 ISSN:2302-8149
e-ISSN:2540-9719

Agile Scrum as a Development Approach: A Case Study of Web-based School Information System Design

[1]Rizky Wandri*, [2]M Rizki Fadhilah, [3]Panji Rachmat Setiawan, [4]Mutia Fadhilla
[1,2,3,4]Program Studi Teknik Informatika, Fakultas Teknik, Universitas Islam Riau
[1,2,3,4]Jl. Kaharuddin Nst No.113 Kota Pekanbaru, Riau, Indonesia
*e-mail: rizkywandri@eng.uir.ac.id

(***received***: 6 May 2025, ***revised***: 20 May 2025, ***accepted***: 21 May 2025)

Abstract

The growing utilization of information technology presents substantial opportunity to enhance efficiency in school administrative activities. Nevertheless, numerous educational institutions continue to employ semi-manual processes with software like Microsoft Word and Excel, thereby significantly heightening the danger of human error. This research employs an Agile development strategy utilizing the Scrum framework to create a web-based school information system that is more efficient and responsive to user requirements. The evaluation results indicate that this system has effectively enhanced administrative efficiency and attained a user satisfaction rate of 95%, demonstrating the successful implementation of the Agile Scrum methodology in the educational setting. This system is anticipated to provide as an efficient solution for the integrated management of student, teacher, staff, and school financial data.

Keywords: information systems, website, agile scrum model, vocational high school

1 Introduction

Computers are currently considered capable of substantially enhancing teaching, learning, and administrative management in educational institutions. Consequently, numerous individuals utilize information technology as a means to fulfill their requirements [1]. Computers are integral to information technology, particularly in expediting data processing for decision-making, thereby yielding information with high precision, accuracy, and timeliness [2]. The evolution of global civilization has transitioned into the internet era through the utilization of mobile phones for web browsing [3]. Individuals' lives become engaging as technology and the internet facilitate greater ease [4]. The progressive advancement of technology has yielded significant advantages for the field of education [5]. Information technology systems have been extensively utilized in education to promote innovative learning approaches [6]. The creation of web applications, currently widely utilized for certain functions, is a consequence of technological advancement [7]. The growing utilization of information technology presents significant opportunity to enhance efficiency in various aspects of school administration; with information technology in place, procedures can be executed more rapidly.

Software development enhances system capability through a framework known as the Software Development Life Cycle (SDLC) [8]. The quality of software and its development process stem from the Software Development Life Cycle (SDLC) methodology, wherein several software development models are formulated and executed, each possessing distinct stages [9]. In research, it is essential to first ascertain the appropriate development approach to ensure that the development process proceeds in an organized manner and aligns with user requirements [10]. Agile Software Development has become an emerging software development process [11]. Agile generates software that is more marketable, cost-effective to manufacture, rapidly adaptable to change, and fosters effective communication between clients and developers [12]. The Agile development approach is significantly more efficient than alternative methodologies. Through a phased methodology and prompt responses to all feedback, Agile maximizes flexibility and customer satisfaction with each software release [13]. This agile development methodology has been sanctioned to expedite the development process, emphasizing the proper management and prioritization of new user requirements [14], [15]. In agile technique, Scrum is a widely utilized framework in which teams collaborate to attain a shared

 ISSN:2302-8149
e-ISSN:2540-9719

objective [16]. Scrum is an Agile approach that prioritizes iterative and incremental development while fostering continuous collaboration among team members during the project development phase [17], [18], [19]. The investigation into the utilization of Agile Scrum methodologies in systems development has escalated throughout the last twenty years. Comprehensive studies have analyzed multiple facets of the Scrum approach, highlighting its growing adoption and application in diverse software development initiatives. Scrum has garnered significant attention due to its adaptability and efficacy in facilitating agile and responsive development.

The growing user base of information technology presents a significant opportunity to enhance efficiency in all facets of school administration. The incorporation of information technology enhances the efficiency of the process's completion. Nonetheless, numerous schools continue to employ semi-manual methods, namely with Microsoft Word and Microsoft Excel apps, resulting in an increased incidence of human mistake. Manual procedures, characterized by conventional data recording and documentation, are labor-intensive, necessitate substantial physical storage, and are susceptible to inevitable human mistake [20]. The creation of a web-based SMK information system is crucial for enhancing the efficiency and efficacy of administrative operations inside SMK. This system is designed for the administration of many management areas, including student management, financial management, teacher and staff management, among others. This study aims to enhance the administrative process by utilizing various management characteristics in schools to provide an effective solution for data management and improve school quality.

Based on the above problems, the problem-solving approach is the need for a school information system development that can be a solution for effective data management in improving school quality. The agile model with the scrum framework is the development model used in this study, because of its characteristics: Scrum is highly structured with clear roles (Scrum Master, Product Owner, and Team) and rituals (Sprint Planning, Daily Standups, Sprint Review, and Sprint Retrospective). Benefits: Enhances effective communication and accelerates feedback cycles between the development team and stakeholders. The Scrum approach, as noted in [21], effectively addresses the issues encountered in the business sector during the creation of website-based information systems. This methodology has been implemented in the educational sector, as demonstrated by research undertaken by [22], which examines the creation of personnel information systems at educational institutions utilizing Agile Development. The development of information systems in educational settings can gain advantages from the iterative framework provided by Agile. For instance, [23] underscores the significance of iterative development to guarantee superior application quality by employing the phases in Agile, which encompass planning, implementation, and testing. The implementation of Agile in information systems facilitates adaptations to evolving requirements, a frequent occurrence in educational institutions [24]. A separate study by [25] examined how the phases of the Agile methodology, including needs analysis and prototype development, may be utilized to create efficient and effective educational information systems. The research by Budhie and Yulia [26] and [27] substantiates that Agile not only offers advantages in the development of web-based systems but is also applicable to diverse information systems in educational institutions, including academic information systems and laboratory management systems. As more educational institutions adopt digital systems for administration and instruction, the significance of the Agile model is becoming increasingly vital.

