Development of Student Information System at Universitas Negeri Medan

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Abstract This study aims to develop a Student Information System to improve the efficiency and accuracy of student data management at Universitas Negeri Medan. The system is designed to support various student services, including biodata management, academic status monitoring, organizational activities, scholarship services, information on achievements and academic as well as non-academic competitions, student reports or complaints related to academic matters, and digital-based administrative services. This research employed the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, the needs of students and administrative staff were identified through observations and preliminary studies. The design stage involved planning the system structure and service features, followed by the development of the system prototype. The implementation stage included preliminary testing involving 700 students as users of the system. The evaluation results indicate that the system can be accessed online, is responsive across various devices, and helps accelerate administrative service processes such as submitting letters, recording student activities, and submitting reports. Expert validation also shows that the system is feasible to use and has the potential to be integrated with other information systems within the university environment. This article reports the development process from the initial development stage to the implementation stage.

Keywords: Development, Student Information Sysrem, Universitas Negeri Medan

1 Introduction

Universitas Negeri Medan as one of the state universities with a large number of students, is required to provide fast, effective, and efficient services in all matters related to student administration and academics. Along with the development of information technology, the need for an integrated information system is becoming increasingly urgent [7]. The development of the Student Information System (SIK) at Unimed aims to answer this challenge. Currently, for the student affairs section, there is a lot of activity information that should be easily accessible to students, such as KIP scholarships, UKT, competitions such as MTQ and Pilmapres, course registration to checking grades, and others [1]. However, this information is still delivered

manually via bulletin boards, WhatsApp groups, to students themselves who come to the office to ask for updated announcements. This is not effective considering the large amount of information related to student affairs that must be delivered and followed up [3] as shown in the illustration below:

Figure 1. Illustration of Manual System for Obtaining Student Information

The Figure 1 illustrates that students must come to the student affairs office if they want to obtain the information they need. This is not effective because they have to queue, and students often become tired, which discourages them from doing it again.

Several academic information system websites are actually available, such as devakad.unimed.ac.id and exam.unimed.ac.id. However, these websites have not yet reached student activities. The activities covered are only superficial and the important ones. As a result, many students often miss or even miss information about activities that are currently or will take place.

Therefore, a global application is needed that can connect student access to each submenu of the most up-to-date activity information they need [5]. So, they no longer need to come and ask for the latest information from the student affairs staff. This is considered more efficient in terms of time and energy because the application accessed by students already covers all activity information starting from lecture administration, tuition fees, competition activities at internal, external and foreign levels, to other services such as scholarship applications and student activity information [9].

By knowing the information that will take place well in advance, students can make better preparations to participate in these activities [11]. This can increase the number of students involved in activities because they already have preparation [12].

Unimed experiences an increase in the number of students every year. With a large number of students, data and information management becomes more complex. The manual system previously used to manage student and academic administration is no longer effective enough. This encourages the need for a technology-based information system that can manage various student data more efficiently and in a structured manner.

Students currently need easier and faster access to various academic and administrative services [13]. The previous system has not been able to meet these expectations, both in terms of speed, completeness, and accuracy of data. Student data that is managed manually or using a separate system often causes difficulties in processing and reporting. In addition, data that is not integrated can cause inaccurate information that has an impact on services to students.

With an integrated information system, Unimed can optimize existing resources, such as time and manpower. An automated system will reduce dependence on time-consuming manual processes and allow students, lecturers, and administrative staff to focus on more strategic tasks. Along with the rapid advancement of information and communication technology, Unimed is required to adapt to these changes. Technology allows data management to be faster, easier, and more affordable. The implementation of a web-based information system or mobile application is very relevant to meet the needs of the increasingly digital era.

The student information system also helps university leaders and administrators in making better decisions, based on accurate and real-time data. Decisions related to academic policies, scholarship distribution, and resource allocation can be more targeted if based on integrated and well-documented data.

