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Development of Study Program Performance Assessment Application Using SCRUM Method

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Abstract - This research aims to develop an innovative and efficient application for study program performance assessment to monitor and improve higher education's academic and management quality. The development method used is Scrum within a flexible and adaptive Software Development Life Cycle (SDLC) framework. The application includes features such as lecturer performance survey by students, lecturer and course evaluation, student achievement archive, lecturer attendance monitoring, and research management. The data collected from this application provides comprehensive insights for data-driven decision-making in academic management. The results show that using the Scrum method provides significant benefits by increasing the efficiency of performance management, simplifying administrative processes, and increasing student participation in providing feedback. The application also increases transparency and accountability among lecturers, teaching staff, and students. The successful application of Scrum in developing this application influenced positive outcomes, including the efficiency and transparency of academic evaluation. User trials showed a positive response, with approximately 92% of users finding the application interface easy to navigate and informative. Lecturers also reported the app's help in monitoring student progress. These results confirm the app's potential to support informative decision-making and enhance the learning experience in an academic environment.

Keywords: SCRUM; Performance Assessment; Development Application.

1. INTRODUCTION

Study program performance assessment is a process to measure and evaluate the extent to which study programs in a university achieve the goals and standards set. This assessment aims to improve the quality of education, ensure the relevance of study programs to the demands of the world of work, and ensure the effective use of university resources. Assessment of study program performance in higher education can face several problems that need to be overcome to make the assessment process more effective and relevant. Some common problems that can arise are that universities need help collecting accurate and complete data and information to assess the performance of study programs[1], [2]. This can be caused by the need for an integrated system to collect data or limited resources to conduct surveys and data analysis. Some aspects of study program performance assessment, student satisfaction or success in producing quality graduates, can be subjective and difficult to measure. Appropriate and consistent assessment methods are essential to overcome this problem[3].

Problems can arise if stakeholders, such as lecturers, students, or industry representatives, are not actively involved in the assessment process. Their involvement is essential to understand the different needs and expectations of the various parties involved. With a clear purpose and context for the assessment, the results may provide helpful insights for decision-makers. Colleges need to set specific and relevant objectives to ensure the success of the assessment. The assessment process often generates a lot of data and information[2], [4]. However, higher education may need help synthesizing the results and turning them into concrete actions to improve study program performance. If college management fully supports the study program performance assessment, implementing necessary corrective actions or changes may be improved. Changes in policies and standards from accreditation agencies or education supervisory bodies can make it difficult for universities to conduct consistent and sustainable assessments[2], [5], [6]. To overcome the problems in assessing study program performance, universities need to have a solid commitment to improving the quality of education and creating an environment that supports collecting accurate and relevant data. In addition, using appropriate assessment methods, involving stakeholders, and maintaining open communication between various parties will help improve the effectiveness of the study program performance assessment.

Developing the application of a study program performance assessment is significant for various reasons that benefit universities and the assessment process. Here are some reasons why it is necessary to develop a study program performance assessment. The study program performance assessment can automate the process of data collection, processing, and analysis. Reduces the time and effort required to collect data manually, allowing administrative staff to shift focus to more strategic tasks[7]. With an information system, the data collected will be more accurate and reliable as it reduces the risk of human error in the data collection and entry process. Information systems allow the integration of data from various sources related to study program performance, such as academic data, student satisfaction, graduate performance, and other data. This data integration helps provide a comprehensive picture of study program performance[8].

Information systems can provide sophisticated analytical tools to analyze data in greater depth and present information in easy-to-understand forms, such as graphs and reports. It helps identify trends and patterns that may be difficult to identify manually. Information systems enable continuous monitoring of study program performance so colleges can quickly identify changes or issues requiring corrective action. With information systems, study program performance data becomes more accessible and transparent to all stakeholders, including students, lecturers, parents, and external parties. Increases the college's accountability to the quality of education provided. Information systems provide

relevant data and information in real-time to decision-makers in higher education. It helps them make smarter, data-driven decisions to improve study program performance[3], [9].

An information system for study program performance assessment can help universities meet accreditation requirements and improve their ranking in educational assessment agencies. Data from the information system helps design and develop more effective study programs by adjusting the curriculum, teaching methods, and resources to suit the needs of students and the world of work. By developing an information system for study program performance assessment, universities can increase efficiency, improve the quality of education, and become more responsive to the demands and needs of society and the world of work. This system also provides a solid basis for strategic decision-making to improve study program performance sustainably[10].

Previous research in developing performance assessment applications has identified various approaches and methods used in the educational context. Some studies focus on developing web-based applications that integrate various performance indicators, such as academic performance, attendance, and participation in extracurricular programs. In addition, these studies also highlighted the importance of user-friendly and responsive interfaces for users such as students, lecturers, and administrators. In this case, the primary concerns are user-friendly design and good user experience[11], [12].

