2024, https://doi.org/10.62527/joiv.8.1.2217.

[17] M. Shoaib, N. Sayed, J. Singh, J. Shafi, S. Khan, and F. Ali, "AI student success predictor: Enhancing personalized learning in campus management systems," *Comput. Human Behav.*, vol. 158, p. 108301, Sep. 2024, https://doi.org/10.1016/j.chb.2024.108301.

[18] I. E. Okokoyo, "Robotic Process Automation in School Administration: Exploring the Integration of RPA Solutions to Streamline Administrative Processes and Reduce Workload," *NIU J. Humanit.*, vol. 9, no. 2, pp. 71–80, Jun. 2024, https://doi.org/10.58709/niujhu.v9i2.1905.

[19] M. Aly, "Revolutionizing online education: Advanced facial expression recognition for real-time student progress tracking via deep learning model," *Multimed. Tools Appl.*, vol. 84, no. 13, pp. 12575–12614, Apr. 2024, https://doi.org/10.1007/S11042-024-19392-5.

[20] T. A. Kustitskaya, R. V. Esin, Y. V. Vainshtein, and M. V. Noskov, "Hybrid Approach to Predicting Learning Success Based on Digital Educational History for Timely Identification of At-Risk Students," *Educ. Sci.*, vol. 14, no. 6, p. 657, Jun. 2024, https://doi.org/10.3390/educsci14060657.

[21] B. Razia and B. Awwad, "A Comprehensive Review of Blockchain Technology and Its Related Aspects in Higher Education," *Stud. Comput. Intell.*, vol. 1019, pp. 553–571, 2022, https://doi.org/10.1007/978-3-030-93921-2_29.

[22] Z. A. Adhoni and D. L. Narayan, "Improving the interoperability of a

Function-as-a-Service platform using an orchestration framework with a cloud-agnostic approach," *ETRI J.*, vol. 47, no. 2, pp. 312–325, Apr. 2024, https://doi.org/10.4218/etrij.2023-0443.

[23] B. Abbasnejad, S. Soltani, F. Taghizadeh, and A. Zare, "Developing a multilevel framework for AI integration in technical and engineering higher education: insights from bibliometric analysis and ethnographic research," *Interact. Technol. Smart Educ.*, vol. ahead-of-print, no. ahead-of-print, 2025, https://doi.org/10.1108/ITSE-12-2024-0314.

[24] M. Coeuret, J. Falip, and A. Bénel, "Cooperating in Academia with underspecified protocols: A case study of students and researchers practitioners of Grounded theory methodology (GTM).," 2025, https://doi.org/10.48340/ECSCW2025_EP03.

[25] A. Luştrea *et al.*, "The Digital Reflective Journal: A Self-Assessment Tool for Higher Education Students," *Lect. Notes Educ. Technol.*, vol. Part F3676, pp. 259–283, 2024, https://doi.org/10.1007/978-981-97-6136-4_12.

[26] G. D. Carlos and A. López, "The Systematisation of Survey Drawings: Identifying the Development of Morphological Awareness via Teaching Approaches," *Buildings*, vol. 15, no. 5, p. 674, Feb. 2025, https://doi.org/10.3390/buildings15050674.

[27] L. Guillaume, V. Laurent, and M. J. Genge, "Immersive and interactive three-dimensional virtual fieldwork: Assessing the student learning experience and value to improve inclusivity of geosciences degrees," *J. Geosci. Educ.*, vol. 71, no. 4, pp. 462–475, 2023, https://doi.org/10.1080/10899995.2023.2200361.

[28] B. Persson and B. Hermelin, "Decentralised cooperation between industries and local governments in a statist skill-formation system: an analysis of industrial schools in Sweden," *J. Vocat. Educ. Train.*, vol. 74, no. 4, pp. 645–663, Oct. 2022, https://doi.org/10.1080/13636820.2020.1829007.

[29] M. Vijayalakshmi, A. K. Subramani, R. Vettriselvan, P. R. Velmurugan, and J. Hasine, "Strategic collaborations in medical innovation and AI-driven globalization: Advancing healthcare startups," *Navig. Strateg. Partnerships Sustain. Startup Growth*, pp. 85–110, Jan. 2025, https://doi.org/10.4018/979-8-3693-4066-0.ch004.

[30] R. Trager *et al.*, "International Governance of Civilian AI: A Jurisdictional Certification Approach," *SSRN Electron. J.*, Aug. 2023, https://doi.org/10.2139/ssrn.4579899.

[31] J. I. Ricks and R. F. Doner, "Getting institutions right: Matching institutional capacities to developmental tasks," *World Dev.*, vol. 139, p. 105334, Mar. 2021, https://doi.org/10.1016/j.worlddev.2020.105334.