

DEVELOPMENT OF LEARNING ACHIEVEMENT (CP) MONITORING MODULE AND INTEGRATED SUMMATIVE ASSESSMENT WHATSAPP GATEWAY AT SIAKAD (CASE STUDY: SDN JULUK I)

Ach. Dedi Kurniawan¹, Arda Gusema Susilowati², Miftah Farid³

Informatics Study Program, Faculty of Engineering, Wiraraja University, Indonesia

Email: dedik3344@gmail.com¹, arda_wiraraja.ac.id²

Abstract

Keywords:

*Summative Assessment,
Learning Outcomes,
SIAKAD,
WhatsApp Gateway.*

The implementation of the Independent Curriculum in elementary schools requires systematic monitoring of Learning Outcomes (CP) and Summative Assessments, but at SDN Juluk I the process is still carried out conventionally and semi-manually so that the recapitulation of grades becomes less efficient, the principal cannot monitor student performance in real-time, and the distribution of learning results to parents is relatively slow. This research aims to develop a CP Achievement Monitoring Module and Summative Assessment on the Academic Information System (SIAKAD) of SDN Juluk I which is integrated with WhatsApp Gateway. The system was developed using the Research and Development method with a waterfall model, including the needs analysis stage, system design using use case diagrams, data flow diagrams, and flowcharts, implementation using PHP Native and MySQL databases, and system testing. The system provides multi-role access rights for Admins, Teachers, Principals, and Students, and implements a message queue mechanism to maintain the stability of sending grade notifications in bulk via WhatsApp. Functional testing using the Black Box Testing method produced a 100 percent success rate out of 50 test scenarios. Usability testing using the System Usability Scale (SUS) on 42 respondents resulted in an average score of 76.67, exceeding the initial research hypothesis of 75 percent so that the research hypothesis was accepted. These results show that the system has a good level of usability, is easy to use, and is feasible to implement as a support for monitoring learning achievement and summative assessment at SDN Juluk I.

This is an open access article under the [CC BY-NC-SA 4.0](https://creativecommons.org/licenses/by-nc-sa/4.0/) license



INTRODUCTION

Digitization of education through the Academic Information System (SIAKAD) in elementary schools is an urgent need to support the effectiveness of the Independent Curriculum, especially in managing and monitoring Learning Outcomes (CP) systematically [1]. Assessment no longer only focuses on absolute numbers, but on monitoring the achievement of Learning Objectives (TP) and CP as measured through assessment stages, so that the integration of technology in the school system is needed to strengthen transparency and the involvement of parents in monitoring children's academic development quickly and accurately [2].

In reality, academic recording at SDN Juluk I still faces obstacles. The current grade recording system has not been fully adapted to the structure of the Independent Curriculum so that CP recapitulation and summative assessment are still carried out separately or semi-manually, increasing the administrative burden of teachers and prone to recording errors. In addition, there is a communication gap between the school and the student's parents because information on learning progress is only known to parents at the end of the semester, without a fast and real-time notification mechanism.

Based on these problems, this study developed an additional module in SIAKAD that specifically manages academic data for the Independent Curriculum, focused on monitoring the achievement of CP and Summative Assessment, and integrated with WhatsApp Gateway to overcome delays in information to parents. The formulation of the research problem includes how the application can facilitate teachers to ensure that learning is in harmony with the CP target, how the system processes and recapitulates summative assessment scores effectively, and how the integration of WhatsApp Gateway can ensure the delivery of assessment results to parents quickly and precisely. The purpose of the research is to produce a monitoring application that facilitates the alignment of teachers' teaching with CP targets, build automatic and structured processing of summative assessment score data, and implement WhatsApp Gateway to distribute assessment results reports in real-time. The research hypothesis stipulates that the developed system is expected to achieve a System Usability Scale (SUS) score of at least 75 percent as an indicator of good user acceptance.

LITERATURE REVIEW

Research [3] designed a web-based academic information system at SMK Wira Harapan using PHP and MySQL to overcome conventional data management, and produced a platform that cuts manual bureaucracy and minimizes human error in value input. Research [4] builds a web-based academic information system at SD Inpres Code using the Modified Waterfall model and performance testing using GTMetrix, Lighthouse, and Apache JMeter, and obtained a high level of user satisfaction from admins, teachers, and principals. Research [5] applies WhatsApp API Gateway as a real-time notification medium for service monitoring, and proves that notifications can be sent consistently with low latency as long as the server connection is stable. The three studies are a reference that the integration of PHP and MySQL-based academic information systems with WhatsApp notification channels is a feasible approach to be applied to the case study of SDN Juluk I.

