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Development of A Collaborative Web-Based Academic Supervision Model to Improve Learning Quality

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Abstract: This study aims to develop and implement a digital-based academic supervision model that addresses limitations in time, resources, and data accessibility, thereby supporting the effectiveness of school principals in improving the quality of learning in schools. This study employed the Research and Development (R&D) method with a 4D model approach (Define, Design, Develop, Disseminate). The data collection instruments included interview guides, questionnaire item indicators, and product feasibility assessment indicators. The research data analysis technique used qualitative and quantitative descriptive analysis. This study successfully developed and implemented a web-based academic supervision model that allows flexible supervision without time and location constraints. Validation results showed that the system was highly feasible, with a feasibility score of 83.33% in terms of technology and 92.9% in terms of academic supervision. A field trial involving school principals, teachers, and educational staff indicated a user satisfaction rate of 81.4%. The system effectively addresses the limitations of conventional supervision—such as time constraints, limited resources, and lack of systematic documentation. Its key features included supervision data management, automatic report generation, and real-time feedback, all of which directly support school principals in enhancing the quality of teaching and learning.

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Introduction

Supervision has emerged from various controversial perspectives among education experts regarding its urgency in the education sector. Based on various summarized sources, the primary goal of supervision is to establish a system that assists educators in enhancing their professional quality. This mechanism is implemented by providing guidance and technical assistance to teachers. Well-directed and structured guidance can significantly impact performance outcomes. The performance demonstrated by each teacher or educator serves as an indicator of how well the learning process is being delivered to students (Asmadi et al., 2023). Teachers' ability to manage learning is a critical aspect that requires special attention. In this regard, school principals play a strategic role in managing and improving the quality of education in their institutions. One of the key instruments that determine success is supervision, which ensures the effective implementation of the curriculum and optimal teacher performance. However, in this digital era, it is essential to adapt to a more flexible and effective supervision system (Soro et al., 2022).

Regarding supervision, school principals are not only responsible for assessing the quality of teachers as educators but also for developing their capacity and potential.

Academic supervision primarily focuses on improving teachers' professional skills in relation to the learning process and objectives for which they are responsible. Academic supervision serves as a system that encourages, guides, and acts as a coordination tool for school principals to enhance teachers' quality and effectiveness in performing their duties (Kurnianingsih, 2023).

Despite its importance, school principals often face challenges in conducting academic supervision. One of the most common obstacles is time constraints and unpredictable schedules. Due to their heavy workload, school principals frequently struggle to allocate sufficient time for supervision. Additionally, the limited availability of supporting resources, including staff to assist in the supervision process, further exacerbates the problem. As a result, school principals often find it difficult to collect data quickly and accurately, which is essential for evaluation and informed decision-making (Sukanto et al., 2022).

A preliminary study conducted at Sidorejo Kidul 2 Public Elementary School in Central Java found that out of 12 teachers, only 33.3% received regular supervision. This was primarily due to the school principal's limited time, as they were preoccupied with administrative tasks and other managerial responsibilities. Consequently, academic supervision was not carried out optimally, leading to less effective efforts in improving teacher competency. The lack of regular supervision directly impacted the monitoring of classroom learning processes and resulted in minimal constructive feedback for teachers (Aditya, P. T., & Ismanto, B., 2020).

The limited time available for supervision affects the effectiveness of the school principal's direct supervision of teachers (Utami, K. B. 2021). The requirement for principals to monitor teachers' classroom learning processes often faces obstacles during implementation. Challenges in conducting direct supervision ultimately impact teacher performance quality. According to Pujianto et al. (2020), limitations in supervision implementation can influence the assessment of the quality of learning delivered by teachers to students. This, in turn, affects the overall school quality in producing competent human resources.

Given the current situation, technology serves as a valuable tool to assist in human tasks. In the education sector, technology is no longer a foreign concept but rather an essential means of enhancing educational quality. One widely adopted technological application is the use of websites to support institutional needs. Implementing a web-based system for supervision can enable school principals to conduct supervision online, offering greater flexibility (Ghavifekr, S., & Rosdy, W. A. W. 2015).

