

Needs Analysis of an Integrated Android-Based Academic Information System in Higher Education

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Abstract. This study aims to analyze the needs for an integrated academic information system based on Android and web technology at the Master of Educational Technology Program, Graduate School of Universitas Negeri Makassar. The research employed a descriptive qualitative method, involving 30 students, 5 lecturers, and 2 administrative staff as purposive participants. Data were collected through observation, semi-structured interviews, questionnaires, and document analysis. Findings revealed that the current academic system is still static, unresponsive, and lacks interactivity, resulting in limited accessibility and inefficient communication. More than 85% of students expressed the need for a mobile-friendly platform that supports academic service tracking, notifications, schedule access, and grade viewing. In addition, lecturers highlighted the importance of features such as uploading learning materials and evaluation results through the system. Based on triangulated data, users require a system with real-time notifications, personal dashboards, online academic forms, and Android-web integration. This aligns with recent international studies emphasizing the role of mobile academic systems in increasing engagement, transparency, and operational efficiency. The research recommends the immediate development of an Android-based academic information system using a user-centered design approach to ensure system relevance and usability. The results of this study can serve as a reference for institutions aiming to implement digital transformation in higher education academic services.

Keywords: Academic Services, Android Application, Higher Education, Information System, User Needs

1 Introduction

Advances in information and communication technology (ICT) have brought about major changes in various aspects of human life, including in the world of education. In today's digital age, almost all activities of society cannot be separated from the use of technology, especially internet-based technology and mobile devices. Technology

has become the backbone of information management, both in terms of storage, processing, distribution, and accessibility of data in a fast, precise, and accurate manner.

In the context of higher education, information systems are an integral part of modern institutional management. Information systems are not only a means of providing data, but also play a major supporting role in the academic and administrative processes of the campus. As explained by O'Brien, (2002), an information system is an integrated system that provides information for organizational operational activities, managerial decision-making, and administrative accountability reporting [2], [3].

Information technology enables educational institutions to reach students more effectively through digital services tailored to the needs of the times. In this case, technology-based information systems play a crucial role in supporting academic services. According to Siburian (2019), information technology can process, receive, compile, store, and manipulate data to produce relevant, accurate, and timely information (Arina et al., 2020). This is the main reason why universities must actively develop information systems that are not only informative but also interactive and easily accessible.

The massive use of smartphones among Indonesians is a compelling reason to adopt an Android-based information system approach. Data from StatCounter in 2023 shows that 88.26% of mobile users in Indonesia use the Android operating system. When compared to Indonesia's population of 278.7 million (BPS, 2023), it is estimated that around 245.98 million people are active Android users. This fact shows that the development of an Android-based information system is not only feasible but also highly relevant to current community behavior patterns.

However, observations made by the author at the Postgraduate Education Technology Study Program at Makassar State University (UNM) for approximately one and a half years show that the information system currently in use is not yet fully optimal. The available system is still limited to a one-way website that does not allow for interaction or service personalization. In fact, students as service users want a system that is responsive, flexible, and accessible at any time via mobile devices.

The results of a survey of 30 active students show that 96.7% of active students use the internet, and more than 80% stated that they need an academic information system that can be accessed online and supports lecture activities and other academic services. The majority of students also stated that the integration between the website and the Android application would facilitate the process of obtaining academic information in real-time and efficiently.

Previous studies also support this urgency. For example, research by Hakim et al. (2019) successfully developed an Android-based academic information system using the Flutter framework, which provides various features such as class schedules, transcripts, and the latest academic news. This application has been proven to improve the efficiency of campus information services. Similarly, Bacsafra et al., (2022) developed an Android-based publication information system for the Kuningan Regency Central Statistics Agency, which proved to be functional and easily accessible to the general public. In the field of service, developed an Android-based car service information system and successfully provided real-time services to customers. The similar-

ity between these three studies is the success of Android in bridging the need for fast, dynamic, and integrated information [5], [6].

Based on this context, the development of an Android-based academic information system and website is very important for the UNM Postgraduate Education Technology Master's Program. In addition to responding to the challenges of the times, this system will also help improve the quality of academic services and the operational efficiency of the institution. This system is expected to provide a participatory space for students and lecturers through two-way communication, as well as enable more systematic and transparent data processing.

Furthermore, the development of this information system supports UNM's mission to provide quality educational services to the wider community and encourage the use of technology in academic activities. Regulations such as Law of the Republic of Indonesia Number 11 of 2008 concerning Electronic Information and Transactions, as well as the 2005-2009 National Education Strategic Plan, also emphasize the importance of utilizing technology in improving the effectiveness and efficiency of public services, including in the field of higher education.

