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Development of a Web Based Academic Supervision Application (SUAMIC) in Elementary Schools

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ABSTRACT

This research focuses on the development of a web-based academic supervision application (SUAMIC) to enhance the efficiency, effectiveness, and transparency of academic supervision in elementary schools within the Ungaran Barat sub-district, Semarang Regency. The study follows the 4D model (Define, Design, develop, and disseminate), beginning with a needs analysis to identify challenges in the manual academic supervision process. The development process resulted in the SUAMIC application, which includes features such as user management, academic supervision via Google Forms, supervision recaps, and communication tools like Zoom and Live Chat. The validity of the SUAMIC application was assessed by content and media experts, both of whom deemed it feasible for use in academic supervision. Practicality testing conducted on a small scale and a large scale revealed high usability scores, confirming the application's ease of use. Additionally, effectiveness was measured through pre-test and post-test results, with significant improvements in teachers' academic supervision skills. These findings demonstrate that SUAMIC effectively supports academic supervision and enhances teachers' ability to manage and evaluate academic performance. In conclusion, the SUAMIC application provides a structured, systematic, and efficient way to conduct academic supervision, improving transparency and feedback in real-time. The study recommends integrating SUAMIC into school systems, providing training for users, and adding new features for further optimization. The findings suggest that SUAMIC can be a model for digitizing academic supervision and promoting educational reform in elementary schools.

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INTRODUCTION

The conventional model of academic supervision implemented in various schools still relies on classroom visits and observations. This conventional model of academic supervision often impacts teachers' mental readiness and adds to their workload during classroom sessions. These challenges might cause the teaching performance to be manipulated, as teachers may create scenarios to meet the expectations of the supervision process. Based on these issues, an alternative approach is required to replace the conventional model, such as shifting to a digital academic supervision model as part of the ongoing technological advancements in education. This study

presents SUAMIC, a web-based application aimed at overcoming these challenges and enhancing the effectiveness of supervision processes.

Education is one of the means by which humans develop their potential (Syarnubi, 2024). Through education, individuals can enhance their skills and knowledge to contribute to society. Education is a micro-level issue that relates to the teachers' abilities, their preparedness, the readiness of schools to support the learning process by providing necessary facilities, and the community's involvement in education (Musaheri, 2017). Sardiman, states that teachers play a critical role in the learning process, contributing significantly to the development of human resources needed in the field of national development (Sardiman, 2015). Therefore, teachers must actively engage in their role as professionals in the educational sector, in line with societal demands. Teachers are not only instructors who transfer knowledge but also educators who impart values and guide students in their learning journey.

According to educational expert Hamalik, teachers should also function as leaders, having the responsibility to supervise student learning activities, create lesson plans for their classes, manage learning effectively, and maintain class discipline democratically. Similarly, (Majid, 2017) emphasizes that teachers should be able to manage and structure the learning process according to the context of the classroom. (Yamin, 2017a) also notes that teachers have a dual role in school, as the quality of education rests on their shoulders. A teacher with the necessary skills and capabilities can deliver the learning process needed by students and help develop their potential. Academic supervision plays a central role in fostering teacher competency in preparation, implementation, and evaluation of the learning process (Komariah, 2018).

Ideally, academic supervision should be conducted every semester or twice a year to evaluate and provide guidance on lesson preparation, teaching, and assessment (Fahmi, 2018). The tools for assessment during supervision include the completeness of documents, introduction, core activities, and closure. One significant problem in academic supervision is its lack of effectiveness in improving the professionalism of teachers (Sanoto, 2021).

The instruments for academic supervision include planning, implementation, and monitoring. After determining the instruments, the school principal sets the schedule for the academic supervision process. The principal serves as the supervisor of the teachers. Once the teachers are informed of the supervision schedule, they then discuss the preparations needed for the supervision. However, implementing supervision is not as easy as expected, especially when traditional methods, such as using printouts to store supervision results, are still being employed. This leads to challenges such as lost files and storage issues due to excessive paper records, making it necessary to transition to a more efficient and systematic approach.

