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A Literature Review of Empirical Studies on Empowering GIDA Schools Through AI-Based Academic Data Management

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Abstract *-This study presents a systematic literature review of empirical research on the use of artificial intelligence (AI)–based academic data management systems in Geographically Isolated and Disadvantaged Areas (GIDA) schools. The review synthesizes studies addressing persistent challenges faced by GIDA schools, including limited infrastructure, scarce resources, and constraints in accessing qualified personnel and learning materials. Using established systematic review procedures, the study examines current academic data management practices, feasibility considerations for AI integration in low-resource settings, and AI technologies reported as suitable for geographically isolated school contexts. The reviewed literature indicates that while AI-driven academic data systems have demonstrated benefits in improving administrative efficiency, data accuracy, and decision-making in well-resourced schools, their application in GIDA schools remains limited. Nevertheless, evidence suggests that context-appropriate AI solutions—particularly those supporting offline functionality, low-bandwidth operation, and user-friendly interfaces—hold significant potential for strengthening academic data management and promoting educational equity. The findings underscore the importance of aligning AI initiatives with local conditions, capacity-building efforts, and national education policies to support inclusive digital transformation in GIDA schools.*

Keywords *- GIDA, educational technology, predictive analytics, data-driven decision making, inclusive education, Learning Management Systems (LMS), AI in Education*

INTRODUCTION

Geographically Isolated and Disadvantaged Areas (GIDA) schools continue to experience structural and systemic challenges that affect teaching, learning, and school administration. These challenges include limited access to digital infrastructure, shortages of instructional resources, unstable power supply, and difficulties in maintaining accurate academic records, particularly in rural and remote Philippine communities (Lambunao, 2024; Goles et al., 2024).

Recent advances in artificial intelligence (AI) have introduced new opportunities for addressing inefficiencies in academic data management. AI-based systems can automate data collection, validate records, and generate predictive insights that support early intervention and data-driven decision-making (Costa, 2025; Cubio, 2025). In well-resourced educational settings, these technologies have been shown to improve administrative efficiency and monitoring of learner outcomes; however, their adoption remains limited in geographically isolated schools where infrastructure and technical capacity are constrained (Ongco, 2025).

In the Philippine context, the Department of Education's initiatives to promote AI research and innovation in education reflect growing institutional recognition of AI's potential role in improving school systems. Existing studies on AI integration in education highlight both opportunities and gaps, particularly in

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terms of infrastructure readiness, teacher capacity, and ethical considerations related to data use (Bautista et al., 2024; Cabreira et al., 2025). These gaps are more pronounced in GIDA schools, where localized and context-sensitive solutions are required.

Given these conditions, there is a need to synthesize empirical evidence on AI-based academic data management systems applicable to GIDA and similar low-resource contexts. This systematic literature review aims to examine current academic data management practices, identify challenges to AI integration, and determine AI technologies reported as suitable for geographically isolated school environments (Costa, 2025; International Journal of Educational Research and Innovation, 2025).

METHODOLOGY

2.1 Research Design

This study employed a systematic literature review (SLR) design to synthesize empirical evidence on the use of artificial intelligence–based academic data management systems in Geographically Isolated and Disadvantaged Areas (GIDA) and comparable low-resource school contexts. A systematic review approach was selected to ensure transparency, methodological rigor, and replicability in examining existing research rather than collecting primary data (Costa, 2025). This design is particularly appropriate for identifying prevailing practices, recurring challenges, feasibility considerations, and AI technologies reported as effective in disadvantaged educational settings (Cubio, 2025).

