International Transactions on Education Technology (ITEE)
Vol. 4, No. 2, May, 2026, pp. 172−186
E-ISSN: 2963-1947 | P-ISSN: 2963-6078, DOI:10.33050

Analysis of Academic Information System Integration in Improving the Quality of Higher Education Data Reporting to PDDIKTI

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Article Info

Article history:

Submission October 30, 2025
Revised January 15, 2026
Accepted March 17, 2026
Published May 31, 2026

Keywords:

Academic Information System
System Integration
PDDIKTI
Higher Education Data Reporting

ABSTRACT

Interdisciplinary Digital transformation in higher education requires integrated academic information systems to support accurate, consistent, complete, and timely reporting to the Higher Education Database (PDDIKTI). However, many universities still face reporting delays, data inconsistencies, and synchronization problems caused by fragmented systems and manual processes. **This study** aims to analyze the role of academic information system integration in improving the quality of higher education data reporting. **A qualitative case study** approach was employed at a private university in Banten Province, Indonesia. Data were collected through observation, semi structured interviews, and document analysis, and analyzed using thematic analysis and the Miles and Huberman interactive model. **The findings** indicate that system integration through API-based synchronization, ETL processes, automated validation, and monitoring mechanisms significantly improves reporting quality in terms of accuracy, consistency, completeness, and timeliness. Integration also reduces manual workloads, mini mizes data duplication, accelerates synchronization, and improves transparency in reporting activities. Nevertheless, challenges related to synchronization failures, API security, and institutional interoperability remain important considerations. **The study concludes** that academic information system integration is a critical factor in strengthening higher education data governance and supporting data-driven decision-making.

DOI: https://doi.org/10.33050/itee.v4i2.961

1. INTRODUCTION

Digital transformation in the higher education sector has driven universities to manage academic data systematically through integrated information systems. Academic data plays a crucial role in supporting planning, evaluation, and data-driven decision-making at both institutional and national levels. Academic information systems function as the primary infrastructure for managing student, lecturer, curriculum, and learning activity data, which are subsequently utilized for administrative and reporting purposes. Previous studies have

shown that the implementation of integrated academic information systems can improve data management efficiency and support the digitalization of academic services in higher education institutions [1, 2].

In Indonesia, higher education data management is conducted through the national system known as the Higher Education Database (PDDIKTI), which serves as a centralized repository for academic data reported periodically by universities. This system enables the government to monitor and evaluate higher education performance in a structured and data-driven manner [3]. Consequently, the accuracy, consistency, completeness, and timeliness of reported data are critical, as they form the basis for policy formulation, accreditation, and institutional performance assessment [4, 5].

However, despite the mandatory implementation of PDDIKTI reporting, various challenges persist in practice. Many universities still experience delays in reporting, data inconsistencies, and invalid data caused by mismatched formats, incomplete records, and discrepancies between internal systems and the national database. These issues often indicate suboptimal integration between academic information systems and the PDDIKTI reporting system, which may lead to data duplication, synchronization failures, and inefficiencies in data processing. Empirical evidence also suggests that weak data governance and limited system integration remain significant barriers to achieving high-quality academic data reporting [6].

In addition, some higher education institutions continue to rely on manual or semi-manual data processing, increasing the risk of human error and reducing operational efficiency. Non-integrated systems further complicate data synchronization across institutional platforms, thereby hindering the overall reporting process. In this context, system integration particularly through the use of web service APIs has been identified as a key enabler for improving data exchange, reducing redundancy, and enhancing synchronization between internal academic systems and external platforms such as PDDIKTI [7, 8].

Although prior studies have extensively examined the development and implementation of academic information systems, most have focused on technical aspects or service improvement. Studies that explicitly investigate the relationship between system integration and the quality of higher education data reporting particularly within the PDDIKTI context remain limited. Therefore, this study addresses this gap by analyzing the role of academic information system integration in improving data quality based on key dimensions, namely accuracy, consistency, completeness, and timeliness.

Based on these considerations, this study aims to analyze how the integration of academic information systems contributes to improving the quality of higher education data reporting to PDDIKTI. This research is expected to provide both theoretical insights into the relationship between system integration and data quality, as well as practical recommendations for universities in optimizing their academic data management and reporting processes.

2. LITERATURE REVIEW

2.1. Academic Information System

An academic information system is a technology-based system used by higher education institutions to manage various academic activities in an integrated manner, including student data, lecturers, curriculum, class schedules, and grading. The implementation of such systems aims to improve data management efficiency and support more structured academic administrative processes.

Previous studies indicate that academic information systems play a significant role in enhancing administrative efficiency and accelerating academic data processing [4]. Furthermore, web-based systems enable automated data processing, which minimizes data entry errors and improves the quality of academic services [5, 9]. The adoption of modern technologies such as cloud computing also supports real-time data access and improves system scalability in managing academic data [10].