The factual model represents the current state of academic supervision in primary schools in the Ungaran Barat district. Key characteristics of this model include: (1) Traditional Supervision: Supervision is conducted manually and often involves physical visits by supervisors to schools. (2) Manual Documentation: Results of supervision are recorded manually in physical documents. (3) Limited Communication: Interaction between supervisors, teachers, and school principals is primarily face-to-face. (4) Resource Limitations: There are constraints in terms of time and personnel to effectively carry out supervision.

The academic supervision system, which was initially limited to a Google Sites platform and accessible only through a web link, has undergone a significant transformation. What was once a time-consuming process with high resource demands has now become more efficient through automation of various tasks, real-time reporting, and broader accessibility. With these innovative features, the system now enables more focused, objective supervision, significantly enhancing the quality of learning.

This paper focuses on developing the web-based academic supervision application (SUAMIC) to overcome the limitations of the previous system. The application has been integrated with a secure login system using a username and password, improving accessibility and security. This innovative step enables all stakeholders—teachers, principals, and supervisors—to actively participate in real-time and organized supervision.

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Based on data from academic supervision in schools in Semarang Regency in 2023, such as at SDN Ungaran 01, 60% of teachers reported losing academic supervision files due to poor storage practices. Additionally, 58% of teachers had scheduling issues, as principals often left the school for official duties, and the system still relies on manual methods. This inefficiency emphasizes the need for a more systematic approach to academic supervision.

One of the strategies to achieve national educational goals is improving the quality of education. To achieve quality education, professional educators are required. Teachers, as educators, must possess competencies in managing learning, developing potential, and mastering academic knowledge. As learning managers, teachers should act as planners, implementers, and evaluators of learning activities (Nasional, 2014).

Academic supervision is a process of oversight and guidance carried out by an academic supervisor toward teachers to improve the quality of learning in schools. Various educational experts have provided definitions of academic supervision. Harris, as cited by (Sahertian, 2020), states that academic supervision is everything that school personnel do to maintain or change what is done in schools in ways that directly affect the teaching-learning process to enhance student learning. According to Alfonso, cited in (Sahertian, 2020), academic supervision is an action by officials designed to directly influence teachers' behavior in various ways to assist students' learning processes and achieve the goals set by the institution. According to Daresh (Mulyadi, T., & Fahriana, 2018), academic supervision is an effort to help teachers develop their abilities to achieve teaching goals (Suryadi, 2017). mention that supervision is a service to assist teachers in becoming professional educators in line with the development of knowledge and enhancing the effectiveness of the teaching and learning process.

Academic supervision is essential in schools because it can motivate and improve teachers' performance, making them more innovative and high-performing. (Rosyida, A., & Suhartini, 2021) states that academic supervision needs to be developed through new practices to make educational innovation a driving force for positive, high-quality, and productive changes. (Prasetyono, 2018) mentions that academic supervision is an activity conducted by school principals to assist teachers in developing their expertise and facilitating teachers in enhancing teaching quality.

Based on these definitions, it can be concluded that academic supervision is the process of oversight and guidance carried out by academic supervisors on teachers to improve the quality of learning in schools. The goal of academic supervision is to assist teachers in developing their professional competencies, improving the quality of education, identifying problems in the learning process, and providing solutions or guidance to help teachers overcome these problems.

Development generally refers to the pattern of growth, gradual changes (evolution), and incremental changes. According to Seels & Richey, development means the process of translating or elaborating design specifications into physical features.

According to the *Kamus Besar Bahasa Indonesia* (KBBI), development is the process, method, or act of developing. (Setyosari, 2016) defines development as a process used to develop and evaluate educational products.

Seels and Richey (Sutarti, F., & Irawan, 2017) also define developmental research as a systematic study of designing, developing, and evaluating programs, processes, and products that meet the criteria of validity, practicality, and effectiveness. Based on these definitions, development in this study refers to the process or method of designing, developing, and evaluating educational products that meet the criteria of validity and practicality.

Effective development must include several key elements: (1) Needs Identification: Determining areas requiring improvement. (2) Planning: Developing strategies and concrete steps to achieve development goals. (3) Implementation: Carrying out the plan with the involvement of all relevant parties. (4) Evaluation and Feedback: Assessing the results achieved and providing feedback for further improvement.