The development of a web-based academic supervision system aligns with the evolving educational paradigm, which increasingly integrates technology (Wijayanti, D. 2022). A web-based supervision system facilitates more efficient data collection and analysis. Therefore, the development of this web-based academic supervision system aims to describe the academic supervision practices currently carried out by school principals at Sidorejo Kidul 2 Public Elementary School and to propose a web-based supervision model to enhance the efficiency and effectiveness of school supervision.

Unlike the research conducted by Prihayuda Tatang Aditya & Bambang Ismanto (2020) and the study by Meka Yulianto, Ngasbun Egar & Nurkolis (2023) this study develops a web-based academic supervision model that is more adaptive to local needs. This research offers an innovative approach by leveraging digital technology to facilitate real-time teacher performance evaluation and feedback. The main contribution of this study is the creation of a flexible and efficient supervision system that reduces administrative burdens and enhances collaboration between school principals and teachers. Additionally, this model supports

digital transformation in education and accelerates adaptation to digital-based curricula, ultimately having a positive impact on teacher competency and overall learning quality (Suryana, B. 2023).

Research Method

This study employed Research and Development (R&D) with the 4D model (Define, Design, Develop, and Disseminate) (Hidayat, M., Sabil, H., & Toat, F. A. 2024). Research and Development (R&D) is a research method used to develop and produce specific products (Sugiyono, 2019). The Define stage involved observations and interviews to analyze field problems. The Design stage then developed the product based on the collected data, including media and format selection. Next, the Develop stage included expert validation and limited trials to ensure product feasibility. Finally, the Disseminate stage involved distributing the product after it had been deemed feasible and revised. This research was conducted at Sidorejo Kidul 2 Public Elementary School, Salatiga City, Central Java, with research subjects consisting of the school principal, teachers, and educational staff.

The research instruments consist of interview guidelines, questionnaire indicators, and product feasibility assessment indicators (Aeni et al., 2022). The data analysis technique in this study was presented using a descriptive quantitative approach. Data obtained from interviews and observations would be presented descriptively in the research findings and discussion section (Airlangga et al., 2020). Meanwhile, data collected from the product validity questionnaire would be presented quantitatively and descriptively. The percentage results from these calculations would be categorized based on each product feasibility assessment indicator. Subsequently, the percentage results for each product assessment indicator would be interpreted based on the following product feasibility percentage scale (Damayanti et al., 2018).

Table 1. Product Feasibility Criteria

Product Feasibility Percentage	Interpretation
0% - 20%	Highly Infeasible
21% - 40%	Infeasible
41% - 60%	Moderately Feasible
61% - 80%	Feasible
81% - 100%	Highly Feasible

Results and Discussion

The observation results indicated that the existing supervision system was still manual, where the school principal conducts supervision by visiting classrooms and conducting direct observations. However, this process is not integrated with easily accessible data for teachers and other school staff. As a result, the evaluation and improvement of teacher performance are not optimized (Alamsyah et al., 2020). Interviews were conducted with the school principal and teachers to gain deeper insights into their needs and the challenges faced in academic supervision (Amini et al., 2021). The interview findings revealed that many teachers struggle to receive regular and constructive feedback. Additionally, the school principal stated that time constraints and limited access to teacher performance data pose significant challenges in implementing more effective supervision. Here are excerpts from the responses given by teachers and the school principal during interviews regarding the current supervision practices at the school:

Question : How is the planning and implementation of academic supervision carried out so far?

School Principal: "We plan supervision by preparing an annual supervision schedule. However, its implementation is often hindered by urgent additional tasks, such as external duties and other responsibilities. Time constraints have been one of the main obstacles to effective supervision."
Question : What is the current supervision process like at the school?
Teacher :"Academic supervision is usually conducted through classroom visits and discussions with teachers. However, the number of visits by the principal is still limited, and supervision often feels formal without clear follow-up actions. Additionally, although the supervision schedule is set, the supervisor (principal) is sometimes unable to attend due to other responsibilities, causing the supervision process to not proceed as planned."

The interview results with the school principal, teachers, and staff provide an overview of various aspects of academic supervision. The school principal stated that supervision planning was carried out by preparing an annual supervision schedule. However, the implementation is often hindered by urgent additional responsibilities. Teachers also mentioned that academic supervision was generally conducted through classroom visits and discussions with teachers (Asmadi et al., 2023). However, the number of visits by the principal remains limited. Teachers often feel that supervision is conducted formally without clear follow-up actions.

