

UI/UX Design of Higher Education Academic Information System for Users with Low Digital Literacy

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Abstract. Academic Information Systems (AIS) play a crucial role in supporting academic activities at universities. However, at STIE Indonesia Pontianak, academic information management is still partially conducted manually and is difficult to access; additionally, some students have low digital literacy, which causes difficulties in using complex systems. This study aims to design a simple and user-friendly AIS interface prototype using a User-Centered Design (UCD) approach within the framework of the Design Science Research Methodology (DSRM). Data collection was conducted through observation using the think-aloud method and interviews. The design outcome, a high-fidelity prototype, was then evaluated using task-based usability testing and the System Usability Scale (SUS). Test results showed that the success rate for the low digital literacy group was 99%, while for the high digital literacy group it reached 100%. SUS scores indicated that the low literacy group received a score of 69 (marginal category), while the high literacy group received a score of 81.4 (acceptable category). These results indicate that the prototype has good usability, but still requires improvement for users with low digital literacy. The resulting prototype can serve as a reference in the development of user-centered AIS.

Keywords: Academic Information System; User-Centered Design; Design Science Research Methodology; Usability; Digital Literacy; Interface Prototype.

1 Introduction

The success of an information system's implementation is determined not only by the sophistication of the technology but also by the users' ability to utilize the system effectively. When developing an information system, the User Interface (UI) and User Experience (UX) must be carefully considered to ensure that users can use the system comfortably and easily [1]. The UI is the visual presentation of a website that serves as a bridge between the system and the user, featuring appealing colors, shapes, and text. Meanwhile, UX, or user experience, refers to the experience related to users' reactions, perceptions, behaviors, emotions, and thoughts while using the system [2]. UI and UX design play a crucial role in determining the system's comfort, ease of use, and user acceptance. An unattractive and difficult-to-understand UI can lead to system failure

[3], whereas a well-designed UX can enhance user comfort and satisfaction [4]. Therefore, attention to UI and UX aspects is a key factor in the success of information system development [1].

Hargittai [5] states that in addition to internet access, differences in usage skills are also a critical factor in users’ ability to utilize technology. This relates to digital literacy, which is an individual’s ability to acquire, understand, and use information from various digital sources [6]. Differences in digital literacy levels result in variations in users’ ability to utilize information technology [5]. Users with low digital literacy tend to face difficulties when interacting with complex systems, which can hinder technology adoption in academic environments [7].

Efforts to improve digital literacy require significant investments of time, cost, and resources and are influenced by users’ access availability and socio-economic conditions [8]. Limited access to technology and infrastructure, particularly in rural areas, also contributes to low digital literacy [9]. Therefore, a more realistic approach is to design systems that make it easier for users.

Landra’s research [7] shows that a simplified, consistent, and intuitive interface design can improve usability for users with low digital literacy while still providing efficiency for users with high digital literacy. Meanwhile, research by Suryodiningrat [10] confirms that the use of clear icons, minimal text, high-contrast colors, and informative feedback can improve readability and reduce users’ cognitive load.

Advances in digital technology are driving universities to adopt Academic Information Systems (AIS) as a means of integrated management of academic data and services [11][12]. In their development, user characteristics of the system are an aspect that must be considered [13]. The majority of STIE Pontianak students come from regions with limited technological infrastructure and digital access. Institutional data indicates that over 56% of first-semester students come from 3T regions (Underdeveloped, Frontier, and Outermost), including Bengkayang Regency, Kapuas Hulu Regency, Sambas Regency, Sanggau Regency, and Sintang Regency-areas facing challenges regarding technology access and usage. The digital literacy levels of STIE Pontianak students in 2025, based on survey results, are presented in Table 1.

Table 1. Digital Literacy Levels of STIE Pontianak Students in 2025

Semester	Number of Students	Average Digital Literacy Score	Category of Digital Literacy
Semester 1	32	3,1	Low
Semester 3	90	3,75	High
Semester 5	148	4,25	High

There are four categories of digital literacy: scores of 1.00–2.25 fall into the very low category, scores of 2.25–3.50 into the low category, scores of 3.50–4.75 into the high category, and scores of 4.75–6.00 into the very high category [14]. These data indicate that new students tend to have difficulty utilizing digital technology compared to more senior students. Therefore, the design of the AIS interface needs to be adapted

to users' digital proficiency levels while still prioritizing the convenience of experienced users.

Currently, academic data management at STIE Pontianak still relies on spreadsheets, which have limitations regarding data integration and ease of access. Additionally, the dissemination of academic information to students is still done manually, such as via WhatsApp messages and bulletin boards, resulting in information that is often scattered, difficult to trace, and prone to delays or inconsistencies. Consequently, the institution plans to transition to a web-based AIS to enhance data management efficiency and improve access to academic services for all users.

Based on these issues, this study aims to design a prototype interface for the AIS that emphasizes simplicity, consistency, and visual clarity to improve usability for users with low digital literacy, without compromising efficiency and convenience for users with high digital literacy. This approach aligns with Landra's [7] research, which emphasizes the importance of adjusting interface complexity based on users' digital literacy levels, as well as Suryodiningrat's [10] research, which demonstrates that the use of clear, intuitive, and easily understandable visual elements can improve usability and reduce cognitive load for users with low digital literacy. The results of this study are expected to provide practical contributions to universities in developing inclusive AIS that are user-centered.

