



Digital Personnel Systems: Navigating 21st Century Office Management Learning in Vocational Schools

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Abstract

Competency in Office Management and Business Services at Vocational Schools (SMK) in Indonesia faces the challenge of preparing skilled human resources for the digital age. Currently, learning remains suboptimal due to limited technological facilities and a curriculum that is not fully aligned with industry needs. Consequently, relevant digital learning media are required to improve students' competencies in line with 21st-century demands, integrating technology, automation, and connectivity. This research aimed to develop and test the feasibility of the Digital Human Resources System (SIKEDIG) as a learning tool for the Office Management and Business Services specialization. The study employed a Research and Development (R&D) approach using the ADDIE model. Feasibility testing involved six experts and practitioners and used a 5-point Likert scale. The results indicated that SIKEDIG was rated as "Highly Feasible" by language experts (mean score 4.5) and practitioners (mean score 4.5), while information systems experts rated it as "Feasible" (mean score 4.2). Based on evaluation and feedback, SIKEDIG was enhanced with new dashboard features, including attendance and employee recruitment trends. In conclusion, this research successfully developed and validated SIKEDIG as a feasible digital learning tool for vocational office administration programs.

How to Cite

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INTRODUCTION

The vocational school program in Office Management and Business Services is a crucial educational program designed to equip students with practical office administration skills and expertise, meeting the high demand for job readiness in the industrial world (Arkipov et al., 2021; Borzova et al., 2022). The curriculum for this specialisation places a greater emphasis on practical skills such as typing, filing, correspondence, and the use of office technology rather than on theory. Consequently, the urgency of an office administration central in vocational schools becomes increasingly evident. Unlike general education levels, which focus more on theoretical aspects, the ratio of practice to theory for the vocational office administration level is 70% to 30% (Sukoco et al., 2019). This ratio is well-suited to the demands of the professional world, which require graduates who can quickly master technical administrative skills (Kareem & Adekiigbe, 2017). Therefore, the vocational education program is the best and most urgent choice for producing skilled personnel ready to work across various industrial sectors (Sutirman & Yuliansah, 2025).

The urgency of vocational education programs must also align with developments in 21st-century education. Education in the 21st century encourages every element of the educational system to adapt to changes, particularly those driven by technological advancements. Digital learning, in this context, serves as an essential tool that facilitates student learning, enabling them to leverage knowledge and enhance their skills. (Andriana et al., 2021). As a key component, teachers can facilitate the learning process by utilising various learning media tailored to current market demands (Wang, 2024; Wihartanti & Wibawa, 2017). Therefore, teachers need to provide students with digital instruction that is tailored to the development of their teaching competencies (Prastyaningtyas, Wulansari, & Irmayanti, 2025). This serves as a foundational consideration to ensure the learning process runs effectively and creates an interactive environment that addresses global challenges.

21st-century learning, characterized by adaptive learning environments and technological advances, aligns with the demands of the

business and industrial sectors, especially in the current Industry 4.0 era. With the integration of digital technology, automation, and connectivity, the Industrial Revolution 4.0 is significantly changing the nature of work by replacing traditional technical and administrative jobs with intelligent machines and automated systems. This technological revolution utilises new methods for production processes that are directly based on the interaction between humans, machines, and the internet (Moktadir et al., 2018; Levchenko et al., 2023).

To achieve this more flexible implementation, artificial intelligence, robotics, and cyber-physical systems are utilised to automate repetitive tasks such as data processing, document management, data entry, and other administrative procedures, eliminating the need for human assistance (Prasetyo, 2018). As a result, many administrative and technical tasks that previously required human labour can now be completed by machines with greater accuracy, speed, and efficiency. This means that workers must learn new, more advanced, and strategic skills.