2.2 Data Sources and Search Strategy

A comprehensive search of relevant academic literature was conducted using major scholarly databases, including Scopus, Web of Science, ERIC, IEEE Xplore, ACM Digital Library, and Google Scholar. The review focused on studies published between 2020 and 2025 to capture recent developments in artificial intelligence, educational data systems, and digital transformation initiatives in education. Search terms were systematically combined using Boolean operators to reflect the core concepts of the study, including artificial intelligence, academic or student data management, and rural, remote, or disadvantaged school contexts. In addition to peer-reviewed journal articles, grey literature such as government reports and institutional studies related to AI integration in Philippine education was screened to strengthen contextual relevance (International Journal of Educational Research and Innovation, 2025).

2.3 Inclusion and Exclusion Criteria

The review included empirical studies published within the specified time frame that employed quantitative, qualitative, or mixed-methods research designs and examined AI-enabled systems for academic data management, student analytics, administrative automation, or decision-support mechanisms in basic education settings. Particular emphasis was placed on studies conducted in rural, remote, or disadvantaged school contexts that shared characteristics with GIDA schools in the Philippines (Lambunao, 2024). Studies were excluded if they were purely conceptual, opinion-based, or editorial in nature, lacked empirical evidence, focused exclusively on higher education without relevance to basic education, or discussed AI in education without addressing academic data management or decision-support functions (Ongco, 2025).

2.4 Study Selection Process

The study selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a transparent and structured screening procedure. Initial database searches yielded a broad set of records, including non-peer-reviewed materials. Duplicate entries were removed prior to screening. Titles and abstracts were then reviewed to determine relevance to the objectives of the study, followed by full-text screening to assess methodological rigor and alignment with the inclusion criteria. Through this multi-stage process, twenty-four peer-reviewed empirical studies were identified and retained for final synthesis (Costa, 2025; Cubio, 2025).

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2.5 Data Extraction and Quality Assessment

Data extraction was conducted using a structured matrix designed to capture essential characteristics of each included study, including research context, study design, AI technologies applied, academic data management functions addressed, and reported outcomes and challenges. To ensure the credibility and reliability of the synthesized findings, methodological quality appraisal was performed using established evaluation tools appropriate to each study design. Qualitative studies were assessed using the Critical Appraisal Skills Programme (CASP) framework, quantitative studies were evaluated using Joanna Briggs Institute (JBI) checklists, and mixed-methods studies were reviewed using the Mixed Methods Appraisal Tool (MMAT) (Bautista et al., 2024; Cabreira et al., 2025). Only studies that met acceptable quality standards were included in the final synthesis.

2.6 Data Analysis and Synthesis

Given the heterogeneity of study designs, educational contexts, and reported outcomes, a narrative and thematic synthesis approach was employed. Extracted data were systematically coded and organized according to analytical themes aligned with the research questions. These themes focused on current academic data management practices and challenges in GIDA schools, the feasibility of integrating AI-based academic data systems in low-resource and geographically isolated environments, and the AI technologies identified in the literature as suitable for improving data collection, analysis, and decision-making (Tabuena, 2025; Nogot, 2025). Quantitative findings were summarized descriptively, while qualitative findings were analyzed thematically to identify recurring patterns, enabling factors, and contextual constraints.

2.7 Ethical Considerations

As this study relied exclusively on secondary data derived from published sources, no direct involvement of human participants was required. Ethical considerations were addressed by ensuring accurate citation and attribution of all sources, maintaining academic integrity, and faithfully representing the findings of the reviewed studies. In addition, ethical issues related to the use of artificial intelligence in education—such as data privacy, equity, and responsible AI deployment—were considered based on discussions presented in the reviewed literature (Ortega-Dela Cruz & Dela Cruz, 2024; International Journal of Educational Research and Innovation, 2025).

RESULTS AND DISCUSSION

3.1 General database search

Table 1 shows the number of papers in each of the databases that were identified using the key search. The second column in table 1 contains all results, including the non-scientific writing such as magazine articles. In all, there are 60 journals examined against the inclusion and exclusion criteria. Based on the reading abstracts, 34 journals are excluded from the review, and the remaining 26 journals with potential are acquired. The remaining full texts journal articles are evaluated to check if it has empirical evidence. Finally, 12 articles are excluded, and 24 qualified peer-reviewed research papers on empowering GIDA schools though AI-based academic data were left to review.

