

AN INTEGRATED TEACHER-ALUMNI-STUDENT INFORMATION SYSTEM FOR DATA-DRIVEN CURRICULUM MANAGEMENT: A DEVELOPMENT AND FEASIBILITY STUDY AT AN INDONESIAN SENIOR HIGH SCHOOL

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Abstract

The increasing digital transformation of educational institutions has intensified the need for integrated school information systems that extend beyond administrative automation to support evidence-based curriculum management. Despite the widespread adoption of digital technologies in schools, most existing information systems operate in isolated functional domains, resulting in fragmented management of teacher, student, academic, and alumni data. This fragmentation constrains the availability of comprehensive and timely information required for curriculum planning, implementation, monitoring, and continuous improvement. Grounded in the principles of Educational Management Information Systems (EMIS) and data-driven decision-making, this study aimed to develop and evaluate an integrated Teacher, Student, and Alumni Information System (SIGANSA) to strengthen curriculum management through centralized and real-time educational data. The study employed a Research and Development (R&D) approach based on the Four-D (4D) model, comprising the Define, Design, Develop, and Disseminate phases. Data were collected through observations, semi-structured interviews, documentation, and questionnaires, while the system was evaluated by 80 teachers and educational staff to assess its practicality and feasibility. The developed system successfully integrates teacher administration, student records, academic management, and alumni tracer study data within a unified web-based platform, enabling comprehensive educational data management across multiple administrative functions. Evaluation results demonstrated a practicality score of 93.45% and a feasibility score of 97.92%, indicating that the system is highly practical and highly feasible for institutional implementation. Beyond demonstrating successful system development, this study contributes empirical evidence that integrating multi-dimensional educational data into a unified information system enhances the capacity of schools to implement data-driven curriculum management, thereby supporting more informed curriculum planning, implementation, monitoring, and evaluation. These findings underscore the strategic role of integrated educational information systems in advancing digital transformation, strengthening institutional governance, and improving curriculum management practices in secondary education.

Keywords: *Curriculum Management, Digital Transformation, Research and Development, School Information System, SIGANSA.*

INTRODUCTION

The rapid digital transformation of education has fundamentally reshaped the way schools manage educational resources, administrative processes, and curriculum implementation (Duraes et al., 2024). Beyond improving operational efficiency, digital technologies are increasingly

recognized as strategic instruments for supporting evidence-based educational governance through systematic data collection, integration, analysis, and utilization. Within this context, Educational Management Information Systems (EMIS) have emerged as an essential infrastructure for enabling schools to transform

fragmented administrative records into meaningful information that supports educational planning, monitoring, evaluation, and continuous improvement (Vakaliuk et al., 2025). International organizations, including UNESCO, emphasize that well-designed EMIS provide reliable educational data that strengthen institutional governance and improve the quality of educational decision-making, while the OECD highlights the importance of educational data ecosystems and curriculum analytics in promoting responsive and adaptive curriculum development. Consequently, the effectiveness of curriculum management is increasingly dependent on the availability of integrated educational information capable of supporting data-driven decision-making throughout the curriculum lifecycle (Hafizoh, 2025; Muqdamien et al., 2021).

Curriculum management has therefore evolved from a predominantly administrative function into a strategic process requiring comprehensive, timely, and reliable information. Contemporary curriculum management encompasses not only curriculum planning and implementation but also continuous monitoring, evaluation, and refinement based on empirical evidence generated from multiple educational stakeholders (Mania et al., 2025; X. Wang, 2025). The increasing emphasis on evidence-based curriculum management reflects a broader paradigm shift in educational administration, where institutional decisions are expected to be supported by integrated educational data rather than isolated administrative reports. Accordingly, school information systems are no longer viewed merely as digital administrative tools but as strategic platforms capable of generating actionable knowledge that informs curriculum development and educational quality improvement (Hidayati, 2022; Patingki et al., 2025).

In Indonesia, the implementation of the

Merdeka Curriculum has further intensified the demand for integrated educational information systems capable of supporting curriculum management through comprehensive educational data (Muhamad et al., 2025). Schools are required to manage information related to teachers, students, learning activities, assessments, school administration, and graduate outcomes efficiently to facilitate curriculum planning, implementation, monitoring, and evaluation (Hamid & Aslan, 2025). Digital transformation has consequently become a strategic priority for improving educational governance, institutional accountability, and service quality. Nevertheless, despite the increasing adoption of digital technologies, the implementation of school information systems remains largely fragmented, with most applications developed independently to support specific administrative functions rather than integrated institutional management (Malik et al., 2026; Kristanti & Putra, 2025).

This fragmented implementation represents an important technical gap in current educational practice. Existing school information systems generally manage teacher administration, student records, academic services, school administration, and alumni information through separate applications with limited interoperability (Ketut & Purnamayanti, 2025; Faizah & Fathonah, 2021). Such fragmentation frequently results in redundant data entry, inconsistencies among institutional databases, inefficient reporting procedures, and limited accessibility of information across organizational units. As a consequence, educational data are often underutilized despite their potential value for supporting institutional decision-making and curriculum management (Nugraha & Rochimat, 2025).