The new skills represent a tangible manifestation of the synchronization between 21st-century learning and the conditions of the Industrial Revolution 4.0. These competencies require individuals to be adaptable to digital technologies such as artificial intelligence, robotics, and cyber-physical systems (Makovetskaya & Sumachev, 2018; Nestor et al., 2022). Therefore, office administration personnel are required to master 21st-century technology skills, which include digital literacy for operating cloud-based office software, the ability to use electronic document management systems, proficiency in artificial intelligence applications for automating administrative tasks, and skills in managing data through integrated systems (Mardhiyah et al., 2021; Muladi et al., 2020). Furthermore, 21st-century competencies in office administration also require critical thinking skills to analyse digital data, creativity in designing efficient administrative solutions, effective digital communication across various technological platforms, and virtual collaboration in increasingly connected digital workplaces. These skills enable administrative personnel to remain relevant and competitive in the era of digital transformation (Zaitseva et al., 2017).

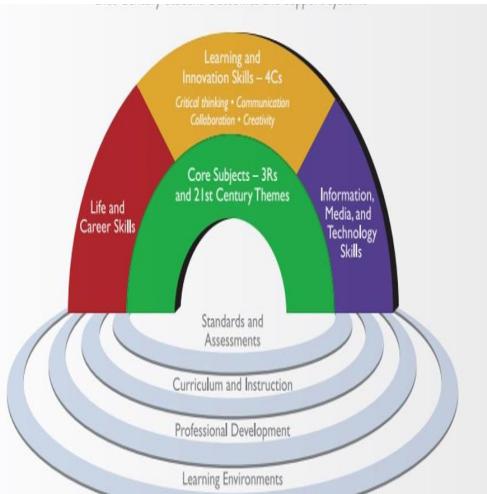


Figure 1. Learning Needs

In Indonesia, the development of the business and industrial sector (DUDI), particularly in the office administration field, shows a growing orientation toward technology adoption. This trend aligns with the growth of information and communication technology (ICT), which reached an index of 5.85 in 2022 (Databoks, 2024). Technological advancements in the office sector are implemented through office automation systems, the digitalisation of administrative processes, and the application of artificial intelligence (AI) to improve operational efficiency. Projections indicate that AI use in Indonesia will generate USD 366 billion, or approximately 12% of the country's GDP growth, by 2030 (Liputan6, 2025). This indicates significant potential for digital transformation across the business and industrial sectors, particularly in office administration, where systems are shifting from manual to digital. This drives fundamental changes in office work practices, ranging from electronic document management and digital archiving systems to communication via technology platforms, as well as the use of integrated software that enables virtual collaboration and automates routine administrative tasks.

The condition of vocational high school graduates in Indonesia presents numerous challenges stemming from issues in vocational education, the relevance of SMKs to industry needs, the quality of their graduates, graduate competitiveness, and the low level of support and participation from the industrial sector toward SMK institutions (Isnandar et al., 2023). According to Yang (2025), the quality of graduates is directly linked to the quality of learning at vocational high schools. The study highlights that vocational education struggles with poor learning qua-

lity and insufficient teaching resources. This suggests a significant gap: the SMK curriculum is not adequately aligned with industry needs, and schools lack adequate facilities, particularly in modern learning technology (Parker & Nelson, 2016; Utami et al., 2021). Therefore, it is necessary to reform the vocational high school curriculum, improve teaching quality, invest in digital facilities and technology, and strengthen strategic partnerships with the industry. However, this study will focus more on the issue of technology in digital learning.

Based on observations at several vocational high schools (SMK) in Central Java, including Boyolali, Surakarta, and Salatiga, the researcher highlights a lack of adequate learning media in the Office Management and Business Services specialization. This issue is particularly evident in the subject of Automation and Human Resource Management. This finding is reinforced by discussions during a Focused Group Discussion (FGD) with the Subject Teacher's Deliberation (MGMP) of Office Management and Business Services in the districts.

