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RESEARCH ARTICLE

Development of an Information System for Student Data Management at Mts.S Krueng Seumideun, Pidie Regency

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Abstract

The implementation of a Student Information System at Mts. S Krueng Seumideun in Pidie Regency aims to improve the efficiency and accuracy of managing student data. Previously, the school relied on manual methods using Microsoft Word and Excel for data entry and report generation, which were slow and error-prone. This research focuses on designing, developing, and implementing a computerized system using Microsoft Visual Basic 6.0 and Microsoft Access 2007. The development process included several phases: feasibility study, system planning, system analysis, and implementation. The system features a Student Data Input Form that captures essential student information such as registration number, student ID, name, and academic details, streamlining data entry. A Main Menu was created to provide access to various administrative functions, including report generation and data retrieval. The system's implementation involved coding, testing, and training staff to ensure smooth adoption. Performance testing showed that the new system was faster and more accurate than the previous manual methods. By automating administrative tasks, the system reduces human error, speeds up data processing, and allows for quicker, data-driven decision-making. The shift to a digital platform will enhance administrative efficiency, support better resource management, and improve the overall educational environment.

Keywords
Student Information System; Data Management; Administrative Efficiency; Digital Systems; Automation; System Development; Educational Technology.

1 | INTRODUCTION

In today's digital age, managing data efficiently is essential for enhancing the effectiveness and quality of administrative tasks in educational institutions. The need for accurate and real-time student data is growing, yet traditional methods such as Microsoft Word and Excel, which are still commonly used, no longer meet the demands of modern education. For instance, Mts. S Krueng Seumideun in Pidie Regency continues to rely on manual systems for managing data, which leads to difficulties in maintaining efficiency and accuracy. Research has shown that adopting digital information systems can help address these issues. Transitioning from manual processes to digital platforms allows schools to streamline administrative tasks, automate data entry, and simplify reporting. This shift not only improves the accuracy of student records but also makes data more accessible, helping administrators make faster, better-informed decisions. Moreover, digital systems minimize the risk of human error and increase transparency in the management process. By implementing such systems, educational institutions can better respond to the needs of students, staff, and the school community. Moving towards digitalization in school management is a crucial step for improving operational efficiency and ensuring that schools can meet the demands of the modern educational landscape.

Managing student data at Mts. S Krueng Seumideun requires considerable time and effort, and it is also prone to a high risk of data entry errors. The manual processes used for data management often make it difficult to generate reports quickly and accurately. This inefficiency not only affects the timely reporting of student information but also disrupts the overall flow of operations within the school. As a result, administrative tasks take longer to complete, which leads to delays in decision-making and can impact the quality of service provided to students and staff. Research has shown that adopting the right information systems, such as web-based student management systems, can significantly reduce the administrative workload and improve the speed of data processing. These systems automate tasks like data entry, record keeping, and report generation, making it easier for staff to manage student information with greater accuracy and efficiency. Moreover, web-based systems allow for real-time data access, enabling school administrators to make informed decisions more quickly. By automating many of the manual tasks, the system minimizes the risk of human error and ensures that the data remains accurate and up-to-date. Ultimately, implementing such systems can lead to smoother operations, better resource allocation, and a more efficient administrative process, benefiting both the school and its students (Purwanti et al., 2023).

The development of a new system at Mts. S Krueng Seumideun is aimed at solving the challenges the school currently faces. Using Microsoft Visual Basic 6.0, the system is designed to simplify several administrative tasks, such as student registration, data entry, retrieval, and report generation. Previously, these tasks were done manually, but with this new system, everything will be streamlined, leading to greater efficiency and accuracy. Studies have shown that well-designed digital systems can improve data management, minimize administrative errors, and make information more easily accessible. The development process involves thorough system analysis and feasibility assessments to ensure the solution is practical and fits the school's specific needs. Additionally, a user-friendly interface is being developed to ensure that administrative staff can easily navigate the system without needing advanced technical skills. This focus on usability will make it easier for staff to use the system in their daily tasks. By automating administrative processes, the school will reduce the time spent on manual tasks and improve overall efficiency. Ultimately, this system will enhance the school's ability to manage student data, streamline operations, and support better decision-making (Hu, 2023).