The innovation of this research is in (1) the integration of cutting-edge features and technology, encompassing the examination of real-time analytics and interactive dashboards for administrators and educators. The agile methodology, prevalent in software development, has been increasingly applied within the education sector, particularly with school information systems. This project will employ the scrum architecture tailored to the distinct requirements and constraints presented by the education industry, including academic cycles and intricate administrative demands. Case studies and local implementation: conducting research in a vocational high school to evaluate the efficacy of the adapted agile approach. The case study results can yield significant insights into the efficacy of the employed methodologies and technologies, as well as the obstacles anticipated on a broader scale. Collaboration and ongoing feedback: input from the established system fosters continual collaboration among authors, educators, and students, with feedback from each stakeholder employed for perpetual product development. Education serves as the cornerstone of national growth, necessitating ongoing enhancement of quality [28]. The Sustainable Development Goals (SDG4) acknowledge that the

 ISSN:2302-8149
e-ISSN:2540-9719

delivery of quality education is an independent objective. This research centers on one of the 17 Sustainable Development Goals, specifically Goal 4, which pertains to the enhancement of productivity and capacity inside educational institutions using the school information system [29].

2 Literature Review

Previous research has indicated that the development of school information systems necessitates an adaptive methodological approach to meet the changing needs of educational institutions. [30] used the Agile method to create a web-based school information system, although the methodology was more general and did not include an in-depth investigation of the Scrum framework, which is an essential component of Agile methods. The iterative approach was used, however the development stages did not clearly relate to Scrum roles and artefacts such as the sprint backlog, scrum meetings, or the role of the product owner, which are common in the methodology. This study suggests the possibility of additional improvement, particularly in terms of a more measurable and collaborative project management framework.

Meanwhile, [31] used the Scrum technique directly when developing a web-based academic information system for high schools. This study focusses on the efficacy of Scrum in developing software that is more responsive to user needs through sprint division and routine evaluation. However, this study is currently limited to academic functions, such as entering grades and schedules, and has not addressed the overall school information system, which includes the integration of personnel components, administration, and internal communication services.

Both studies reveal that using Agile and Scrum to construct school information systems has resulted in great outcomes, however there are still gaps in the context of holistic Scrum implementation in vocational school contexts (SMK). These deficiencies include a lack of complete module integration, low involvement of internal stakeholders in the Scrum process. As a result, the focus of this essay is on the creation of school information systems at SMK YKWI Pekanbaru using the Agile Scrum methodology in its entirety. This study seeks to fill the gap by proposing a development process that fully adheres to Scrum norms while accommodating the unique requirements of SMKs in a single integrated platform.

3 Research Method

This research intends to develop a web-based school information system utilizing the agile methodology. The findings of this study are anticipated to serve as a reference for the system development process. This study involved researchers collaborating with SMK YKWI Pekanbaru during the development phase, which includes the stages in figure 1 below:

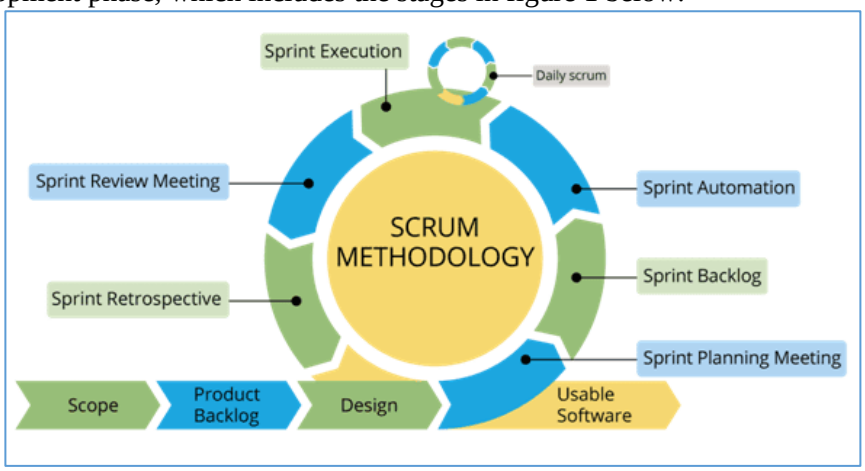

Figure 1. Phases in agile scrum

- **Scope**: the project starts from determining the scope, namely the objectives, needs and expected results..
- **Product Backlog**: a prioritized list of all the feat ures, improvements, and other requirements desired for a product is known as the Product Backlog. This list is maintained by the Product Owner and is the sole source of work the team will perform [32].

 ISSN:2302-8149
e-ISSN:2540-9719

- **Design**: After prioritizing the items on the list, the team designs and prepares for development. This includes technical design, architecture [33] and user experience for the items worked on in the cycle [34].
- **Sprint Planning Meeting**: the sprint planning meeting aims to define and detail the work to be completed during the upcoming sprint, improve collaboration between cross-functional teams and create a culture of continuous improvement [35]. Sprint planning is usually directed at identifying the highest priority backlog items, which are usually user stories, to ensure that the team can deliver maximum value in each iteration [36].
- **Sprint Backlog**: the part of the Product Backlog that is selected to be worked on in a particular sprint is called the Sprint Backlog. A sprint backlog consisting of items selected from a well-defined product backlog [18] will facilitate effective sprint execution, increasing overall team productivity to achieve product quality [37], [38] where this selection process is very important because it aligns development activities with team capacity and project goals [39]. Backlog planning and structuring allows the team to stay focused and adapt to changing requirements [40].
- **Sprint Automation**: In some Scrum teams, automation is applied during the Sprint to automatically test, build, and integrate code. This automation helps maintain quality and speeds up the development process.
- **Sprint Execution**: the period when the team works to complete Sprint Backlog items in Sprint Execution.
- **Daily Scrum (Standup Meeting)**: daily meeting during the Sprint, where the team discusses the work done, the plan for the day, and any impediments that may have occurred. This helps the team stay in sync and adjust the plan if necessary.
- **Sprint Review Meeting**: end of sprint meeting to review results and demonstrate new functionality to partners in the Sprint Review.
- **Sprint Retrospective**: end-of-sprint meeting to evaluate the team's process and how to improve performance in the next sprint.
- **Usable Software**: the end result of each Sprint is usable software that meets the established criteria. This is an Increment of the product that is ready to be used or released and is the accumulation of all backlog items that have been completed during the sprint.