Beyond these technical limitations, a more fundamental knowledge gap remains insufficiently addressed in the existing literature. Previous studies have

consistently demonstrated that web-based school information systems improve administrative efficiency, facilitate information access, and enhance educational service delivery (Desai et al., 2024). However, the majority of these studies evaluate information systems primarily from technological perspectives, such as usability, functionality, system quality, or user satisfaction, while providing limited empirical evidence regarding how integrated educational information systems contribute to curriculum planning, implementation, monitoring, and evaluation (Putri et al., 2025). Furthermore, alumni information and tracer study data are commonly treated as independent administrative components rather than strategic feedback mechanisms capable of informing curriculum evaluation and continuous curriculum improvement. Consequently, current knowledge remains limited regarding the extent to which integrated educational data can strengthen evidence-based curriculum management within secondary education (Ahyani & Dhuhani, 2024; Reid & Ivenz, 2025).

Preliminary observations conducted at State Senior High School 1 Semarang illustrate these challenges. Teacher administration, student records, academic management, school administration, and alumni information are currently maintained through multiple independent systems that require repeated data entry and manual coordination across departments. Interviews with teachers, administrative personnel, and school management revealed that administrative processes remain time-consuming, institutional data are insufficiently integrated, and curriculum-related decision-making is rarely supported by comprehensive educational information (Li, 2026). Although stakeholders expressed strong readiness to adopt an integrated digital platform, existing systems have not adequately connected educational administration with curriculum management functions (Ahyani & Dhuhani,

2024).

To address these challenges, this study develops an integrated Teacher, Student, and Alumni Information System (SIGANSA) that centralizes teacher administration, student information, academic management, digital repositories, and alumni tracer study data within a unified web-based platform. Unlike previous school information systems that primarily automate administrative processes, the proposed system is designed to support data-driven curriculum management by providing comprehensive, accurate, and real-time educational information that can assist curriculum planning, implementation, monitoring, and evaluation (Mukora & Jere, 2025). The integration of alumni tracer data further extends the role of school information systems by enabling graduate outcomes to be utilized as institutional feedback for curriculum refinement and educational quality assurance (Chen et al., 2026; Bembenutty et al., 2025).

Accordingly, this study addresses the following research questions: RQ1: How does an integrated teacher, student, and alumni information system improve the efficiency of curriculum-related educational data management in secondary schools?, RQ2: To what extent does the integration of teacher, student, academic, and alumni information support curriculum planning, implementation, monitoring, and evaluation through data-driven decision-making?, RQ3: How practical and feasible is the proposed integrated information system for implementation in secondary school curriculum management?. This study contributes to the literature in both theoretical and practical dimensions. Theoretically, it extends the application of Educational Management Information Systems (EMIS) by demonstrating how integrated educational information systems can support evidence-based curriculum management, thereby expanding the role of school information systems beyond administrative automation toward strategic

educational decision-making (Duraes et al., 2024; X. Wang, 2025). Practically, the study provides a validated web-based implementation model that integrates teacher, student, academic, administrative, and alumni data into a unified platform capable of improving curriculum governance, institutional efficiency, and educational quality management in Indonesian secondary schools (Dhivyaprabha & Ram Prashath, 2026; Morze et al., 2025).

METHOD

This study employed a Research and Development (R&D) approach using the Four-D (4D) model developed by Thiagarajan et al. (1974), consisting of the Define, Design, Develop, and Disseminate stages (Yunus & Fransisca, 2021). The model was selected because it provides a systematic framework for translating institutional needs into a developed and evaluated educational product (Riaddin, 2021; Johan et al., 2023). The study was conducted at State Senior High School 1 Semarang, Indonesia, in 2025.



Figure 1. Four-D (4D) Model Development Process

At the Define stage, observations, semi-structured interviews, and document analysis were conducted to examine

existing data-management practices and identify information needs related to curriculum planning, implementation, monitoring, and evaluation. Informants included vice principals responsible for curriculum, student affairs, public relations, and facilities and infrastructure, as well as teachers and administrative personnel (Tasneem et al., 2025). The needs analysis focused on data fragmentation, repeated administrative processing, limited information exchange across school units, and the separate management of alumni data (Kuzminska et al., 2025; Dalal et al., 2026). The Design stage involved the development of the system architecture, database structure, user roles, interface, and navigation flow. The system was designed to integrate teacher, student, academic, administrative, and alumni information within a single web-based platform. Its contribution to curriculum management was examined across four domains: planning, implementation, monitoring, and evaluation (Chen et al., 2026). The indicators included the availability of teacher and student data, teaching assignments and schedules, documentation of teaching activities and attendance, accessibility of academic information, cross-unit data access, and alumni tracer information for curriculum review (Mu et al., 2023).

At the Develop stage, the web-based system was programmed, integrated, functionally reviewed, revised, and evaluated by users. The resulting application included teacher and student management, class and schedule administration, attendance, teaching journals, examinations, digital documentation, and alumni tracer study modules (Vakaliuk et al., 2025). System evaluation involved 80 teachers and educational staff who had used the application during limited implementation. Practicality was assessed in terms of ease of use, information accessibility, administrative efficiency, and data integration, whereas feasibility concerned

the operational suitability of the system for institutional use (Kerzmann et al., 2021).