After the definition stage was carried out through observations and interviews, the next step was to design the website according to the needs of academic supervision. The designed website would then enter the development stage to ensure its functionality. During this stage, the product would be validated by information technology (IT) experts and academic supervision experts. This validation is conducted to assess the quality and suitability of the website based on the established standards. Professionals in the fields of IT and academic supervision play a crucial role in ensuring that the developed design meets user needs. Thus, the resulting website can be effectively utilized in academic supervision (Hanafi, 2017).The product validation results from IT experts can be seen in Table 2 below.

Table 2. IT Expert Validation Results

No	Aspect	Average Score	Percentage
1	Usability	4	80%
2	Responsiveness & Accessibility	4	80%
3	User Interface (UI) Design	4	80%
4	Content Quality	4	80%
5	Security & Privacy	5	100%
6	SEO & Visibility	3.5	70%
7	Interactivity & User Feedback	5	100%
8	Compatibility	5	100%
9	Performance	3	60%
Average Percentage			**83.33%**

Based on the validation results from Information Technology (IT) experts, the website received an 80% score for aspects such as usability, responsiveness, user interface (UI) design, and content quality. This indicates that the system is easy to use, responsive across various devices, features an intuitive design, and provides relevant supervision content. The security and privacy aspect received a 100% score, signifying that the website is equipped with strong encryption and authentication systems to protect supervision data confidentiality. Additionally, the interactivity and user feedback features also scored 100%, demonstrating that the platform effectively supports real-time communication between school principals and teachers through comments and supervision feedback. The website's compatibility across multiple operating systems and browsers was also rated highly at 100%, ensuring smooth access without technical issues.

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However, some areas require improvement. The SEO and visibility aspect scored 70%, indicating a need for optimization to enhance search engine discoverability. Moreover, the performance aspect scored 60%, highlighting the necessity for better data processing speed and reduced page load times. Enhancements can be achieved through server optimization and minimizing excessive data loads. Overall, the web-based academic supervision system meets the "Highly Feasible" category and is ready to be implemented to support academic supervision in schools. In addition to validation by IT experts, validation was also conducted by academic supervision experts. This validation aimed to assess the feasibility of implementing the web-based academic supervision system. The validation results from academic supervision experts are presented in Table 3 below.

Table 3. Academic Supervision Expert Validation Results

No	Aspect	Average Score	Percentage
1	Planning	4.50	90%
2	Implementation	4.71	94.3%
3	Evaluation	4.63	92.5%
4	Follow-up Actions	4.75	95%
5	Language Usage	4.75	95%
6	Readability	4.67	93.3%
7	Presentation	4.50	90%
Average Percentage			**92.9%**

Based on the validation results from academic supervision experts, the academic supervision website received an average score of 92.9%, categorizing it as "Highly Feasible" according to product feasibility standards. This indicates strong support for digital-based academic supervision in schools. The planning aspect received a score of 90%, reflecting a well-structured system design. Meanwhile, the implementation stage achieved the highest score of 94.3%, indicating a well-executed process. The evaluation aspect obtained 92.5%, supporting a systematic teacher performance assessment, while the follow-up actions aspect scored 95%, demonstrating the system's effectiveness in facilitating instructional improvement and data-driven decision-making (Rofiki, M., 2019). Regarding language, grammar usage scored 95%, and readability 93.3%, ensuring clear and easy-to-understand instructions. The presentation aspect received 90%, reflecting an organized, engaging, and informative display.

At the final testing stage, teachers were asked to complete a survey questionnaire to assess satisfaction levels, ease of use, and the effectiveness of the EKG academic supervision website in supporting the supervision process. Rohmani, R., & Prihatmojo, A. (2020) stated that the purpose of the survey was to identify any challenges or difficulties teachers encountered while using the platform, which would serve as input for further evaluation and improvement. The results of teacher responses to the EKG web-based academic supervision system are presented in Figure 1 below.