4 Results and Analysis

A. Product Backlog Process Results

This study identifies the Product Backlog stage as the primary foundation for establishing a web-based school information system. The Product Backlog is a dynamically managed collection of prioritized features, enhancements, and requirements specified by stakeholders. Informed by the needs assessment from SMK YKWI Pekanbaru, the Product Backlog was developed, focusing on essential school administration requirements, including student management, financial management, teacher and staff management, along with supplementary features such as interactive dashboards and notification systems. Every backlog item is meticulously detailed with explicit acceptance criteria to ensure the development team comprehends and executes it accurately. Product Backlog management is executed iteratively and adaptively, involving regular assessments and adjustments of priorities informed by stakeholder feedback and the outcomes of preceding sprints. This guarantees that system development stays pertinent to the actual requirements of the school and can adapt swiftly to changes. This method positions the Product Backlog as both a task list and a potent communication instrument between the development team and stakeholders, promoting transparency and robust collaboration. The effectiveness of this phase is evidenced by the organized backlog and defined priorities, facilitating the team's sprint planning and development execution. Table 1 below shows the product backlog as follows:

Tabel 1. Product backlog

No.	Features / Requirements	Priority	Description	Criteria for Acceptance

 ISSN:2302-8149
e-ISSN:2540-9719

1	Student Data	High	A system for inputting, editing and managing student data completely and accurately.	Student data can be added, changed, deleted and searched easily and stored securely.
2	Teachers and Staff	High	Management of teacher and staff data including schedules and absences.	Teacher and staff data can be updated and accessed by relevant parties with appropriate access rights.
3	Student Attendance	High	Daily student attendance recording system and absence recap.	Attendance can be recorded in real-time and attendance reports can be generated easily.
4	Schedule of lessons	Moderate	Setting lesson schedules for classes and teachers.	Schedules can be created, changed, and accessed by teachers and students as needed.
5	Academic Values	High	Recording and managing student grades for various subjects.	Grades can be entered, changed, and reported accurately and are accessible to students and teachers.
6	Digital Report	Moderate	Digital reporting system for various administrative needs.	Reports can be generated and accessed online by relevant users.
7	Educational Funding	High	School financial income and expenditure recording module.	Financial reports can be generated automatically and accurately according to the specified period.
8	Teacher and Staff Attendance	Moderate	Teacher and staff attendance and absence recording system.	Attendance data can be input and reported easily.
9	Incoming and Outgoing Mail	Low	Digital management of incoming and outgoing mail.	Letters can be registered, stored and accessed easily.
10	Guest Book	Low	Guest recording system for visiting the school	Guest data can be recorded and accessed again if necessary.

B. Design Process Results

This school information system was developed utilising the Agile Scrum approach, which focusses not only on project management but also on the system's technical components. The system is constructed with three layers: frontend, backend, and database. Each component has a specific purpose, such as maintaining student, instructor, financial, and academic data, and they are linked together via internal APIs to facilitate module integration. Technically, the backend is created with Laravel since it enables a clean structure via the MVC model and has built-in capabilities like authentication, validation, and route management. The frontend makes use of Bootstrap to ensure that the UI display is responsive and accessible across a variety of devices. Meanwhile, data is kept in MySQL using a table structure that contains user, academic, financial, and transaction information. In the Design stage, the development team conducts technical design and user experience based on the items that have been prioritized in the Product Backlog. This design includes system architecture, database structure, user interface, and system workflow to be developed. Based on the needs that have been identified, the system design is focused on ensuring ease of use, data security, and scalability so that the system can grow according to the school's future needs. The team also pays attention to responsive aspects so that the

 ISSN:2302-8149
e-ISSN:2540-9719

system can be accessed properly through various devices, including desktop and mobile. Technical design includes the selection of appropriate technology, such as web frameworks, database management systems, and integration with supporting modules such as notifications and interactive dashboards. In addition, the user interface design is made with simple and intuitive principles so that users such as teachers, staff, and students can operate the system easily without requiring complicated special training. During this stage, the team also creates an initial prototype that will then be tested and validated in the next sprint. This prototype is the basis for further development and as a visual communication tool between the development team and stakeholders.

Figure 2. Use case of school information system

Figure 2 presents a use case diagram depicting the interactions among the three primary actors in the school information system: Administration, Teachers, and Students, together with the respective data modules they administer or access. The administration is tasked with overseeing guest information, correspondence, master records (including teacher, student, and class data), financial matters, and academic subjects. Educators are responsible for overseeing student grades and attendance, which are subsequently utilized to determine final grades accessible to students following their academic assessment. This system is meant to facilitate administrative and academic operations in an integrated and efficient manner. Several technological issues arose throughout the design phase, including guaranteeing robust module integration using the REST API method and handling user authorisation based on various roles such as admin, instructor, and student. Furthermore, the database architecture took into account the efficiency of the relationships between the primary entities, the majority of which are one-to-many. Query optimisation and data validation management were also prioritised to ensure the system's responsiveness, particularly when multiple users are using it at the same time. The Laravel framework was fully utilised, with middleware features for authorisation, Eloquent ORM for data management, and Blade for structured display integration. The difficulty of producing adaptive displays for multiple devices was met with a combination of Bootstrap and repeated interface testing during each sprint.

C. Results of the Sprint Planning Meeting Process

In the Sprint Planning stage, the Scrum team and the Product Owner meet to determine the items from the Product Backlog that will be worked on in the next sprint. The feature priorities that have been set in the backlog become the main reference in choosing realistic work that can be completed within the sprint duration. In this meeting, the team also sets the Sprint Goal which is the main focus during the sprint. The development team estimates the effort and divides the tasks in detail so that the work can run effectively and efficiently. The

 ISSN:2302-8149
e-ISSN:2540-9719

result of Sprint Planning is the Sprint Backlog, which is a list of work items that will be worked on during the sprint, complete with an implementation plan and completion target. This Sprint Backlog becomes the team's daily guide during sprint execution.