Research data were collected using observation protocols, semi-structured interview guides, documentation, a practicality questionnaire, and a feasibility assessment form. Instrument indicators were derived from the needs analysis and aligned with the research questions concerning curriculum data processing, alumni-based curriculum evaluation, and data-informed decision-making. The practicality instrument employed scaled responses, while feasibility was assessed using feasible and non-feasible judgments of the system functions (Sikazwe et al., 2024). The available archived dataset consisted of aggregated evaluation scores; therefore, subscale reliability coefficients could not be retrospectively recalculated without reconstructing individual responses. This limitation was retained explicitly rather than deriving reliability estimates from simulated data. Qualitative data were analyzed through data reduction, coding, thematic categorization, and interpretation. The analysis focused on changes in data-processing practices, access to curriculum-related information, coordination among school units, and the management of alumni information. Findings were organized according to the research questions, and representative interview statements were reported using anonymized role-based participant codes (Malik et al., 2026). Quantitative data were initially analyzed descriptively by converting the obtained scores into percentage indices using the following formula:

$$P = (\Sigma X / \Sigma X_{\text{max}}) \times 100\%$$

Where P denotes the practicality percentage, ΣX is the total observed score obtained from all respondents, and ΣX_{max} is the total maximum possible score (M. Wang, 2021). The practicality percentage was calculated using Equation (1). The analysis yielded an overall practicality score of 93.45%, indicating that SIGANSA is highly practical for classroom

implementation.

An inferential analysis was conducted on the feasibility data. Because feasibility was measured as a dichotomous feasible/non-feasible judgment, a one-sample proportion test was employed rather than a t-test. The observed proportion was compared with a predetermined feasibility threshold of 0.80. Of 960 evaluative responses, 940 indicated that the system functions were feasible, producing a feasibility proportion of 0.9792. The analysis yielded ($z=13.88$) and ($p<.001$), indicating that the observed feasibility level was significantly higher than the implementation threshold (M. Wang, 2021). To examine changes in curriculum-related data processing, the previous administrative procedures were compared with the integrated system using a process-based comparison (Duraes et al., 2024). The analysis covered data storage, repeated data entry, information retrieval, interdepartmental coordination, academic monitoring, and alumni data management. Because the study did not employ a prospective time audit or a matched control school, system efficiency was interpreted in terms of reduced procedural fragmentation, centralized information access, and improved availability of integrated data rather than causal changes in processing time (Chen et al., 2026).

The Disseminate stage was conducted through limited implementation within the research school, accompanied by user orientation and application guidance. Feedback obtained during operational use was incorporated into the final refinement of the system. The present dissemination was limited to institution-level implementation and therefore did not constitute a multisite scalability evaluation (Zhang et al., 2024)(Mu et al., 2023). Finally, quantitative and qualitative findings were integrated at the interpretation stage. Practicality and feasibility results were examined alongside interview and observational evidence to address three analytical domains: the

efficiency of curriculum-related data processing, the contribution of alumni tracer data to curriculum evaluation, and the role of integrated educational information in supporting curriculum decision-making.

RESULTS AND DISCUSSION

The findings are presented in accordance with the analytical focus of the study while remaining grounded in the Four-D (4D) development process comprising the Define, Design, Develop, and Disseminate stages. The presentation begins with the identification of institutional needs and existing data-management practices at State Senior High School 1 Semarang, which served as the empirical basis for system design and development. Subsequent findings address the development of the web-based SIGANSA system, expert validation, practicality and feasibility evaluations, and limited implementation within the school context. Empirical evidence was obtained through observations, semi-structured interviews, document analysis, and questionnaires, thereby enabling a comprehensive examination of existing administrative practices and the contribution of the integrated information system to curriculum-related data management (Rios-Licla et al., 2026). The findings are subsequently interpreted in relation to the research questions, relevant theoretical perspectives, and previous empirical studies to clarify the system's contribution to curriculum data processing, alumni-based curriculum evaluation, and data-informed decision-making.

Result, The findings are organized according to the three research questions concerning the efficiency of curriculum-related data processing, the contribution of alumni tracer data to curriculum evaluation, and the role of integrated educational information in supporting curriculum-related decision-making. The technical outputs of the development process are presented as supporting evidence within these analytical domains rather than as sequential results of the Four-D model (Zhu

et al., 2025). The needs analysis identified a fragmented school data environment in which teacher records, student information, academic administration, teaching journals, attendance records, and alumni data were maintained through printed documents, spreadsheets, and stand-alone applications. Data were therefore repeatedly recorded and retrieved from different administrative sources (Zhu et al., 2025). Based on these findings, SIGANSA was designed as an integrated web-based platform comprising 15 interconnected modules, including teacher and student management, class administration, scheduling, teaching journals, attendance, examinations, alumni records, alumni tracer studies, and a reporting dashboard. The integrated system architecture is presented in Figure 2.