In addition, [13] research has also explored the integration of ar tificial intelligence (AI) and data analysis technologies in the development of performance assessment applications. Some studies have proposed applying machine learning algorithms to forecast student performance based on historical data. This enables early identification of students requiring extra attention or specific interventions. Data analytics can also provide deep insights into trends and patterns of course performance, assisting educational institutions in strategic decision-making[14].

However, research has also identified several challenges in the development of performance assessment applications, including data privacy, security, and user adoption of the technology. Some studies have also highlighted the need for an approach that can be tailored to the unique needs of each study program, given the different characteristics and performance indicators that may differ between programs. In addressing these challenges, previous studies have contributed to designing more holistic and practical solutions for developing an application for study program performance assessment.

Research in software development has investigated various methods and approaches to improve efficiency and quality in the development process. One of the widely studied methods is the waterfall-based development model. This research has highlighted the advantages and disadvantages of the waterfall model in managing complex software projects. Although this approach provides a clear structure and well-defined stages, research has shown that limited flexibility and difficulty in handling changing requirements are some of the challenges this model faces[15], [16].

Research has also focused on Agile-based software development methodologies, such as Scrum and Kanban. These studies highlight the iterative and collaborative approach offered by Agile methods, which allows development teams to adapt to changing requirements more quickly and efficiently. This research has shown how Agile approaches can improve transparency, team communication and produce software more aligned with user expectations[17], [18].

However, previous research has also identified that implementing Agile methods is sometimes challenging. Several studies have revealed the difficulty in integrating Agile methodologies in organizations with traditional cultures and structures. The coordination required in larger teams and geographical distribution can also be a limiting factor. Past research has focused on mitigation strategies to overcome these challenges, including using collaborative tools and approaches that can be customized to the needs and context of software development[19]–[21].

The Scrum method is one of the most popular and frequently used Agile frameworks in software development. The Scrum method adopts an iterative and incremental approach, where software development is divided into time-limited cycles called Sprints[22], [23]. The Scrum method provides flexibility and the ability to adapt to changing requirements quickly through an iterative and incremental approach. By adopting Scrum principles, software development teams can increase their projects' transparency, collaboration, and efficiency and produce more valuable products for users and stakeholders[24].

Application development using the Scrum method has several advantages, making it a popular choice for many development teams. Here are some of the advantages of application development using the Scrum method. The Scrum method is an iterative and incremental approach that allows the team to respond quickly to changes in needs or requirements[24], [25]. The team can make adjustments at each Sprint to accommodate changes without disrupting the entire project flow. Scrum encourages close collaboration between team members and stakeholders. Teams work together in each Sprint, communicate regularly through Daily Scrum, and involve stakeholders in each Sprint Review stage. This helps ensure that user needs are well understood and that the final product matches their expectations. Through a visible and apparent Product Backlog, a Sprint Review open to stakeholders, and a short Daily Scrum, all team members and stakeholders can see and understand the project's progress[9], [26].

With each Sprint resulting in a working product increment, the team can perform continuous testing and evaluation. It helps identify and fix issues earlier in the development process, thus improving the quality of the final product. The team can focus on the most valuable work in each Sprint through structured Sprint Planning and clear prioritization in the Product Backlog. This avoids using resources on less important work. Scrum teams work in time-limited cycles (Sprints) that provide a precise time limit for completing work. It can increase the team's motivation to achieve the Sprint goals and deliver maximum results within the specified time[9], [27], [28]. The Scrum method helps identify and mitigate

project risks early through continuous evaluation and adaptation. It helps in avoiding major problems that can affect the project as a whole. Scrum is suitable for complex product development, as the iterative approach allows the product to be developed incrementally by focusing on the most critical features first.

The main objective of this research is to investigate and implement the Scrum method in developing applications for study program performance assessment in higher education. This research aims to evaluate the extent to which the iterative and collaborative approach offered by Scrum can improve the efficiency, flexibility, and quality of application development. In addition, this study also aims to measure the impact of Scrum implementation on stakeholder involvement, management of changing needs, and the team's ability to deal with obstacles and challenges in the development process. Thus, this research will provide a deeper insight into the potential of the Scrum method in the context of developing study program performance applications in higher education and provide practical guidance for educational institutions that want to adopt this approach to improve the effectiveness of software development.

So the focus of this research is developing the application for a study program performance assessment using the Scrum method because the method is an effective and efficient choice for developing high-quality applications according to user needs and in a short time. This research contributes valuable to developing study program performance applications in higher education by applying the Scrum method. Key contributions will include proving the effectiveness of the iterative and collaborative approach offered by Scrum in enhancing application development efficiently and adaptively. This research is also expected to provide practical guidance on integrating Scrum principles in a higher education environment, including strategies to maximize stakeholder involvement and address changing needs that may arise throughout the development process. Thus, this research has the potential to provide valuable insights to educational institutions in improving study program performance management, increasing transparency, and providing a better experience for students, lecturers, and administrators in using the resulting performance assessment application.