In the context of web-based academic supervision (SUAMIC), development refers to efforts to enhance the effectiveness of academic supervision through the use of information technology. According to (Arsyad, 2011), the development of technology in education can improve the efficiency

and accessibility of academic services. (Gusman, 2015) also highlights the importance of developing web-based systems to support academic activities, as they can facilitate better communication and coordination between teachers and supervisors.

Research and Development (R&D) is a research method used to develop and test products that will later be implemented in the field of education. There are various research models that can be used as references in this research and development process (Amali, 2019).

According to (Borg, W. R., & Gall, 1983), this development model uses a waterfall approach in its stages. This model consists of ten steps: (1) research and information collecting, (2) planning, (3) developing preliminary form of product, (4) preliminary field testing, (5) main product revision, (6) main field testing, (7) operational product revision, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation (Hamadani, 2021).

According to (Thiagarajan, 1974), the 4D model consists of four stages: Define, Design, Develop, and Disseminate. These stages involve defining needs, designing learning tools, developing and validating the tools, and implementing them in real-world settings.

The ADDIE model, developed by Dick, consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model is widely used for educational product development and involves systematic processes to assess, create, and refine educational products(Yamin, 2017).

In the digital era, the internet has become a widely used tool for facilitating various activities. Websites are accessed globally through various devices like smartphones, tablets, laptops, and PCs using an internet connection. According to (Yeni Susilowati, 2019), a website is a collection of interconnected web pages that usually reside on a web server, accessible via the internet or a local area network (LAN). Sebok and Vermat define a website as a collection of connected pages containing documents and images stored on a web server. A web application (web app) is an application hosted on a web server that users can access through a browser, typically displaying user data and information from the server.

METHODS

This research employs a Research and Development (R&D) approach, which is used to generate specific products and test their effectiveness. According to (Borg, W. R., & Gall, 1983), *"research and development is a powerful strategy for improving practice. It is a process used to develop and validate educational products."* In this study, the product being developed is a Web-based Academic Supervision Application (SUAMIC), aimed at improving the existing manual supervision process that is inefficient in terms of storage and accessibility. The R&D approach is appropriate for this research as it involves analyzing needs through qualitative methods, such as surveys, and testing the developed product's effectiveness through quantitative methods. (Sugiyono, 2017) asserts that the R&D approach is effective for producing practical solutions to real-world problems, allowing for continuous improvement and validation of educational products. The data collection in this study is conducted in stages, initially focusing on qualitative data, and then transitioning to quantitative methods during product testing. The combination of qualitative and quantitative data analysis makes the R&D approach ideal for achieving the research objectives.

The research design in this study follows the 4D model, which is a systematic approach used in the development of educational products, including software and training modules. (Thiagarajan, 1974) defines the 4D model as consisting of four stages: Define, Design, Develop, and Disseminate. These stages include identifying needs, designing the product, developing the system, and then disseminating it for real-world use. This model ensures a comprehensive approach to product development that includes testing, feedback, and refinement. The Define stage includes the identification of academic supervision goals, needs analysis, and problem formulation to clarify the objectives of the Web-based Academic Supervision Application (SUAMIC). (Seels, B., & Richey, 2017) emphasize that needs analysis is crucial to determine the features and functions necessary for effective supervision. The Design stage involves creating the system's architecture, workflow, and user interface. (Arsyad, 2011) highlights the importance of user-friendly interface design in educational technology, as it influences user adoption and usability. Prototyping is also an essential

step in this stage, where an initial prototype of the system is developed. The Develop stage focuses on actual software development, coding, testing, and validation. As (Hidayat, 2020) notes, educational software development must prioritize scalability, flexibility, and usability to fit diverse educational contexts. The Disseminate stage involves implementing the system in schools, providing training to users (teachers and school staff), and evaluating the system's performance in real-world settings. (Fullan, 2016) argues that iterative testing and refinement are critical in ensuring that educational tools are effective and meet user needs.