This condition aligns with the ongoing problems faced by Indonesian SMK graduates regarding learning quality, competitiveness, and industry-related issues (Isnandar et al., 2023). The quality of graduates is linked to the quality of learning, and a lack of teaching resources exacerbates this situation. Therefore, it is crucial to develop digital teaching media related to digital human resources as a digital tool. This will enable students in the Office Management and Business Services program at vocational institutions to gain practical learning experiences and skills that align with the demands of the digital era and industry needs.

The evolution of learning media in the digital age is a blend of technology and delivery systems that provide students with information in a convenient, accessible manner. This helps them acquire the necessary competencies, knowledge, skills, and attitudes more easily, overcoming limitations of time and space while remaining relevant to real-world applications. (Permansasih & Murwaningsih., 2018; Vidal et al., 2017).

This phenomenon of digital transformation in education aligns with the need to develop a Digital Human Resources System that leverages information technology to optimise performance and efficiency in an organisation's human resource management. (Pradhan et al., 2015; Wang, 2020). As digital learning media facilitate the flexible, systematic transfer of knowledge, a Digital Human Resources System is also necessary to

streamline human resource administration processes, making them faster, more transparent, and more accountable. This research aims to develop and test the feasibility of the Digital Human Resources System (SIKEDIG) as a learning tool for the Office Management and Business Services specialization at vocational schools.

METHODS

This research is a type of Research and Development (R&D) study. R&D research is a process conducted to develop and validate learning products, including not only material objects such as textbooks and instructional films, but also procedures and processes, such as teaching methods and organisational methods. The purpose of this study is to produce a system called the Digital Human Resources System (SIKEDIG). The research and development procedure for this study uses the ADDIE model. The ADDIE model comprises five stages that the researcher follows: analysis, design, development, implementation, and evaluation (McGriff, 2000). The ADDIE development model is shown in Figure 2.

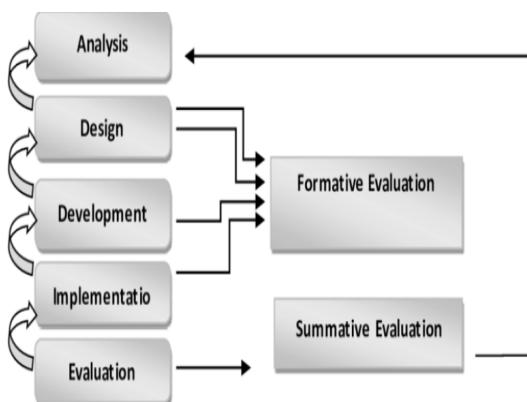


Figure 2. ADDIE research model design according to Steven J. McGriff

The ADDIE development model was selected for its systematic and accessible nature. The validation process involved six experts, comprising one language expert, one information systems expert, and four practitioners from vocational schools. Data collection utilized validation instruments with specific assessment criteria: the language expert evaluated four indicators (Language Rules, Terminology Suitability, Clarity & Readability, and Effective Communication); the information systems expert assessed five indicators (Self-Instruction, Self-Contained, Stand-Alone, User-Friendly, and Novelty & Usability); while practitioners evaluated five indicators (Self-

Instruction, Self-Contained, Stand-Alone, Adaptive, and User-Friendly). Following validation, a limited trial was conducted with 20 vocational teachers specializing in Office Management and Business Services.

This trial consisted of a 2-hour simulation delivered through a system-use mentoring format. Qualitative data, including suggestions and feedback from experts and trial participants, were analyzed to refine and further develop the SIKEDIG system. The quantitative data, in the form of assessment scores, were analysed descriptively using a score conversion table.

Table 1. Conversion of Quantitative Data into Qualitative Data

Score Interval	Value	Category
$X \geq 4.21$	5	Very Eligible
$3.40 < X \leq 4.21$	4	Eligible
$2.60 < X \leq 3.40$	3	Fair
$1.79 < X \leq 2.60$	2	Less Eligible
$X \leq 1.79$	1	Very Less Eligible

Source: Koo & Yang (2025)

During development, the minimum product feasibility score was set to "Eligible." This feasibility score applies to all assessment components, including those from media, subject matter, and system experts. If the result of this feasibility test is at least "Eligible," the developed product can be declared suitable for use.