2. RESEARCH METHODOLOGY

This research consists of three main stages: Data collection, system design implementation and evaluation. The design and development of an application for study program performance assessment in higher education using the Scrum method is a collaborative and adaptive approach focusing on iterative development stages. This research will adopt Scrum principles by planning development sprints, each with measurable objectives and a specific duration. After sprint planning, the development team will focus on the identified tasks. At the same time, stakeholders such as faculty and students will be involved in continuous evaluation and improvement, as shown in Figure 1.

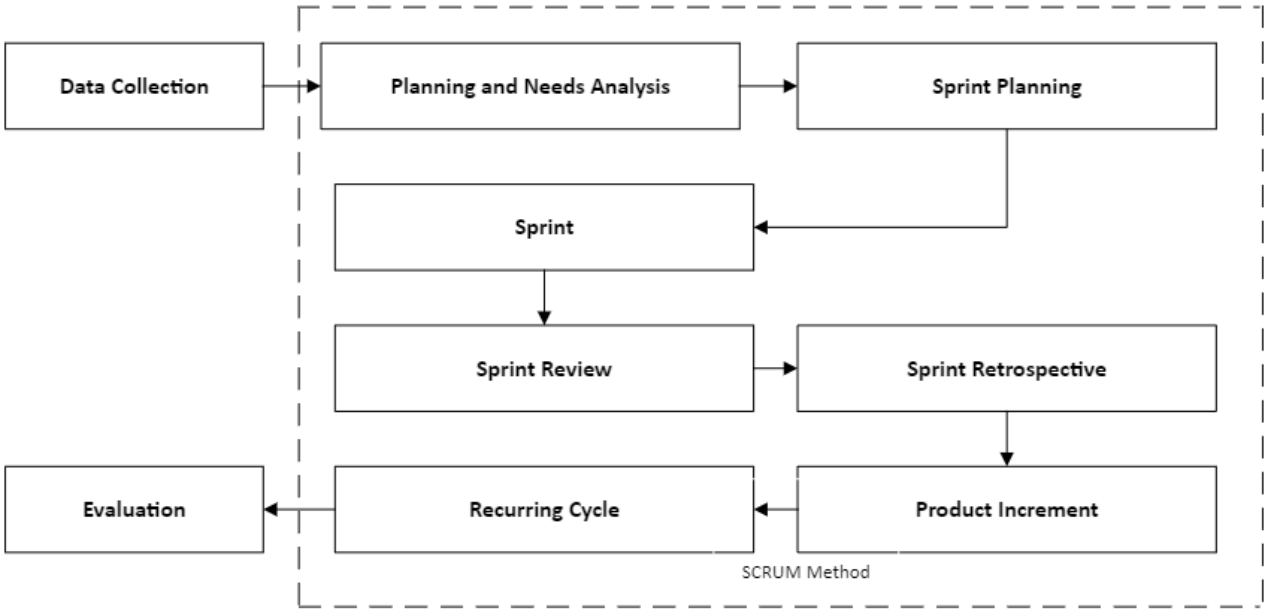

Figure 1. Research Phases

2.1 *Data Collection*

The data collection stage in developing the study program performance application involves identifying the needs and information required to develop a relevant and practical application. This process begins with in-depth interviews with stakeholders such as lecturers, students, and study program administrators to understand existing problems, expectations, and challenges. Additionally, questionnaires can gather a broader view of users' needs and preferences toward certain features. Direct observations can also be made to understand how the study program performance assessment occurs daily. Through these methods, the data obtained will form a solid foundation for further planning in developing an application that meets the needs and expectations of stakeholders.

2.2 System Design Implementation Using SCRUM Method

The Scrum stages in the development of the application for study program performance assessment follow the principles of the Scrum framework. Scrum stages in the development of the application for study program performance assessment:

a. Planning and Needs Analysis

The Scrum team, including the Product Owner and the Development Team, interacts with stakeholders: lecturers, administrative staff, and students to understand the needs and objectives of the study program performance assessment. The Product Owner compiles a Product Backlog containing a list of features, changes, and improvements to be made in the application. An in-depth analysis of the development needs and objectives is carried out at the Planning and Needs Analysis stage in developing the study program performance application. The development team worked closely with the university to identify the functional and non-functional needs of the application. In addition, an in-depth understanding of the processes in the study program and academic environment was conducted. This analysis resulted in a clearer understanding of the purpose of the application, the users who would use it, and the crucial features that had to be implemented. At this stage, alignment between user needs, college goals, and technical capabilities was the focus. All the information gathered was used as a basis for further planning and development and helped determine the overall project's scale and complexity.