2 Research Method

This study employs the Design Science Research Methodology (DSRM) as its primary research framework and User-Centered Design (UCD) as the approach for designing the user interface (UI) and user experience (UX). DSRM ensures that the resulting artifacts are relevant to real-world problems, while UCD emphasizes design centered on user needs and characteristics, particularly those of students with low digital literacy.

Figure 1 illustrates the integration of the DSRM framework and the UCD process in the design of the AIS interface prototype. DSRM consists of the following stages: problem identification and motivation, defining the objectives of a solution, design and development, demonstration, evaluation, and communication [15]. UCD consists of the stages of specifying the context of use, specifying user requirements, producing design solutions, and evaluating the design against user requirements [16].

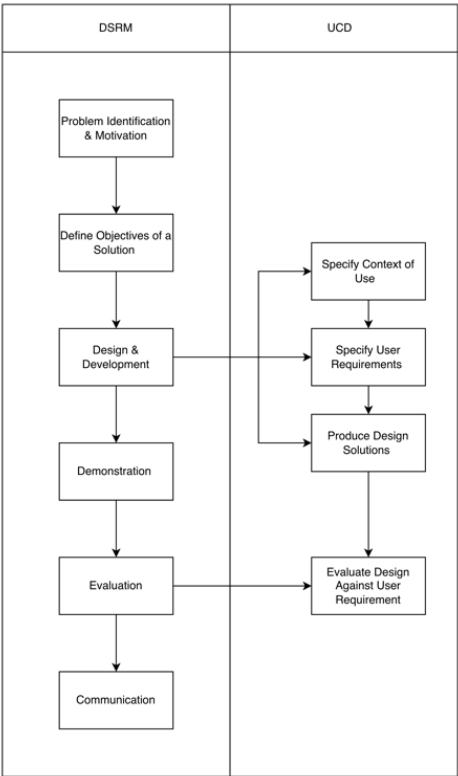


Fig 1. Integration of DSRM and UCD

2.1 Application of the Design Science Research Methodology (DSRM)

DSRM was selected for this study due to its focus on designing practical solutions to existing problems, as well as its ability to develop and test artifacts tailored to user needs [15].

The problem identification and motivation phase was conducted to thoroughly identify issues in the process of managing and disseminating academic information at STIE Pontianak. Problem identification was conducted through observations and interviews regarding the existing academic information management processes, as well as an analysis of students’ digital literacy levels. The results of this stage were used as the basis for formulating system requirements and determining the design direction of the AIS interface to align with user characteristics.

The define objectives of a solution stage was conducted to formulate the objectives of the solution to be developed based on the problems identified in the previous stage. In this phase, the researcher determined the direction of the solution to be designed, established the scope of system development, and identified the target users who would use the system. Additionally, the researcher formulated the system design objectives and established development constraints to ensure the system design process was more focused and aligned with user needs.

The design and development phase is conducted to design and develop the proposed artifact as a solution to the identified problems. In this phase, the researcher carries out the design process for a web-based AIS interface prototype using a UCD approach. The design process involves several activities, including understanding the system's usage context, identifying user needs, and developing the interface design solution.

The demonstration phase is conducted to show that the developed artifact can be used in accordance with the design objectives. In this phase, the prototype is demonstrated to 15 students through task scenarios representing real academic activities. Students are asked to use the prototype to complete several tasks. This phase aims to ensure that the main functions of the prototype can be executed properly and understood by users.

The evaluation phase was conducted to assess the extent to which the developed artifacts could meet the established solution objectives. In this phase, the evaluation focused on the designed AIS interface prototype. The evaluation process utilized a UCD approach, specifically through the "evaluate design against user requirements" stage. Testing involved users interacting with the prototype through prepared task scenarios. During the testing process, respondents were asked to describe their experiences and difficulties encountered while using the system using the think-aloud technique. Additionally, evaluation was conducted using the SUS questionnaire to assess the system's usability level from the user's perspective. A more detailed explanation of this evaluation procedure is provided in the UCD implementation section.

The communication phase is the final stage in the implementation of DSRM. In this phase, the entire research process—from problem identification and artifact design to usability evaluation results—is presented. This phase aims to convey the research contributions, findings, and recommendations for designing a user-centered AIS interface to the academic community and practitioners.

2.2 Application of the Ucer Centered Design (UCD)

The UCD approach was applied in this study to ensure that the UI and UX design process for the AIS was truly centered on the needs, abilities, and characteristics of the users. This approach was used because the study focused on designing a system interface that is easy to use for students with varying levels of digital literacy, particularly those with low digital literacy.