Table 2. Sprint planning meeting

No.	Backlog Features / Items	Effort Estimate (Points)	Sprint Target
1	Student Data	8	The student data input, editing and search system can run well and without errors.
2	Academic Values	8	The student grade recording module for the main subjects is complete and can be tested.
3	Student Attendance	5	Students' daily attendance system can be inputted and attendance reports can be generated.
4	Educational Funding	8	The financial income and expenditure recording module can run and produce reports.
5	Schedule of lessons	5	Lesson schedules can be created, changed, and accessed by teachers and students.
6	Digital Report	3	Digital reporting systems can be used to create and access administrative reports.

In this Sprint Planning Meeting, as shown in table 2, the team selects features with high priority and reasonable effort estimates that can be accomplished within the sprint duration. Therefore, several features such as Teachers and Staff, Teacher and Staff Attendance, Incoming and Outgoing Letters, and Guest Book have not been included in this sprint. These features will be scheduled in the next sprint so that the team can focus on completing the work with the best quality and remain flexible in adjusting to changing needs during the development process. In this Sprint Planning Meeting, the team selected six main features with high priority and appropriate effort estimates to be completed in the sprint, namely Student Data, Academic Grades, Student Attendance, School Finance, Lesson Schedule, and Digital Report. The selection of these features aims to allow the team to focus on completing the work with the best quality and provide direct benefits to the school administration, while other features will be scheduled in the next sprint according to capacity and priority.

D. Results of the Sprint Execution and Daily Scrum Process

In the Sprint Execution phase, the team begins working on the tasks planned in the Sprint Backlog with a focus on completing features according to the sprint target. During this process, the team also holds a Daily Scrum, which is a short meeting every day to report progress, obstacles, and work plans, so that communication remains smooth and problems can be resolved immediately. In this way, system development runs in a coordinated manner and the results continue to develop gradually.

E. Results of the Sprint Review Meeting Process

During the Sprint Review phase, the Scrum team collaborates with stakeholders to assess the outcomes of the work completed in the sprint. The produced features are showcased and evaluated to confirm their alignment with user requirements and expectations. Stakeholder feedback is crucial for identifying necessary improvements or adjustments for the upcoming sprint. This is the developed school information system:

a. System Login Display

 ISSN:2302-8149
e-ISSN:2540-9719

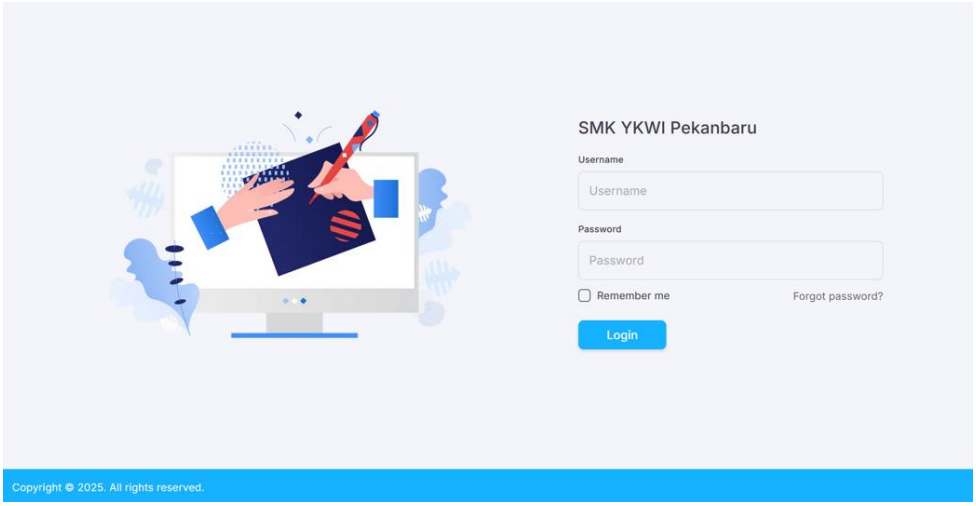

Figure 2. System login view

Figure 2 is the login page used for school users (school operators/admins) to enter the system as users with school user access rights.

b. Main System Dashboard

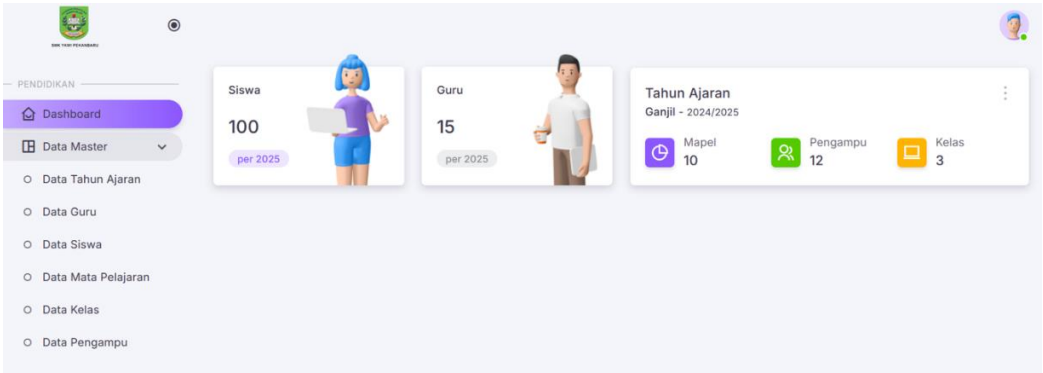

Figure 3. Operator dashboard view

Figure 3 is the main or initial display when the school user successfully logs into the system. On this main page displays information on the number of students, teachers, academic year, number of subjects, lecturers, classes and others.

c. Subject/Teacher Input Display

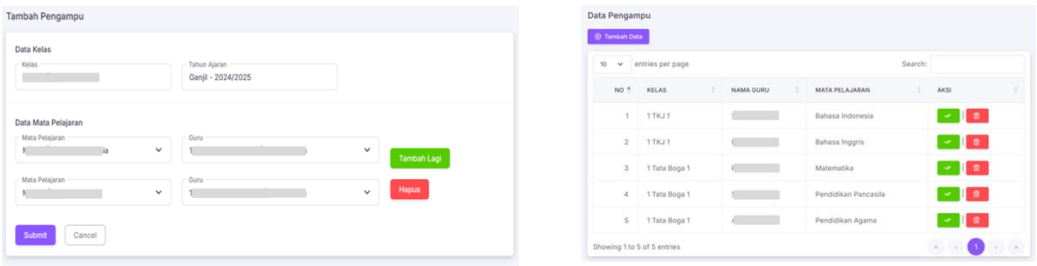

Figure 4. Input display and subject instructor list

Figure 4 displays the subject input per teacher entered by the school operator so that each teacher can see what subjects are being taught in the new semester.