The successful implementation of an efficient information system is expected to have a significant positive impact on the management of student data at Mts. S Krueng Seumideun. By automating key administrative processes, the new system will streamline tasks such as data entry, retrieval, and report generation, resulting in faster data processing and improved accuracy. This advancement will not only reduce the risk of human error but will also make it easier for administrative staff to access and manage student information in real-time. Research indicates that with the adoption of this system, administrative staff will have more time and resources to focus on improving the quality of education. The automation of routine tasks will free up valuable time for staff to address more pressing educational needs and student support functions. Moreover, the new system will enable the school to operate more efficiently, reducing the manual workload and ensuring that administrative processes run smoothly. As educational institutions continue to face the challenges of adapting to new technologies, this system will allow Mts. S Krueng Seumideun to keep pace with changing times. By implementing such a system, the school can improve its operational efficiency, enabling it to prioritize the enhancement of educational quality. Ultimately, the implementation of this system will help the school provide better services to students, fostering an environment where both administrative and academic functions are seamlessly integrated (Juliansyah, 2021).

2 | BACKGROUND THEORY

Based on the analysis of significant changes in data management in the education sector, several references can be synthesized to support the argument that shifting from manual systems to computer-based information systems has a positive impact on the efficiency and accuracy of student data processing. Specifically, implementing a student administration information system in schools can improve service quality, as the developed system enables faster, more accurate, and efficient data processing. The manual processes used previously often took a long time, whereas with a computer-based system, data processing becomes quicker and more precise. The use of more advanced software, such as Microsoft Visual Basic and Microsoft Access, greatly supports this goal. These software tools reduce the potential for errors commonly found in manual systems and speed up the report generation process, which previously took much longer when done manually. With a computer-based system, reports can be automatically generated based on existing data, significantly reducing human error in the manual data entry process. Overall, the transition to computer-based information systems has a substantial impact on improving the effectiveness of school administration, both in terms of data processing speed and the accuracy of the generated reports. The application of information technology in the education sector not only enhances efficiency but also provides a stronger foundation for making well-informed, data-driven decisions (Yasmihan & Azhar, 2021).

The student administration information system is designed to optimize the storage and management of data in an integrated manner. This system facilitates various administrative processes, including data entry and report generation, which were previously performed manually. With the implementation of this computerized system, these processes become more efficient, faster, and more accurate. Additionally, the system enhances transparency and accountability in decision-making within the school environment. A key advantage of implementing this information system is its ability to provide quick and easy access to comprehensive and accurate data. This is highly relevant to the needs of schools, which require up-to-date information that can be accessed easily by relevant stakeholders. Previously, data management was done manually using paper records and spreadsheets, which were highly prone to human error. With a computer-based system, data management becomes more structured, secure, and easily accessible within a short period. The transition from a manual system to a computer-based one is a crucial step toward improving the operational efficiency of schools. In addition to speeding up data processing, this system also reduces the likelihood of errors that frequently occur in manual processes. Therefore, the implementation of a student administration information system is essential for improving the quality of data management and supporting better decision-making in schools (Mahdalaina, 2022).

It is essential to emphasize the importance of training in database management for school staff to ensure they can optimize the use of the information system. This training plays a crucial role in supporting the implementation of information technology in managing school data efficiently. By equipping administrative staff with the necessary skills, they will be able to access, update, and generate administrative reports in real-time, greatly improving the overall workflow and responsiveness of the institution. The training also ensures that staff members can fully utilize the system's features, allowing for more effective data management and minimizing the risk of errors that could arise from a lack of understanding of the system. With this training, school staff will be empowered to maintain accurate and up-to-date student records, which is critical for timely decision-making. Moreover, the adoption of this training concept aligns with the expectation that the information presented within the system is reliable, current, and readily accessible for use in educational decision-making. Having real-time access to accurate data helps administrators make informed decisions that are in the best interest of the students and the overall school community. In this regard, providing comprehensive training in database management is an essential step in ensuring that technology integration into school administration is successful and sustainable (Ariani, L., 2022).