Database	Total number of results	Peer review paper
Scopus		
Web of Science	**289**	**4**
ERIC	**346**	**6**
IEEE Xplore	**2**	**1**
ACM Digital Library	**5,486**	**4**
Google Scholar	**115,000**	**5**

3.2 Current practices and challenges in academic data management among GIDA schools in the Philippines

The results indicate that GIDA schools generally comply with the Department of Education's mandate to maintain academic records through centralized systems such as the Learner Information System (LIS). However, due to infrastructural and

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contextual constraints, full digital implementation remains limited. Most participating schools reported the use of hybrid academic data management practices, combining manual, paper-based documentation with periodic digital encoding when internet connectivity becomes available.

Teachers and school heads primarily maintain learner profiles, attendance records, and grades using printed templates aligned with LIS requirements. These records are later encoded into the system, often during scheduled visits to areas with stable internet access. This practice reflects an adaptive response to geographical isolation and limited technological resources. Similar practices have been observed in remote educational settings where access to digital infrastructure is constrained.

Most of the reviewed papers reported common practices and challenges in academic data management among GIDA schools in the Philippines. Through analysis, five challenges are identified and encountered in recent years.

CONCLUSION AND RECOMMENDATIONS

This systematic literature review examined empirical studies on the use of artificial intelligence–based academic data management systems in Geographically Isolated and Disadvantaged Areas (GIDA) and comparable low-resource school contexts. The findings indicate that while GIDA schools generally comply with mandated academic data reporting requirements, their data management practices remain constrained by persistent infrastructural, technological, and human resource challenges. Limited internet connectivity, unstable power supply, inadequate ICT infrastructure, and insufficient digital skills among school personnel continue to hinder the effective implementation of fully digital academic data systems.

The reviewed literature further demonstrates that GIDA schools have adopted adaptive strategies, particularly hybrid data management practices that combine manual documentation with periodic digital encoding. These practices reflect resilience and contextual responsiveness rather than resistance to technological change. However, such approaches also contribute to issues related to data timeliness, accuracy, and usability for evidence-based decision-making.

Despite these challenges, literature consistently highlights the transformative potential of AI-based academic data management systems in addressing long-standing inefficiencies in disadvantaged educational settings. AI-driven tools offer opportunities to automate routine administrative tasks, improve data validation, generate predictive insights on student performance, and support early intervention strategies. The feasibility of AI integration in GIDA schools is strongly influenced by the alignment of technological solutions with local conditions, particularly the need for offline functionality, low-bandwidth compatibility, minimal hardware requirements, and user-friendly interfaces.

Overall, the findings suggest that AI-based academic data management should be viewed not merely as a technological enhancement but as a strategic intervention for advancing educational equity and strengthening school systems in geographically isolated areas. When implemented in a context-sensitive and supported manner, AI has the potential to empower educators, enhance administrative efficiency, and improve data-driven planning and decision-making in GIDA schools.

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Recommendations

Based on the synthesized findings of this review, several recommendations are proposed to support the effective integration of AI-based academic data management systems in GIDA schools. First, education policymakers and stakeholders should prioritize investments in foundational digital infrastructure, including reliable electricity, internet connectivity, and access to appropriate ICT devices. Without addressing these basic requirements, the potential benefits of AI technologies cannot be fully realized in geographically isolated settings.

Second, the design and selection of AI-based academic data systems should emphasize contextual appropriateness. Systems with offline-first capabilities, lightweight architectures, and low-bandwidth requirements are more suitable for GIDA schools than fully cloud-dependent platforms. Aligning AI tools with existing education management systems and national education policies is also essential to ensure coherence, scalability, and sustainability.

