Development of the Deli Serdang Regency Education Database System as a Basis for Policy Implementation, Planning, and Supervision

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Abstract. This study aims to develop an education database system at the Deli Serdang Regency Education Office, which is needed to implement policies, plan, and supervise education implementation in Deli Serdang Regency. This study continues previous research that has developed a model for supervising education financing through a collaborative approach. The development of the Deli Serdang Regency education database system will maximize the planning and supervision functions at the Deli Serdang Regency Education Office. This research will be able to produce a database system that is relevant to the needs of the Deli Serdang Regency Education Office. This study uses the Research and Development (R&D) method. This method involves the research and development process to create innovative products or technologies. The research and development (R&D) stages involve steps designed to achieve research objectives and produce innovation or change. The research was conducted from February to September 2024 at the Education Office in Deli Serdang Regency. Respondents in this study were officials related to the development of the education database system and those related to implementing policies, planning, and supervision at the Deli Serdang Regency Education Office. Developing the education database system brings many significant benefits for improving education management, decision-making, and progress monitoring. The resulting database system is the School Facilities and Infrastructure Monitoring Information System and Recommendations for School Facilities and Infrastructure Rehabilitation. With this application, the need for facilities and infrastructure and monitoring of facilities and infrastructure in all schools in Deli Serdang Regency can be accommodated easily, quickly, and on target.

Keywords: database system development, education database system.

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1 Introduction

Education is one of the main pillars of development that each region must manage well. Effective education management is essential to ensure that educational goals are adequately achieved based on society's needs and the times' development. One crucial innovation in education management is developing an education database system, which is the basis for implementing policies, planning, and supervision in the education sector. Deli Serdang Regency is one of the regions in Indonesia that realizes the importance of developing this system as a tool to improve the quality and efficiency of education management. [1][2]

Deli Serdang Regency has faced various challenges in education management in recent years. One of the main problems faced is the lack of accurate and relevant data that can be used for decision-making. Basic Education Data (Dapodik), which the Ministry of Education and Culture manages, has been widely used by the Deli Serdang Regency Education Office. However, although Dapodik provides essential data, several limitations prevent the available data from fully meeting local needs. For example, data related to school facilities and infrastructure often need to be more detailed and reflect actual conditions in the field. This results in difficulties in planning the rehabilitation and construction of educational facilities that are by needs. In addition, the data collection process that relies on technological infrastructure that still needs to be improved in some rural areas is also an obstacle to obtaining accurate and up-to-date information.[3][4]

Developing an education database system aims to overcome these problems by providing an integrated platform for collecting, storing, and analyzing education data. This system supports various aspects of education management, from monitoring student progress, evaluating teacher performance, curriculum planning, and managing facilities and infrastructure. One of the main benefits of this system is the ability to monitor student progress in real time. With continuously updated data, schools and education offices can immediately identify students who need special attention and evaluate the effectiveness of ongoing education programs. In addition, this system also facilitates reporting and communication between various stakeholders, including parents of students, who can access information related to their children's academic development.[5][6]

In addition to the benefits of monitoring and reporting, the education database system also significantly supports data-based decision-making. Decisions based on accurate and relevant data are more likely to result in effective and targeted policies. For example, when planning the construction or rehabilitation of school facilities, data from this system can provide a clear picture of priority needs so that budget allocation can be more efficient.

Despite many benefits, implementing an education database system is not free from various challenges. One of the biggest challenges is the limited technological infrastructure in some areas, especially rural ones. Unstable internet connections, outdated hardware, and lack of training for system users are often obstacles [7][8]. In addition, the cost of developing and maintaining this system is also quite significant and requires total commitment and support from the local government. Another problem is related to data security[9][10]. In a system that manages the personal information of students and teachers, the protection of sensitive data is critical. Inadequate data security can risk information leakage, harming individuals and

educational institutions. Therefore, the security aspect must be a priority in developing and operating an education database system. [11][12][13]

Developing an education database system in Deli Serdang Regency is a strategic step to improve the quality and efficiency of education management in the area. This system not only provides benefits in terms of monitoring and reporting but also supports more effective data-based decision-making. However, to achieve optimal results, various challenges in implementation, such as infrastructure limitations and data security, must be adequately addressed. With the commitment and collaboration between local governments, educational institutions, and the community, this education database system can become a strong foundation for improving the quality of education in the Deli Serdang Regency. This initiative can also be a model for other regions in Indonesia facing similar education management challenges. [14][15][16]

2 Research Method

This study uses the Research and Development (R&D) method, a common approach to creating innovative new products or technologies. R&D is a systematic process that combines theoretical research with practical development to produce solutions that can be implemented in the field. This method is relevant to designing and developing an education database system in the Deli Serdang Regency that effectively supports education policies, planning, and supervision.

This study's research and development process follows the ten stages of the development model adapted from Borg and Gall (2013) [17][18][19]. These stages are designed to ensure that the products developed meet user needs, have a solid theoretical basis, and have been thoroughly tested before being widely implemented. The first step in this study is to identify problems in the education system in the Deli Serdang Regency, especially those related to managing school facilities and infrastructure. Problem identification is obtained through initial surveys, interviews, and discussions with stakeholders, including Education Office officials and school staff. This data collection aims to obtain a comprehensive picture of the condition of education in the field and identify specific needs that must be met by the database system to be developed.

After identifying the problems and needs, the next stage is to plan the development of the database system. This planning involves setting development goals, formulating the project's scope, and preparing the system's initial design. At this stage, detailed budget planning and implementation schedules are also carried out to ensure that the entire process can run according to the time set and within the limitations of available resources.