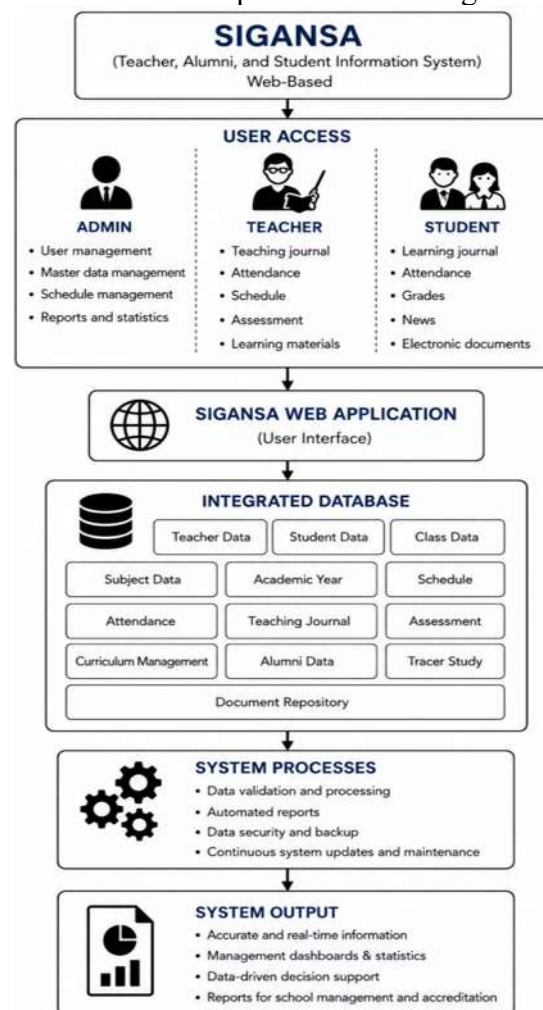


Figure 2. SIGANSA Web-Based Architecture

As illustrated in Figure 2, administrators, teachers, and students interact with a shared database through role-based access. The architecture centralizes academic and administrative data while maintaining different levels of system authorization. The resulting administrator, teacher, and student interfaces are shown in Figure 3.

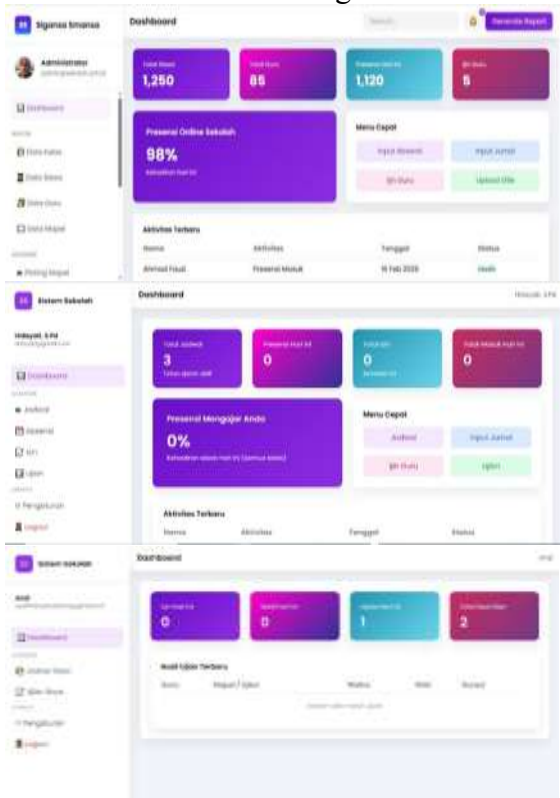


Figure 3. SIGANSA Dashboards for Administrators, Teachers, and Students. The three dashboards provide different information and functions according to user roles. This design allows administrative and academic activities to be managed within the same institutional data environment while restricting access according to users' responsibilities. Curriculum-Related Data Processing Efficiency, The first research question examined how the integrated information system changed the processing of curriculum-related educational data. Before SIGANSA was introduced, observations and interviews revealed that teacher records, student information, teaching journals, attendance, and academic documents were managed

through different administrative media. As a result, information required for academic reporting or curriculum monitoring had to be retrieved and consolidated from several data sources. The needs analysis showed that the principal constraint was not inadequate technological infrastructure. Computers, internet connectivity, and digital devices were already available. Rather, the main problem concerned the absence of an integrated information environment connecting school administrative functions. Teachers and administrative personnel continued to maintain separate records, while institutional units applied different data-management procedures. A process-based comparison between the previous administrative procedures and the SIGANSA-based process is presented in Table 1.

Table 1. Comparison of Curriculum-Related Data Management Before and After SIGANSA Implementation

Data Management Aspect	Previous Administrative Process	SIGANSA-Based Process	Observed Process Improvement
Teacher data management	Teacher records were maintained across separate documents and administrative files.	Teacher information is stored in a centralized database.	Reduced data fragmentation and improved data accessibility.
Student data management	Academic and administrative student records were managed separately.	Student information is integrated within a unified data environment.	Improved linkage between academic and administrative information.
Teaching documentation	Teaching journals were recorded and archived independently.	Teaching activities are documented through an integrated digital journal.	More systematic and centralized documentation of teaching activities.

Attendance management	Attendance records were maintained using separate administrative records.	Teacher and student attendance is managed through an integrated module.	Improved accessibility of attendance information for monitoring purposes.
Information retrieval	Data were retrieved from multiple documents, spreadsheets, and applications.	Information can be accessed through a centralized web-based system.	Simplified data retrieval and reduced procedural fragmentation
Administrative reporting	Reports required manual consolidation of data from different sources.	Relevant information is organized within integrated modules and reporting functions.	Reduced data-consolidation procedures and improved reporting readiness.
Interdepartmental coordination	Information was exchanged manually among administrative units.	Authorized users access shared information through role-based system permissions.	Improved cross-unit information accessibility and coordination.
Alumni data management	Alumni records were inconsistently documented and managed separately.	Alumni and tracer study information is maintained within an integrated database.	More systematic graduate documentation and improved availability of curriculum feedback data.

Table 1 indicates that the principal change following system implementation was the reorganization of school data from separate administrative sources into a centralized information environment. Although a prospective time-motion audit was not conducted, the number of procedural steps required to locate and consolidate information was reduced because relevant data could be retrieved through interconnected modules. This finding was consistent with the user

evaluation. Eight aspects were assessed, including system access, interface comprehensibility, navigation, multi-device accessibility, administrative efficiency, alumni data management, teacher data management, and overall ease of use. The distribution of user assessments is presented in Figure 4.