The first stage of UCD is to specify the context of use, which involves understanding the users and the context in which the system is used. In this stage, the researcher identified the users as students at STIE Pontianak and examined their characteristics when accessing academic information. Data collection was conducted through observations of similar AIS using the think-aloud technique and interviews. The observations aimed to identify interaction patterns, menu structures, and usage barriers. The think-aloud technique was conducted by providing task scenarios to respondents to elicit their experiences and difficulties during interactions with the system [1]. Interviews were used to explore users' needs, habits, challenges, and preferences regarding the system. In this phase, the study involved 15 students comprising 8 first-semester students, 4 third-semester students, and 3 fifth-semester students as respondents to explore their

experiences using the AIS and the challenges they faced. The researcher used 11 task scenarios on a similar application, namely logging in, viewing the AIS homepage, viewing academic announcements, viewing the class schedule, viewing the academic calendar, simulating course registration, viewing the academic record/grades, viewing the academic transcript, registering for the final project, viewing payment invoices, and downloading or viewing the student ID card. These scenarios were used to understand the system's usage flow and identify sections that could potentially pose difficulties for users. The results of the observations and interviews were subsequently used as the basis for developing user personas that represent student characteristics based on their level of digital literacy and the challenges they face.

The second phase is to specify user and organizational requirements. In this phase, the results of the usage context analysis are used to develop user personas that represent student characteristics based on their level of digital literacy and the challenges they face when accessing academic information and using similar AIS. These user personas are used to identify user needs, which include functional requirements—such as the services the system must provide—and interface requirements related to system presentation to ensure ease of use and understanding.

The third stage is to produce design solutions. In this stage, the user needs identified in the previous stage are translated into interface designs through the development of an AIS interface prototype. The prototype is designed to represent the navigation structure, interface layout, and user interaction flow when accessing academic information.

The final stage of UCD is evaluating the design. The evaluation is conducted to assess the alignment of the interface design with user needs. Usability evaluation focuses on two aspects: effectiveness and satisfaction. The effectiveness aspect is evaluated through task-based usability testing, supported by the think-aloud technique to identify users' cognitive barriers during interaction with the prototype. This testing involved 15 students from STIE Pontianak who had previously participated in the context-understanding phase, ensuring that the evaluation process reflected the user experiences identified in the previous phase. The formula for calculating the success rate is as follows [17]:

$$\text{Success Rate} = \left(\frac{DS + PS \times 0,5}{\text{Total Task}} \right) \times 100\% \quad (1)$$

In calculating the success rate, DS (Direct Success) indicates the number of tasks successfully completed without errors, while PS (Partial Success) indicates the number of tasks successfully completed with minor errors. Total Tasks refers to the total number of tasks tested during the usability testing process. Satisfaction was measured using the SUS instrument on a 1–5 Likert scale, where a score of 1 indicates “strongly disagree” and a score of 5 indicates “strongly agree”. The SUS instrument consists of 10 statements covering the aspects of ease of use, system complexity, consistency, need for help, and ease of learning. The total score ranges from 0 to 40. To convert it to a scale of 0 to 100, multiply the total score by a factor of 2.5 [1]:

$$\text{SUS} = S_{\text{total}} \times 2.5 \text{ (Brooke, 2013)} \quad (2)$$

The SUS scores were then categorized into three groups: acceptable (71–100), marginal (51–70.9), and not acceptable (0–50.9) [1]. The results of this evaluation were used as the basis for validating and refining the interface design.

3 Result and Discussion

This section presents the results and discussion of the design of a web-based AIS interface prototype using DSRM and UCD. The application of these two methods aims to produce a design that aligns with the needs, characteristics, and capabilities of users. The research results are used to assess the extent to which the prototype can support the needs of students, particularly those with low digital literacy, without compromising the user experience for experienced users.

3.1 Problem Identification And Motivation

The results of the observation indicate that academic data management is still conducted using standalone spreadsheets, resulting in data that is not integrated and difficult to access centrally. Additionally, the dissemination of academic information to students is still done manually via WhatsApp messages and bulletin boards, which leads to scattered information that is difficult to trace and has the potential to cause delays and inconsistencies in information. Another issue is that the results of a student digital literacy survey indicate that first-semester students fall into the low digital literacy category, so they tend to face difficulties when directly interacting with an AIS that has a complex structure and a non-intuitive workflow. These conditions served as the primary motivation for this research to design an AIS interface tailored to users with low digital literacy, while still providing comfort and efficiency for users with high digital literacy.

3.2 Define Objectives of A Solution

At this stage, it was determined that the developed solution would take the form of a web-based AIS interface prototype specifically designed for students. The design objectives focused on providing centralized access to academic information, simplifying interaction workflows, and improving usability for students with low digital literacy. Additionally, the system design is expected to continue providing an efficient and comfortable user experience for students with high digital literacy. The scope of the solution is limited to the student user side and does not include the roles of faculty members or system administrators.

3.3 Design And Development

At this stage, the design process for the AIS interface prototype is carried out using a UCD approach to ensure that the system design aligns with user needs and characteristics.

Results of the “Specify The Context Of Use” Phase.

a. Preliminary Evaluation Results of a Similar Application Using the Think-Aloud Method

This subsection presents the results of a preliminary evaluation of a AIS application using the think-aloud method to identify the challenges students faced when interacting with the system. The evaluation results indicate that different usage challenges were encountered by each semester group, as summarized in Table 2.