The development of the Student Information System at Universitas Negeri Medan is a very important step in increasing the efficiency, transparency, and quality of academic and administrative services. This system will also help support the academic development of students by providing easy access to various services and supporting the decision-making process at the university level. With an integrated system, it is hoped that Unimed, especially the student affairs department, can face the challenges of the times and provide better services for students, lecturers, and staff.

2 Theoretical Literature

The rapid development of information technology has significantly influenced the management of higher education institutions, particularly in the administration of academic and student services. Information systems are defined as organized combinations of people, hardware, software, networks, and data resources that collect, process, store, and disseminate information to support decision-making and control within organizations [6]. In universities, information systems play a crucial role in improving administrative efficiency, data accuracy, and service delivery to students. The implementation of digital systems allows institutions to manage large volumes of data effectively while providing faster and more transparent services.

A Student Implementation System (SIK) is a specialized information system designed to manage various aspects of student data and services within an educational institution. A student information system functions as a computerized platform that integrates student biodata, academic records, administrative processes, and other student-related services into a single digital system. The adoption of such systems enables universities to streamline administrative

procedures, reduce manual work, and improve accessibility of information for both students and administrative staff [1]. Consequently, the development of a well-structured SIS is essential to support efficient student services and institutional management.

Furthermore, the development of information systems in educational contexts requires a systematic and structured approach to ensure the resulting system meets user needs and operational requirements. System development models provide guidelines for designing, implementing, and evaluating information systems effectively. Software and system development processes involve stages such as planning, design, development, implementation, and evaluation to produce reliable and user-oriented systems [10]. Therefore, the development of a Student Information System at Universitas Negeri Medan is expected to enhance the effectiveness of student services through an integrated digital platform.

3 Method

The research conducted in this study uses development research or Research and Development (R&D), which aims to develop new products or to test the effectiveness of the product [8].

This development research uses the ADDIE model. This model consists of five stages, namely Analyze, Design, Development, Implementation and Evaluation [4].

1. Analysis
   The analysis stage begins with identifying user needs through documentation studies, observations, and interviews with related parties such as the student affairs department, supervisors, and student representatives. The results of the analysis show that the old system is still manual and not integrated, so an information system is needed that is able to support digital recording of student data, including organizational data, activities, achievements, and scholarship applications efficiently and in a structured manner.

2. Design
   Based on the analysis results, a system design was carried out that includes database structure, process flow (flowchart), and user interface (UI) design. The system is designed web-based with main features such as user dashboard, student data input, activity submission and verification, and automatic reports. The design is designed to be easily accessible by three main types of users: admin, students, and supervisors, with a responsive and user-friendly interface.

3. Development
   At this stage, the system is developed using a web-based programming language. Each module is developed according to the design, including the user account module, activity input and reporting, and notification system. After the development is complete, an initial trial is carried out to ensure that all features are running according to function, and fixes are made to any bugs or technical deficiencies found. The result was conducted through expert validation involving lecturers in the field of information systems and student practitioners, as well as limited trials by end users.

4. Implementation
The developed system is uploaded to the institution's server for limited implementation. Internal users such as student staff and lecturers are given brief training on how to use the system. In addition, students are also given usage guidance through digital documentation. Implementation is carried out in stages with direct monitoring of usage constraints that arise in the field for immediate follow-up.

5. Evaluation
The evaluation results showed that the system was feasible to use with several inputs for improvements that would be used as the basis for further development.