Data collection instruments used in this study include expert validation, questionnaires, and tests. Expert validation is conducted to assess the validity of the developed product. The instrument used for expert validation is a questionnaire that evaluates both content validity and the suitability of the web application for academic supervision. Expert validation is done by subject matter experts and IT professionals. Once the system is validated, it is ready for use in the study. (Seels, B., & Richey, 2017) emphasize that expert validation is necessary to ensure the product's quality and its alignment with educational standards. Practicality is assessed through questionnaires filled out by teachers to gather feedback on the usability of the SUAMIC system. (Fullan, 2016) stresses the importance of practicality testing to ensure that the system is easy to use and meets users' needs in everyday academic supervision activities. Effectiveness is assessed by comparing pretest and posttest results, with the Web-based Academic Supervision Application (SUAMIC) being considered effective if there is a significant improvement in teachers' ability to supervise students and perform academic tasks. (Riduwan, 2013) note that a significant difference between pretest and posttest scores indicates the effectiveness of an educational tool.

The data collection process involves three main stages: expert validation, practicality testing, and effectiveness testing. Expert validation focuses on assessing the content and media aspects of the application, with the data being analyzed using percentage techniques to determine if the product is valid for use. Practicality testing collects feedback from teachers using a questionnaire, and the data is analyzed descriptively to determine how practical the system is for use. Finally, effectiveness testing involves measuring the improvement in teachers' academic supervision skills by comparing pretest and posttest results. According to (Miles, M. B., & Huberman, 2020)m, statistical tests are crucial for identifying significant differences between pretest and posttest scores, allowing for an assessment of the product's effectiveness in achieving the desired results.

The data analysis techniques used in this study include calculating the validity, practicality, and effectiveness of the product. The product's validity is measured using a formula provided by (Riduwan, 2013), categorizing the product into different feasibility levels, including Very Feasible, Feasible, Sufficiently Feasible, Not Feasible, and Very Not Feasible. Practicality is also measured using a similar percentage formula, with categories such as Very Practical, Practical, Sufficiently Practical, Not Practical, and Very Not Practical. The effectiveness of the product is determined by comparing pretest and posttest results, using the N-Gain (Normalized Gain) method to categorize the effectiveness as High, Medium, or Low.

FINDINGS AND DISCUSSION

The product of this research is the development of a web-based academic supervision model (SUAMIC). This research aims to create a web-based academic supervision model (SUAMIC), analyze the validity and practicality of the web-based academic supervision model, and assess the effectiveness of this model according to the 4D development procedure (Define, Design, Develop, and Disseminate)(Mubyanto, 2020).

This research produced the development of a web-based academic supervision application (SUAMIC) aimed at enhancing the efficiency, effectiveness, and transparency of academic supervision processes at elementary schools in the Ungaran Barat sub-district. The development of this model is in line with (Setiawan, 2018)s study, which indicates that the use of technology in education management can improve productivity and efficiency across various educational sectors. The model developed through the 4D stages, which include needs analysis, system design, development, and implementation, is highly relevant to the approach used in Arsyad's research,

which emphasizes the importance of efficient systems in technology-based educational management (Arsyad, 2011).

Define Stage. The Define stage begins with a needs analysis aimed at identifying the issues in academic supervision at elementary schools in the Ungaran Barat sub-district. Observations and interviews revealed that academic supervision was still conducted manually using printed documents, which made data management and decision-making difficult. Therefore, a system capable of digitizing the supervision process to improve efficiency and transparency is required. The SUAMIC application was developed with features such as user management, academic supervision stages based on Google Forms, supervision recaps, as well as communication through Zoom and Live Chat.

The results of observations and interviews revealed that academic supervision conducted manually hinders efficiency, data accessibility, and the transparency of evaluations. This is consistent with findings presented by (Widiastuti, 2019), who states that the use of manual methods in educational administration often leads to difficulties in data management and affects decision-making by education managers. With the SUAMIC application, it is expected that the supervision system will become more efficient, with easier access to data and more systematic, real-time feedback for teachers. The key features of the SUAMIC application have been designed to meet these needs, including user management and interactive communication(Daresh, 2003).