However, most existing studies primarily focus on system implementation and operational efficiency, with limited attention given to how academic information systems directly contribute to improving the quality of higher education data reporting. This indicates the need to position academic information systems not only as administrative tools but also as strategic components in ensuring data quality.

2.2. Information System Integration

Information system integration refers to the process of connecting different systems or applications so that they can communicate and exchange data automatically. In higher education, system integration is essential to ensure data consistency and interoperability across various platforms, including academic systems, e-learning systems, administrative systems, and reporting systems.

Studies show that integration using RESTful web services enables real-time data exchange and improves the efficiency of academic data management [11]. System integration involves key aspects such as data integration, interoperability, and database integration. Data integration facilitates automatic data exchange, while interoperability ensures that different systems can communicate through standardized protocols. Other studies highlight that the use of web services enhances data exchange efficiency and reduces redundancy across systems [12].

Academic information system integration not only supports operational efficiency but also strengthens interoperability and institutional data governance in higher education. Recent international studies emphasize that interoperability enables different educational platforms and databases to communicate through standardized protocols, thereby reducing data redundancy and synchronization errors within digital education ecosystems [13]. In addition, data-informed digital readiness frameworks highlight the importance of integrated information systems in supporting institutional governance, real-time monitoring, and evidence-based decision-making in higher education institutions [14].

Furthermore, digital transformation in higher education requires interoperable academic ecosystems capable of integrating academic systems, learning management systems, and national reporting platforms within a unified environment [15]. API-based integration models such as EDU-API have also been recognized as important mechanisms for enabling seamless interoperability between institutional databases and external educational services [16]. These studies indicate that system interoperability and API-based integration are becoming strategic components in improving higher education data management and reporting quality.

Nevertheless, existing research tends to emphasize technical aspects of integration, such as system architecture and implementation, rather than examining its impact on data quality, particularly in the context of higher education data reporting.

2.3. Data Quality

Data quality is a critical factor in information systems, as it determines the reliability of information used for decision-making. Data quality is commonly measured using key dimensions such as accuracy, consistency, completeness, and timeliness.

Accuracy reflects the extent to which data represents real-world conditions, consistency refers to the alignment of data across systems, completeness indicates whether all required data is available, and timeliness relates to the availability of data when needed. Previous studies suggest that data quality is a key determinant of successful information system implementation, as accurate and consistent data leads to more reliable decision-making [17]. Moreover, the use of information systems in educational data management has been shown to improve data quality and support more effective data-driven decisions [18].

However, studies on data quality in higher education are generally still broad and have not specifically examined the relationship between data quality dimensions and system integration in the context of national reporting systems.

2.4. Higher Education Data Reporting

Higher education data reporting refers to the process of submitting academic data from universities to the government through a national database system. In Indonesia, this process is conducted through the Higher Education Database (PDDIKTI), which serves as a centralized repository of higher education data.

The reported data is used as the basis for various policies, including accreditation, institutional performance evaluation, and national education planning. Therefore, data quality is a critical factor in ensuring transparent and accountable higher education governance. Previous research indicates that integrating academic information systems with the PDDIKTI reporting system can improve data accuracy and accelerate synchronization processes [3].

However, comprehensive studies examining the relationship between system integration and data quality in the context of PDDIKTI reporting remain limited, highlighting the need for more integrative research in this area.

2.5. Previous Studies (Conceptual Synthesis)

Previous studies have examined the implementation of academic information systems in improving data management efficiency and academic services. Marpaung and Suendri (2024) found that web engineering-based academic information systems improve data management efficiency [7]. Similarly, Pamungkas and

Widarti (2024) reported that academic information systems enhance service quality and accelerate data processing [19]. Pauji et al. (2024) also demonstrated that web-based systems improve user satisfaction and the quality of academic services [20].

Overall, these studies indicate that academic information systems and their integration contribute to improved efficiency and service quality. However, most of them focus on system implementation and service improvement, without specifically analyzing the relationship between academic information system integration and the quality of higher education data reporting. In addition, studies that examine this relationship using comprehensive data quality dimensions such as accuracy, consistency, completeness, and timeliness particularly in the context of PDDIKTI, remain very limited. Therefore, this study aims to address this gap by adopting a more integrative analytical approach.

2.6. Conceptual Framework

Based on the conceptual synthesis of the literature, academic information system integration is considered a key factor influencing the quality of higher education data reporting. An integrated system enables automatic data exchange across system modules, thereby improving data accuracy, consistency, completeness, and timeliness.

In this study, academic information system integration is positioned as the primary construct that affects academic data quality, which subsequently influences the quality of higher education data reporting to PDDIKTI. This relationship is analyzed qualitatively based on findings from interviews, observations, and document analysis.