Considering the internal needs of the study program, student expectations, and global trends in the use of digital technology, the development of an Android-based information system and website will not only improve service quality but also provide a more inclusive and adaptive learning experience. This research will focus on analyzing the needs for developing the information system, which is expected to serve as a reference for the continuous improvement of the academic information system at the UNM Postgraduate Education Technology Master's Program.

2 Literature review

2.1 Information Systems Theory

Conceptually, an information system is a combination of technology, people, and procedures that work together to collect, process, store, and distribute information to support decision-making in an organization [7], [8]. In the context of education, information systems serve as tools for academic data management, improving administrative services, and communication between members of the academic community.

O'Brien, (2002) emphasizes that information systems consist of five main components: hardware, software, data, procedures, and human resources. In their development, information systems must fulfill the principles of integration and usefulness for users, especially in dynamic environments such as higher education [2].

2.2 Academic Information System (AIS)

The Academic Information System (AIS) is a derivative of an information system that is specifically designed to manage all academic processes in educational institutions, such as registration, class schedules, grades, and other academic administrative services. The effective use of AIS has been proven to increase service efficiency and information transparency for both students and lecturers [9], [10], [11].

In a study conducted by Sahindra (2015), an Android-based academic portal application was developed using REST architecture and a SQLite database, allowing students to access academic information offline and in real-time. This demonstrates the great potential of mobile integration in modern academic information systems [12].

2.3 Information System Development Models and Methods

There are various methods of information system development, one of which is Waterfall, known for its systematic and linear approach. This method consists of the stages of requirements analysis, system design, implementation, testing, and maintenance (Royce, 1970) in [13].

Waterfall is widely used in Android-based application development because of its simplicity and ease in documenting each process, as applied in research by (Iriyani et al., (2016) on an Android-based employee bulletin board system.

Another method that is also used is the Rational Unified Process (RUP), as in the development of a school academic system by Chen & Song, (2021); Hasanah & Supatmi, (2023), which emphasizes an iterative and component-based approach. The framework built with RUP provides flexibility for developers and institutions in adapting the system to local policies and needs.

2.4 Android-Based Information Systems

Along with the increasing penetration of smartphone use, especially Android, mobile-based applications have become a strategic alternative in delivering academic information. Android, as an open-source operating system, provides high flexibility and accessibility for application development in various fields, including education [17].

Research conducted by Munthe et al., (2021); Wayan et al., (2019) shows that the development of an Android-based educational management information system can improve the efficiency and effectiveness of educational services in schools, as well as provide a better user experience because it can be accessed anytime and anywhere.

A similar finding was reported by Iskandar et al., (2023), who developed an Android-based library system to support digital book borrowing and returning activities. The results showed a significant increase in the efficiency of school library services .

2.5 User-Centered Design Theory

In designing information systems, especially mobile-based ones, the User-Centered Design (UCD) approach is very important to ensure that the application truly meets the needs and expectations of users. UCD places the user at the center of the entire development process, from needs identification to final evaluation [21], [22] (Norman, 2013).

In the development of Android-based academic applications, the application of UCD enables the integration of features such as academic notifications, access to grades, and user-friendly lecturer-student communication [17], [23]. This is evident in

Saeidnia et al., (2023) research, where users can access JSON data through an intuitive and easy-to-use interface, even without an internet connection.

2.6 Android and Web Service Integration

The integration between Android systems and web-based services (web services) is a dominant trend in academic application development. The use of REST architecture enables efficient data exchange between mobile applications and servers. This has been applied in many academic information system development studies, including Android-based geographic location and academic reporting systems [25], [26], [27].

This literature review confirms that the development of Android-based academic information systems requires a strong foundation in information systems theory, appropriate system development methodologies (such as Waterfall and RUP), and an approach that focuses on user needs. The integration of mobile technology and web services is key to creating systems that are efficient, effective, and easily accessible to the entire academic community.