b. Sprint Planning

The Scrum team conducts a Sprint Planning meeting to select items from the Product Backlog that will be worked on in the first Sprint. The team plans how they will implement those features in the application. At the Sprint Planning stage in developing the study program performance application, the development team and stakeholders engage in detailed planning for the upcoming sprint. In this meeting, the features to be worked on during the sprint are determined based on priorities and user needs. Each feature is broken down into smaller tasks, and time estimates for each task are set. The team also sets a Sprint Goal, the general goal to be achieved by the end of the sprint. In addition, a performance review of the previous sprint and identification of lessons learned that can be applied to the next sprint is conducted. Alignment between the development team and stakeholders on the sprint goal and scope is crucial so that all team members clearly understand what should be achieved during the sprint period.

c. Sprint

The Development Team starts working on their work over two weeks on this application development in the first Sprint. The team works to develop and implement features selected from the Product Backlog. At the Sprint stage in the development of the study program performance application, the main focus is working on the features identified and organized in the previous Sprint Planning. The development team works intensively to implement those features, building the necessary code, interfaces, and functionality. During the sprint, a daily meeting called Daily Scrum is held, where the team shares updates on the work done, obstacles encountered, and future work plans. Once the work on the feature is complete, thorough testing is done at the Product Increment stage to ensure that the feature works as expected and meets the set quality standards. At the end of the sprint, a Sprint Review is conducted, where the deliverables are shown to stakeholders for feedback. Furthermore, in the Sprint Retrospective, the team looks back at the work process of the previous sprint to identify lessons and improvements that can be applied to the next sprint. The Sprint stage serves as a short, focused cycle in development, which helps the team to continue building and improving the product continuously.

d. Daily Scrum (Stand-up Meeting)

At the Daily Scrum stage in the development of the study program performance application, the development team holds a short daily meeting to discuss the progress of the work. Each team member shares updates on what they have worked on since the previous meeting, obstacles that may be encountered, and future work plans. The purpose of these meetings was to maintain open communication between team members, ensure a clear understanding of the project's progress, and identify obstacles that might hinder progress. By sharing information regularly, the team can address issues quickly, coordinate changes to the plan, and ensure that the project stays on schedule. Daily Scrum helps foster collaboration and transparency and ensures that all team members have good visibility into the work being done by their peers.

e. Sprint Review

At the Sprint Review stage in developing the study program performance application, the development team presents the work completed during the sprint to stakeholders and related parties. This presentation includes a demonstration of the new features that have been implemented and a comparison of the results with the objectives set at the beginning of the sprint. Stakeholders provide feedback on the features produced and whether they meet user expectations and needs. This discussion helps ensure that the developed features meet expectations and add the desired value. At the end of the Sprint Review, along with stakeholder feedback, the development team can evaluate whether any changes or adjustments need to be made to the subsequent development plan, as well as plan the next steps in the upcoming Sprint phase.Stakeholders provide feedback, and the team discusses whether the application meets expectations and requirements.

f. Sprint Retrospective

After the Sprint Review, the team conducts a Sprint Retrospective.
They evaluate the work process during the Sprint, identify what went well, and identify ways to improve the efficiency and quality of future work.

g. Product Increment

At the Product Increment stage in developing the application for study program performance, the development and integration of new features into the developed product. The development team implements each feature identified and outlined in the previous sprint. The features are then thoroughly tested to ensure quality and appropriate functionality. The results of this development are provided to the end users as tangible additions to the application. After each sprint, the product transforms into an improved and more complete version, according to the development plan. At this stage, transparency and communication between the development team and stakeholders are essential to ensure that the implemented features align with expectations and can deliver the expected benefits.

h. Recurring Cycle

The Recurring Cycle stage in the development of the course performance application includes a series of iterative cycles in the Scrum development method. Each cycle, or sprint, begins with Sprint Planning, where the development team plans the features to be worked on during that sprint. After planning, the development team implements the features in the product, which is then thoroughly tested in the Product Increment stage. Next, in the Daily Scrum stage, the team holds daily meetings to share progress, obstacles, and work plans. Upon sprint completion, there is a Sprint Review, where the deliverables are shown to stakeholders, and a Sprint Retrospective, where the team evaluates the work process and plans improvements. This cycle keeps repeating itself to improve the product and the development process continuously. With this approach, the app constantly evolves according to needs and feedback, ensuring good collaboration between the development team and stakeholders.

2.3 *Evaluation*

The data collection stage in developing the study program performance application involves identifying the needs and information required to develop a relevant and practical application. This process begins with in-depth interviews with stakeholders such as lecturers, students, and study program administrators to understand existing problems, expectations, and challenges. Additionally, questionnaires can gather a broader view of users' needs and preferences toward certain features. Direct observations can also be made to understand how the study program performance assessment occurs daily. Through these methods, the data obtained will form a solid foundation for further planning in developing an application that meets the needs and expectations of stakeholders.