RESULTS AND DISCUSSION

Analysis Phase

The analysis phase of the ADDIE model is the first stage, which involves identifying the need for developing the Digital Human Resources System (SIKEDIG). During this phase, data is collected to understand the problem or identify the need for development. This includes defining the development goals, their use and components, and creating specifications for the SIKEDIG to be used as a learning tool. The goal of this analysis is to ensure that the developed media design will meet learning needs. Therefore, the analysis phase is crucial to ensuring that the learning media are both practical and relevant.

A needs analysis was conducted through interviews and observations at several reference schools. The interviewees included teachers in the Office Management and Business Services specialisation at SMK Negeri 1 Salatiga, SMK PGRI 2 Salatiga, and SMK BM Salatiga. From

these interviews, it was found that the implementation of learning in the office administration department employs a conventional approach, with Microsoft Excel serving as the primary tool. There is no learning media that uses technology for more effective and efficient human resources automation and management.

One teacher stated:

“Learning for office automation and management does not fully utilise the potential of modern technology; it still uses a traditional approach with Microsoft Excel as a tool.” - K (3/3/2025)

Another teacher added:

“Students usually still do manual employee administration records, then use Microsoft Excel to compile the data.” - KY (24/3/2025)

A third teacher confirmed:

“For the system we use, we still rely on Microsoft Excel for administrative records.” - LJ (16/4/2025)

Based on observations at the three schools, it was found that almost all schools have laboratory facilities, and students are allowed to bring their smartphones and laptops. Teachers hope to have an alternative learning medium to help students learn automation and human resources management more easily. They specifically want a system that can be accessed anytime, anywhere, via a laptop, PC, or smartphone, and has a user-friendly format.

Teacher Quotes

"If possible, the application should be usable on smartphones and laptops and be lightweight." - K (3/3/2025)

“A system that isn’t too complicated for students and teachers to use.” - KY (24/3/2025)

“The format within the system shouldn’t be too difficult for students to understand, so it doesn’t confuse them.” - LJ (16/4/2025)

Based on the observations and interviews, the specifications for the Digital Human Resources System (SIKEDIG) to be developed are as follows: it must be accessible via the internet, allowing it to be used anywhere and anytime; it should be accessible on all devices; and its features and interface should be simple enough for general use.

Design Phase

The design phase of the ADDIE model involves developing the learning media in the form

of a flowchart design. Flowcharts are an effective way to enhance concept maps that depict inputs and outputs, thereby supporting the visualization of thought processes in information system development (Zhang et al., 2023).

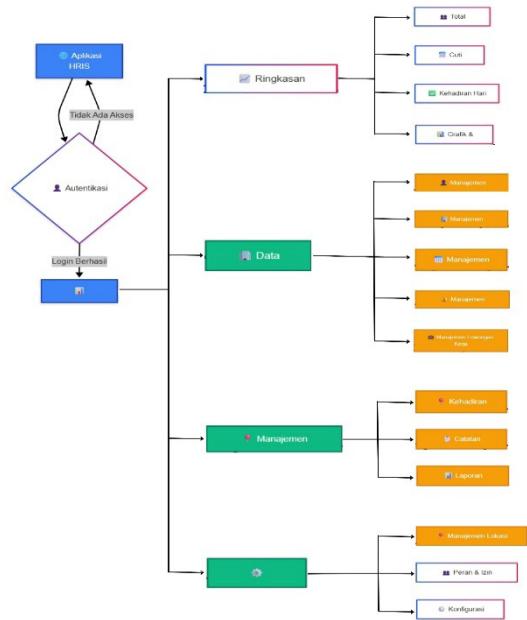


Figure 3. Flowchart Design

Development Phase

The development phase of the ADDIE model involves creating the Digital Human Resources System (SIKEDIG) website based on the previously planned designs, materials, and supporting media. The objective of this stage is to produce a learning tool, the Digital Human Resources System (SIKEDIG), which is ready for classroom implementation. The following are the results of the developed Digital Human Resources System (SIKEDIG).