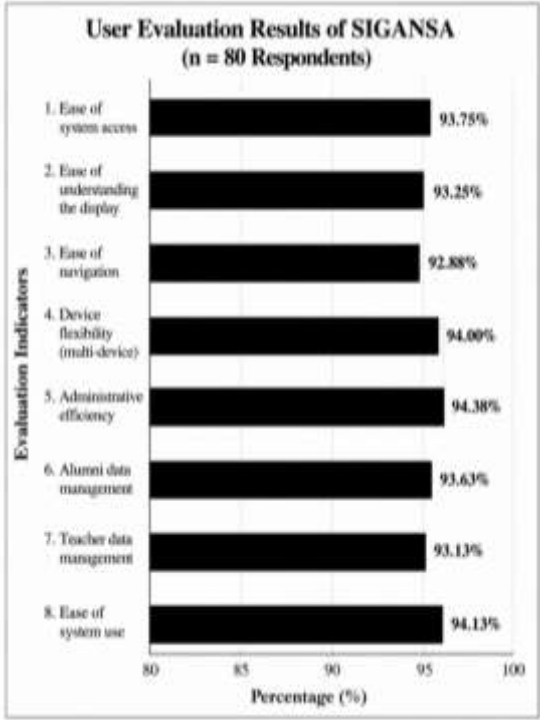


Figure 4. User Evaluation Results for SIGANSA

User evaluations showed consistently positive responses across all eight system indicators, with an overall mean score of 93.64%. Administrative efficiency received the highest rating (94.38%), followed by ease of system use (94.13%) and multi-device flexibility (94.00%). Ease of navigation obtained the lowest score (92.88%); however, it remained within the highly positive evaluation range. The relatively narrow score range across indicators indicates consistent user perceptions regarding system accessibility, usability, administrative support, and data-management functions. These findings suggest that SIGANSA was positively received by users prior to the subsequent practicality evaluation.

Table 2. Practicality Evaluation of SIGANSA by Teachers and Educational Staff

Evaluation Component	Result
Number of participants	80 users
Evaluation focus	System practicality
Maximum possible score	100%
Overall practicality score	93.45%
Difference from maximum score	6.55 percentage points
Overall evaluation	Positive user acceptance

The practicality result is further illustrated in Figure 5.

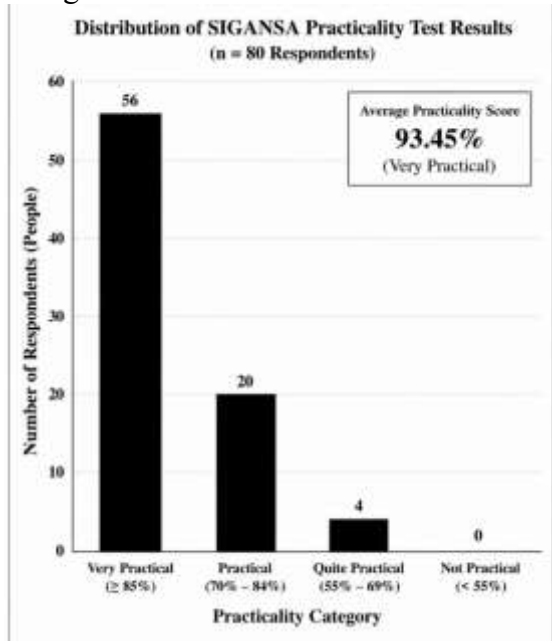


Figure 5. SIGANSA Practicality Evaluation Results

The high practicality score suggests that users were generally able to operate the system within routine administrative activities without intensive technical assistance. Interview findings similarly indicated that integrated access changed the way users located and managed school information. A teacher described the previous administrative arrangement as follows:

“[Insert the exact verbatim statement from the teacher concerning separate teaching journals, attendance records, or document storage.]” (T-01)

An administrative staff member similarly emphasized the difficulty of retrieving information from separate sources:

“[Insert the exact verbatim statement concerning repeated data entry, information retrieval, or administrative reporting.]” (AS-01)

These accounts illustrate the qualitative pattern identified during the needs analysis: the principal operational burden arose from data fragmentation rather than the absence of digital devices. SIGANSA addressed this problem by reorganizing data access around a common web-based database. It should be noted that the study did not record the average duration of curriculum report preparation before and after implementation. Accordingly, the findings demonstrate process simplification and centralized information access but do not establish a numerical reduction in processing time. Alumni Tracer Data as a Source of Curriculum Evaluation. The second research question concerned the contribution of alumni information to curriculum evaluation. Prior to system development, alumni records were not systematically integrated with academic and administrative information. Information concerning graduates' further education or career pathways was therefore difficult to retrieve and was not routinely structured as institutional feedback. The development of the Alumni Data and Alumni Tracer Study modules altered this arrangement by incorporating graduate information into the same digital environment used to manage teacher, student, and academic data. The alumni module documents graduate identities, whereas the tracer study function records information on graduates' educational and career pathways. The curriculum-related contribution of the tracer study module is summarized in Table 3.