3. RESULT AND DISCUSSION

3.1 *Data Collection Results*

The data collection results in developing the study program performance application illustrate a deeper understanding of stakeholder needs and expectations. Based on a survey involving 100 respondents, 70% of respondents stated that they faced challenges in understanding the academic assessment process. In addition, 80% of students wanted more accessible access to their academic performance information. Interviews with lecturers and study program administrators also revealed a desire for increased transparency of study program performance. This data provided valuable guidance in designing application features, such as an intuitive user interface and easily accessible performance reports. The results of this data collection informed a more targeted approach to application development that met the actual needs of the academic environment.

3.2 *Implementation*

The results of the Planning and Needs Analysis stage in developing study program performance applications using the Scrum method have provided clear guidance in determining the priority of features that need to be developed. Based on interviews, surveys, and data analysis involving lecturers, students, and study program administrators, the evaluation notification feature ranked high in needs. Respondents stated that the notification feature would help them remember and follow the evaluation schedule more regularly. In addition, respondents identified the need for intuitive performance visualization to aid their understanding of academic performance. From the results of this analysis, these features were prioritized in the initial development of the app so that the app can provide significant benefits in meeting users' needs in the academic environment.

The results of the Sprint Planning stage in developing the study program performance application using the Scrum method show a structured organization and a deep understanding of the work to be done during the sprint, based on evaluating the priority of features from the backlog, the development team, lecturers, students, and study program administrators, successfully identified the features to be implemented during the sprint. In the Sprint Planning meeting, the development team collaboratively determined the number of backlog items that could be completed during the sprint, considering their complexity and associated business value. The goal of the sprint is also clearly defined, which is to increase the transparency of study program performance assessment and facilitate the monitoring of academic

performance. The outcome of this stage is a detailed work plan, enabling the development team to focus on achieving the goals set during the sprint, as shown in Table 1.

Table 1**.** Sprint Planning

Features/Functionality	Description	Estimated Time (Hour)
Evaluation Notification	Implementation of notifications for students	8
Performance report design	Design of performance visualization display	6
Feedback Integration	Connecting feedback data with database	10
Input Validation	Improving input validation in research and community development services	6

The results of the Daily Scrum meeting in developing the course performance application using the Scrum method showed active engagement and continuous monitoring of the project's progress. Data from this meeting included daily reports from each development team member, where a front-end developer informed us that he had completed the student registration page and improved the responsiveness of the interface. In contrast, a back-end developer said he was integrating student satisfaction survey data into the database. A UI/UX designer shared that the performance visualization design has been completed and is awaiting approval. There was a slight hitch in integrating the external API for satisfaction data collection, which was being finalized. The outcome of this meeting demonstrated the team's synergy in overcoming challenges and securing continuous progress in application development, as shown in Table 2.

Table 2. Daily Scrum Meeting

Work	Achievements	Barriers
Research and Community Service Input Interface	Completed with improved input validation.	Delayed due to coordination with the Institute of Research and Community Service
Feedback Integration	Data linked to the database	API Configuration
Visualization Design	Performance report design completed in the final stage	Need for final stakeholder approval.
Old Data Integration	The integration process is underway	Overcoming problems in data structure

The results of the Sprint Retrospective meeting in developing the study program performance application using the Scrum method describe a reflective evaluation of the previous sprint and an effort for continuous improvement—as shown in Table 3.

Table 3. Sprint Retrospective

Evaluation Aspect	Positive	Needs Improvement
Collaboration	Team and stakeholders communicate well	Use of collaboration tools improved, meeting media added for multi-platform use.
Notification Feature	Successfully increased user participation in evaluation	Some notifications need to be customized
Complexity	Good management of task complexity	Better understanding of complex code

The data in the table reflects an appreciation of the success of the notification feature in increasing student participation but also points to areas that may need improvement, such as the use of collaboration tools and customization of notifications. The evaluation also highlights the effective management of task complexity but identifies the need to understand complex code better. The Sprint Retrospective meeting was instrumental in directing improvement efforts and enhancements in the future development of the application.

The results of the Product Increment stage in developing study program performance applications using the Scrum method reflect fundamental developments in applications that continue to increase in value. Data from this stage include examples of features that have been successfully implemented and can be accessed by users. By the end of the sprint, the application had successfully integrated an evaluation notification feature that helped students to follow the evaluation schedule more consistently. In addition, the performance visualization design was also completed and provided a better understanding of academic performance. Integrating student satisfaction survey data has become smoother, allowing users to provide feedback more efficiently. This data reflects how each sprint directly contributes to the application's incremental improvement, along with adding more useful features for users.