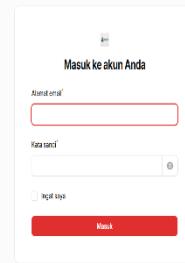


Figure 4. Log in view

This initial menu serves as the application's login page. The administrator will provide the website address and login credentials (email and password). This feature serves as an introductory component that helps students understand data security.

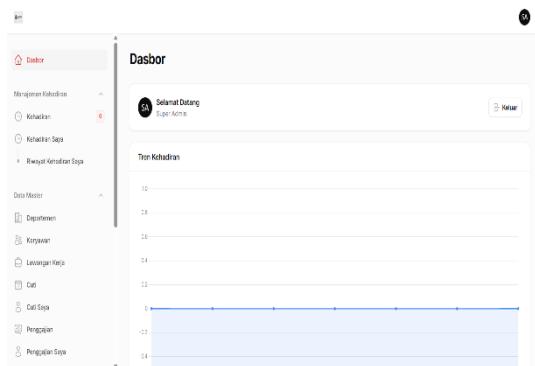


Figure 5. Dashboard View

The dashboard display provides a data summary with quick access to key information, such as the total number of employees, pending leave requests, and today's attendance. This view also includes an attendance graph, a recruitment graph, and a list of the latest leave requests. Through this dashboard, students receive a concise analytical overview of all ongoing processes. Consequently, students can be trained to make rapid decisions or draw conclusions based on the available information.

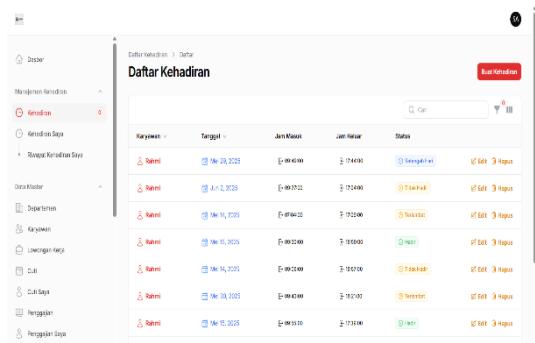


Figure 6. Attendance List Display

The attendance list displays the employee's name, date, check-in and check-out times, attendance status, and any additional notes. Attendance can be recorded in two ways: manually and through a self-check-in system. Through this feature, students are taught the importance of attendance, as it is a determinant of performance assessment.

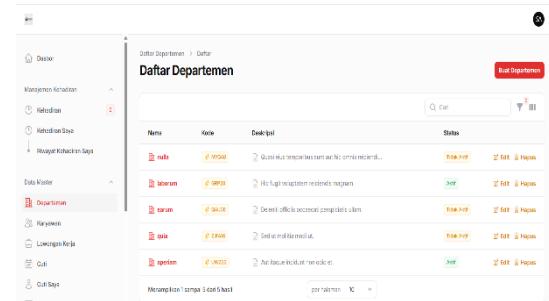


Figure 7. Department List View

The department list displays the company's existing departments. From this view, users can add new departments as needed. In line with the theory of division of labor, which encompasses centralization and decentralization, this system teaches students to apply the concept of work division.

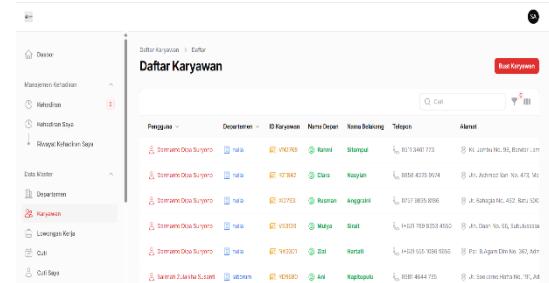


Figure 8. Employee List View

The employee list displays a table of all employees within the company. From this interface, users can add, edit, and delete employee data. Through this feature, students learn the importance of the employee self-development theory.