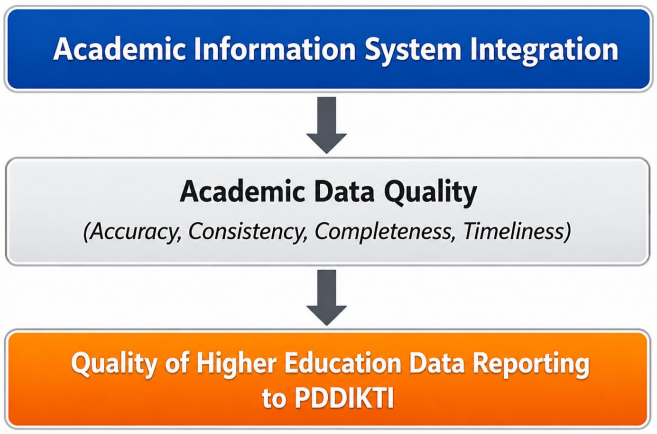

Figure 1. Research Conceptual Framework

As shown in Figure 1, the integration of academic information systems contributes to improving academic data quality through key dimensions, namely accuracy, consistency, completeness, and timeliness. High-quality data then supports more effective, accurate, and reliable reporting of higher education data to the PDDIKTI system. Therefore, the framework emphasizes that better system integration leads to improved data quality, which ultimately enhances the quality of higher education data reporting.

3. RESEARCH METHODOLOGY

3.1. Research Design

This study employs a descriptive approach using a qualitative method with a case study design to analyze the integration of academic information systems in improving the quality of higher education data reporting [21]. The descriptive approach is used to systematically explain the integration process and its impact on the quality of data reported to the PDDIKTI system.

A qualitative approach is selected to gain an indepth understanding of academic data management processes, system integration mechanisms, and challenges encountered in higher education data reporting [22]. Through this approach, the study provides comprehensive insights into how system integration influences data quality, particularly in terms of accuracy, consistency, completeness, and timeliness.

3.2. Research Site and Informants

This study was conducted at a private university in Banten Province that has implemented an integrated academic information system for managing academic data and reporting to the PDDIKTI system. The research focuses on the academic information system management unit responsible for handling student data, lecturers, curriculum, and learning activities.

The study involves five key informants consisting of PDDIKTI operators, academic information system administrators, and staff from the Registration, Lecture, and Examination. These participants were intentionally selected because they represent the primary stakeholders directly responsible for academic data management, validation, synchronization, and reporting activities. In qualitative case study research, the richness and relevance of information are considered more important than sample size. Therefore, the selected informants provided sufficient contextual insights into the integration process and its impact on data quality within the institution. These informants were selected using a purposive sampling technique because they are directly involved in academic data management and reporting processes. Data collection was continued until thematic saturation was achieved. Saturation was determined when consecutive interviews no longer generated new codes, categories, or themes related to system integration, data validation, synchronization processes, and reporting quality. After the fifth interview, the researchers observed substantial repetition of information and no emergence of additional analytical themes, indicating that thematic saturation had been reached. indicated by the absence of substantially new information or emerging themes from additional interviews. Although the study focuses on a single institutional case, the selected informants represent the primary operational units responsible for academic data integration and reporting activities within the institution.

3.3. Data Collection Techniques

Data were collected using three main techniques: observation, semi-structured interviews, and document analysis. These methods were applied complementarily to obtain a comprehensive understanding of the integration process between the academic information system and the PDDIKTI reporting system.

Observation was conducted to directly examine the academic data management process, including data entry, validation, and synchronization with the PDDIKTI system.

Semi-structured interviews were conducted with key informants to explore their experiences, challenges, and strategies in managing and reporting academic data.

Document analysis was used to review supporting materials such as data synchronization reports, institutional policies, and academic data reports submitted to the PDDIKTI system. The use of multiple data sources enabled data triangulation, which enhances the validity and reliability of the research findings.

Table 1. Research Design Overview

Component	Description
Research Approach	Qualitative Case Study
Research Focus	Exploring how the integration of academic information systems contributes to improving academic data quality and reporting to the PDDIKTI system
Participants	PDDIKTI operators, academic information system administrators, and IT/RPU staff
Sampling Technique	Purposive Sampling
Data Collection Methods	Semi-structured Interviews, Observation, Document Analysis
Data Analysis	Thematic Analysis
Research Duration	Conducted during the academic reporting period
Expected Outcomes	Identification of key factors influencing data quality and the effectiveness of system integration

3.4. Data Analysis Techniques

The qualitative data in this study were analyzed systematically to identify patterns, relationships, and meanings related to the integration of academic information systems and their impact on the quality of data reporting to the PDDIKTI system [23].

The analysis began with a data familiarization stage, in which the researchers reviewed interview transcripts, observation notes, and relevant documents to gain a comprehensive understanding of academic data management processes and system integration mechanisms.