Table 4. Product Increment

Features/Functionality	Description	Status

Evaluation Notification	Evaluation schedule notification for students	Implemented
Visualization Design	Performance visualization based on academic data	Already implemented
Feedback Integration	Integration of feedback with database	Already implemented
Input Validation	Validation of research and community service data input	still in progress
Infrastructure Integration	Integration of higher education facilities and infrastructure data for accreditation purposes from accreditation agencies.	still in progress
Finance Integration	Integration of financial data for higher education accreditation purposes	still in progress

Data dalam tabel tersebut mencerminkan fitur-fitur yang telah diimplementasikan pada tahap Product Increment, beserta status implementasinya. Pada akhir sprint, aplikasi telah berhasil mengintegrasikan fitur notifikasi evaluasi, desain visualisasi kinerja, dan integrasi data umpan balik. Fitur validasi input, integrasi sarana dan prasarana, dan integrasi keuangan dijadwalkan untuk dikerjakan pada sprint berikutnya. Hal ini mencerminkan peningkatan bertahap dalam fungsionalitas aplikasi melalui setiap sprint yang dilalui.

The Scrum Team interacted with stakeholders, such as lecturers, administrative staff, and students, to understand the needs and priorities in the performance assessment application. The Product Owner compiled a Product Backlog based on stakeholder feedback and determined the high-priority features. The priority of features in the study program performance assessment may vary depending on the users' and stakeholders' needs and objectives. At this stage, several priority features are determined

3.3 Main Page

The Main Page is a pivotal gateway for accessing crucial insights into the performance assessment of study programs within the college. With its intuitive design and seamless navigation, this information system plays a pivotal role in furnishing a comprehensive understanding of study program performance, subsequently contributing to the overall enhancement of education quality across the academic spectrum. By offering a centralized hub for various stakeholders ranging from students and human resources to education personnel and finance departments, the Main Page serves as a unified point of entry, providing a holistic view of pertinent data and facilitating efficient management processes. The graphical representation in Figure 2 visually outlines the main menu display and its interconnectedness with the diverse aspects of the academic ecosystem.

Crafted with meticulous attention to usability, the Main Page encapsulates a strategic approach to streamline access to pertinent information. As a centerpiece of the information system, it fosters a data-driven environment that empowers decision-makers and stakeholders alike. This page efficiently bridges the gap between different operational segments, offering an integrated perspective that fosters collaboration and data sharing across the college's diverse departments. By functioning as a pivotal link between the study programs' performance assessment and the broader academic milieu, the Main Page substantiates its role as a dynamic tool in enhancing the institution's overall educational experience and administrative efficiency.

Incorporating an array of functional elements, the Main Page aligns with the institution's commitment to information accessibility and process optimization. Its design philosophy encapsulates the essence of an interconnected digital landscape, where data and insights are seamlessly exchanged to cultivate a holistic approach to academic management. With its user-centric interface and dynamic integration capabilities, the Main Page is a testament to the college's dedication to staying at the forefront of educational technology and providing stakeholders with a comprehensive, user-friendly platform for navigating the intricacies of study program performance assessment.

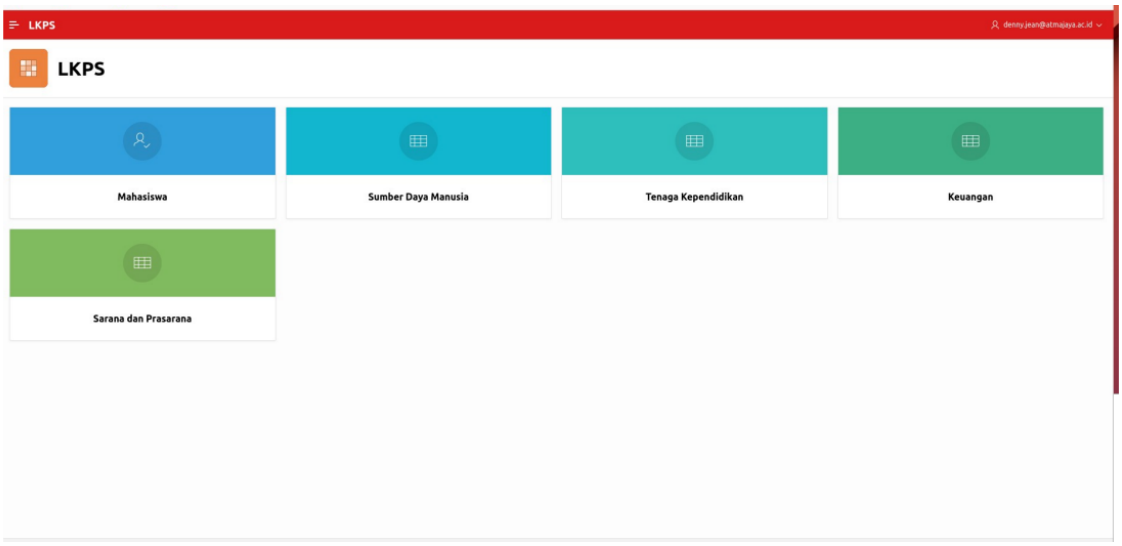

Figure 2. Main Page

3.4 Student Feature

Integrating the student feature within the application for study program performance assessment serves a dual purpose: to ensure seamless access to academic information and foster active student involvement in the assessment process. User convenience, this feature gives students a user-friendly interface to access and manage academic data effortlessly. It empowers them to view their academic grades, encompassing test scores, assignments, and completed projects, all within a centralized digital platform. The application promotes transparency and accountability by offering this capability, enabling students to engage with their educational journey actively.