2.7 Methodology

This study uses a descriptive qualitative approach with a needs analysis method to identify and formulate the needs of an Android and web-based academic information system in the UNM Postgraduate Education Technology Master's Program. The research was conducted on the UNM campus from January 2022 to June 2023 with research subjects consisting of 30 active students, 5 lecturers, and 2 educational staff, who were selected purposively because they were direct users of the academic information system. Data collection techniques included observation of the existing information system, semi-structured interviews with users, distribution of questionnaires to measure user needs, as well as system documentation and usage statistics. The main instruments in this study were the researchers themselves, equipped with observation guides, interview guidelines, and questionnaires. The data were analyzed using thematic analysis techniques, starting from data reduction, data presentation in narrative and tabulation form, to drawing conclusions based on the patterns and themes found. To ensure data validity, source and technique triangulation and member checking were used. This research also adopted the initial stages of the Waterfall system development model, namely requirements analysis and system design, as the basis for developing a responsive, integrated academic application that meets the actual needs of users.

3 Results and Discussion

3.1 Results

The results of this study are presented based on data obtained through observation, interviews, and questionnaires distributed to active students, lecturers, and education-

al staff in the UNM Postgraduate Educational Technology Master's Program. This study focused on identifying user needs for Android and web-based academic information systems, as well as mapping the weaknesses of the existing information system.

Findings from Field Observations.

The observations show that the information system currently in use is still a static website, which only displays one-way information from the administrator to students. There are no interactive features such as online form filling, academic service status tracking, or automatic notifications related to lectures. The website is also not integrated with mobile systems, so information must be accessed through a browser, which is not responsive to various mobile devices. In addition, there is no personal dashboard for students that can display individual academic data in real-time.

Interview Results.

Interviews were conducted with 10 students and 5 lecturers. Most students stated that they had difficulty obtaining the latest information if they did not actively open the website or come directly to campus. The lecturers also said that the absence of a system that allows the direct distribution of academic information to students causes delays in communication. In addition, lecturers stated the need for a system that allows them to upload lecture materials, revision schedules, and evaluation results directly through an integrated platform.

Some quotes from the interviews:

“I am often late in getting information because I don't always open the website. If there were notifications to my cell phone, it would definitely be more helpful.” Student, Semester 2

“There should be a system that can directly send information to students, and we as lecturers can also upload grades and teaching materials.” Permanent lecturer, UNM

Student Questionnaire Results.

The questionnaire was distributed to 30 active students to measure their perceptions and needs regarding the academic information system. The results are presented in Table 1.

Table 1. Recap of Student Questionnaire Results

No	Statement	Agree (%)	Disagree (%)
1	I use the internet daily for academic purposes	96.7%	3.3%
2	I need an academic information system that can be accessed online	80.0%	20.0%
3	I would like an integrated academic system based on Android and website	83.3%	16.7%
4	An Android-based application will ease access to academic information	86.7%	13.3%
5	I often find it difficult to get information	76.7%	23.3%

from the current website			
6	I want to access schedules, grades, and academic service status directly through an app	90.0%	10.0%

Sourced : Processed 2025

The questionnaire results show that the majority of students really need an integrated information system that can be accessed through Android devices. As many as 90% of students stated that they want to have direct access to information such as schedules, grades, and academic service status. In addition, 86.7% stated that the Android application would greatly facilitate their academic activities.

Mapping System Feature Requirements.

Based on the triangulation of data from observations, interviews, and questionnaires, the main requirements for an ideal academic information system can be summarized in Table 2.

Table 2. Integrated Academic Information System Feature Requirements

No	Required Feature	Description
1	Student Dashboard	Displays personal data, GPA, class schedule, and academic service status
2	Push Notifications	Provides real-time alerts about classes, announcements, and revisions
3	Lecturer Upload Access	Enables lecturers to upload learning materials, assignments, and grades
4	Online Academic Service Forms	For submitting course registration, grade reports, active enrollment letters
5	Application Status Tracking	Allows students to monitor the progress of their submitted service requests
6	User Feedback System	Enables students and lecturers to submit suggestions and complaints
7	Android and Web Integration	Ensures system accessibility via both Android app and responsive web version

Sourced : Processed 2025

System Gap Analysis.

The currently available system does not meet most user needs. There is no dashboard feature, no two-way communication channel, and no automatic notifications. This leads to a reliance on conventional communication methods such as manual announcements and WhatsApp groups, which are not always well documented and are prone to miscommunication.

In contrast, an academic information system developed with Android and web integration will enable information personalization, interactivity, and accelerated services. This will not only increase service effectiveness, but also increase student satisfaction and engagement in the academic process. of the study show that there is a significant gap between the currently available academic information systems and the

real needs of users. The majority of students and lecturers support the development of an integrated, interactive Android and web-based system that is capable of providing notifications and access to services quickly and personally. These findings form an important basis for the next stage, which is the design of an information system that is adaptive to user needs.