The implementation of a computer-based information system in educational institutions brings numerous benefits. It not only speeds up administrative tasks but also enhances data accuracy and security by minimizing the reliance on manual records, which are often prone to errors. Transitioning to an automated system ensures that student information is processed more efficiently and accurately, reducing the risks associated with human mistakes. Additionally, integrating information technology in school data management is a strategic approach to tackling the growing complexity of handling data in today's digital world. As the volume of data increases, the need for more efficient and secure systems becomes even more critical. A computer-based system offers a solution by managing large amounts of data more effectively, while also allowing schools to remain adaptable to future technological advancements and changes in educational needs. Beyond improving operational efficiency, such systems enable the generation of accurate, real-time reports that are essential for informed decision-making. This real-time data access helps school administrators, teachers, and staff make well-informed choices that can positively impact the learning environment. In summary, adopting technology for data management is vital for schools to meet the challenges of a rapidly evolving digital landscape and provide better services to students and staff alike.

3 | METHOD

This study follows a descriptive approach with a development research method aimed at designing, developing, and implementing a student data management system at Mts. S Krueng Seumideun, Pidie Regency. The approach was chosen to provide a clear depiction of the system development process and to evaluate the effectiveness of the implemented system in improving the school's administrative efficiency.

1) Type of Research
   This research is classified as applied research, with a focus on developing a practical solution to the current issues at Mts. S Krueng Seumideun, where student data is still managed manually. The aim is to create a computerized information system that will streamline administrative tasks, enhance data accuracy, and accelerate the report generation process. By automating these procedures, the system is expected to reduce the time spent on manual data entry and minimize the risk of errors, ultimately improving the overall efficiency of the school's administrative operations and providing a more reliable method for managing student data.
2) Research Design
   The research follows the system development life cycle, which consists of several key stages. The first stage is the Feasibility Study, which identifies the requirements for the new system. This phase focuses on both the unmet needs of school management and the limitations of the existing manual system, providing a foundation for the development process. The second stage, System Planning and Design, is based on the findings from the feasibility study. During this phase, data flow diagrams (DFD) are created, starting with the context diagram and extending to hierarchical and level 0 diagrams to visualize the system's flow and structure. The next stage is System Analysis, where system analysts engage with users to gather detailed requirements. Data collection methods such as interviews, observations, and questionnaires are employed to clarify the user's needs and ensure the system meets expectations. Following system analysis, the System Design Phase focuses on two critical components. The first is Database Design, ensuring that the database structure meets the school's specific needs for efficient data management. The second component is Process Design, where programming specifications are created, and the system's structure is designed to ensure smooth integration and functionality.
3) Research Location
   The research took place at Mts. S Krueng Seumideun, located in Pidie Regency, where the new system will be implemented. The school was chosen because it still relies on manual data management, which creates challenges in terms of efficiency and accuracy. The current system has proven to be slow and prone to errors, making the need for a more reliable and automated solution clear. Implementing a computerized system aims to streamline administrative tasks, reduce the potential for human mistakes, and improve the overall management of student data, benefiting both staff and students.
4) Data Collection Techniques
   Data collection in this study was conducted using a combination of methods. First, observation was employed to assess the current administrative processes at the school, helping to identify the challenges associated with the manual system. Next, interviews were conducted with school staff, particularly administrative personnel, to gain insight into their specific needs and the difficulties they face in managing student data. Additionally, questionnaires were distributed to the administrative staff to gather their feedback on the proposed system after its testing, providing valuable input on its effectiveness and usability. Finally, documentation was collected, including relevant student data records, reports generated, and details of the current systems in use, which were essential for understanding the existing processes and areas for improvement.
5) Data Analysis
   Data analysis was carried out through two main approaches. The first is qualitative analysis, which involves examining the data collected from interviews and questionnaires. This analysis helps to gain a deeper understanding of user needs and their responses to the newly developed system. The second approach is quantitative analysis, where data from system testing is evaluated. This includes assessing factors such as processing time and error rates, which provide insights into the performance and efficiency of the system. By combining both qualitative and quantitative methods, the study aimed to ensure a comprehensive evaluation of the system's effectiveness.
6) System Evaluation
   After the system implementation, an evaluation was conducted to determine if the system met the research objectives. This included assessing whether it helped improve administrative efficiency and data accuracy. The evaluation compared the time needed for data processing before and after the system implementation and measured user satisfaction with the system.