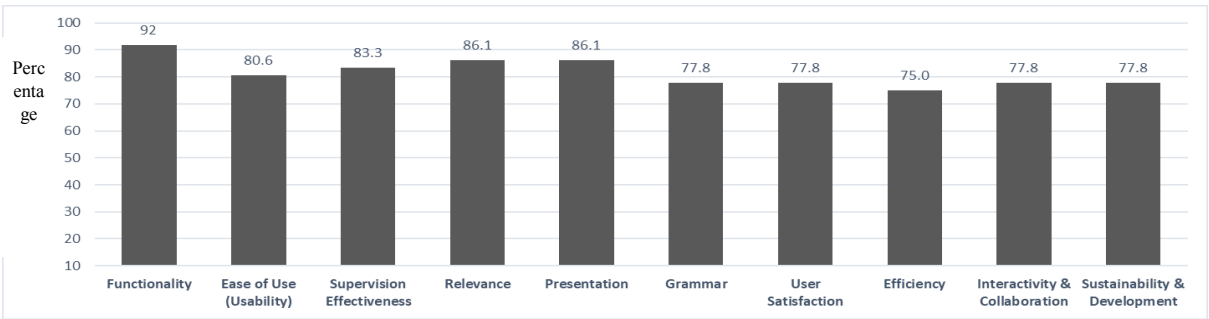

Figure 1. Teachers' Responses

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Based on the diagram of teachers' responses to the EKG (Teacher Competency Evaluation) supervision website, the overall feedback is positive, with an average score of 81.4%, indicating that most teachers find the website effective in supporting academic supervision. The functionality aspect received the highest score of 92%, signifying that the features meet users' needs. Meanwhile, usability (80.6%) and supervision effectiveness (83.3%) show that the system is quite user-friendly and effectively supports the supervision process (Ertmer, P. A., & Ottenbreit-Leftwich, A. T. 2010). The relevance and presentation aspects both scored 86.1%, confirming that the information is presented clearly and attractively. However, some aspects need improvement, such as language (77.8%), user satisfaction (77.8%), and efficiency (75%) the lowest score indicating issues related to access speed and performance. Additionally, interactivity & collaboration and sustainability & development each received a score of 77.8%. Nevertheless, the website is considered effective in facilitating the academic supervision process and has the potential for further development (Sanoto et al., 2022).

Discussion

The results of this study indicate that technology-based academic supervision, particularly through the use of websites, has a positive impact on improving school principals' supervision. These findings align with research by Alenezi, A. (2019), which emphasizes that web-based academic supervision models can enhance education quality through a more effective and efficient monitoring system. With digital-based supervision, school principals can more easily conduct real-time monitoring and evaluation of teachers' performance.

Additionally, this study confirms that developing websites as a learning and supervision medium facilitates the teaching process and improves education quality. As stated by Aeni et al. (2022), the use of websites in education, including in the context of religious teaching, provides broader access to learning resources and enhances students' understanding of the material. This is further supported by research by Airlangga et al. (2020), which shows that website development in rural education contexts can increase participation and improve learning quality. Thus, technology-based academic supervision not only supports teachers' competency development but also positively impacts students' learning experiences.

In the context of academic supervision, this study also found that school principals play a central role in improving teachers' competencies through structured and systematic guidance. This is reinforced by findings from Amini et al. (2021), which show that the implementation of academic supervision by school principals at SMA Negeri 5 Pematangsiantar successfully enhanced teachers' teaching quality. Continuous supervision helps teachers recognize their strengths and weaknesses, allowing them to improve their teaching skills sustainably. Furthermore, this study found that the effectiveness of academic supervision depends not only on the school principal but also on a conducive work environment. Pujianto et al. (2020) emphasize that a supportive work environment and effective academic supervision can significantly improve teachers' performance.

Schools with web-based supervision systems can create a more collaborative and innovative work environment, ultimately enhancing teachers' professionalism. The findings also showed that using technology in academic supervision improved teachers' competencies and accelerated adaptation to increasingly digital-based curricula. These findings align with research by Devella et al. (2021), which highlights that training teachers to create school websites using WordPress enhances their digital skills and improves school management

systems overall. Therefore, integrating technology into academic supervision is a strategic step in enhancing education quality in the digital era.

When linked to the development of web-based learning media, this study supports findings by Sadikin et al. (2020), which affirm that developing interactive multimedia on websites can help students gain a deeper understanding of the material. Thus, technology-based academic supervision benefits not only teachers but also positively impacts students' learning processes. This further reinforces that the use of technology in academic supervision is not just a supporting tool but an integral part of improving teaching effectiveness and student learning outcomes (Yussanti, D. W., & Dwikurnaningsih, Y. 2020).