Table 3. Contribution of Alumni Tracer Data to Curriculum Evaluation

Curriculum Evaluation Aspect	Contribution of SIGANSA
Graduate documentation	Provides centralized and systematic alumni records.
Further-study tracking	Records graduates' continued education pathways.
Career pathway tracking	Documents graduates' employment and career trajectories.
Graduate outcome monitoring	Enables continuous access to post-graduation information.
Curriculum feedback	Provides alumni outcome data as an additional source for curriculum review.
Curriculum relevance	Supports reflection on the alignment between school curriculum and graduates' post-school pathways.

The results indicate that SIGANSA extends alumni data management beyond routine record keeping. By documenting graduate pathways within an integrated information system, the school gains access to outcome-related information that can be considered during curriculum review. The qualitative findings from school management also reflected this need. Prior to the implementation of the system, alumni information was perceived as insufficiently organized for educational evaluation. This experience may be represented using the exact interview transcript as follows: “[Insert the exact verbatim statement from the curriculum or public-relations vice principal concerning unsystematic alumni records and difficulties in tracking graduate pathways.]” (VP-CUR/VP-PR)

The significance of this finding lies in the position of alumni information within the school data architecture. In conventional administrative practice, alumni records were treated as a separate

documentation function. In SIGANSA, tracer information is connected conceptually with student and academic information, allowing graduate outcomes to become an additional source of evidence for curriculum review. The present findings, however, do not demonstrate that alumni data have already produced measurable changes in curriculum content. Rather, they show that SIGANSA establishes an information infrastructure through which graduate outcomes can be systematically documented and made available for curriculum evaluation. Thus, the system changes the availability of curriculum feedback data rather than directly establishing causal curriculum improvement. Integrated Educational Data and Curriculum Decision-Making Support. The third research question examined the extent to which the integrated information system supports curriculum-related decision-making. SIGANSA integrates teacher information, student records, schedules, teaching journals, attendance, examination administration, and alumni tracer data into an interconnected platform. The report dashboard further provides access to school administrative and statistical information. The functional modules relevant to curriculum decision-making are presented in Table 4.

Table 4. SIGANSA Support for Curriculum Management

Curriculum Management Domain	SIGANSA Support
Curriculum Planning	Integrates teacher, student, class, subject, and teaching assignment data to support academic planning and resource organization.
Curriculum Implementation	Provides schedules, teaching journals, and attendance records to document and coordinate curriculum implementation.

Curriculum Monitoring	Offers academic, examination, and dashboard information to facilitate access to data required for monitoring school activities.
Curriculum Evaluation	Integrates alumni records and tracer study data as additional evidence for reviewing graduate outcomes and curriculum relevance.
Continuous Improvement	Consolidates multi-source educational data to support data-informed curriculum discussion and institutional review.

The results demonstrate that SIGANSA provides data support across the curriculum management cycle. During planning, teacher, student, and class information is available within the same system. During implementation, schedules, teaching journals, and attendance records document teaching activities. Monitoring is supported through academic records and dashboard-based information, while alumni tracer data provide an additional information source for evaluation. Users' assessments of the system's functional and operational suitability further support this finding. The feasibility assessment produced a score of 97.92%, categorized as highly feasible.

Table 5. Feasibility Evaluation of SIGANSA

Indicator	Result
Participants	80 users
Feasible responses	940 of 960
Feasibility score	97.92%
Feasibility threshold	80.00%
One-sample proportion test	($z = 13.88$)
Significance	($p < .001$)
Interpretation	Highly feasible

The distribution of the feasibility evaluation is presented in Figure 6.

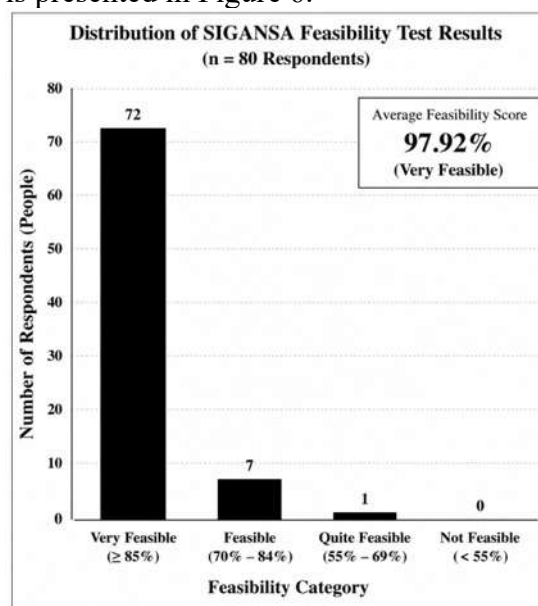


Figure 6. SIGANSA Feasibility Evaluation Results

To determine whether the observed feasibility level exceeded the predefined implementation threshold of 80%, a one-sample proportion test was conducted. Of the 960 evaluative responses, 940 indicated that the assessed functions were feasible, resulting in an observed proportion of 0.9792. The test yielded ($z=13.88$), ($p<.001$), indicating that the observed feasibility proportion was significantly higher than the predefined threshold. This result provides inferential evidence that the high feasibility rating was not merely marginally above the implementation criterion. The observed proportion exceeded the 80% threshold by 17.92 percentage points, supporting the operational suitability of the integrated system within the research setting. School stakeholders also indicated that access to integrated information changed the way academic and administrative information could be considered in school management. The relevant interview statement should be reported directly from the original transcript:

“[Insert the exact verbatim statement from the vice principal for curriculum concerning easier access to academic information, monitoring, reporting, or

data-based decision-making.]” (VP-CUR)