 ISSN:2302-8149
e-ISSN:2540-9719

d. Value Input Display

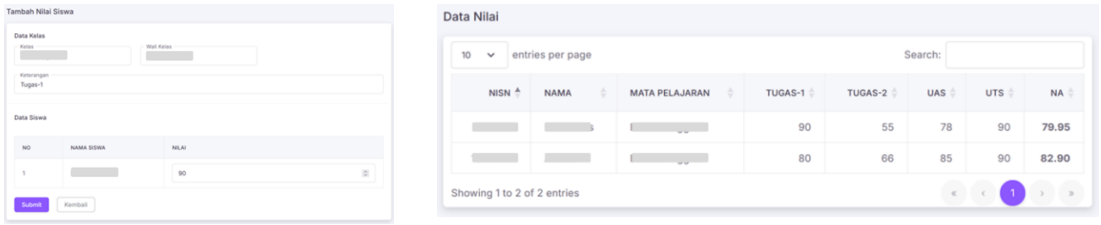

Figure 5. Display of input and value list from teacher

Figure 5 is a display of the value input carried out by the teacher, where the teacher will input each assignment value, mid-term test value and final test value to produce the final value that will appear on the E-Report.

e. E-Report Display

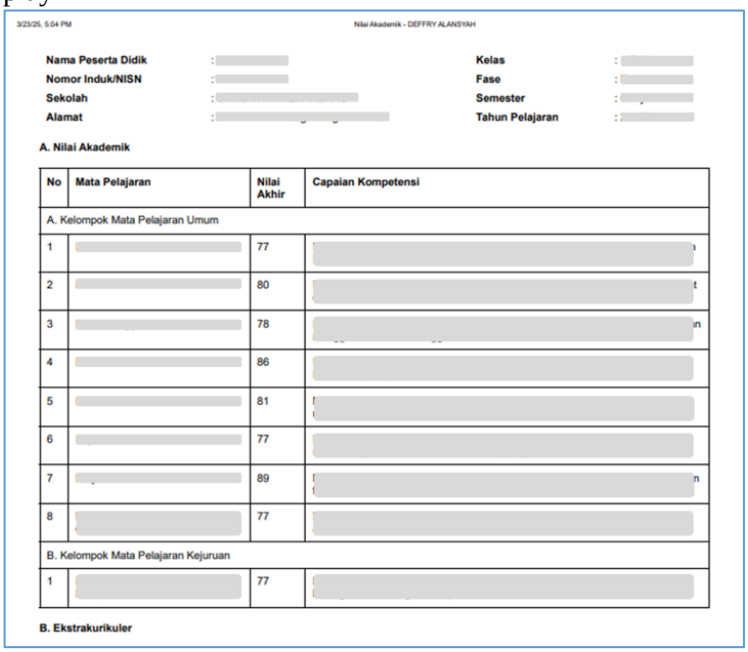

Figure 6. Student e-report display

Figure 6 is a display of each student's E-Report, where there is information on subjects, achievements and final grades of students. The team developed a questionnaire to measure project success by inquiring about users' satisfaction with the system under development. Table 3 below presents the questionnaire scenario that will be administered to the user.

Table 3. Sprint review meeting

No.	Features / Modules	Question Satisfaction 1	Question Satisfaction 2	Rating Scale (1-5)
1	Student Data	How easy is it for you to manage student data using this system?	Is the student data displayed accurate and complete?	1 (Very Dissatisfied) – 5 (Very Satisfied)
2	Teachers and Staff	Does the teacher and staff data management feature help your work?	How quickly can you access teacher and staff data?	
3	Student Attendance	How easy is it to record student attendance in this system?	Are student attendance reports easy to generate and understand?	
4	Schedule of	Is the class schedule easy	How accurate is the	

 ISSN:2302-8149
e-ISSN:2540-9719

	lessons	to organize and access?	displayed lesson schedule?
5	Academic Values	How easy is it for you to input and manage academic grades?	Does the system help you in monitoring the progress of students' grades?
6	Digital Report	Does the digital reporting feature make report creation easier?	How quickly can digital reports be accessed and shared?
7	Educational Funding	How easy is it to use the financial module for record keeping?	Are the financial reports produced accurate and easy to understand?
8	Teacher and Staff Attendance	How easy is it to record teacher and staff attendance?	Does teacher and staff absence reporting help administration?
9	Incoming and Outgoing Mail	Is the management of incoming and outgoing mail running smoothly?	How quickly can letters be registered and accessed again?
10	Guest Book	How easy is it to record guest books in the system?	Is guest data easily accessible again when needed?

Real-time data and interactive dashboards have been integrated into the primary dashboard for school operators as part of the innovation. This function displays the most recent data, including the number of students, subjects, teachers, and more information, immediately upon user updates. Data visualization is presented interactively and comprehensibly, hence fostering collaboration among users. This function is a crucial element in enhancing administrative efficiency and facilitating data-driven decision-making.

F. Sprint Retrospective Process Results

In the Sprint Retrospective stage, the Scrum team reflects together to evaluate the work process during the sprint that has been running. The team discusses what went well, obstacles or barriers faced, and things that can be improved for the next sprint. The goal is to improve the effectiveness of teamwork and product quality continuously.