Table 2. Results of the think-aloud analysis of a similar application

Semes- ter	Student Perceptions
Semes- ter 1	- Students feel confused when they first log in and don't yet understand how to navigate to the main page - Students have trouble finding certain menus, such as announcements, the calendar, and the student ID - Students don't understand the functions of the icons on the calendar - Students find the course registration process confusing because the information isn't presented in a single view
Semes- ter 3	- Students are having trouble understanding the information on the academic calendar - Students are unsure which schedule option to choose because they look similar - Students are having trouble finding the student ID feature
Semes- ter 5	- Students find the payment information confusing - Students have trouble finding the student ID feature

In general, the challenges most commonly faced by first-semester students relate to navigating and understanding the menu structure, while upper-level students place greater emphasis on the consistency of feature placement and the efficiency of information access. These findings form the basis for redesigning the interface to make it simpler, more consistent, and easier to understand for users at all levels.

b. Interview Results

The results of interviews with students reveal a number of key issues related to access to and management of academic information. These issues are summarized based on patterns of findings that emerged from all respondents and are presented in Table 3.

Table 3. Summary of Issues Identified in the Interviews

No	Interview Findings	Short Description
1	Academic information is not well organized	Information such as schedules, announcements, grades, and administrative data is scattered, making it difficult for users to quickly find information
2	Inefficient KRS input interaction flow	Users must go through multiple non-simple steps, reducing usability

3	Academic schedule presentation is unclear	Schedule information is not presented in a structured and easily understandable format
4	Difficulty accessing grade information	Grade and KHS information is not clearly presented and not easily accessible in the interface
5	Manual process for internship, thesis defense, and graduation submission	The submission process is not supported by a simple and understandable interaction flow
6	Lack of transparency in submission status	Users find it difficult to monitor submission status due to unclear information display
7	Payment information is poorly structured	Billing and payment history are not well integrated within the interface
8	Ineffective announcement presentation	Announcements are not presented in a centralized view, making them easy to miss

These findings serve as the foundation for defining user needs in the next phase, ensuring that the designed system effectively addresses the real-world challenges users face.

Results of the “Specify User and Organizational Requirements” phase.

After identifying user needs and characteristics through the “Understand and Specify the Context of Use” phase, the next phase is “Specify User and Organizational Requirements.” In this phase, user and organizational needs are formulated in a more structured manner based on the results of interviews, observations, and user persona analyses obtained in the previous phase. These formulated requirements serve as the basis for determining the features, functions, and interface design of the AIS to be developed.

a. User Persona Results

The user personas in this study are presented in tabular form to illustrate user characteristics based on academic year and digital literacy. These personas are used to identify users’ needs, goals, and challenges as a foundation for the system’s UI/UX design.

Table 4. User Persona Description

Aspect	Semester 1	Semester 3	Semester 5
User Characteristics	Age 17–19 years, low digital literacy	Age 18–20 years, high digital literacy	Age 20–23 years, high digital literacy
Expected System/Feature Needs	- Academic information is available in one place and easy to find (schedule, announcements, grades, student ID (KTM), and payments) - Simple and easy-to-understand interface	- Complete and integrated academic information (schedule, announcements, grades) - Ability to perform KRS input independently	- Ability to access all academic information in one platform (schedule, announcements, transcripts, and KTM) - Ability to fill in KRS and view course history - Ability to register and track academic processes (thesis, internship, and graduation)

Challenges Without an Integrated System	- Need to search information across multiple platforms - Dependence on others - Need to visit campus for information	- Need to store documents manually - Risk of losing documents - Slow administrative processes	- Manual submission processes - Difficulty tracking status - Information scattered across multiple platforms
Main UI/UX Needs	- Icons with clear labels/descriptions - Clear navigation menu - Simple menu structure - Important features are easy to find - Related information presented on a single page	- Well-structured and easily accessible information - Clear and consistent menu labeling - Features easily accessible without excessive navigation	- Integrated information in a single context - Consistent and easy-to-understand navigation - Important features are easily recognizable and accessible

First-semester students generally have a relatively low level of digital literacy, so they need an interface that is simple, easy to understand, and not confusing. Users in this group expect a system capable of presenting academic information in a centralized manner with clear and structured interaction flows. Third-semester students generally have a higher level of digital literacy than first-semester students, so they are becoming accustomed to using AIS. Users in this group expect an interface that is efficient, easy to learn, and capable of supporting the rapid completion of academic tasks. Fifth-semester students generally have a high level of digital literacy and broader experience in using AIS. Users in this group expect a system that is not only easy to use but also efficient in supporting more complex academic activities.

b. User Needs Findings

User needs were formulated based on the results of interviews and user personas representing student characteristics. The formulation of these needs aims to identify the primary user requirements that the AIS must fulfill in order to enhance usability, process efficiency, and the integration of academic services. The resulting user needs serve as the foundation for determining system features and designing user interaction flows.