3.2 Discussion

The findings of this study reveal a significant need among postgraduate students for a more responsive and integrated academic information system. The use of Android-based applications is seen not only as a technological shift but also as a pedagogical necessity in enhancing academic access, flexibility, and service quality. The majority of student respondents (over 85%) strongly support the development of a mobile academic platform, aligning with broader educational trends toward digital transformation.

One of the main advantages identified is mobility, which enables users to access academic services and information at any time and from anywhere. This supports Gunawan et al., (2021), who argue that Android-based academic systems function like a "University Communication Center in your palm," allowing students to view schedules, fill out academic forms, receive grades, and access announcements in real time, ultimately increasing institutional efficiency and student satisfaction.

Moreover, integration with web platforms and administrative systems is critical for academic and institutional coherence. Yang & Wang (2011) proposed an integrated system combining Android, cloud computing, and web portals to manage service-learning programs effectively. They found that such systems enhanced communication, real-time troubleshooting, and performance tracking features that students in this study also highly desired [29].

Another important aspect is notification features, which allow real-time updates and alerts. This aligns with the findings by Sanmorino & Fajri (2018), who designed an Android notification system to broadcast campus announcements more efficiently than traditional methods. They demonstrated that this system significantly improved communication between institutions and students, reducing costs and information delays [30].

The system's potential to integrate academic functions such as attendance, grading, and parent interaction was also emphasized. A recent study by Neeharika et al. (2023) showed that Android-based systems that allow real-time grade monitoring and parent communication promote transparency and increase student motivation [31].

From a pedagogical standpoint, the integration of such systems supports constructivist learning, where students engage more actively with their learning environment. According to Ratka (2012), system integration in education strengthens student-centered approaches by shifting the focus from passive reception to active exploration and problem-solving [32].

The implementation of Android-based academic systems also correlates with broader institutional goals such as quality assurance and ISO-based academic govern-

ance, as highlighted in Ashour et al. (2018), where Android-based academic tools were integrated with ISO 9001 standards to streamline quality control in higher education institutions [33].

Furthermore, the design approach using Model-View-Controller (MVC) architecture, which separates logic, data, and interface components, ensures modularity and ease of maintenance, as demonstrated by Utpatadevi et al. (2012) in their Android-based academic management system [34].

Institutional readiness also plays a critical role. Research by Ying (2024) emphasizes that intelligent educational systems embedded in Android can support multicultural integration and quality management, suggesting a broader societal impact beyond administrative convenience [35].

While the benefits are numerous, the discussion would be incomplete without acknowledging implementation challenges. These include ensuring data security, user training, and aligning the system with evolving academic policies. Therefore, adopting a user-centered design approach is imperative to accommodate the diverse needs of students, lecturers, and administrative staff.

In conclusion, the integration of Android-based academic information systems is a progressive step toward enhancing service quality, accessibility, and digital literacy in higher education. This study's findings are supported by current international research and reinforce the argument that mobile learning systems, when designed inclusively and responsively, can transform the academic experience for all stakeholders.

4 Conclusion

This study concludes that the current academic information system used by the Postgraduate Program of Educational Technology at Universitas Negeri Makassar is inadequate in meeting the needs of students, lecturers, and administrative staff. Based on observations, interviews, and questionnaire results, there is a clear and urgent demand for an integrated, Android-based academic system that allows real-time access to schedules, grades, academic services, and announcements. The majority of users prefer mobile accessibility, interactive features, and notification systems to enhance communication and service efficiency.

Findings are consistent with international studies showing that mobile-based academic platforms significantly improve academic engagement, transparency, and institutional responsiveness. The integration of Android applications with web services, combined with user-centered design, creates a more inclusive and adaptive academic environment. Furthermore, implementing such a system aligns with broader trends in digital education and supports efforts to improve quality assurance and academic service delivery.

Therefore, the development of a responsive, Android-integrated academic information system is not only relevant but essential for improving academic service quality, optimizing internal operations, and supporting digital transformation in higher education.

4.1 Recommendation

Based on the study's findings, it is recommended that the university immediately initiate the development of an integrated academic information system that supports both Android-based mobile access and responsive web interfaces. The system should include essential features such as real-time notifications, user dashboards, academic service tracking, and lecturer-student interaction tools. To ensure its effectiveness, a user-centered design approach must be applied by involving students, lecturers, and administrative staff throughout the development process. Additionally, periodic evaluation and feedback mechanisms should be embedded to continuously improve system performance and relevance. Finally, institutional policies should support the digitalization of academic services as part of broader efforts to improve educational quality, efficiency, and accessibility in the digital era.

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