Subsequently, the analysis focused on two main aspects: system integration processes and data quality. The analysis of system integration examined data exchange mechanisms, synchronization workflows, and operational practices involved in connecting the academic information system with the PDDIKTI reporting system [24]. Meanwhile, data quality analysis was conducted based on four key dimensions: accuracy, consistency, completeness, and timeliness, which served as analytical indicators to evaluate the quality of higher education data reporting.

To strengthen the analytical rigor, this study applied the interactive data analysis model proposed by Miles and Huberman, which consists of three stages: data reduction, data display, and conclusion drawing [25]. Data reduction involved selecting and focusing on relevant information, while data display organized the data into structured narratives and tables to facilitate interpretation. The final stage involved drawing conclusions by identifying patterns and relationships between system integration and data quality.

In addition, the analysis process involved coding techniques to categorize data into themes related to system integration and data quality. To ensure the validity and credibility of the findings, source triangulation and method triangulation were applied by comparing data obtained from interviews, observations, and document analysis [26].

Table 2. Data Collection Matrix

Research Objective	**Data Source**	**Description of Collected Data**	**Analytical Focus**
To analyze the integration process between the Academic Information System and the PDDIKTI reporting system	Semi-structured interviews with system administrators and PDDIKTI operators	Explanations regarding system integration mechanisms, data synchronization processes, and challenges in data exchange	Identifying how system integration is implemented and the factors influencing its effectiveness
To identify the workflow of academic data management and reporting to PDDIKTI	Observation of academic data management processes	Notes on data processing workflows, data validation procedures, and reporting activities to the PDDIKTI system	Understanding the operational process of academic data reporting and potential issues that arise
To analyze the quality of higher education data reporting	Document analysis	Academic reporting data, system reporting logs, and institutional documents related to data management	Evaluating data quality based on accuracy, consistency, completeness, and timeliness dimensions

4. RESULTS AND FINDINGS

4.1. Overview of Academic Information System

To understand how the integration process of academic information systems is carried out, this study analyzes the architecture of the integration system used in academic data management. The integration architecture is illustrated in Figure 2.

The academic information system architecture consists of integrated modules for academic data management, ETL processing, validation, synchronization, and monitoring. Academic data are extracted from the institutional database, validated, transformed, and synchronized with PDDIKTI through API-based integration mechanisms. The architecture also includes logging and monitoring features to support data accuracy, synchronization tracking, and reporting efficiency [27].

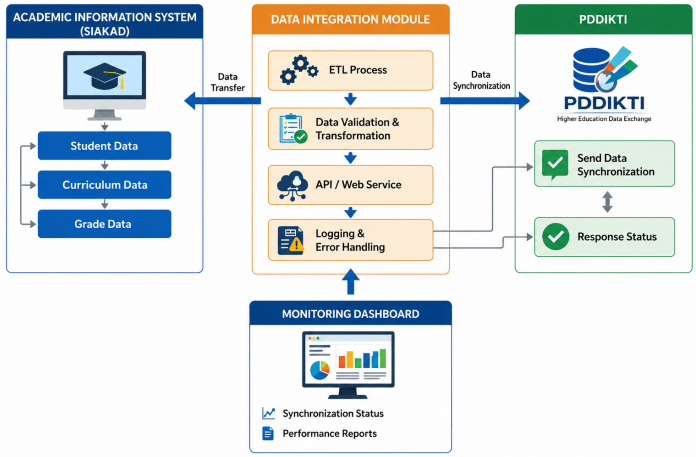

Figure 2. Academic Data Integration Architecture Diagram

4.2. Academic Database Structure

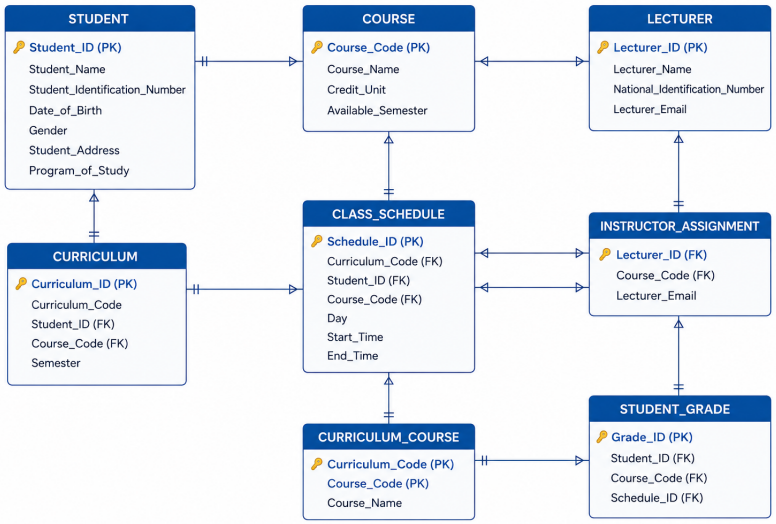

Figure 3. ERD of Academic Data Integration for PDDIKTI Reporting

Figure 3 illustrates the Entity Relationship Diagram (ERD) used for academic data integration and PDDIKTI reporting. The integrated database structure connects entities such as students, lecturers, courses, curriculum, study plans (KRS), and grades within a centralized system. This integration minimizes data duplication and improves data consistency and reporting accuracy [28].