Table 5. User Needs Results

No	Interview Findings	User Needs	Think Aloud Findings	User Needs
1	Academic information is not well organized	Users need centralized academic information in a single page with a clear and easy-to-understand structure	Users are not directly directed to the dashboard after login	Users need direct transition to the main page after login
2	KRS interaction flow is inefficient	Users need a simple, clear, and non-confusing interaction flow	Calendar icons are not understood	Users need clear icons with labels or descriptions

3	Academic schedule presentation is unclear	Users need structured, readable schedules accessible in a single view	Users must explore multiple menus to find features	Users need simple and intuitive navigation
4	Difficulty accessing grade information	Users need clear, accessible, and integrated grade information	KRS preview is not on the same page	Users need integrated information within a single interface
5	Submission process is not user-friendly	Users need a simple, guided, and understandable submission flow	There are duplicate menus with similar functions	Users need consistency and clear menu labeling
6	Lack of transparency in submission status	Users need clear, informative, and trackable status displays	Navigation is confusing	Users need simple navigation and consistent structure
7	Payment information is not well structured	Users need organized, clear, and understandable payment information	Users feel anxious and afraid of making mistakes	Users need confirmation dialogs, clear error messages, and undo/back features
8	Announcement presentation is ineffective	Users need centralized, accessible, and noticeable announcement displays	—	—

Based on the user needs table above, user needs center on the availability of a system capable of integrating academic information into a single platform, as well as a simple user interface. Mapping user needs by role serves as the foundation for interface design to ensure that the solution aligns with user expectations.

Result of the ‘Product Design Solutions’ phase.

The final outcome of the product design solutions phase is a prototype of the student AIS interface, designed based on user needs. This prototype accurately represents the system’s appearance and interaction flow under real-world conditions, enabling users to understand how the system supports academic activities. The prototype design incorporates a complete set of interface elements, such as colors, typography, icons, buttons, and layout. The primary color selected for this application design is blue with the code #2563EB. The choice of blue as the dominant color is based on input from STIE, which sought alignment with the institution’s visual identity. Additionally, this choice is supported by Brewster’s Color Theory, where blue as the primary color has a high level of visual clarity and is easily recognizable, making it suitable as the main color in interface design. The use of blue combined with neutral colors like white and gray also helps create visual balance and improve interface readability [18]. This application uses

the Inter font in bold, semibold, and regular styles. The use of the Inter font is intended to maintain consistency and improve readability in the application [19].

a. Login Page

Figure 5 shows the login page designed using a split-layout approach to clearly separate the visual area and the main interaction area on a single screen. This approach aligns with [20], which states that split-screen design allows for a clear functional division between visual content and the main action area. The left area displays visual elements and the institution's identity to provide context and reinforce branding, while the right area focuses on the login form as the primary user interaction area. This approach helps establish a clear visual hierarchy, maintains a balance between aesthetic and functional aspects, and focuses the user's attention on the authentication process, thereby enhancing user comfort and the quality of the user experience [21].

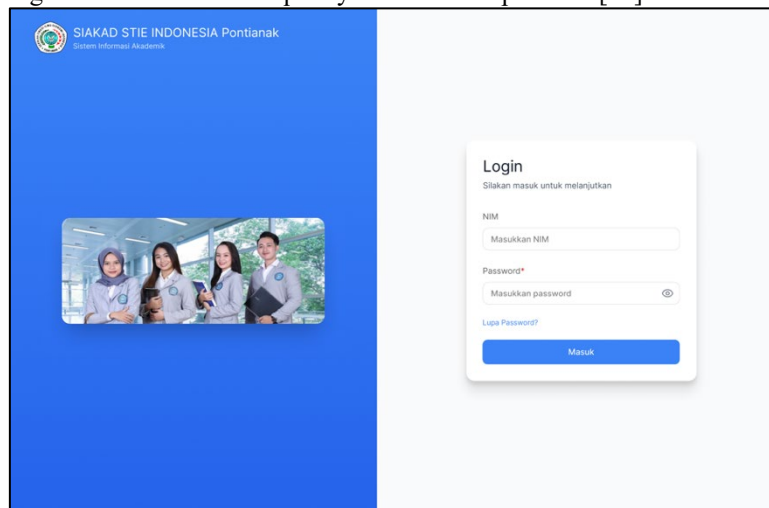


Fig. 2. Login Page

b. Dashboard Page

Figure 6 shows the AIS dashboard page, which applies the principle of placing key elements in the left and upper-left areas of the page, such as the system identity and main navigation menu. This placement follows the F-pattern reading pattern, where users begin scanning from the top-left corner of the page, ensuring that area receives the greatest visual attention [22]. Therefore, critical information is placed in the left and top-left areas of the page to enhance visibility and ease of access, including system identity elements and the main navigation. The navigation menu is designed to be simple, with an uncomplicated structure, and consistent to help users find the features they need. This design is based on observations of similar AIS, which indicate that students with low digital literacy tend to become confused when faced with multi-level menus and complex navigation structures. Additionally, the global search feature is placed at the top of the page as an efficiency mechanism to help users find information quickly and reduce cognitive load [23]. The presentation of key indicators on the dashboard serves as an information summary (overview), while the use of graphs helps users

understand data patterns and trends more effectively than numerical presentation alone [24].