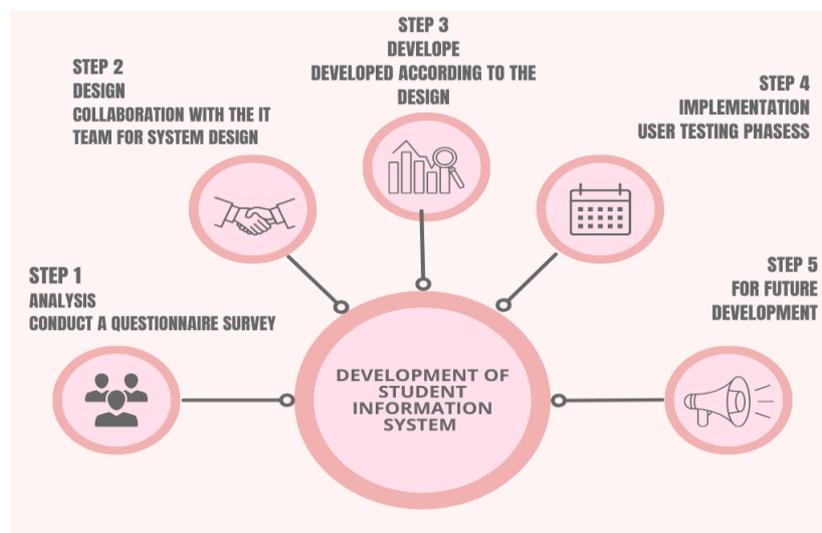The following graphik presents the ADDIE model, which also serves as the procedure in this research.

Figure 2. The Research Procedure Adopted the ADDIE Model

As shown in the Figure 2, this study follows the ADDIE model, in which each stage consists of several activities conducted to achieve the research objectives.

4 Result and Discussion

This study resulted in the development of a Student Information System (SIS) designed to improve the management of student administrative services at Universitas Negeri Medan. The system was developed using the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. Each stage contributed to ensuring that the system meets the needs of its users, particularly academic staff and students.

Step 1. Analysis

The analysis stage was conducted to identify the needs and problems related to student administrative services at Universitas Negeri Medan. Based on observations and discussions with academic administrative staff, it was found that several processes, such as student data management, course registration (KRS), scholarship administration, and academic reporting, were still handled manually or through separate platforms that were not integrated. This condition often caused delays in administrative processes and increased the risk of data entry errors.

In addition, students experienced difficulties in accessing academic information in real time. Based on the needs analysis, the proposed system was designed to integrate several essential services, including student data management, course registration, grade recording, and academic activity reporting. The analysis stage also identified the technical requirements of the system, including hardware and software specifications as well as the main system users, namely administrators, lecturers, and students.

Step 2. Design

The design stage was carried out based on the results of the needs analysis. This stage involved designing the system architecture, user interface, database structure, and process flow of the application. The system interface was designed to be simple, user-friendly, and responsive so that it could be accessed through various devices such as desktop computers, tablets, and smartphones. The design also considered the integration of various student service modules into a single platform to ensure efficiency and ease of access for users.

Step 3. Development

During the development stage, the system was built according to the previously designed specifications. The development process was conducted modularly, including several core modules such as the login module, student data management module, course registration (KRS) module, grade management module, reporting module, and other supporting features. Each module underwent unit testing to ensure that all functionalities operated properly. The system was also equipped with basic security features, including authentication mechanisms, role-based authorization, and input data validation to ensure data accuracy and security. The development process was initially conducted in a local development environment before being deployed to the institutional server.

Expert validation was also conducted to assess the feasibility of the developed system. Two experts were involved in this validation process: a content expert specializing in higher education management and a media/system expert with expertise in information technology and academic software development. The content expert evaluated the suitability of the system features with the needs of academic services in higher education. The evaluation results indicated that the system adequately supports basic student administrative functions such as student data management, course registration, and grade reporting. The expert suggested adding a notification feature to remind students to complete their course registration and implementing manual validation by academic advisors to strengthen academic supervision. The average feasibility score from the content expert reached 89%, which falls into the category of "Highly Feasible."

Meanwhile, the media expert evaluated the technical aspects of the system, including navigation structure, system performance, data security, and user interface design. The results showed that the system was stable, well-organized, and compatible with multiple devices, including computers and smartphones. The expert also appreciated the use of the Laravel framework, which supports modular system management and secure authentication processes. However, it was recommended that additional features such as password recovery and user activity logs be implemented to support system auditing. The average score from the media expert was 92%, which also falls into the "Highly Feasible" category. The results of the expert assessment of the content and media are presented below.