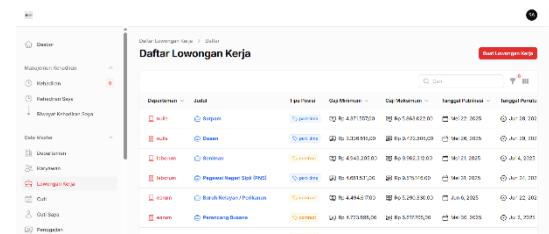


Figure 9. Job Vacancy List Display

The job vacancy list displays all available job openings within the company. This interface allows users to create new job vacancies tailored to a department's needs. This feature provides students with insights into the staffing process, from job analysis and workforce planning to employee recruitment.

Figure 10. Leave List View

The leave request list displays all leave applications from employees within the company. This interface allows users to submit new leave requests, while supervisors can process them. This feature teaches students about the types of employee leave and leave durations, while also providing an overview of the leave application procedures.

Figure 11. Payroll List View

The payroll list displays all salary data for every employee in the company. This interface allows users to create new salary data for employees. This feature provides students with insights into employee salary calculations, covering the Regional Minimum Wage, bonuses, and overtime pay.

Figure 12. Performance List View

The performance list displays the perfor-

mance evaluations of all employees in the company. This interface allows users to create new assessments based on employee performance.

Figure 13. User List View

The user list displays all user accounts with access to the Digital Human Resources System (SIKEDIG). This interface allows users to add new accounts to the system. Through this feature, students will learn about managerial levels, including top management, middle management, and lower management, as well as administrative roles.

Figure 14. Office Location List View

The office location list displays all registered company locations. This interface allows users to add new office locations.

Implementation Phase

The implementation of the Digital Human Resources System (SIKEDIG) was conducted at the Laras Asri Hotel in Salatiga on May 12, 2025. The event was attended by 25 MPLB teachers from Salatiga, Boyolali, and Solo. The proceedings commenced with an opening ceremony, followed by a comprehensive explanation of the program and system, a simulation of system use, and concluded with a discussion session. At the end of the activity, participants were asked to provide feedback and suggestions regarding the developed system.



Figure 15. Limited implementation documentation with teachers

Evaluation Phase

In this stage, an evaluation was conducted to assess the effectiveness and efficiency of the developed Digital Human Resources System (SIKEDIG), which had undergone a limited implementation. This evaluation collected data on the achievement of training objectives, participants' responses to the training, and the efficiency of resource use. The evaluation results will be used to gauge the success of the training program and to make necessary improvements to perfect the media. The evaluation data, consisting of program assessments from invited practitioners, was collected from the MGMP meeting minutes and a Google Form distributed to each participant.

Discussion

Feasibility Test Results

In the third phase, Development, an expert feasibility test was conducted to ensure that the Digital Human Resources System (SIKEDIG) was suitable for use. The experts involved were a language expert, an information systems expert, and a user/practitioner. The following results

were obtained:

Language Expert Assessment

The language expert selected, Dr. Sunardi, M.Pd., had a PhD and 10 years of experience in language. The results of the language expert's assessment are detailed in the following table 2.

Based on the average questionnaire responses from the language expert, the final assessment score was 4.5. This indicates that, from a linguistic perspective, the developed system is in the "Highly Feasible" category for use.

Information Systems Expert Assessment

The information systems expert selected was Prof. Dr. Sri Yulianto Joko Prasetyo, M. Kom., who holds a PhD and has more than 10 years of experience in the field. The assessment results from the information systems expert are detailed in the following table 3.

Based on the average results of the questionnaire completed by the information systems expert, the final score was 4.2. This places the developed product in the "Feasible" category from an information systems perspective.