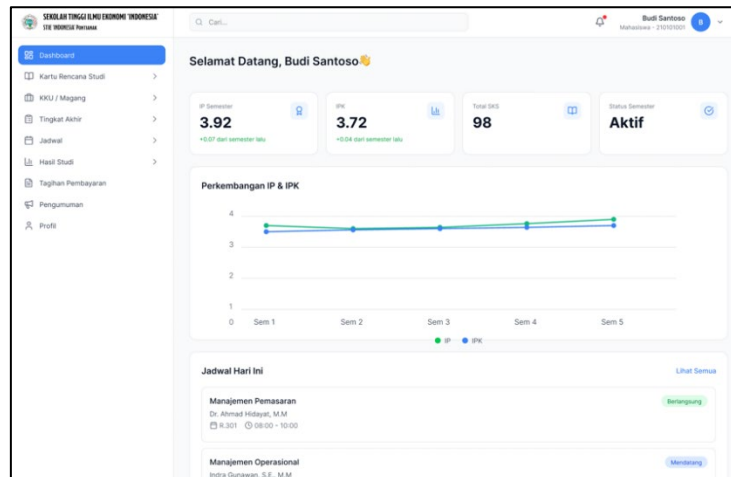


Fig. 3. Dashboard Page

c. Course Registration Form Page

Figure 7 shows the design of the Course Registration Form (KRS) page, which employs a single-page interface approach by displaying the list of courses and the KRS cart on a single page. This approach aims to reduce the user's cognitive load because related information can be monitored simultaneously, which has been proven to be more effective than multi-page designs [25]. Additionally, a semester filter is provided to display relevant courses, thereby minimizing the amount of information the user must process. This filtering mechanism aligns with findings [26] indicating that filtering out irrelevant information can reduce cognitive load while enhancing usability and user satisfaction. This design choice also takes into account the characteristics of students with low digital literacy. Therefore, combining the course list and the course registration form (KRS) into a single page was chosen to minimize confusion, reduce the risk of course selection errors, and help users maintain the context of the interaction during the KRS filling process.

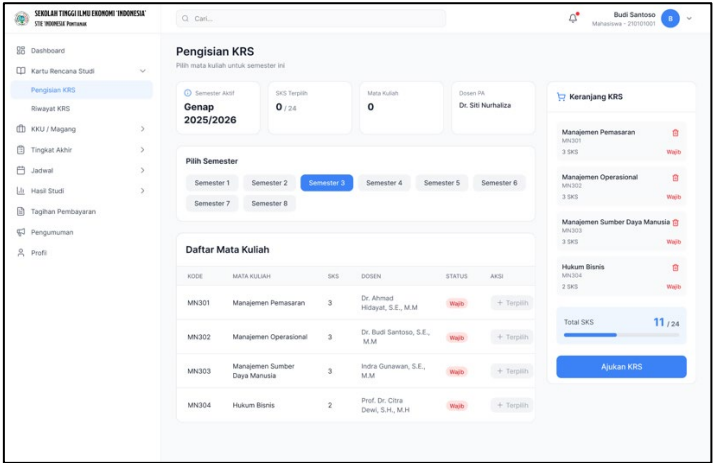


Fig. 4. Course Registration Form Page

d. Logout Placement

Placing the logout button in the top-right corner of the page follows a common design pattern widely recognized by users, thereby improving the system’s ease of use and accessibility. The top-right area is the standard location for user account-related features, aligning with users’ mental models and the principle of consistency in interface design. Additionally, the clearly visible placement supports the principles of visibility and “don’t make me think,” allowing users to log out quickly without having to search through additional menus [27][28].

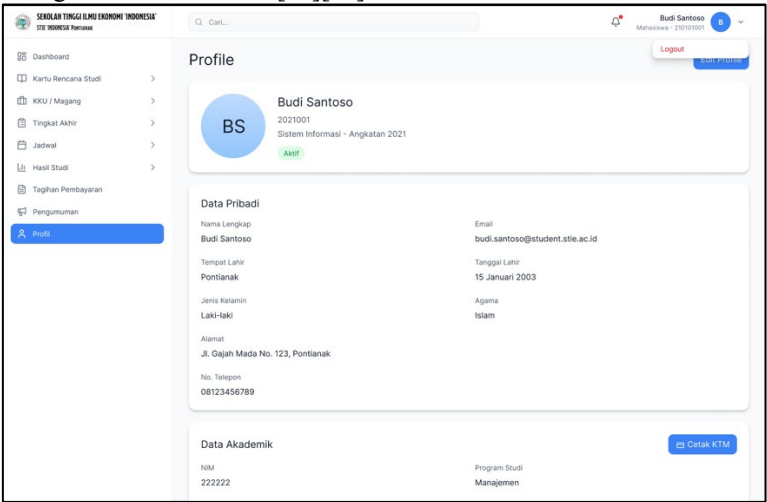


Fig. 5. Logout

3.4 Demonstration

At this stage, the AIS interface prototype was demonstrated to 15 students using task scenarios that represented academic activities. The results of the demonstration showed that the prototype functioned properly and that all of the system’s main features were usable by the users. The students were able to understand the system workflow and navigate the available features without significant difficulty. This indicates that the prototype has met the users’ basic needs and is suitable for proceeding to the evaluation phase.