4.3. System Integration Process with PDDIKTI

The integration between the Academic Information System and PDDIKTI is conducted through API-based synchronization mechanisms. The process includes data extraction, transformation, validation, and synchronization to ensure compliance with national reporting standards. Integrated monitoring features enable operators to track synchronization status and identify reporting errors in real time, thereby improving reporting efficiency and data quality. The integration workflow is illustrated in Figure 4.

Figure 4 illustrates the data integration process between the Academic Information System and PDDIKTI. The process begins with the extraction of academic data, including student, lecturer, course, study plan (KRS), and student learning activity (AKM) data, followed by data transformation to meet PDDIKTI standards. The system then performs automated validation to ensure data completeness, consistency, and format compliance.

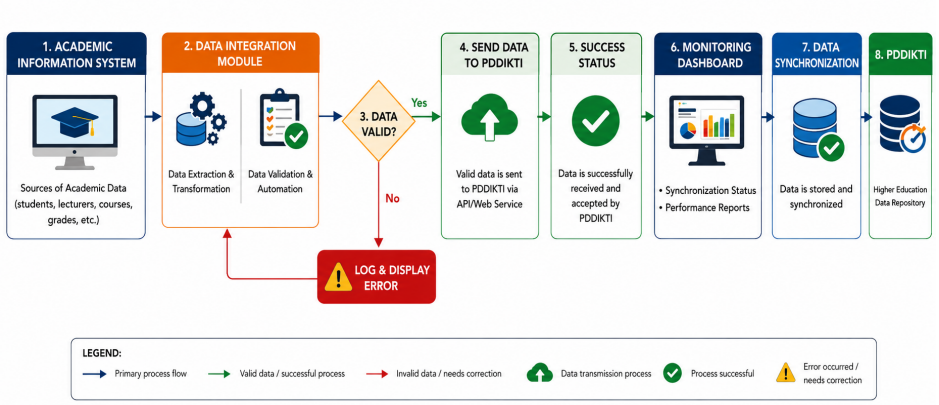

Figure 4. Architecture of Academic Data Integration and Synchronization with PDDIKTI

Valid data is synchronized with the PDDIKTI system, while invalid data is flagged as errors for correction by the operator. This process is supported by a monitoring dashboard that enables real-time tracking of synchronization status. Through this integration and monitoring mechanism, academic data reporting becomes more efficient, accurate, and controlled, thereby improving the quality of higher education data reporting.

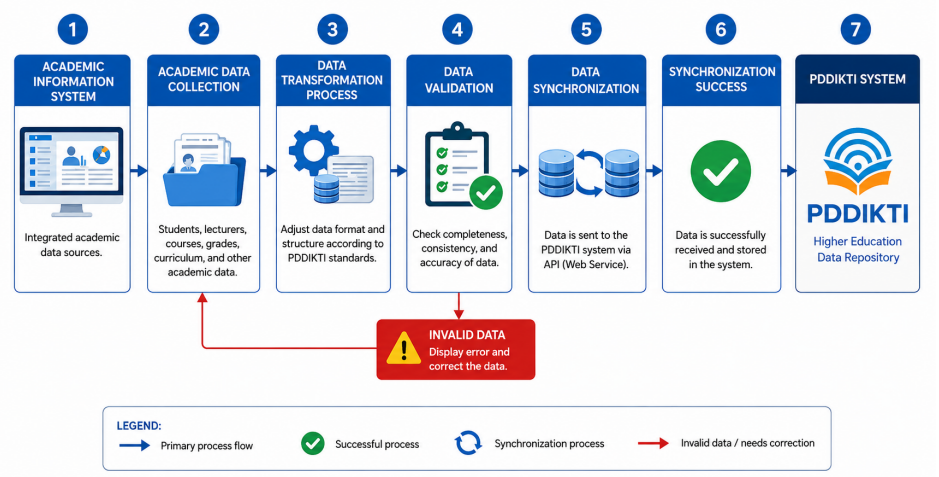

Figure 5. Data Integration Flow to the PDDIKTI System

The data integration process between the Academic Information System and PDDIKTI is carried out through several interconnected stages to ensure accurate reporting in accordance with national standards. As shown in Figure 5, the process begins with the extraction of academic data, including student, lecturer, study plan (KRS), and grade data, followed by data transformation to align with PDDIKTI formats. The system then performs validation to ensure data completeness, consistency, and to minimize errors and duplication. Validated data is subsequently synchronized with the PDDIKTI system through the available integration mechanisms. This process enables academic data reporting to be conducted automatically, more efficiently, and in a structured manner, while supporting the availability of accurate information for higher education institutions [29].