Table 4. Respondents of the system satisfaction questionnaire

No.	Features / Modules	U-01	U-02	U-03	U-04	U-05	U-06	U-07	U-08	U-09	U-10	U-11
1	Student Data	5, 5	5, 4	5, 5	4, 5	5, 5	4, 4	5, 5	4, 5	5, 5	5, 5	4, 4
2	Teachers and Staff	5, 5	4, 4	5, 5	5, 5	4, 4	4, 3	5, 5	5, 4	5, 5	4, 4	5, 5
3	Student Attendance	5, 5	5, 5	5, 5	4, 4	5, 5	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4
4	Schedule of lessons	5, 5	4, 4	5, 5	5, 5	4, 4	4, 4	5, 5	4, 4	5, 5	4, 4	5, 5
5	Academic Values	5, 5	5, 5	4, 4	5, 5	4, 4	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4
6	Digital Report	5, 5	4, 4	5, 5	5, 5	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4	5, 5
7	Educational Funding	5, 5	5, 5	4, 4	5, 5	4, 4	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4
8	Teacher and Staff Attendance	5, 5	4, 4	5, 5	5, 5	4, 4	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4
9	Incoming and Outgoing Mail	5, 5	5, 5	4, 4	5, 5	4, 4	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4
10	Guest Book	5, 5	4, 4	5, 5	5, 5	4, 4	4, 4	5, 5	5, 5	4, 4	5, 5	4, 4

 ISSN:2302-8149
e-ISSN:2540-9719

To support the validity of the evaluation results, more information on the respondents' profiles and selection is provided below. A total of 11 responders (U-01 to U-11) are teachers at SMK YKWI Pekanbaru, with some also serving as administrative staff (TU) and school operators who actively use the system during the sprint process. Respondents were chosen specifically for their direct engagement in the produced module, such as entering grades, attendance, financial reports, and monitoring student data. It is shown in table 4, the questionnaire completed by 11 system users indicates that nearly all features and modules achieved a high satisfaction level, with most respondents rating them 4 or 5 on the two satisfaction inquiries posed. Attributes including Student Data, Student Attendance, and Digital Report demonstrated a high degree of satisfaction, indicating user perceptions of usability, data precision, and access velocity. Other modules, including Teachers and Staff, Schedule of Lessons, and Academic Values, garnered favorable feedback; nevertheless, there was minor variability in the scores among certain respondents, however all remained above the satisfaction level. This demonstrates that the designed system efficiently fulfills the requirements of school administration and delivers a generally pleasant user experience. Based on the results of the questionnaire filled out by 11 system users, it was found that around 95% of respondents gave a satisfactory assessment (values 4 and 5) to the various features and modules of the system developed. This shows that the Agile Scrum-based information system implemented successfully meets user needs well, provides ease of access, speed of response, and high data accuracy, thereby increasing user satisfaction and work effectiveness in the school environment.

G. Challenges and Efficacy of System Development

During the implementation of Agile Scrum at SMK YKWI Pekanbaru, the team faced two main challenges. First, teachers and staff were not yet accustomed to the iterative method and the use of digital systems, so initial feedback was slow. This problem was overcome through short training and a system demo at the end of the sprint. Second, teachers' limited time due to teaching schedules was overcome by discussions outside of class hours. Overall, Agile Scrum was effective. Daily scrums and sprint reviews helped maintain the work rhythm and ensure the system was as needed. The system was also flexible to changes, such as adjusting the digital report format and grade modules during the development process. Before the system was used, administration was done manually with Word and Excel, taking days per month. After implementation, data entry and search became fast and centralized, reports were automatically presented in seconds, and student attendance could be monitored in real time by homeroom teachers.

5 Conclusion

The application of the Agile development model with the Scrum framework in the development of a web-based school information system has proven effective in increasing the efficiency of the administration process and reducing the risk of human error that often occurs in semi-manual methods. The Scrum approach allows the development of a system that is more flexible and responsive to user needs, resulting in a system that is easy to use and able to support the management of students, teachers, staff, finances, and school administration as a whole. In addition, the results of the questionnaire showed that 95% of users were satisfied with the system developed, indicating that this system was not only technically successful but also well received by users in the field.

Acknowledgement

Thank you to everyone who has offered support and contributions so that this research can be performed appropriately. Thanks are extended to the Islamic University of Riau, particularly to DPPM UIR, for providing the chance to seek financial help through the Penelitian Grant with a Non-Competitive Scheme. This award has provided the resources required to perform more in-depth and thorough research.

 ISSN:2302-8149
e-ISSN:2540-9719

Reference

[1] F. A. H. Ali, M. K. A. M. Sukri, M. Z. Jali, M. Al-Fatih, and M. A. M. Yusof, "*Web-based Reporting Vulnerabilities System for Cyber Security Maintenance*," *Journal of Advanced Research in Applied Sciences and Engineering Technology*, Vol. 29, No. 3, pp. 198–205, Feb. 2023, doi: 10.37934/araset.29.3.198205.

[2] L. Fauziah, A. Firmansyah, and A. Aguswin, "Sistem Informasi Sekolah berbasis *Web* menggunakan Metode *Waterfall* Studi Kasus: SMPI Al-Hudri Walibrah," *Remik: Riset dan E-Jurnal Manajemen Informatika Komputer*, Vol. 8, No. 1, Jan. 2024, doi: 10.33395/remik.v8i1.13371.

[3] C. Y. Tsai, W. L. Shih, F. P. Hsieh, Y. A. Chen, and C. L. Lin, "*Applying the Design-based Learning Model to Foster Undergraduates' Web Design Skills: The Role of Knowledge Integration*," *International Journal of Educational Technology in Higher Education*, Vol. 19, No. 1, Dec. 2022, doi: 10.1186/s41239-021-00308-4.

[4] J. E. Rodriguez, "*Development of Vinzons Pilot High School Online Enrollment with Student Track Identification System*," *Cognizance Journal of Multidisciplinary Studies*, Vol. 4, No. 2, pp. 216–225, Feb. 2024, doi: 10.47760/cognizance.2024.v04i02.020.

[5] A. I. Harahap, R. Dhika Priyatna, and H. P. Figna, "Sistem Informasi Sekolah berbasis Web pada SMA Khatolik Budi Murni 2 Medan," *Indonesian Journal of Education And Computer Science*, Vol. 2, No. 1, 2024.