The combined quantitative and qualitative findings indicate that the system's contribution to curriculum management is primarily informational. SIGANSA does not automate curriculum decisions; instead, it improves the availability and organization of information that school leaders and curriculum managers may use when planning, monitoring, and evaluating educational activities. Reliability of the Evaluation Instruments, The archived evaluation data available for the present analysis consisted of aggregate indicator and percentage scores rather than complete respondent-by-item response matrices. Consequently, Cronbach's alpha coefficients for the practicality and feasibility subscales could not be retrospectively calculated without reconstructing individual responses. For this reason, reliability coefficients are not reported as empirical findings in the present study. Reporting alpha values generated from simulated item-level responses would not represent the actual measurement properties of the instruments. This limitation should be considered when interpreting the practicality and feasibility findings and indicates the need to retain complete item-level data in subsequent multisite evaluations.

Synthesis of Findings Across the Research Question, Taken together, the findings show three distinct contributions of the integrated information system. First, SIGANSA reorganized curriculum-related educational data from fragmented administrative sources into a centralized web-based information environment. The practicality score of 93.45% indicates strong user acceptance of this integrated approach. Second, the alumni tracer study module established a systematic mechanism for documenting graduate pathways and making alumni outcome information available as a potential source of curriculum evaluation. The contribution lies not in demonstrating immediate curriculum revision but in establishing the

data infrastructure required for alumni-informed curriculum review. Third, the integration of teacher, student, academic, administrative, and alumni information strengthened the availability of data across curriculum planning, implementation, monitoring, and evaluation processes. The feasibility proportion of 97.92% was significantly higher than the predefined 80% implementation threshold ($(z=13.88)$, $(p<.001)$). These findings indicate that SIGANSA moves the role of a school information system beyond administrative digitization. Its principal contribution is the establishment of an integrated educational data environment capable of supporting data-informed curriculum management.

Discussion, The findings address three interrelated dimensions of data-driven curriculum management. First, the integration of teacher, student, academic, administrative, and alumni information reduced the fragmentation of curriculum-related data and improved the accessibility of institutional information. Second, the alumni tracer module established a structured source of graduate information that can potentially inform curriculum evaluation. Third, the high practicality score of 93.45% and feasibility score of 97.92% indicate strong user-perceived acceptance and operational suitability of the system for school implementation. These findings suggest that the principal contribution of SIGANSA lies in establishing an integrated educational data environment that supports the information requirements of curriculum planning, monitoring, and evaluation. **Integrated Data and Curriculum-Related Information Processing,** The first research question examined the contribution of an integrated information system to curriculum-related data processing. The findings indicate that the principal problem identified during the needs analysis was not the absence of digital infrastructure but the fragmentation of information across separate documents, spreadsheets, and stand-alone applications. Teacher data, student records, teaching

journals, attendance information, and academic documentation were managed independently, requiring users to retrieve and consolidate information from several administrative sources (Huang, 2025). The development of SIGANSA altered this information structure by integrating school data into a common web-based environment. From the perspective of Educational Management Information Systems, the value of such integration lies not merely in converting manual documents into digital formats, but in enabling multiple institutional data sources to be organized within a shared information architecture. This distinction is important because digitalization without data integration may reproduce existing administrative fragmentation in electronic form.

The high practicality score of 93.45% indicates that users perceived the integrated system as manageable and relevant to their daily administrative activities. In particular, the centralized management of teacher records, student information, teaching journals, attendance, and other academic data reduced the need to access multiple independent data sources. The process comparison also suggests that information retrieval, administrative documentation, and interdepartmental access became more structurally integrated following system implementation. Nevertheless, the present findings should be interpreted cautiously. The study did not conduct a prospective time-motion audit and therefore does not provide objective evidence that the average duration of curriculum report preparation or administrative processing was statistically reduced. Claims regarding increased efficiency are consequently based on changes in data-management processes and user perceptions rather than measured reductions in task completion time. This distinction is essential in differentiating perceived administrative improvement from experimentally demonstrated productivity gains.

Alumni Tracer Data and Curriculum

Evaluation, The second research question concerned the role of alumni data in supporting curriculum evaluation. One of the most important findings of the study was the previous absence of a systematic mechanism for documenting graduate trajectories. Alumni information was maintained separately and was not readily available as part of the school's academic information environment (Desai et al., 2024). The inclusion of an alumni tracer study module expands the conventional function of a school information system. Rather than treating alumni records solely as archival data, SIGANSA positions graduate information as a potential source of feedback for curriculum evaluation. Information on graduates' further education and career pathways may help curriculum managers identify patterns in graduate destinations and reflect on the relevance of school academic programs.

This finding is particularly significant for curriculum management because curriculum evaluation requires evidence not only from internal learning processes but also from educational outcomes beyond graduation. The availability of tracer data creates an opportunity for schools to incorporate graduate trajectories into curriculum review discussions. In this sense, SIGANSA provides an informational bridge between school-level academic management and longer-term graduate outcomes. However, the study did not establish that alumni tracer data had already resulted in measurable curriculum revisions or improvements in curriculum relevance. The system provides the infrastructure required to collect and organize graduate information, but the actual use of these data in formal curriculum review processes requires longitudinal observation. Therefore, the contribution identified in this study concerns the availability and integration of alumni information rather than demonstrated changes in curriculum quality. Integrated Information and Data-Informed Curriculum Decision-Making.