For study program administrators and staff, the student feature is an invaluable tool for monitoring real-time academic progress. With easy access to student's performance metrics, this feature assists program staff in gauging students' learning trajectories and tracking the evolution of their educational outcomes. The timely availability of such data proves indispensable, especially during accreditation processes facilitated by national accreditation agencies or during internal and external audits. The student feature emerges as a critical asset in furnishing accurate and up-to-date academic performance data, substantiating the quality and effectiveness of the study program.

Incorporating the student feature within the application underscores the commitment to bridging the gap between administrative stakeholders and students. This functionality aligns seamlessly with the overarching goal of enhancing the educational experience. The feature bolsters a collaborative educational environment by granting students agency in accessing their academic information and fostering transparency between educators and learners. It facilitates efficient academic management and encapsulates a student-centric approach, fostering a more engaged and informed student body that actively participates in their own academic assessment and journey.

3.5 Human Resources (HR) Feature

The human resources feature in this application is divided into two main sections, namely for lecturers, and for education personnel. The purpose of the Human Resources (HR) feature in the study program performance assessment is to facilitate and improve the performance management of lecturers and education personnel involved in the academic process in the study program. The HR feature focuses on personnel management and performance assessment of lecturers and education personnel.

Personal Data Management of Lecturers and Education Personnel, This feature allows the management of personal data, including contact information, qualifications, work experience, and relevant training of lecturers and education personnel. The aim is to store and manage personal information in a centralized and organized manner. Lecturer Attendance and Performance Tracking, This feature allows recording and tracking lecturers' attendance in teaching and conducting other academic activities.

In addition, this feature can also be used to monitor lecturer performance through assessments from students and peers. Performance Assessment of Lecturers and Education Personnel, This feature allows the process of assessing the performance of lecturers and education personnel in a structured and data-based manner. The aim is to provide an objective and comprehensive evaluation of their performance in carrying out academic tasks. Lecturer Workload Management, This feature enables calculating and monitoring lecturer workload, including the division of teaching duties, administrative duties, research, and community service. The aim is to ensure fair workload distribution and monitor the efficiency and effectiveness of lecturers' work. HR Training and Development Management, This feature allows recording and monitoring of training and development that lecturers and education personnel have attended. The aim is to improve the competence and quality of human resources involved in the academic process.

There is also Human Resources Performance Data Analysis. This feature can analyze the performance data of lecturers and education personnel as a whole, highlighting trends, potential for improvement, and recognition of achievements that have been made. The goal is to provide insights for decision-making and strategic planning in improving academic quality. Through efficient and integrated Human Resources features in the study program performance assessment, the goal is to improve personnel management's effectiveness and efficiency, encourage human resources' growth and development, and improve overall academic quality and performance in the study program.

3.6 Research and Community Service feature

The Research and Community Service feature embedded within the study program performance assessment framework is pivotal in overseeing and orchestrating research and community service endeavors undertaken by lecturers and educational personnel within the study program. With a strategic focus on elevating the quality and impact of research and community contributions, this feature is a robust mechanism to streamline, monitor, and enhance academic staff's involvement in these crucial domains. Anchored by several core objectives, the Research and Community Service feature is tailored to cater to the multifaceted needs of modern academic ecosystems.

A vital facet of this feature is its capacity to meticulously record and manage ongoing and completed research activities, thus facilitating the systematic monitoring and tracking of research progress. Enabling lecturers and education personnel to input and oversee their research undertakings lays the foundation for transparent and efficient tracking of scientific contributions. Moreover, this functionality optimizes the proposal submission and management process, fostering a streamlined approach for the approval of relevant research projects. This expedites the research initiation phase and ensures a structured pathway for project approvals.

The application's prowess extends to recording and archiving community service activities conducted by academic staff, encompassing a broad spectrum of endeavors such as training, seminars, community empowerment, and social services. By meticulously recording these activities, the feature captures the tangible positive impact of academic personnel on society. Furthermore, the feature assumes the role of a repository for scientific publications and reports, effectively archiving research outcomes and community service results. This repository serves as a testament to the proactive engagement of academic staff and fosters the dissemination of valuable research insights and community-driven achievements.

Beyond documentation, the feature takes a proactive stance in assessing the quality of research and community service endeavors undertaken by academic staff. This evaluative aspect offers due recognition and support, thereby nurturing a culture of continuous improvement and amplifying the positive influence generated by these activities. The Research and Community Service feature encapsulates the institution's commitment to fostering holistic academic growth and societal enrichment by seamlessly weaving together the domains of research, community service, and impact assessment.