3.5 Evaluation

At this stage, an evaluation of the AIS interface prototype was conducted using a UCD approach to assess the design’s alignment with user needs.

Results of the “Evaluating The Design Against User Requirements” phase.

a. Think-Aloud Testing Results

While working on the task scenarios, participants were required to verbalize their thoughts (think aloud). This study utilized 19 task scenarios representing all major features of the AIS, including logging into the system, viewing the student dashboard, filling out the Course Registration Form (CRF), viewing CRF history, submitting internship/practicum applications, checking the status of internship/practicum applications, registering a thesis title, scheduling a final thesis defense, registering for graduation, viewing the class schedule, viewing the midterm exam schedule, viewing the final exam schedule, viewing the academic calendar, viewing academic records, viewing transcripts, viewing and managing payment invoices, viewing academic announcements, managing student profiles, and the logout process. These task scenarios were designed based on user needs identified in the previous phase. The observation during this design evaluation phase involved 15 participants consisting of students from different semesters: 8 first-semester students (M1–M8), 4 third-semester students (M9–M12), and 3 fifth-semester students (M13–M15). The codes M1 through M15 were used to identify each respondent during the think-aloud testing process and the analysis of results. All statements made by the respondents were recorded and analyzed to identify the problems users experienced when interacting with the system. The results of the think-aloud analysis are presented in Table 5.

Table 6. Think-Aloud Results in the Evaluate Design Phase.

Semes-ter	TS1–TS18 (All Main Tasks)	TS19 (Logout)	Conclusion
Semes-ter 1 (M1–M8)	All students provided positive responses. The system was considered easy to use, with a clear workflow, informative interface, and features	Positive: M3, M4, M6, M7, M8 (5 students) Negative: M1, M2, M5 (3 students) experienced difficulty finding the logout	Most semester 1 students were able to use the system effectively; however, improvements are needed in visibility

	that support academic activities.	button and confusion due to English labeling.	and clarity of the logout label.
Semester 3 (M9–M12)	All students provided positive responses across all tasks.	Positive: M9–M12 (4 students) Negative: None	Semester 3 students did not experience any issues in using the system.
Semester 5 (M13–M15)	All students provided positive responses across all tasks.	Positive: M13–M15 (3 students) Negative: None	Semester 5 students were able to use all system features optimally.

Based on think-aloud testing across 19 task scenarios (TS1–TS19), the majority of students responded positively to the interface design and user flow of AIS. This indicates that the system has facilitated easy access to information and the completion of academic tasks. Minor issues were found in the logout scenario (TS19), where a small number of users experienced confusion, necessitating improvements in menu label clarity and language consistency.

b. Usability Testing Results

1. Effectiveness Testing Results

Effectiveness testing was conducted to assess the degree to which users successfully completed task scenarios on the AIS prototype. Success was classified as success (S), partial success (PS), and failure (F) according to the established criteria [17]. The effectiveness test results, based on the success rate calculation for 19 task scenarios involving 15 students, are presented in Table 6.

Table 7. Effectiveness Test Results

Task Scenario	Low (Semester 1 Students)			High (Semester 3 & 5 Students)		
	S	PS	F	S	PS	F
TS1 (Login)	8	0	0	7	0	0
TS2 (View Dashboard)	8	0	0	7	0	0
TS3 (Fill KRS / Course Registration)	8	0	0	7	0	0
TS4 (View KRS History)	8	0	0	7	0	0
TS5 (Submit Internship/KKU Application)	8	0	0	7	0	0
TS6 (View Application Status)	8	0	0	7	0	0
TS7 (Register Final Project Title)	8	0	0	7	0	0
TS8 (Submit Final Defense Application)	8	0	0	7	0	0

TS9 (Register for Grad-uation)	8	0	0	7	0	0
TS10 (View Class Schedule)	8	0	0	7	0	0
TS11 (View Midterm Exam Schedule)	8	0	0	7	0	0
TS12 (View Final Exam Schedule)	8	0	0	7	0	0
TS13 (View Academic Calendar)	8	0	0	7	0	0
TS14 (View KHS / Grade Report)	8	0	0	7	0	0
TS15 (View Transcript)	8	0	0	7	0	0
TS16 (View Payment Bill)	8	0	0	7	0	0
TS17 (View Announcements)	8	0	0	7	0	0
TS18 (Manage Profile)	8	0	0	7	0	0
TS19 (Logout)	5	3	0	7	0	0
Total	149	3				

The average success rate was calculated using formula (1), with the following results:

$$\text{Success Rate} = \frac{149 + (3 \times 0,5)}{19 \times 8} \times 100\% = \frac{150,5}{152} \times 100\% = 99\% \quad (3)$$

Based on Equation (3), the success rate for the group of students with low digital literacy (first semester) was 99%. This figure indicates that the majority of respondents were able to successfully complete all task scenarios, although there were still instances of partial success, particularly in the logout scenario. This suggests that the developed prototype is sufficiently effective for users with low digital literacy, with a very minimal error rate.

$$\text{Success Rate} = \frac{133}{19 \times 7} \times 100\% = \frac{133}{133} \times 100\% = 100\% \quad (4)$$

Furthermore, based on Equation (4), the success rate for the group of students with high digital literacy (semesters 3 and 5) was 100%. These results show that all respondents in this group were able to complete all task scenarios without errors (direct success), indicating that the prototype was very easy to understand and use for users with higher levels of experience and digital literacy.