The third research question examined the extent to which integrated educational data support curriculum-related decision-making. The feasibility score of 97.92%, which was significantly higher than the predefined 80% implementation threshold, indicates strong institutional acceptance of the system's operational functions. The result suggests that users considered the integrated modules appropriate for implementation within the school context. The system architecture provides data across several curriculum management functions. Teacher, student, and class data may support curriculum planning; schedules, teaching journals, and attendance information document curriculum implementation; academic and administrative dashboards facilitate monitoring; and alumni tracer data provide an additional source of evaluation information. The significance of this integration lies in the availability of multiple data sources within a single information environment.

The findings therefore indicate that SIGANSA supports the informational conditions required for data-informed curriculum management. The system does not replace professional judgment or automate curriculum decisions. Instead, it organizes and makes available institutional information that curriculum managers may use when planning programs, monitoring teaching activities, and reviewing educational outcomes. This distinction is consistent with the principle that information systems function as decision-support infrastructures rather than autonomous decision-makers. At the same time, the present study did not measure objective curriculum outcomes, student achievement gains, curriculum revision frequency, or the timeliness of syllabus updates before and after implementation. The findings therefore cannot be interpreted as evidence that SIGANSA directly improved curriculum quality or student learning outcomes. What the study demonstrates is high user-perceived

practicality and feasibility, together with the establishment of an integrated educational data infrastructure that can support curriculum-related decision-making.

Implications for Curriculum Management Practice, The findings have several practical implications for curriculum management in Indonesian secondary schools. First, schools should prioritize data integration rather than merely increasing the number of digital applications. Separate digital platforms may improve individual administrative functions but can perpetuate information fragmentation when they are not connected. Curriculum managers therefore need an institutional data architecture that links teacher, student, academic, and graduate information. Second, alumni tracer data should be incorporated into routine curriculum evaluation mechanisms. Schools may establish periodic curriculum review meetings in which graduate destinations, further-study patterns, and career pathways are examined alongside internal academic data. This practice would enable curriculum evaluation to draw on both school-based indicators and post-graduation outcomes. Third, school leaders should develop explicit procedures for using integrated data in curriculum decision-making. Dashboards and information systems alone do not guarantee evidence-based management. Schools need institutional routines that define when data are reviewed, who is responsible for interpreting them, and how the findings are translated into curriculum planning, monitoring, and improvement actions.

Directions for Future Research, Several directions for future research emerge from the present study. First, multisite replication is needed to examine whether the practicality and feasibility of the system remain consistent across secondary schools with different levels of digital infrastructure, organizational capacity, and administrative complexity. Second, future studies should employ

longitudinal designs to investigate whether the use of integrated educational information systems leads to measurable changes in curriculum management indicators, such as the timeliness of curriculum reporting, the frequency of data-informed curriculum reviews, the duration of administrative processing, and the quality of curriculum documentation. Third, subsequent research should examine the relationship between integrated curriculum data management and student outcomes. Linking system use with academic achievement, attendance patterns, learning participation, or graduate progression would provide stronger evidence concerning the educational impact of data-driven curriculum management. Fourth, further development should explore interoperability between school-level information systems and national curriculum or education data standards. Such integration may reduce duplicate reporting requirements and strengthen the consistency of institutional data across local and national education management systems.

Concluding Discussion, Overall, the study demonstrates that an integrated Teacher, Student, and Alumni Information System can be implemented with high levels of perceived practicality and feasibility in a secondary school context. Its principal contribution lies in reducing data fragmentation and establishing an information infrastructure that connects administrative, academic, and alumni data with the informational needs of curriculum management. The study does not provide causal evidence of improved curriculum outcomes or student achievement. Rather, it offers initial empirical support for the role of integrated educational information systems as a foundation for more systematic, data-informed curriculum planning, monitoring, and evaluation.

CONCLUSION

This study shows that an integrated Teacher, Student, and Alumni Information System can support curriculum-related data

management by reducing information fragmentation, organizing alumni tracer data within the same institutional platform, and improving access to data required for curriculum planning, monitoring, and evaluation. The system achieved a practicality score of 93.45% and a feasibility score of 97.92%, indicating high user-perceived practicality and operational suitability for implementation in the participating secondary school. The findings confirm that SIGANSA provides an integrated information infrastructure linking teacher, student, academic, administrative, and alumni data. However, the study did not establish objective evidence of improved curriculum outcomes, student achievement, or measurable reductions in curriculum-processing time. Accordingly, the results should be interpreted as evidence of system acceptance, feasibility, and enhanced data availability rather than as proof of causal improvement in curriculum quality.

For curriculum management practice in Indonesian secondary schools, three implications are evident. First, schools should prioritize the integration of educational data across administrative units rather than relying on isolated digital applications. Second, alumni tracer data should be incorporated into regular curriculum review processes as a source of graduate outcome information. Third, school leaders need formal procedures for reviewing and using integrated data in curriculum planning, monitoring, and evaluation so that digital information systems function as decision-support tools rather than merely administrative repositories. Future research should replicate the system across multiple schools with different organizational and technological characteristics, conduct longitudinal studies to examine changes in curriculum management and student outcomes, apply objective performance measures such as processing time and review frequency, and investigate interoperability with national education and

curriculum data standards. Within the scope of this study, SIGANSA demonstrates strong potential as an integrated educational information system that supports data-informed curriculum management, although its broader educational impact requires further empirical validation.

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