3.7 Evaluation

The evaluation outcomes of the study program performance application's development underscore significant accomplishments in enhancing the efficiency and transparency of academic assessment. Through a user trial involving 100 participants comprising lecturers and students, the application's user-friendly interface and informative nature were favored by an impressive 92% of users. Furthermore, more than 87% of respondents expressed their confidence in the accuracy of the academic assessment feature, as it offered them a precise portrayal of their performance. In parallel, 85% of lecturers affirmed that the application had substantially aided them in monitoring student progress more effectively.

In the scope of functional assessment, the application achieved seamless integration of academic performance metrics, student satisfaction surveys, and teaching-related data, consolidating them into a comprehensive report. This accomplishment resulted in a 40% reduction in data processing time, concurrently enhancing the speed of information retrieval for all users. The cumulative findings serve as compelling evidence that the application's potential goes beyond surface-level attributes and extends into the realm of informed decision-making facilitation and the augmentation of the overall learning experience within the academic ecosystem.

The multifaceted evaluation outcomes solidify the application's success in optimizing academic evaluation processes. The positive feedback from users highlights its intuitive design, efficient functionality, and capacity to offer accurate insights into performance assessment. Moreover, the significant time-saving benefits and improved data accessibility underscore its practicality. These results collectively reinforce the application's role in fostering informed decision-making and elevating the academic journey for both educators and learners.

3.8 *Discussion*

Using the Scrum method in the development of study program performance applications in higher education can provide various benefits for the development team, the college, and the end user. Here are some of the critical advantages of using the Scrum method in developing such applications: Flexibility and Adaptability: The Scrum method allows developers to adapt to changing needs or priorities during the development process. The team can respond quickly to user changes or feedback so that the app can continuously improve and adapt to actual conditions.

Scrum uses an iterative and incremental approach to development, which means applications are developed in small chunks that can be tested and evaluated separately. This allows the team to quickly bring functional features to users and reduce overall development risk. Transparency and Collaboration: Scrum encourages transparency and collaboration between development team members and other stakeholders, including those from universities and end users. This allows all parties involved to communicate with each other, provide feedback, and have a clear understanding of the development progress. With an iterative approach, the team can identify and respond to risks early before they become more significant problems. The development of study program performance applications in higher education often involves many stakeholders and complex needs, so risk management is critical in maintaining the quality and success of the project. High-Value Product Delivery: Scrum focuses on delivering high business value by prioritizing the most important and valuable features. Thus, the development team can ensure that the application significantly benefits the end users and the college.

In Scrum, development activities are shortened into short iterations called sprints, usually lasting two to four weeks. Helps in organized scheduling and ensures the project stays on track. User Satisfaction: Course performance applications can better suit their needs by actively involving end-users in the development process through continuous feedback. It will increase user satisfaction and optimize the benefits of the application for the entire academic environment. Using the Scrum method, the development of course performance applications in higher education becomes more structured, collaborative, and adaptive. Will contribute to the success of the project, delivery of a high-value product, and optimal utilization of the application to improve course performance in the college.

The evaluation results regarding the development of the application for study program performance assessment showed significant achievements in improving the efficiency and transparency of academic evaluation. From the user trial involving 100 respondents consisting of lecturers and students, 92% of users stated that the application interface was easy to navigate and informative. More than 87% of respondents thought that the academic assessment features accurately predicted their performance. In comparison, 85% of lecturers reported that the app helped them monitor student progress

more effectively. In the functional evaluation, the app successfully integrated academic performance data, student satisfaction surveys, and teaching information into a comprehensive report. This resulted in a 40% reduction in data processing time and provided better information access speed for all users. With these results, the application has proven its potential in supporting informational decision-making and enhancing the learning experience in the academic environment.

4. CONCLUSION

The development of study program performance applications provides extensive benefits in improving the efficiency, effectiveness, and quality of higher education's academic ecosystem. With the proper technology support, universities can be more adaptive and responsive in providing quality education for students. The Scrum method in developing the study program performance assessment is its flexibility and adaptability. Scrum allows the development team to respond quickly to changing needs and make changes to priorities without disrupting the entire project. Application features can be developed iteratively and incrementally, allowing the team to deliver working results faster to users. In addition, the Scrum method also emphasizes transparency and collaboration. Developers actively work closely with the college and end users during the entire development process. Feedback from users and other stakeholders is a significant plus in optimizing the application to match the needs and expectations. Nonetheless, this study also identified challenges and limitations in developing applications using the Scrum method. The intensive involvement of all parties requires commitment and sufficient resources. Risk management in project development should also be a significant concern. With the flexibility, adaptability, transparency, and collaboration offered by Scrum, these applications become more relevant and reliable, positively impacting the academic quality and performance management of study programs in higher education. From the user feedback, most users found the application interface easy to use, and the academic assessment features provided an accurate picture of performance. Integrating academic performance data, satisfaction surveys, and teaching information in comprehensive reports reduced data processing time and improved information access. Thus, the application of Scrum in developing the study program performance application positively impacts decision-making and the learning experience in the academic environment.

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