Web-based SIAKAD is a digital transformation effort to unify academic data governance into one centralized system, thereby reducing the administrative burden of educators and expanding transparency of information access for school management and parents [6]. Learning Outcomes (CP) serves as a reference for teachers in compiling Learning Objectives (TP) and learning scenarios for each phase of student development [7], while Summative Assessment is an evaluation instrument at the end of the learning period that is the basis for determining report card scores and grade progression [8]. PHP Native was chosen as the foundation of server-side processing because it provides full authority for developers to optimize memory and script execution efficiency without the additional burden of the framework [9]. WhatsApp Gateway is an Application Programming Interface (API) that connects the system with the WhatsApp server

so that notification messages can be sent programmatically without manual interaction [10]. The feasibility of using the system is measured using the System Usability Scale (SUS), a standard instrument containing 10 statements on a Likert scale of 1-5 that produce a score of 0-100 and is interpreted into the categories of Acceptability Range, Grade Scale, and Adjective Rating [11].

RESEARCH METHODS

This research uses the Research and Development (R&D) method with the Waterfall development model, because each stage is carried out systematically and sequentially, starting from needs analysis to system maintenance. The research stages include problem identification, literature study, data collection, needs analysis, system design, implementation, system testing, and operation and maintenance. Problem identification shows that the submission of summative assessment results to parents is still carried out manually through report cards, while teachers have difficulty monitoring the achievement of each student's CP because an integrated monitoring system is not available.

The system development used a laptop with an Intel Core i7 processor and 32 GB of RAM, Visual Studio Code software as a code editor, XAMPP as a local server for Apache, MySQL, and PHP, and Google Chrome for interface testing. Data were collected through direct observation of the grading process, interviews with principals and classroom teachers, literature studies on previous research, and questionnaires to measure the ease of use of the system. The test data involved 42 respondents consisting of 1 principal, 1 admin, 10 teachers, 15 students, and 15 parents at SDN Juluk I.

The system design is illustrated through a use case diagram that maps the interaction of Admins, Teachers, Principals, and Students with the system; flowcharts that describe the flow of the login process, data management, and notification delivery; and Data Flow Diagram (DFD) Level 0 which shows the data flow between the Admin entities, Class Teachers, Students, and Principals with the core processes of SIAKAD CP Monitoring and Summative Assessment. Admins have full access rights to manage student master data, teachers, classes, subjects, CP configurations, as well as WhatsApp Gateway API settings and message queues. The Principal validates the submission of teachers' daily activities and summative assessment results before the system executes automatic notification sending to the student's guardian, with a delay (sleep) on each message to maintain server stability and prevent blocking of sender numbers. The database is designed with main tables including users, teachers, students, learning outcomes, and daily agendas that are related to each other to support the process of recording grades accurately and in real-time.

System testing uses two methods. Black Box Testing is used to test system functionality based on needs without looking at the program code, with valid, invalid, and empty data scenarios in the login features, master data management, input of summative assessment values, and notification delivery. The success rate is calculated by equation (1): Success Percentage = (Number of Successful Test Cases / Total Test Cases) x 100%. System Usability Scale (SUS) is used to measure the ease of use of the system through 10 statements on a Likert scale of 1-5. The SUS score is calculated by subtracting the value of the odd question by 1, subtracting the value of 5 with even question answers, adding the entire score, then multiplying it by 2.5 so that the final score is obtained in the range of 0 to 100.

RESULTS AND DISCUSSION

The design results result in an integrated SIAKAD interface for four user roles. Admins manage master data and curriculum hierarchy through the Home, Manage Users, Academic Data, Independent Curriculum, and WhatsApp Gateway Settings pages. Teachers compile daily agendas and evaluate students' summative assessments. Principals validate evaluation results before distributing them through WhatsApp Gateway. Students can take digital exams and monitor their learning score history independently. The WhatsApp Gateway Settings page

provides API key configuration forms and customizable notification message templates using the variables of student name, subject, and grade.

Functionality testing was carried out on 50 test cases which included the authentication process, master data management, value input, and notification delivery. All scenarios produced the expected output, resulting in a 100% (50/50) success rate, which proved that all system functions were running according to the user's needs and were free from functional errors.

Usability testing of 42 respondents resulted in an overall average score of 76.67 which is in the Acceptability Range Acceptable with Grade Scale C+ and Adjective Rating Good. The recapitulation of scores per respondent category is shown in Table 1.