Furthermore, this study showed that technology-based academic supervision not only enhanced teaching effectiveness but also contributed to improving overall school management quality. According to Fitria et al. (2021), website-based school digitalization helps school principals organize supervision activities so that monitoring and evaluation can be conducted in a more structured and systematic manner. This is supported by research from Hasanah (2022), which emphasizes that digital academic supervision optimizes school principals' roles as supervisors in continuously improving teachers' competencies. With digital supervision systems, school principals can focus more on coaching aimed at improving education quality.

Additionally, this study found that using websites for academic supervision can reduce teachers' administrative burdens. As stated by (Bush, T. 2011), technology-based academic supervision allows teachers to focus more on improving lesson quality without being distracted by excessive administrative tasks. These results align with research by Isbianti & Andriani (2021), which shows that efficient academic supervision can enhance teachers' psychological well-being by reducing excessive work pressure. Therefore, implementing technology in academic supervision impacts not only pedagogical aspects but also the overall well-being of educators.

In the context of school principals' roles, this study supports findings by Kurnianingsih (2023), which reveal that school principals actively engaged in academic supervision can create a more conducive and collaborative learning environment. School principals who adopt a technology-based academic supervision approach can provide more effective guidance and encourage greater teacher participation in professional activities. This is also supported by research by Asmadi et al. (2023), which highlights that structured school principal supervision can significantly improve education quality. Thus, technology-based academic supervision contributes to educational transformation that is more adaptive and responsive to changing times.

Moreover, using websites as a platform for academic supervision also accelerates teachers' adaptation to digital-based curricula. Devella et al. (2021) emphasize that training teachers in school website management positively impacts their digital skills development. Therefore, implementing web-based academic supervision not only enhances teachers' pedagogical competencies but also supports digital transformation in the education system. This further strengthens the urgency of leveraging technology in academic supervision as a strategy to ensure that teachers remain relevant and competitive in facing modern education challenges.

Additionally, this study shows that using technology-based academic supervision not only enhances teachers' competencies but also improves overall school management systems. Digitalized supervision enables a more transparent record of teachers' performance, accessible anytime by school principals and relevant stakeholders. This aligns with findings from Hasanah (2022), which affirm that digital supervision systems create a more objective

and systematic evaluation mechanism. As a result, teachers can more easily receive direct feedback to improve their teaching quality.

Overall, this study provides insights that implementing technology-based academic supervision not only enhances individual teachers' competencies but also improves the broader education management system. As leaders in academic supervision, school principals play a crucial role in optimizing technology as a tool to improve education quality. With the support of a conducive work environment, technology-based academic supervision can be an effective strategy for creating a higher-quality, adaptive, and innovative education system (Lai, K.-W., & Pratt, K. 2004).

Conclusion

This study successfully developed and implemented a web-based academic supervision model that allows flexible supervision without time and location constraints. Validation results showed that the system was highly feasible, with a feasibility score of 83.33% in terms of technology and 92.9% in terms of academic supervision. A field trial involving school principals, teachers, and educational staff indicated a user satisfaction rate of 81.4%. The system effectively addresses the limitations of conventional supervision—such as time constraints, limited resources, and lack of systematic documentation. Its key features include supervision data management, automatic report generation, and real-time feedback, all of which directly support school principals in enhancing the quality of teaching and learning.

Recommendation

Based on the conclusions of this study, the following recommendations are proposed: The Ministry of Education is encouraged to : (1) Adopt and promote the implementation of web-based academic supervision systems nationwide as part of broader digital transformation in school management, given their proven effectiveness in improving supervision efficiency and teacher engagement. (2) Establish technical regulations and policies that integrate such systems into existing educational platforms and programs, such as Dapodik and e-RKAS. (3) Provide training and technical assistance for school principals and teachers across all education levels to ensure optimal use of the digital supervision system. (4) Allocate dedicated funding for the development, maintenance, and expansion of web-based supervision systems, especially to reach schools in areas with limited technological infrastructure. (5) Foster cross-sector collaboration with technology providers, training institutions, and universities to continuously improve system features in alignment with real-world school needs and evolving national curricula.

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