Table 1. Validation Result from Expert

Expert	Percentage	Average in %
Material 1	90	89
Material 2	88	
Media 1	93	92
Media 2	91	

Based on the Table 1, the average evaluation from the four experts indicates that the developed system is feasible for trial and implementation. The average score for the content aspect is 89%, while the media aspect obtained 92%, which indicates that the product is considered highly feasible for use.

Step 4 Implementation

After the development and internal testing processes were completed, the system was implemented on the university's internal server for limited use within the academic unit. The implementation process involved system installation on the hosting server, database configuration, and user training for administrative staff and lecturers. The system was tested through real operational scenarios, including student course registration, grade input by lecturers, academic report generation by administrators, and the dissemination of information related to scholarships and student academic events such as Pilmapres and PKM programs. The initial implementation results indicated that the system operated stably, the user interface was easy to use, and the system was capable of processing academic administrative data efficiently and accurately.

The implementation process consisted of several main steps, including system installation, server configuration, data migration, user training, and system testing. During data migration, existing student data were transferred carefully using import tools integrated into the system to avoid duplication or data inconsistencies. To support system adoption, training sessions were conducted for academic staff, lecturers, and student representatives. The training aimed to provide users with basic knowledge about system operations, feature navigation, and problem handling procedures. In addition, students were introduced to the system through official announcements and user guides in the form of PDF documents and video tutorials accessible from the system homepage.

During the trial period, user feedback and error reports were recorded and analyzed to identify potential issues. System logs were also monitored to detect possible technical problems such as traffic overload or data inconsistencies. Weekly evaluations were conducted during the trial period to ensure system stability before wider implementation.

Step 5 Evaluation

The evaluation stage was conducted to assess the quality, usability, and effectiveness of the developed system. The testing results showed that all system functions operated according to the designed scenarios without any critical errors or system failures.

User evaluation was conducted through questionnaires distributed to students and academic staff who participated in the trial implementation. The results showed an average usability score of 81.5, which indicates that the system falls into the "Very Good" category. Most users reported that the system significantly improved the efficiency of academic administrative services, was easy to use, and provided clear and informative interfaces.

Based on user feedback, several minor improvements were implemented, such as simplifying the dashboard layout and adding search filters to facilitate data retrieval. These evaluation results provide an important basis for further system development and support the potential for full implementation of the Student Information System across all faculties at Universitas Negeri Medan.

Discussion

The development of the Student Information System (SIS) at Universitas Negeri Medan demonstrates the importance of integrating digital technologies into higher education administrative services. The results of this study indicate that the implementation of an integrated information system can significantly improve the efficiency and accuracy of student data management. This finding is consistent with previous studies which state that information systems play a crucial role in supporting organizational decision-making and improving service quality in educational institutions [6]. By integrating multiple services such as student biodata management, course registration, grade recording, and academic reporting, the developed system provides a more efficient platform for managing student-related information.

The implementation results also show that the system improves accessibility to academic information for students and academic staff. Prior to the development of this system, several administrative processes were handled manually or through separate digital platforms, which often resulted in delays and inconsistencies in data management. The newly developed system addresses these issues by providing a centralized platform that can be accessed online through multiple devices. This result supports previous research suggesting that digital transformation in higher education institutions can enhance transparency, responsiveness, and user satisfaction in academic services [2].

Another important finding of this study is the positive response from users during the system evaluation stage. The usability evaluation score of 81.5 indicates that the system is considered

user-friendly and effective in supporting academic administrative processes. This result highlights the importance of incorporating user-centered design principles during system development, particularly in the design of interfaces and system navigation. Successful software development requires careful consideration of usability, functionality, and system reliability to ensure that the final product meets the expectations of its users [10].

In addition, expert validation results showed that the developed system meets the feasibility standards required for educational information systems. The high feasibility scores from both the content expert (89%) and the media expert (92%) indicate that the system is not only technically reliable but also relevant to the operational needs of academic administration. These results reinforce the effectiveness of the ADDIE development model used in this study, which provides a systematic framework for designing and evaluating educational technologies.