Compared with the previous manual reporting workflow, the integrated reporting process significantly improves operational efficiency and data management quality. In the manual workflow, academic staff were required to repeatedly collect, verify, and enter data from multiple academic units before submitting reports to PDDIKTI, increasing the risk of delays, inconsistencies, and human errors. Through the integrated workflow, data validation, transformation, and synchronization are performed automatically within a centralized system environment. This approach reduces redundant activities, accelerates reporting processes, and enhances the

accuracy and reliability of academic data submitted to PDDIKTI.

- **Integration Risks and System Security**

  Despite the benefits of academic information system integration, several operational and technical risks were identified during the implementation process [30]. One major challenge relates to synchronization failures caused by unstable network connections, incomplete data mapping, and inconsistencies between local database structures and PDDIKTI standards. These issues may result in failed synchronization, duplicated records, or delayed reporting processes [31].

  API-based integration also introduces several security and governance challenges related to authentication, authorization, and secure data transmission. Previous studies indicate that higher education institutions implementing API-driven architectures must strengthen cybersecurity controls, logging mechanisms, and access management to prevent unauthorized access and synchronization failures [32].

  To mitigate these risks, the institution implemented access control mechanisms, monitoring dashboards, synchronization logs, and periodic validation procedures to monitor synchronization activities and detect abnormal transactionsn [33]. Informants also emphasized the importance of regular system maintenance and database backup procedures to prevent data loss during synchronization failures. These findings indicate that successful system integration requires not only technical interoperability but also strong governance mechanisms related to data security, operational monitoring, and institutional data management policies [34].

4.4. Data Validation Mechanism

Figure 6 illustrates the data validation mechanism performed before synchronization with PDDIKTI. The system automatically validates data completeness, format conformity, and consistency across academic entities. Invalid records are flagged for correction before synchronization to ensure reporting accuracy and compliance with reporting standards.

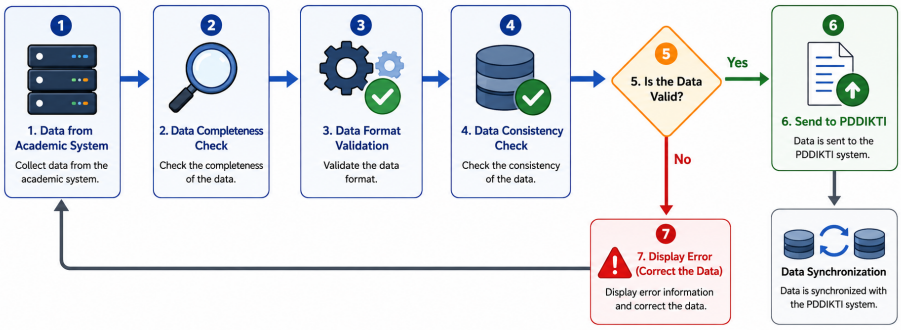

Figure 6. Data Validation Mechanism

4.5. System Integration Implementation

Figures 7 and 8 illustrate the dashboard and monitoring interfaces designed for comprehensive academic data management and real-time synchronization with PDDIKTI. The system integrates multiple functional modules that allow administrators to efficiently manage academic records, including course schedules, student enrollment, curriculum, grades, lecturer assignments, student activities, and graduation tracking. Through these modules, operators can perform tasks such as monitoring data integrity, validating entries, and tracking errors across different academic datasets. The dashboard provides intuitive visual cues and status indicators that highlight successful synchronizations, failed submissions, and records that require correction, enabling prompt decision-making and minimizing discrepancies. Additionally, the monitoring interface offers advanced filtering options by semester, study program, course, class, and status, along with capabilities to export or download data for further analysis. Collectively, these tools enhance the accuracy, transparency, and efficiency of academic data management while ensuring compliance with national educational standards and facilitating seamless reporting to PDDIKTI.