[6] Faurika, R. S. Pradini, and N. Rikatsih, "Perancangan Prototipe Sistem Informasi Sekolah MTs Darul Manja," *JIKA (Jurnal Informatika) Universitas Muhammadiyah Tangerang*, Vol. 7, No. 4, pp. 423–430, 2023.

[7] M. Solahudin, "Rancang Bangun Sistem Informasi Akademik Sekolah (SIAS) berbasis Web," *DoubleClick: Journal of Computer and Information Technology*, Vol. 4, No. 2, pp. 107–113, 2021.

[8] S. Subhan and I. G. A. Suciningsih, "*Development of Geographic Information System for Government with Extreme Programming and User-Centered Design Methods*," *Jurnal Bina Praja*, Vol. 16, No. 1, pp. 111–126, Apr. 2024, doi: 10.21787/jbp.16.2024.111-126.

[9] O. Obulesu, S. Suneel, S. Jangili, S. Ledalla, B. S. Bindu, and S. R. Borra, "*Secure Aware Software Development Life Cycle on Medical Datasets by using Firefly Optimization and Machine Learning Techniques*," *International Journal of Electrical and Computer Engineering*, Vol. 14, No. 4, pp. 4195–4203, Aug. 2024, doi: 10.11591/ijece.v14i4.pp4195-4203.

[10] Y. E. Rachmad, L. Judijanto, S. S. Pettalongi, T. W. Nurdiani, and D. S. Oetomo, "*Application of Rapid Application Development Method In Designing Customer Relationship Management Systems For National Insurance Companies*," *International Journal of Applied Engineering & Technology Copyrights @ Roman Science Publications Ins*, Vol. 6, No. 1, pp. 2633–4828, 2024.

[11] D. A. P. Zainal, R. Razali, and Z. Mansor, "*Team Formation for Agile Software Development-Crowdsourcing-based Empirical Study*," *Journal of Advanced Research in Applied Sciences and Engineering Technology*, Vol. 34, No. 2, pp. 133–143, Apr. 2024, doi: 10.37934/araset.34.2.133143.

[12] C. Noteboom, K. Sutrave, M. Ofori, and O. El-Gayar, "*Agile Project Management: A Systematic Literature Review of Adoption Drivers and Critical Success Factors*," in *Proceedings of the 54th Hawaii International Conference on System Sciences*, 2021, pp. 6775–6783. [Online]. Available: http://agilemanifesto.org/

[13] I. M. Suartana, P. Puspitaningayu, S. A. Pratama, S. Dwiyanti, Maspiyah, and S. I. Haryudo, "*Modeling Agile Development of Web Application E-Monev using UML," In E3s Web Of Conferences, Edp Sciences*, Apr. 2024. doi: 10.1051/e3sconf/202451302010.

[14] B. Ambrosio-Santiago, P. Bravo-Macedo, E. E. Condeña-Yurarima, E. L. Huamaní, and A. Delgado, "*Mobile Application that Promotes Citizen Participation to Counteract Insecurity in the District of Los Olivos*," *Journal of Advanced Research in Applied Sciences and*

 ISSN:2302-8149
e-ISSN:2540-9719

Engineering Technology, Vol. 31, No. 3, pp. 358–372, Aug. 2023, doi: 10.37934/araset.31.3.358372.

[15] N. Bin Saif, M. Almohawes, and S. M. Jamail, "*The Impact of User Involvement in Software Development Process*," *Indonesian Journal of Electrical Engineering and Computer Science*, Vol. 21, No. 1, pp. 354–359, 2021, doi: 10.11591/ijeecs.v21.i1.pp.

[16] S. Thiyagarajan, P. R. M. Saldanha, R. Govindan, K. C. Leena, and P. V Prathyusha, "*Development of Agile Scrum Perception Tool to Evaluate Students' Opinions on Agile Methodology in Nursing Education*," *Int J Appl Basic Med Res*, Vol. 14, No. 1, pp. 35–41, 2024, doi: 10.4103/ijabmr.ijabmr_423_23.

[17] D. Setiawan, F. Fatimah, and D. Primasari, "Pengembangan Sistem Informasi Duta Inovasi Desa berbasis Web menggunakan Scrum," *Jurnal Processor*, Vol. 18, No. 1, 2023, doi: 10.33998/processor.2023.18.1.191.

[18] C. Diantoni, O. Komarudin, and A. Rizal, "Arsitektur MVVM dan *Framework Jetpack Compose* pada Pengembangan Aplikasi Android," *Jati (Jurnal Mahasiswa Teknik Informatika)*, Vol. 8, No. 3, pp. 3216–3224, 2024, doi: 10.36040/jati.v8i3.9638.

[19] F. Suarezsaga, D. Nugraha, and A. Y. A. Putra, "Pengembangan Sistem Informasi Perjalanan Dinas menggunakan Kerangka Kerja Scrum," *Jurnal Algoritma*, Vol. 19, No. 2, pp. 832–842, 2022, doi: 10.33364/algoritma/v.19-2.1243.

[20] L. Anggraeni, M. Dliyaul Haq, and H. Putri Pertiwi, "*Development of School Exam Administration based on LCDP with Scrum Method: An Innovation in Administrative Efficiency in Education*," *Scientific Journal of Informatics*, Vol. 11, No. 2, pp. 273–286, 2024, doi: 10.15294/sji.v11i2.27.

[21] S. H. Nova, A. P. Widodo, and B. Warsito, "Analisis Metode *Agile* pada Pengembangan Sistem Informasi berbasis *Website: Systematic Literature Review*," *Techno Com*, Vol. 21, No. 1, pp. 139–148, 2022, doi: 10.33633/tc.v21i1.5659.

[22] S. Suhari, A. Faqih, and F. M. Basysyar, "Sistem Informasi Kepegawaian menggunakan Metode *Agile Development* di CV. Angkasa Raya," *Jurnal Teknologi Dan Informasi*, Vol. 12, No. 1, pp. 30–45, 2022, doi: 10.34010/jati.v12i1.6622.

[23] I. M. Iqbal, M. F. Rafid, A. P. Pradipa, R. Wijaya, and E. Hikmawati, "Pengembangan Sistem Informasi JaBol sebagai Sarana Pelaporan dan Edukasi Jalan Rusak," *Jurnal Ilmiah Fifo*, Vol. 15, No. 2, p. 138, 2024, doi: 10.22441/fifo.2023.v15i2.005.