4 | RESULTS AND DISCUSSION

4.1 Reults

4.1.1 System Development

System development involves creating a new system designed to improve or replace the existing one entirely. The current system at Mts. S Krueng Seumideun in Pidie Regency requires improvement due to the lengthy process involved in searching for student data. Currently, the school relies on standard applications such as Microsoft Word and Microsoft Excel, which make report generation a time-consuming task. Therefore, the author developed a student information system using Microsoft Visual Basic 6.0 to streamline administrative processes. The development of the new system followed several phases. The first phase, Feasibility Study, focused on identifying the requirements for the new system (Iqbal, Ismail, & Ahmad, 2023). This phase considered not only the unmet needs of the school management but also the limitations of the existing manual system. The second phase, Preliminary Planning, involved determining the scope of the project and creating various Data Flow Diagrams (DFD), starting from the context diagram, followed by hierarchical and level 0 DFDs. The third phase, System Analysis, included detailed interactions between system analysts and users to gather information on their specific needs. Data was collected through interviews, observations, and questionnaires. The analysis was visually represented in the Context Diagram of the Student Information System, which shows how students submit forms for registration, and the system provides confirmation of acceptance. The fourth phase, System Design, focuses on database and process design. Database design ensures that the data structure aligns with the user's needs, while process design creates specifications for program development and system structure. Diagrams illustrating the system's structure, such as the login diagram, main menu, and file master menu, are crucial components of this stage. The final stage, System Implementation, involves the following steps: coding, program testing, system installation, and user training. In the coding phase, the application is developed using Visual Basic. After development, the program undergoes testing, where data is entered to check the system's speed and compare it with the previous manual system. Hardware and software requirements for the new system include personal computers with Intel Core i3, monitors, printers, and Microsoft Visual Basic, Microsoft Access, and Windows 7. The training phase ensures that users are well-equipped to operate the new database system effectively.

4.1.2 System Information Design

The designed information system is intended to streamline the data entry process, making administrative tasks at Mts. S Krueng Seumideun in Pidie Regency more efficient. The system was developed to replace the previous manual processes, which involved using Microsoft Excel 2007 for data management and report generation. With the new system, Microsoft Access 2007 and Microsoft Visual Basic 6.0 are used to simplify the administrative workflow (Zulfinar, Nurrisma, & Imilda. 2023). The development of the system followed several key steps. First, a program folder was created by navigating to the "Start" menu, selecting "Explorer," and creating a new folder labeled "program" in the "D" drive. The next step was to create a new project using Microsoft Visual Basic 6.0, where the user chose "Standard EXE" to start the development. Afterward, the database was set up in Microsoft Access, creating a new blank database and naming it. The database structure was designed to store student data at Mts. S Krueng Seumideun. The table includes essential fields such as the student registration number, student ID, name, date of birth, religion, address, gender, school origin, and academic year. These fields are organized in a way that allows easy data entry and retrieval. The design also includes the creation of a login form, which is the first page the user interacts with when accessing the system. Admin users are required to input their username and password. Additionally, the main menu form provides access to different sections of the system, including options for entering data, managing reports, and other administrative tasks. This structure simplifies navigation and enhances the overall user experience.