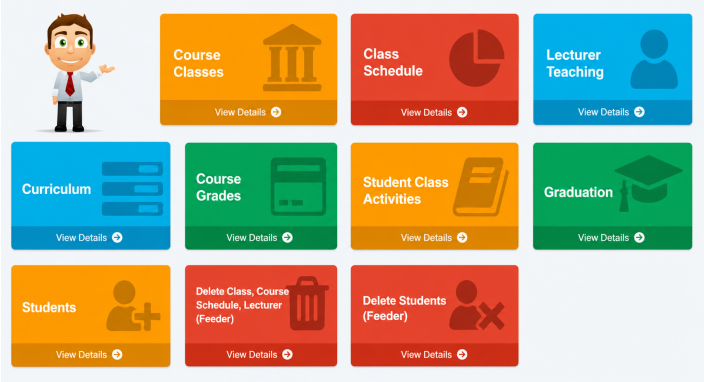

Figure 7. Academic Information System Dashboard Module

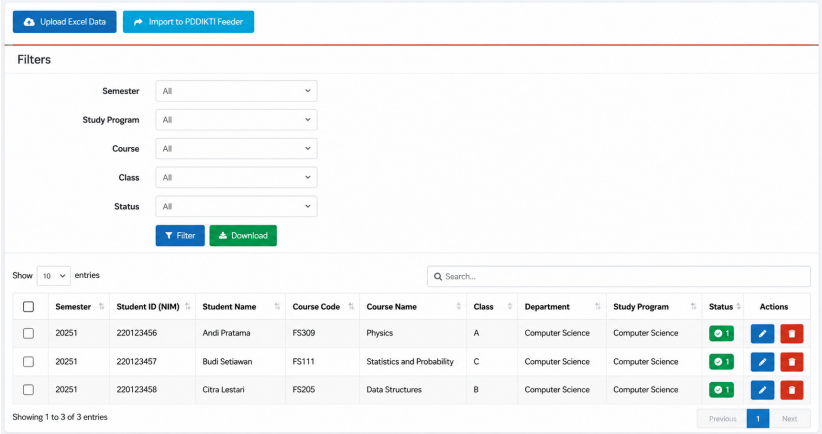

Figure 8. Monitoring Interface of Academic Data Synchronization to PDDIKTI

4.6. Data Synchronization Process

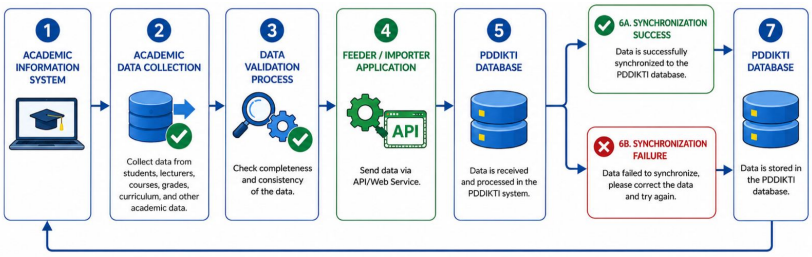

Figure 9. Data Synchronization Process

Figure 9 illustrates the academic data synchronization process between the institutional system and PDDIKTI. The process involves data extraction, validation, synchronization, and status monitoring to ensure accurate and timely reporting. Automated synchronization supports more efficient and reliable higher education data management.

4.7. Impact of System Integration on Data Reporting

The integration of academic information systems with national reporting systems such as PDDIKTI provides significant benefits in managing and reporting higher education data. This integration enables various modules within the academic information system such as student data, curriculum, academic activities, and grades to be interconnected within a unified database. As a result, the processes of data collection, processing, and reporting can be conducted in a more systematic and structured manner. Furthermore, system integration plays a critical role in improving the quality of academic data reported by higher education institutions,

thereby supporting data-driven decision-making in higher education management. Interview findings revealed that system integration significantly reduced manual workloads and reporting errors. One PDDIKTI operator explained:

"Before the integration was implemented, we often had to input academic data manually into multiple systems. This process frequently caused inconsistencies and delayed reporting. After the integration system was implemented, synchronization became faster and more accurate." (Informant 2, PDDIKTI Operator)

Another academic system administrator stated:

"The automated validation feature helps us identify incomplete or inconsistent data before synchronization with PDDIKTI. This significantly reduces reporting errors and minimizes repeated corrections." (Informant 4, System Administrator)

These findings indicate that system integration not only improves technical synchronization processes but also enhances operational efficiency and reporting reliability within higher education institutions.

To facilitate a clearer comparison of data quality improvements resulting from system integration, Table 3 summarizes the conditions observed before and after integration across the four principal dimensions of data quality: accuracy, consistency, completeness, and timeliness.

Table 3. Thematic Analysis of Data Quality Improvement After System Integration

Data Quality Dimension	**Findings Before Integration**	**Findings After Integration**	**Evidence from Informants**	**Impact on Reporting Quality**
Data Accuracy	Manual data entry frequently caused input errors and mismatched records between systems	Automated validation and centralized synchronization reduced input errors and duplicate records	"Synchronization became faster and more accurate after integration." (Informant 2)	Improved reliability and correctness of academic data reported to PDDIKTI
Data Consistency	Data inconsistencies often occurred across academic units due to separated databases and manual updates	Integrated databases standardized data structures and synchronization workflows across system	"Integrated validation helps maintain consistency across academic modules." (Informant 4)	Improved alignment of student, lecturer, and curriculum data across institutional systems
Data Completeness	Some academic records were incomplete before synchronization because validation was conducted manually	Mandatory automated validation identified incomplete records before synchronization	Operators reported fewer incomplete submissions after implementation of integrated validation features	Improved completeness of academic records submitted to PDDIKTI
Timeliness	Reporting processes were often delayed because synchronization relied on repetitive manual procedures	Synchronization and monitoring dashboards accelerated reporting activities	Synchronization monitoring enabled faster correction of failed submissions	Activities became faster, more efficient, and more timely