[24] M. Hilmyansyah, M. Malabay, H. Simorangkir, and Y. Yulhendri, "Implementasi Metode Scrum pada Pembangunan Sistem Informasi Monitoring Progress Proyek berbasis Web (Studi Kasus: PT Quatra Engineering Mandiri)," *Ikraith-Informatika*, Vol. 6, No. 3, 2022, doi: 10.37817/ikraith-informatika.v6i3.2198.

[25] V. J. Wulandari, D. G. Purnama, A. A. Khan, E. D. Juniar, and D. Islamiyati, "Pengembangan Sistem Informasi Pariwisata Wilayah Ciayumajakuning berbasis *Website*," *Jurnal Teknologi Informatika Dan Komputer*, Vol. 10, No. 1, pp. 1–16, 2024, doi: 10.37012/jtik.v10i1.2019.

[26] D. H. A. Budhie and E. R. Yulia, "Perancangan Sistem Informasi Badan Kerjasama Antar Desa UPK Simpan Pinjam berbasis *Website* Kecamatan Somagede," *Computer Science (Co-Science)*, Vol. 2, No. 2, pp. 117–126, 2022, doi: 10.31294/coscience.v2i2.1373.

[27] F. P. E. Putra, Moh. N. Arifin, K. Z. Imam, E. Saputra, and Sofiyullah, "Pengembangan Sistem Informasi Laboratorium Terintegerasi Sistem Akademik menggunakan *Agile Scrum*," *Jurnal Informasi Dan Teknologi*, pp. 109–119, 2023, doi: 10.37034/jidt.v5i2.367.

[28] A. Syafii, Bahar, Shobicah, and A. Muharam, "Pengukuran Indeks Mutu Pendidikan berbasis Standar Nasional," *Jurnal Multidisiplin Indonesia (JMI)*, Vol. 02, No. 07, pp. 1697–1701, 2023, [Online]. Available: https://jmi.rivierapublishing.id/index.php/rp

[29] M. A. Camilleri and A. C. Camilleri, "*The Sustainable Development Goal on Quality Education*," *The Future of the UN Sustainable Development Goals: Business Perspectives for Global Development in 2030*, pp. 261–277, 2020.

[30] H. R. Sanjaya, L. Situmorang, M Syahrul, L. Kalmany, and R. W. P. Pamungkas, "Pengembangan Sistem Ujian Online berbasis Mobile dengan *Agile-Scrum* untuk meningkatkan Efisiensi dan Pengalaman Pengguna," *Jurnal Kecerdasan Buatan dan Teknologi Informasi*, Vol. 4, No. 1, pp. 60–69, Jan. 2025, doi: 10.69916/jkbti.v4i1.209.

 ISSN:2302-8149
e-ISSN:2540-9719

[31] U. Sholikhah, B. Rosyadi, S. R. Wahzuni, S. Ulfa Alasna, K. Fitria, and P. Maharani, "Perancangan Sistem Informasi Sekolah berbasis *Website* pada MI Manbail Futuh Jenu Tuban *Design of School Profile Information System based on Website at MI Manbail Futuh Jenu Tuban*," *IJIS Indonesian Journal on Information System*, Vol. 9, No. 9, p. 120, Sep. 2024.

[32] I. Nugraha and F. Abdussallam, "*Design of the Population Information System in the Village of Pajajaran*," *Journal of Applied Engineering and Technological Science*, Vol. 4, No. 1, pp. 190–201, 2022.

[33] S. Atay, C. T. Müftüoğlu, M. Şahin, and S. Ceylan, "*Design of a Web based Career Counselling Information System: Türkiye Case*," *Educ Inf Technol (Dordr)*, 2024, doi: 10.1007/s10639-024-12659-2.

[34] R. Isa, S. Othman, A. S. Ali, N. Azizan, and J. Ferguson, "*Prototype Development of Final Year Project Management System to Monitor Student's Performance*," *Journal of Advanced Research in Applied Sciences and Engineering Technology*, Vol. 40, No. 1, pp. 164–173, Oct. 2024, doi: 10.37934/araset.40.1.164173.

[35] O. A. Popoola, H. E. Adama, C. D. Okeke, and A. E. Akinoso, "*Conceptualizing Agile Development in Digital Transformations: Theoretical Foundations and Practical Applications*," *Engineering Science & Technology Journal*, Vol. 5, No. 4, pp. 1524–1541, 2024, doi: 10.51594/estj.v5i4.1080.

[36] S. A. Butt *et al.*, "*A Software-based Cost Estimation Technique in Scrum using a Developer's Expertise*," *Advances in Engineering Software*, Vol. 171, p. 103159, 2022, doi: 10.1016/j.advengsoft.2022.103159.

[37] N. F. Wibawanto, Y. P. Astuti, N. A. S. Winarsih, G. W. Saraswati, and M. S. Rohman, "Sistem Permohonan Ijin berbasis *Website* menggunakan *Framework Laravel* dengan Metodologi Scrum," *Jurnal Manajemen Informatika Dan Sistem Informasi*, Vol. 6, No. 1, pp. 100–113, 2023, doi: 10.36595/misi.v6i1.753.

[38] I. G. N. Suryantara, M. Michael, J. F. Andry, and J. A. Ginting, "Pengembangan Aplikasi Operasional Restoran dengan *Framework* Scrum (Studi Kasus: Restoran PT.XYZ)," *Infotech Journal of Technology Information*, Vol. 9, No. 2, pp. 117–128, 2023, doi: 10.37365/jti.v9i2.168.

[39] J. Pasuksmit, P. Thongtanunam, and S. Karunasekera, "*Story Points Changes in Agile Iterative Development*," *Empir Softw Eng*, Vol. 27, No. 6, 2022, doi: 10.1007/s10664-022-10192-9.

[40] K. Pechlivanidis and G. Wagenaar, "*Rapid Delivery of Software: The Effect Of Alignment on Time to Market*," pp. 351–365, 2022, doi: 10.1007/978-3-031-21388-5_24.