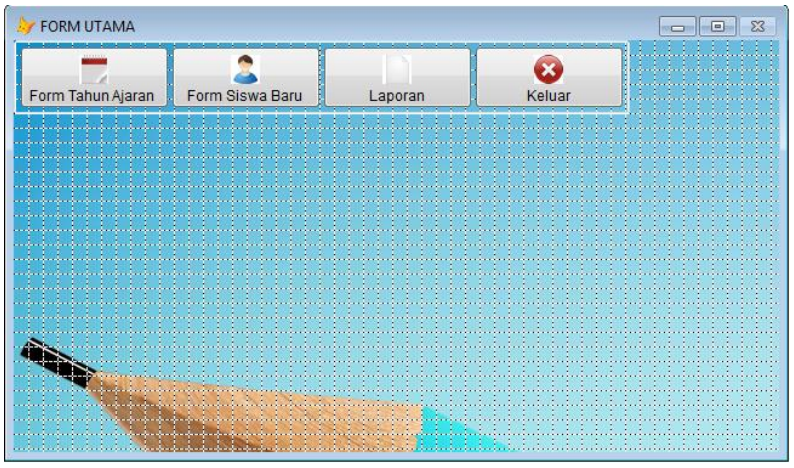


Figure 1. Menu Form Design

The Student Data Input Form is designed to collect and store crucial information about students at Mts. S Krueng Seumideun. This form includes fields for entering details such as the student's registration number, student ID, name, place of birth, date of birth, religion, address, gender, school of origin, and academic year. The properties of the form are outlined in Table 5, with the design depicted visually. Each component is defined by specific properties, such as Shape1 with a background style of 1-Opaque, and labels for each input field. The form also features command buttons for various functions, such as "Input" to add new records, "Edit" to modify existing entries, "Delete" to remove data, and "Exit" to close the form. In terms of system design, the flowchart provides a clear sequence of how the system operates, from logging in to accessing different sections. The flowchart shows the paths users follow when interacting with the system. The Login Form is the first screen that appears when the system is opened. It requires the user to enter a username and password to proceed. Once the correct credentials are provided, users are granted access to the main menu. The Main Menu Form serves as the central navigation point for all system functions. From here, users can access student data input, generate reports, and perform other tasks. The flowchart for the main menu indicates how the user navigates through different options, such as entering new student information or viewing reports.

For the Student Data Input Form, users are able to enter personal information for each student. This form is vital for efficiently managing and organizing student records at Mts. S Krueng Seumideun. With an intuitive design, it allows administrative staff to quickly input data, ensuring that records are easily accessible and up-to-date. This system helps streamline administrative processes, making the work more efficient and reducing the time needed for manual data management.

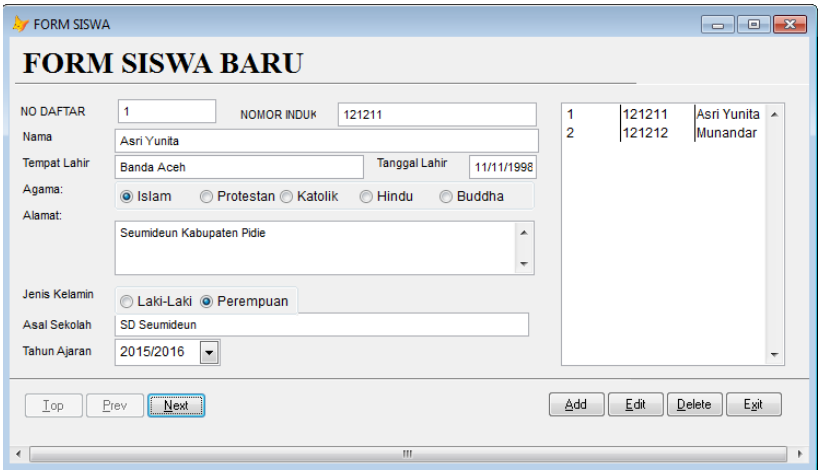
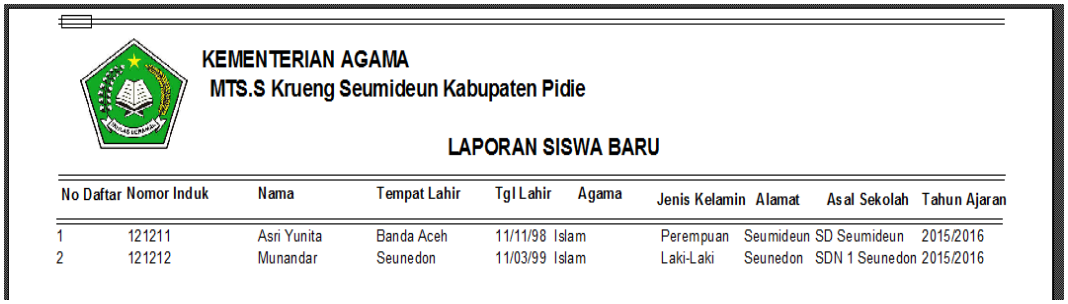