2. User Satisfaction Test Results

The satisfaction assessment focused on the level of user satisfaction with the developed AIS. The results of the SUS questionnaire completed by users are presented in Table 7 below.

Table 8. Satisfaction Test Results (SUS)

User Code	SUS Questions										Total SUS Score
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	
M1	4	2	4	3	4	2	4	2	3	5	62.5
M2	4	2	5	2	4	2	4	2	2	4	67.5
M3	4	2	4	2	4	2	4	2	5	4	72.5
M4	4	3	4	3	3	1	3	3	4	4	60.0
M5	4	3	3	3	4	2	4	3	3	4	57.5
M6	4	1	5	2	5	2	4	1	4	4	80.0
M7	5	2	4	2	4	1	5	2	4	3	80.0
M8	5	2	4	2	4	2	4	2	4	4	72.5
Average SUS Score (Semester 1)											69.0
M9	5	2	4	2	4	2	4	1	4	3	77.5
M10	4	1	5	1	5	2	4	2	5	3	85.0
M11	4	1	5	1	5	1	5	1	5	5	87.5
M12	5	2	4	2	5	1	5	2	5	2	87.5
M13	4	2	4	1	4	1	4	2	4	4	75.0
M14	4	1	4	2	4	2	4	2	4	2	77.5
M15	4	1	4	2	4	1	4	2	4	2	80.0
Average SUS Score (Semester 3 & 5)											81.4

User satisfaction scores were calculated using the SUS questionnaire based on Equation (2). The results were then analyzed according to the respondents’ digital literacy levels.

In the group of students with low digital literacy (first semester), an average SUS score of 69 was obtained. Based on the SUS interpretation criteria [18], this score falls within the 51–70.9 range and thus falls into the marginal category. This indicates that the system is sufficiently usable, but there are still several aspects that need improvement, particularly for users with lower digital experience.

Meanwhile, in the group of students with high digital literacy (semesters 3 and 5), the average SUS score was 81.4. This score falls within the 71–100 range, placing it in the “acceptable” category, indicating that the system is well-received and has a high level of usability for experienced users.

Overall, these results indicate that the developed AIS prototype can be used by both user groups, although the satisfaction level of users with high digital literacy is higher compared to those with low digital literacy.

3.6 Communication

The results of the communication phase consist of the documentation and presentation of the entire research process, which includes problem identification, interface prototype design, and usability evaluation results. The research findings indicate that the developed prototype improves the system's usability, particularly for students with low digital literacy, without compromising the experience of experienced users.

Additionally, this study produced interface design recommendations emphasizing simplicity, consistency, and clear navigation as key factors in improving usability. These findings were subsequently communicated through scientific publications as a contribution to the development of user-centered AIS within the higher education environment.

This study demonstrates that the combination of DSRM and UCD is effective in producing AIS prototypes that meet the needs of users with varying levels of digital literacy. Preliminary findings identified issues related to complex navigation, scattered information, and academic processes that remain manual, which aligns with the literature indicating that users with low digital literacy tend to struggle with complex systems [7].

A design emphasizing simplicity, consistency, and clear navigation proved capable of addressing these issues. Think-aloud results showed positive responses from the majority of users, although there were differences in performance and satisfaction between groups.

In the low digital literacy group, a 99% success rate was achieved with a SUS score of 69 (marginal), indicating the system is usable but still requires refinement. Meanwhile, the high digital literacy group achieved a 100% success rate with a SUS score of 81.4 (acceptable), indicating a more optimal user experience.

These differences confirm that digital literacy influences perceptions and ease of use, so the design must be tailored to user characteristics. The application of UI/UX principles such as single-page interfaces, progressive disclosure, and forcing functions proved effective in enhancing workflow clarity and reducing errors. However, minor challenges remain, such as confusion regarding the logout menu, highlighting the importance of consistent language and labeling.

Overall, the UCD approach successfully produced an inclusive system with high effectiveness, although further optimization is needed to improve the user experience for those with low digital literacy.

4 Conclusion

This study successfully designed a prototype for the SIA interface by applying DSRM and UCD, emphasizing simplicity, consistency, and ease of navigation.

Test results showed a success rate of 99% for low digital literacy and 100% for high digital literacy. SUS scores of 69 (marginal) and 81.4 (acceptable), respectively, indicate that the system has good usability, though improvements are still needed for users with low digital literacy.

This study demonstrates that the integration of DSRM and UCD is effective in producing interface designs suitable for various levels of digital literacy. Furthermore, simplicity of workflow, design consistency, and clarity of navigation are key factors in enhancing usability.

To improve the SUS scores for the low digital literacy group to reach the “acceptable” category, concrete steps are needed, such as simplifying technical terminology into more familiar language, using clearer and more consistent menu labels, and adding usage instructions or contextual help for key features.

Further research is recommended to develop the prototype into a functional system and to involve more respondents and other usability aspects for a more comprehensive evaluation.

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