Design Stage. In the Design stage, the SUAMIC system was designed using the Model-View-Controller (MVC) approach to ensure separation between business logic and application presentation. The main features designed include user management, digital form-based academic supervision, supervision scheduling, as well as evaluation and feedback. The application prototype was tested by users to ensure ease of use and comfort. The results of the prototype testing showed that the application is easy to use and meets the academic supervision needs in elementary schools(Hargreaves, A., & Shirley, 2019).

In the Design stage, the SUAMIC application was designed using the Model-View-Controller (MVC) approach to ensure a clear separation between business logic and the application's presentation layer. In line with research conducted by suharsa, the MVC-based design allows for easier system management and facilitates future system updates. The responsive design used ensures that the application can be accessed well on various devices, enhancing usability. This is also supported by findings from (Sugianto, 2019), who revealed that responsive design is crucial in increasing user engagement with web-based applications.

Develop Stage. In the Develop stage, the application was built using web-based technologies such as Laravel (PHP), MySQL, and JavaScript. Each feature was tested gradually to ensure its functionality. System validation was carried out by two experts in educational management and informatics, who ensured the application's feasibility in supporting academic supervision.

In the Develop stage, the application was built using web-based technologies such as Laravel (PHP), MySQL, and JavaScript. Each feature was tested gradually to ensure its functionality. System validation was carried out by two experts in educational management and informatics, who ensured the application's feasibility in supporting academic supervision. This shows that the use of web-based systems in education can address many of the challenges faced by educational institutions in data management, as highlighted by (Hidayat, 2020), who emphasizes the importance of web-based systems in improving school operational efficiency.

Validity, Practicality, and Effectiveness of SUAMIC. The validation results from content and media experts indicated that SUAMIC is categorized as suitable for use. This application is capable of improving the efficiency of academic supervision, providing easier access to data, and simplifying the analysis of teacher development. Pre-test and post-test testing on users showed a significant improvement in the understanding and skills of academic supervision, with the N-Gain score indicating a high effectiveness of this application in supporting supervision.

validation results from content and media experts indicated that the SUAMIC application is categorized as suitable for use. This aligns with the findings explained by (Mulyadi, T., & Fahriana, 2018), who stated that the validity of an educational application system is crucial for its successful

implementation. Additionally, pre-test and post-test results from users showed a significant improvement in understanding and academic supervision skills, with the N-Gain score indicating high effectiveness of the application in supporting supervision. This effectiveness is consistent with the research by (Prasetyono, 2018), which shows that technology-based systems can enhance the quality of educational supervision in schools. Post-test results revealed that this application makes it easier for teachers to quickly and efficiently access and process supervision data.

The SUAMIC application also provides substantial benefits in terms of efficiency and transparency. Well-managed data gives a clearer picture of teacher development and can be used as a basis for better decision-making, as stated by (Amri, 2017) in his research on web-based information systems for enhancing educational management transparency. Features such as supervision scheduling and automatic recaps simplify the management of academic supervision, in line with the principle stated by (Sutrisno, 2020), who mentioned that transparency in educational data management can improve trust among stakeholders in schools(Sanoto, 2021).

With the SUAMIC application, the academic supervision process becomes more efficient, effective, and transparent. Its implementation in schools in the Ungaran Barat sub-district is expected to improve the quality of education and facilitate academic data monitoring and management in the future, consistent with the findings of (Suri, 2018), which emphasize the importance of digitalization in education to create more open and efficient systems.

CONCLUSION

This study developed the SUAMIC (Web-Based Academic Supervision Application) to enhance efficiency, effectiveness, and transparency in elementary school academic supervision. Using the 4D model (Define, Design, Develop, and Disseminate), the research identified challenges in manual supervision and introduced SUAMIC with features like user management, Google Forms-based supervision, and communication tools. Validity and practicality tests confirmed its feasibility, with positive feedback from teachers and significant improvements in supervision skills, as shown by high N-Gain scores.

To optimize SUAMIC, teachers should actively engage with the application to improve their performance evaluations, while schools should integrate it into their academic systems and provide necessary training. The Department of Education is encouraged to support broader implementation and offer training for supervisors. Future development should focus on adding discussion features, mobile accessibility, and enhanced data security. The findings highlight SUAMIC's role in improving supervision efficiency, providing real-time feedback, and supporting digital transformation in education.

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