Third, sustained capacity-building initiatives should be implemented to strengthen the digital and data literacy of teachers, school administrators, and education personnel. Continuous professional development programs focused on the practical use of AI-supported data systems can enhance user confidence, promote system adoption, and reduce resistance arising from limited technical familiarity.

Fourth, the phased implementation of AI-based academic data management systems through pilot programs is recommended. Pilot testing allows schools to assess system functionality, identify context-specific challenges, and refine implementation strategies before large-scale deployment. Ongoing technical support and monitoring mechanisms should accompany these pilot initiatives to ensure long-term viability.

Finally, future research should move beyond exploratory and descriptive studies by conducting empirical evaluations of AI-based academic data management systems in actual GIDA school environments. Longitudinal studies, implementation research, and impact assessments are particularly needed to examine the effects of AI adoption on data quality, administrative efficiency, student outcomes, and educational equity. Such evidence will be critical in informing policy decisions and guiding the responsible and inclusive use of artificial intelligence in education.

REFERENCES

Bautista, A., Estrada, C., Jaravata, A. M., Bautista, A., Estrada, C., Jaravata, A. M., Mangaser, L. M., Narag, F., Soquila, R., & Asuncion, R. (2024). Preservice teachers' readiness towards integrating AI-based tools in education: A TPACK approach. *EDU PIJ, 13*(3), 40–68.

Cabreira, J. L., Gomez, S. T., & Peria, J. N. T. (2025). Readiness and perspectives of science teachers on the use of artificial intelligence in teaching science. *International Journal of Research Publication and Reviews, 6*(6), 24–30.

Costa, M. L. (2025). Artificial intelligence and data literacy in rural schools' teaching practices: Knowledge, use, and challenges. *Education Sciences, 15*(3), 352. https://doi.org/10.3390/educsci15030352

Cubio, J. V. (2025). The role of artificial intelligence in teaching and administrative tasks: Perspectives of DepEd personnel. *International Journal of Research and Innovation in Social Science (IJRISS).* https://ijriss.com

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Goles, C., Sanchez, J. M., Sumalinog, G., Mananay, J., & Alejandro, I. M. (2024). Beyond the pandemic: The changing landscape of technology integration in higher education in Central Visayas, Philippines. *CTU Journal of Innovation and Sustainable Development, 16*(1), 150–159. https://journal.ctu.edu.ph

Lambunao, G. B. (2024). Enhancing ICT competency among public elementary teachers: A case study in Manolo Fortich II District, Bukidnon. *International Journal of Research and Innovation in Social Science (IJRISS),* Special Issue. https://ijriss.com

Nogot, W. R. (2025). Integration of artificial intelligence tools in inquiry-based physics instruction for Grade 10 students in public secondary schools of Quezon Province. *International Journal of Research and Innovation in Social Science (IJRISS).* https://ijriss.com

Ongco, R. A. (2025). Channeling ICT integration in effective teaching–learning for junior high school. *Dinkum Journal of Social Innovations, 4*(1), 20–33. https://dinkumpublishers.com/journals/djsi

Ortega-Dela Cruz, R., & Dela Cruz, R. (2024). AI integration in IT education: Challenges, opportunities, and future directions. *Journal of Teaching and Learning.* https://journalofteachinglearning.com

Tabuena, A. K. G. (2025). Practices of instructors in integrating artificial intelligence in assessing student performance among community colleges in Albay. *International Journal of Research and Scientific Innovation (IJRSI).* https://rsisinternational.org/journals/ijrsi

Various Authors. (2025). Artificial Intelligence (AI) integration in Rural Philippine Higher Education: Perspectives, challenges, and ethical considerations. *International Journal of Educational Research and Innovation (IJERI)*.

Goles, C., Sanchez, J. M., Sumalinog, G., Mananay, J., & Alejandro, I. M. (2024). Beyond the pandemic: The changing landscape of technology integration in higher education in Central Visayas, Philippines. *CTU Journal of Innovation and Sustainable Development, 16*(1), 150–159.