Figure 2. Student Data Form Design Results

The guidance for the Student Data Input Form can be observed in the corresponding flowchart, which details the processes and steps involved in data entry. This flowchart illustrates the logical sequence of tasks, providing users with a clear pathway to follow when entering data. Additionally, the flowchart for report generation is shown in Figure 38, demonstrating how the system processes and displays student data reports. The resulting

report provides structured and accessible information for administrative use. Table 7 presents the symbols used in the flowchart, each symbol representing a specific function within the system's logic. These include the Processing Symbol, which indicates data processing by the system; the Input/Output Symbol, signifying data entry or output; the Decision Symbol, used to choose processes based on conditions; the Flow Direction Symbol, showing how data flows between processes; the Document Symbol, representing printed data outputs; the Terminator Symbol, marking the start and end of processes; the Display Symbol, which shows data displayed to the user; the Multi Document Symbol, used for displaying multiple outputs in printed form; and the Magnetic Disk Symbol, which symbolizes data storage. These symbols form the core of the flowchart, helping users understand how each system component interacts to facilitate smooth data management and report generation.



KEMENTERIAN AGAMA
MTS.S Krueng Seumideun Kabupaten Pidie

LAPORAN SISWA BARU

No Daftar	Nomor Induk	Nama	Tempat Lahir	Tgl Lahir	Agama	Jenis Kelamin	Alamat	Asal Sekolah	Tahun Ajaran
1	121211	Asri Yunita	Banda Aceh	11/11/98	Islam	Perempuan	Seumideun	SD Seumideun	2015/2016
2	121212	Munandar	Seunedon	11/03/99	Islam	Laki-Laki	Seunedon	SDN 1 Seunedon	2015/2016

Figure 3. Student Data Report Results

The image displays a New Student Report from Mts. S Krueng Seumideun in Pidie Regency, under the Ministry of Religious Affairs. The report is titled "Laporan Siswa Baru" (New Student Report), detailing important information about recently registered students. It includes columns for the student's registration number, student ID, name, place of birth, date of birth, religion, gender, previous school, and academic year. For instance, the first entry lists Asri Yunta Munandar, born in Banda Aceh on November 11, 1998, identifying as Islamic and female, who previously attended SD Suwendon in the 2015/2016 academic year. Another student, Suryani, is also included, with similar details formatted in the same manner. This report efficiently organizes student data, making it easier for school administrators to access and manage the information. It provides a straightforward way to track new student registrations and ensures that the school can keep accurate records for its operations.

4.2 Discussion

The development of a Student Information System at Mts. S Krueng Seumideun in Pidie Regency addresses long-standing challenges associated with managing student data manually. The system replaces traditional methods like Microsoft Word and Excel, which were inefficient and time-consuming, especially when generating reports. This shift towards a digital system has proven essential in improving the efficiency and accuracy of data management processes. According to Purwanti, Hidayani, and Oktaviana (2023), the adoption of digital tools in schools can significantly enhance the management of administrative tasks and improve data accessibility, which aligns with the aims of the new system developed at Mts. S Krueng Seumideun. The system development followed a structured approach, beginning with a Feasibility Study to identify the requirements of the school, as well as the limitations of the current system. The research by Iqbal, Ismail, and Ahmad (2023) emphasizes the importance of assessing existing systems before implementing new technology to ensure that the new system meets organizational needs. This phase was crucial for outlining the problems with the manual data entry process and understanding how the new system would streamline operations.