Practitioner (User) Assessment

For this study, practitioners and users were selected based on at least 4 years of experience in the field. The respondents were four teachers representing the Office Management and Business Services specialization. The results of the practitioner/user assessment are detailed in the following table 4.

Based on the assessment table from practitioners/users, the information system received an average score of 4.5. Therefore, from a user's perspective, the developed product is in the "Highly Feasible" category for use.

Table 2. Linguist Assessment

Aspect	Evaluation Indicator	Score	Criteria
Language Rules	Use of good and correct language rules and spelling	4	Feasible
Terminology Suitability	Consistency in the use of terms, symbols, or icons in line with the subject matter	4	Feasible
Clarity and Readability	Use of straightforward and easily understandable language that represents the content or information	5	Highly Feasible
Effective Communication	Accuracy in language selection for describing material and being communicative	5	Highly Feasible
Average		4.5	Highly Feasible

Source: Processing of Linguist Expert Assessment Instrument data (2025)

Table 3. Information Systems Expert Assessment

Aspect	Indicator	Score	Criteria
Self-Instruction	The system contains interactive features or guides.	4	Feasible
Self-Contained	The system has all the necessary components and information to meet user needs.	4	Feasible
Stand-Alone	The system can operate independently without relying on external systems or supporting software.	4	Feasible
User-Friendly	The system's interface and workflow are intuitively designed, making them easy to understand and use.	4	Feasible
Novelty & Usability	The system has real potential as digital learning media for human resource administration in a vocational school environment.	5	Highly Feasible
Average	-	4.2	Feasible

Source: Information Systems Expert Assessment (2025)

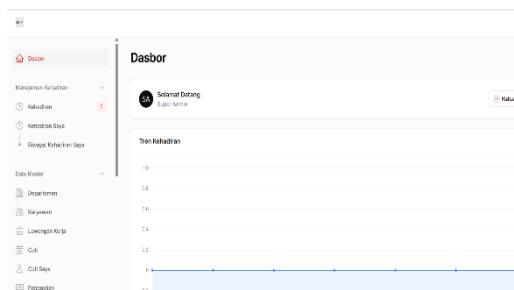
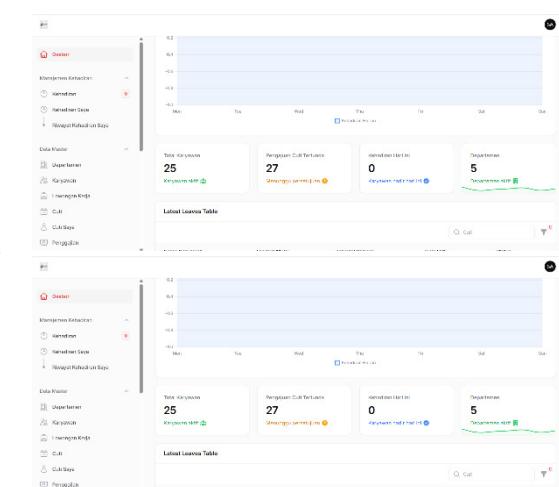
Table 4. User or Practitioner Assessment

Aspect	Indicator	Score	Criteria
Self-Instruction	The learning material has a clear and understandable sequence, objectives, and steps.	4.5	Highly Feasible
Self-Contained	The content (material and visualizations) is appropriate for the needs of vocational high school students in Office Management and Business Services.	4.75	Highly Feasible
Stand-Alone	The system is easy to use independently.	4.25	Highly Feasible
Adaptive	The system is relevant to current developments in science and knowledge.	4.5	Highly Feasible
User-Friendly	The system is accessible on various devices during and outside of class time.	4.25	Highly Feasible
Average	-	4.5	Highly Feasible

Source: User or Practitioner Assessment (2025)

Evaluation Results of the Digital Human Resources System (SIKEDIG)

The evaluation from the feasibility test and limited implementation revealed the need for additional dashboard features, such as attendance trends, total employees, and employee recruitment trends. Based on this feedback, a follow-up action was taken to add these features to the dashboard, making it easier for users to monitor employee attendance and recruitment within the company.