Despite these promising results, several aspects require further improvement before the system can be implemented on a wider scale. For example, additional features such as automated notifications, password recovery mechanisms, and user activity logs should be integrated to enhance system security and monitoring capabilities. Future research may also focus on expanding the system to support additional academic services and integrating it with other institutional information systems, such as financial systems or learning management systems.

Overall, the findings of this study demonstrate that the development of a Student Information System using a structured development model can significantly improve the quality of student administrative services in higher education institutions. The system developed in this research has the potential to support digital transformation at Universitas Negeri Medan and may serve as a reference model for other universities seeking to modernize their academic service systems.

5 Conclusion

This study successfully developed a prototype of the Medan State University Student Information System using the ADDIE development model consisting of five stages: analysis, design, development, implementation, and evaluation. The results of the analysis stage indicate the need for an integrated system that is able to manage student activity, achievement, and organization data efficiently. The design stage produces a system design that meets user needs, with an organized database structure and a user-friendly interface. The development stage produces a web-based system with key features that run well after going through internal trials. At the limited implementation stage, the system showed ease of use and received positive responses from early users. Expert evaluations showed that the system is very feasible to use. Thus, it can be concluded that the development of a student information system based on the ADDIE model is effective in producing digital solutions that support student services at UNIMED. However, the system still requires further refinement based on the results of user and expert evaluations, especially for the addition of supporting features and increasing the efficiency of system navigation. This system has great potential to be widely applied to improve student governance and administration services digitally, transparently, and integratedly.

that the research product developed in this study will be beneficial and contribute to supporting the achievements of students at Universitas Negeri Medan.

References

[1] Ahsyar, T. K. Husna, Syaifullah. 2019. Evaluasi usability sistem informasi akademik SIAM menggunakan metode heuristic evaluation. Seminar Nasional Teknologi Informasi, Komunikasi dan Industri (SNTIKI), vol. 11, pp. 163–170.

[2] Altbach, P. G., Reisberg, L., & de Wit, H. 2019. International higher education: Reflections on policy and practice. Boston: Boston College Center for International Higher Education.

[3] Bachtiar, S. H. Wijoyo, and R. I. Rokhmawati. 2020. Evaluasi usability pada sistem informasi akademik menggunakan metode usability testing (Studi kasus: STIE Widya Gama Lumajang)," Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer, vol. 4, no. 11, pp. 3963–3971

[4] Branch, R.M. 2009. Instructional Design: The ADDIE Approach. New York: Springer

[5] Gunawas, E.R. 2011. Sistem informasi alumni jurusan teknik informatika berbasis website. Pp.11-37

[6] Laudon, K. C., & Laudon, J. P.2018. *Management Information Systems: Managing the Digital Firm* (15th ed.). Pearson.

[7] L'évaluation et le Cadre européen commun. 2005. Paris: CLE Internationale.

[8] Nur Fauzi, A. Triayudi, and I. D. Sholihati. 2022. Mengukur tingkat kepuasan pengguna aplikasi kearsipan menggunakan system usability scale dan PIECES framework, JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika), vol. 7, no. 1, pp. 231–239.

[9] Prabowo and A. Suprapto. 2021. Usability testing pada sistem informasi akademik IAIN Salatiga menggunakan metode system usability scale. JISKA (Jurnal Informatika Sunan Kalijaga), vol. 6, no. 1, pp. 38–49.

[10] Pressman, R. S., & Maxim, B. R. 2020. *Software Engineering: A Practitioner's Approach* (9th ed.). McGraw-Hill.

[11] Sabandar V.P. and H. B. Santoso. 2018. Evaluasi aplikasi media pembelajaran statistika dasar menggunakan metode usability testing. Teknika, vol. 7, no. 1, pp. 50–59.

[12] Sensuse D.I. and S. H. Prayoga. 2012. Pengembangan aplikasi berbasis web dengan mengadopsi model kepuasan pengguna (user satisfaction). Jurnal Sistem Informasi, vol. 6, no. 1, p. 70.

[13] Widyanto. 2018. Sistem informasi akademik berbasis web pada Universitas Wanita Internasional. Jurnal Teknologi dan Informasi, vol. 8, no. 1, pp. 53–66.