In the Preliminary Planning phase, Data Flow Diagrams (DFDs) were created, outlining how information would flow through the system, starting with the context diagram and progressing through hierarchical and level 0 diagrams. The use of DFDs is supported by Hu (2023), who explains that visual representations like these are essential for understanding and communicating the flow of information in a system. The DFDs helped establish the process for student data entry, report generation, and data retrieval, ensuring that all necessary components were integrated into the system. The System Analysis phase involved gathering detailed input from the school's administrative staff through interviews, observations, and questionnaires. The research by Mahdalaina (2022) highlights the significance of user feedback in the development of effective information systems, as understanding the specific needs and pain points of end-users is crucial for building a system that truly enhances operational efficiency. The information collected was used to design a Student Data Input Form, which allows for the easy and accurate entry of student details, such as registration number, student ID, name, place of birth, date of birth, gender, and school of origin.

In the System Design phase, a database structure was developed using Microsoft Access 2007, which ensures that student data is stored securely and efficiently. The design of the database was tailored to the needs of Mts. S Krueng Seumideun, with fields designed to capture all necessary student information. The system design also incorporated a login form, ensuring that only authorized personnel can access the system. This feature aligns with findings by Yasmihan and Azhar (2021), who emphasize the importance of secure access control in any information system. Furthermore, the Main Menu Form was created to provide users with an intuitive interface for navigating the system, including accessing student data, generating reports, and managing other administrative tasks. The System Implementation phase involved coding the application using Visual Basic 6.0 and testing the system to ensure its functionality. This phase also included training sessions for users to familiarize them with the new system, ensuring a smooth transition from the manual processes. The effectiveness of system training has been discussed by Juliansyah (2021), who notes that proper training is essential for maximizing the benefits of a new system by ensuring that users can operate it efficiently. The system's ability to generate reports quickly and accurately represents a significant improvement over the previous manual methods. The Student Data Report generated by the new system allows for quick retrieval and viewing of student information, which was previously a time-consuming task. This feature of the system helps administrative staff save time and reduce errors, which are common in manual data processing. The effectiveness of such systems in educational institutions is supported by research by Anggoro and Lukmana (2019), who found that digitizing administrative tasks improves operational efficiency and supports better decision-making. The development and implementation of the Student Information System at Mts. S Krueng Seumideun reflect a clear shift towards digitalization in school administration, as recommended by various studies. By automating data entry, improving accuracy, and facilitating faster report generation, the new system greatly enhances the school's administrative processes. As noted by Zulfinar, Nurrisma, and Imilda (2023), the transition to digital systems in educational institutions has the potential to transform administrative operations, making them more efficient and responsive to the needs of students and staff alike.

5 | CONCLUSIONS AND FUTURE WORK

The development of the Student Information System at Mts. S Krueng Seumideun has successfully addressed the challenges caused by manual student data management. Previously, the use of Microsoft Word and Excel for data processing resulted in slow administrative processes and a high risk of errors. With the new system built using Microsoft Visual Basic 6.0 and Microsoft Access 2007, tasks such as student registration, data entry, and report generation can now be done more quickly and accurately. Testing results show that this system significantly speeds up data processing and reduces the errors commonly associated with manual methods. Additionally, real-time access to student data allows administrative decisions to be made more efficiently. The automation of these processes enables school staff to focus more on other important tasks, such as improving teaching quality and student services. Overall, the new system has greatly improved operational efficiency and the management of student data.

While the system developed has provided many benefits, there are still areas for improvement. One of the main areas that can be enhanced is the addition of new features to support more school operations, such as attendance management, integration with payment systems, or academic grading management. Additionally, transitioning to a web-based system could improve flexibility and accessibility, allowing data to be accessed from various devices and locations. A web-based platform would also be more adaptable to future needs, especially in supporting remote learning and online collaboration. Intensive training for administrative staff is also necessary to ensure the system is used to its full potential. Ongoing training programs will help staff utilize all the system features effectively, reducing the risk of errors due to lack of understanding. Furthermore, regular updates and maintenance of the system are crucial to ensure it remains relevant and functional as technology evolves. In the future, further integration with other applications used within the school could enhance overall data management, making it more streamlined and efficient. Developing a fully connected administrative ecosystem will allow for smoother operations across all school processes. Continued improvements in this area will ensure that the system can adapt to the changing educational landscape and further enhance operational efficiency.

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