The next stage is the development of a prototype or initial model of the database system. This prototype is designed based on the results of previous needs analysis and planning. Prototype development includes creating a basic database structure, user interface, and primary features required by the system. At this stage, the system developer works closely with the Deliserdang Regency Education Office to ensure that the prototype produced is by operational needs and can be integrated with existing systems.

After developing the prototype, an initial trial or preliminary field testing is carried out. This trial is conducted on a limited basis and on a few users, such as Education Office staff and several selected schools. The goal is to obtain initial feedback on the system's functionality, ease of use, and suitability to the identified needs. Based on the results of this trial, revisions were made to the prototype to correct any deficiencies found and improve the system's quality. After the prototype was revised, a field trial or main field testing was conducted on a larger scale. This trial involved more users from various schools in Deli Serdang Regency and aimed to evaluate the system's performance in real situations. The data obtained from the field trial was used to make further revisions to the system. This stage is critical to ensure the system can function well in various conditions and meet all user needs.

The last stage in developing this database system is full implementation or operational field testing. At this stage, the system is widely implemented throughout the Education Office and schools in Deli Serdang Regency. This implementation is closely monitored to ensure that the system runs according to plan and can support the ongoing education policy, planning, and supervision process. Further monitoring and evaluation are carried out continuously to ensure the system remains relevant and effective long-term.

After the system is fully implemented, final improvements are made based on the monitoring and evaluation results. This improvement includes feature improvements, performance enhancements, and system adjustments according to actual needs in the field. After the improvement process is complete, the system development results are documented and disseminated to all stakeholders through training, workshops, and scientific publications. This dissemination aims to ensure that all parties involved understand the system and can use it effectively. By following these systematic research and development stages, the resulting education database system can significantly improve the quality of education in Deli Serdang Regency.

3 Results and Discussion

The development and implementation of the education database system in Deli Serdang Regency have gone through various stages involving in-depth research, careful planning, and field trials. The system developed, namely the School Infrastructure Monitoring Information System and School Infrastructure Rehabilitation Recommendations, is the result of adapting research and development (R&D) methods to improve the efficiency and effectiveness of education management in the area.

System Development Results

The database system developed was designed to meet the needs of the Deli Serdang Regency Education Office in terms of monitoring and managing school facilities and infrastructure. Developing this system has produced a platform that cannot only store data related to the physical condition of schools but also provide data-based recommendations for the rehabilitation and development of educational facilities. This system allows users to monitor the condition of school facilities in real-time and provides accurate information for better decision-making.

One of the main features of this development is the system's ability to integrate various types of data previously scattered across various sources. The data collected includes the physical condition of buildings, equipment availability, and the need for facility repair or replacement. With this system, the Education Office can easily access centralized information, which was previously difficult to obtain due to the limitations of the existing system.

The system's initial trial was conducted in several randomly selected schools in Deli Serdang Regency. This trial aimed to evaluate the functionality of the system and its ease of use by school staff and the Education Office. The trial results showed that this system successfully increased efficiency in collecting data and reporting the condition of school facilities and infrastructure. Users reported that this system was easy to use and very helpful in promptly identifying the need for facility rehabilitation. However, the trial also revealed several challenges, primarily related to the stability of internet connections in rural areas, which still need to be improved. To overcome this problem, the development team optimized the system to function well even in unstable connection conditions. In addition, additional training was provided to school staff to ensure they could use this system effectively. After making revisions based on feedback from the initial trial, this system was implemented on a broader scale, involving more schools in the Deli Serdang Regency. This full implementation allowed for a more comprehensive evaluation of the system's performance under various conditions. The results show that this system can positively impact education management at the local level, especially in terms of managing facilities and infrastructure.

Impact and Benefits of the System

Implementing this system has provided several significant benefits for the Deli Serdang Regency Education Office. One of the main benefits is increased efficiency in the planning and supervision process of school facilities and infrastructure. With this system, the decision-making process becomes faster and based on accurate data, allowing for more precise resource allocation. This system also supports transparency and accountability in education management. The information available in the system can be accessed by various stakeholders, including local governments and the community, which allows for better supervision of budget use and implementation of education policies. However, although this system has shown positive results, several challenges still need to be addressed. One of the main challenges is the need to continuously update data and ensure that this system can continue to follow the dynamic development of education needs. Therefore, the Education Office needs to ensure that there is a system maintenance and update mechanism that is integrated into daily operations.

Discussion

The results of this study indicate that the development and implementation of an education database system in the Deli Serdang Regency has succeeded in improving education management in the area. This system helps monitor school facilities and infrastructure and provides a strong basis for better decision-making. The increased efficiency and transparency achieved through this system is a significant step forward for Deli Serdang Regency in its efforts to improve the quality of education. However, the success of this implementation also depends on the ongoing support of all related parties. The use of technology in education management requires a commitment to continuous maintenance and improvement of the system. In addition, training and capacity building for users are also significant in ensuring that this system is optimal. Overall, the development of this education database system is an

example of how technological innovation can be applied to overcome local education management challenges. The experience of Deli Serdang Regency can be a model for other regions facing similar challenges in education management.

4 Conclusion

The development of the education database system in Deli Serdang Regency marks a significant advancement in enhancing educational management, policy implementation, and decision-making. This system enables accurate, real-time monitoring and assessment of school facilities and infrastructure, providing essential data to prioritize needs and allocate resources effectively. Through a structured Research and Development approach, this project successfully delivered a user-friendly system that not only integrates diverse data but also supports transparency and accountability by making information accessible to multiple stakeholders. However, challenges such as technological infrastructure limitations and data security risks highlight the importance of continuous system maintenance, user training, and government commitment to fully realize the system's potential. Overall, the Deli Serdang Regency's experience serves as a scalable model for other regions in Indonesia, demonstrating the impactful role of technology in addressing local educational challenges and improving education quality

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