Based on Table 3, demonstrates that the integration of academic information systems significantly improves the four major dimensions of academic data quality, namely accuracy, consistency, completeness, and

timeliness. The implementation of automated synchronization, centralized databases, and validation mechanisms reduces manual errors, accelerates reporting processes, and strengthens institutional data governance. These findings are consistent with previous studies indicating that information system integration positively influences academic data quality, operational efficiency, and institutional decision-making processes [35], [36].

Beyond operational efficiency, the findings suggest that academic information system integration functions as an institutional data governance mechanism rather than merely a technical infrastructure. The integration process facilitates standardized data management practices, strengthens accountability across academic units, and supports evidence-based decision-making through the availability of more reliable data. From a socio-technical perspective, the effectiveness of system integration depends not only on technological interoperability but also on organizational readiness, user compliance, and governance structures. Therefore, improvements in data quality should be interpreted as the result of interactions between technological capabilities and institutional data management practices.

The findings are also consistent with previous international studies on higher education data governance and system interoperability. Previous research has shown that interoperability enables efficient data exchange and reduces data redundancy across digital education ecosystems [13]. In addition, integrated information systems have been recognized as important enablers of institutional governance, digital readiness, and evidence-based decision-making in higher education institutions [14]. Similar studies also emphasize that digital transformation in higher education requires interoperable academic ecosystems capable of integrating institutional databases and external reporting platforms [15], [16]. The present findings extend this understanding by demonstrating that API-based synchronization, automated validation, and centralized academic databases contribute directly to improving data accuracy, consistency, completeness, and timeliness within the context of PDDIKTI reporting.

Recent international studies have further emphasized the strategic role of interoperability standards and API-driven architectures in supporting academic data exchange across higher education ecosystems. Modern educational reporting systems increasingly rely on standardized APIs to facilitate secure data sharing, real-time synchronization, and cross-platform integration between institutional databases and external regulatory systems. These developments demonstrate that interoperability is not only a technical requirement but also an essential component of effective educational data governance, reporting transparency, and institutional accountability.

MANAGERIAL IMPLICATIONS

The findings of this study indicate that higher education institutions should prioritize academic information system integration to improve reporting efficiency, data quality, and institutional governance. Standardized data governance policies, operator training, and dashboard-based monitoring systems are essential to support accurate and timely reporting to PDDIKTI.

CONCLUSION

Based on the findings of this study, the integration of academic information systems appears to contribute positively to the quality of higher education data reporting to the Higher Education Database (PDDIKTI). The implementation of API-based synchronization, ETL processes, automated validation, and monitoring mechanisms enhances reporting efficiency and improves data accuracy, consistency, completeness, and timeliness.

The findings also indicate that integrated systems reduce manual workloads, minimize reporting errors, and accelerate synchronization processes. In operational practice, operators reported fewer repeated corrections and improved monitoring capabilities through dashboard-based synchronization tracking. Furthermore, system integration strengthens institutional data governance by supporting more transparent and structured academic data management processes.

However, this study has several limitations. First, the research was conducted within a single private university, limiting the generalizability of findings across different higher education contexts. Second, the qualitative case study approach relies heavily on institutional experiences and informant perceptions, which may introduce subjective bias. Third, this study primarily focuses on qualitative findings and does not quantitatively measure specific performance indicators such as exact error reduction rates or synchronization time improvements. Future research is recommended to involve multiple universities and apply mixed-method approaches

combining qualitative and quantitative analysis. Further studies may also examine cybersecurity, API governance, interoperability challenges, and performance measurement in large-scale higher education reporting systems.

5. DECLARATIONS

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5.2. Author Contributions

Validation was conducted by: UR. Conceptualization was completed by: MMS. The methodology was developed by: GF. Formal analysis was performed by: NA. Writing, review, and editing were carried out by: JB. Visualization was completed by: UR. All authors, including: MMS, UR, NA, GF and JB, have reviewed and approved the final version of the manuscript.

5.3. Data Availability Statement

The data used in this study are available from the corresponding author upon reasonable request, while maintaining ethical considerations and participant confidentiality.

5.4. Funding

This research was conducted independently without any external financial support.

5.5. Declaration of Competing Interest

The authors declare no financial, personal, or other conflicts of interest that could have influenced this study.

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