The test results showed that the system was not only functionally valid (100% Black Box Testing) but also had a good user acceptance rate (76.67 SUS score), so the research hypothesis that set a minimum score of 75% was accepted. The group of users managing the system such as Principals (87.50), Admins (85.00), and Teachers (83.50) gave an Excellent rating because the interface was considered efficient in cutting administrative burden, while Students (76.00) and Parents/Guardians (71.50) gave slightly lower scores but remained in the Acceptable category, considering the need for an adaptation phase to WhatsApp Gateway notifications. The advantages of the system include increased effectiveness of real-time learning monitoring, ease of summative assessment management, full integration with SIAKAD, automatic notifications to parents, and reduced use of manual documents. The system's disadvantages include reliance on internet connections and WhatsApp Gateway's third-party services, as well as training needs for users who are not familiar with web-based systems.

Table 1. System Usability Scale (SUS) Score Recapitulation

Category Responden	N	Skor SUS (Rating)
Principal	1	87,50 (Excellent)
Admin/Operator	1	85,00 (Excellent)
Teacher Teacher	10	83,50 (Excellent)
Students	15	76.00 (Good)
Parents/Guardians	15	71.50 (Good)
Average	42	76.67 (Good)

Source: Primary data, SUS test results (2026)

CONCLUSION

The WhatsApp Gateway Integrated Summative Learning Achievement and Summative Assessment Monitoring Module at SIAKAD SDN Juluk I was successfully developed using the Waterfall method with the PHP Native programming language and MySQL database. The system helps teachers manage learning data, makes it easier for schools to monitor students' academic progress, and improves communication with parents through automatic notifications. The Black Box Testing test produces a 100% success rate, while the System Usability Scale (SUS) test produces an average score of 76.67 which exceeds the initial hypothesis of 75%, so the system is declared feasible to be implemented to support learning achievement monitoring and summative assessment at SDN Juluk I. Further development is suggested in the addition of learning outcome development analysis features in the form of interactive dashboards, expansion of integration to other communication channels, and improvement of data security aspects through encryption and periodic backups.

ACKNOWLEDGMENTS

The author expressed his gratitude to the Dean and Head of the Informatics Study Program, Faculty of Engineering, Wiraraja University, the supervisors, all lecturers of the Informatics Study Program, and SDN Juluk I who have provided permission and support as a research location so that this research can be completed properly.

BIBLIOGRAPHY

- Bangor, A., Kortum, P., & Miller, J. (2009). Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale. *Journal of Usability Studies*, 4(3), 114–123.
- Febrianti, D. R., & Nugroho, S. (2022). The Application of WhatsApp API Gateway as a Real-Time Notification Media to Improve Service Monitoring. *Journal of Information Technology and Systems (JUTISI)*.
- Hakim, L., Kristanto, S. P., Shodiq, M. N., & Amaliyah, E. (2021). Web-Based Cash Receipt and Disbursement Application and WhatsApp Gateway. *Journal of Compact Technology*, 15(1), 13.
- Hanifah, N., Laherah, T., Vichaully, Y., & Prihantini, P. (2023). The Role of Parents in the Implementation of the P5 Independent Curriculum in Elementary Schools. *Tambusai Education Journal*, 7(3), 28786–28790.
- Ministry of Education and Culture. (2022). *Learning and Assessment Guidelines for Early Childhood, Primary and Secondary Education*. Jakarta: Education Standards, Curriculum, and Assessment Agency.
- Laia, Y., & Siahaan, M. (2024). Design of a Web-Based School Academic Information System Case Study of SMK Wira Harapan. *Journal of Informatics Student Research and Application (JRAMI)*.
- Magdalena, I., Fauzi, H. N., & Putri, R. (2020). Analysis of Student Learning Evaluation Based on the 2013 Curriculum on the Theme of the Beauty of Togetherness in Class IV SD Negeri 14 Pagi East Jakarta. *Journal of Education and Da'wah*, 2(1), 170–187.
- Nugraha, F., & Setiawan, A. (2022). Application of the Waterfall Method in the Development of Web-Based Elementary School Academic Information Systems. *Journal of Informatics and Information Systems Management (JMISI)*, 5(2), 110–118.
- Nurak, F. G. D., Chandra, C. J., & Rozady, M. P. N. (2025). Web-Based Academic Information System at Elementary School Presidential Instruction Code. *HOAQ: Journal of Information Technology*.
- Pratama, R. A., & Hidayat, T. (2022). Implementation of Native PHP Programming Language in the Development of Web-Based Management Information Systems. *Journal of Informatics and Software Engineering (JATIKA)*, 3(2), 112–120.
- Sukanto, R. A., & Shalahuddin, M. (2018). *Structured and Object-Oriented Software Engineering*. Bandung: Informatics.
- Suparni, S., Sarwanto, S., & Sudrajat, A. (2023). Development of Assessment Information Systems to Improve the Effectiveness of Grade Processing at the Elementary School Level. *ELSE (Elementary School Education Journal)*, 7(1), 97–110.