**Figure 16.** SIKEDIG Dashboard Display**Figure 17.** Total Employee View

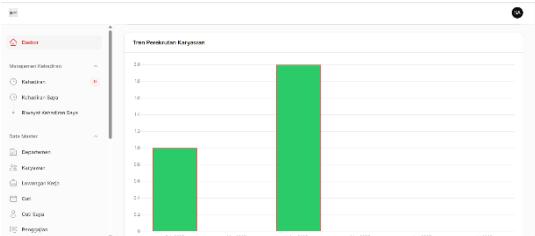


Figure 18. Employee Recruitment Trends Display

Based on the evaluation and subsequent revisions, a crucial aspect for future product enhancement is the dashboard features, such as attendance trends, total employees, and employee recruitment trends. Therefore, when developing a new media or information system, it is essential to conduct validation by media experts and subject matter experts, as well as user trials, to determine the system's feasibility and effectiveness. This process ensures the system is ready for practical use.

To substantiate the findings, an analysis of several relevant references was conducted. Ruswiansari et al. (2024), in their article titled 'Pengembangan Sistem Pegawai (Simpeg) Berbasis Mobile Menggunakan Metode V-Model', emphasized that personnel applications can be accessed via mobile devices. In comparison, SIKEDIG offers greater flexibility as a web-based application accessible via both computers and smartphones, which constitutes a distinct advantage.

Siahaan et al. (2025), in their study 'Perancangan Sistem Informasi Penggajian Karyawan Pada Pt. Gunung Moria Mega Prima Jakarta Barat explained that a robust payroll system is essential for ensuring transparency, accuracy, and administrative efficiency. The developed SIKEDIG system offers a more comprehensive suite of features, ranging from attendance and employee data to leave management, payroll, and work productivity, as well as employee recruitment.

Furthermore, Nusantoko and Prapanca (2025), in their article 'Pengembangan Aplikasi Human Resource Information System Berbasis Mobile Dengan Absensi Wajah Menggunakan Metode CNN Pada BMT Bahtera Pekalongan', stated that a mobile-based Human Resource Information System (HRIS) integrated with facial recognition technology can enhance employee attendance productivity. While SIKEDIG encompasses a wider range of features, the concept of attendance via facial verification serves as valuable input for future system development.

CONCLUSION

The Development of the Digital Human Resources System (SIKEDIG) as a learning tool for vocational office administration was conducted by the ADDIE model. The first phase, Analysis, involved identifying the media's requirements, such as internet access, facilities, and a general system overview. The second phase, Design, focused on creating the flowchart and preparing the feasibility instruments. In the third phase, Development, the SIKEDIG was built and concluded with a feasibility test by a panel of experts. The fourth phase, Implementation, involved a limited rollout with practitioners, office management, and business services teachers, followed by an MGMP (Subject Teacher's Deliberation) meeting to gather feedback. The final phase, Evaluation, concluded with necessary revisions and improvements based on practitioner feedback and feasibility test results. The feasibility test results showed strong approval across all categories, with a final average score from language experts of 4.5, placing it in the "Highly Feasible" category. The final average score from information system experts was 4.2, categorized as "Feasible." Finally, the average score from practitioners/users was 4.5, which also falls into the "Highly Feasible" category.

The practical implication of this study is the creation of a digital personnel information system product that serves as a learning medium in schools, specifically for the Office Management and Business Services specialization. However, this research was conducted on a limited implementation scale. Therefore, further research involving large-scale implementation in schools is required to thoroughly evaluate the system's effectiveness in the learning process. Additionally, a limitation of this study is the restricted hosting and storage capacity. Consequently, simultaneous usage by many users may result in reduced system performance. This is a critical consideration for field implementation, where greater resources will be required to ensure optimal use.

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