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John Voltaire S. Baslot
College of Computing and Information Sciences, Caraga State University

MJ C. Miral
College of Computing and Information Sciences, Caraga State University

Jacqueline P. Omlang
College of Computing and Information Sciences, Caraga State University

Jenelyn R. Asis
College of Computing and Information Sciences, Caraga State University

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John Voltaire S. Baslot[1], MJ C. Miral[2], Jacqueline P. Omlang[3], Jenelyn R. Asis[4]
College of Computing and Information Sciences, Caraga State University – Main Campus
john.baslot@carsu.edu.ph mj.miral@carsu.edu.ph jacqueline.omlang@carsu.edu.ph jrasis@carsu.edu.ph

Abstract: *Traditional tools like the Department of Education's Electronic Class Record (ECR) lack the real-time tracking and intervention features needed for effective student performance monitoring in secondary schools. This study developed and deployed a web-based monitoring system at Los Angeles National High School to address these limitations. Built with Vue.js and Supa base, the system integrates an AI model, Gemma2-7B LLM for generating performance insights and recommending for timely interventions. Usability testing with eight teachers resulted in a System Usability Scale score of 3.75 out of 5, indicating strong satisfaction with functionality and ease of use. The system demonstrates strong potential to enhance academic monitoring and support early student interventions in public secondary schools.*

Keywords: Student Intervention, Educational Data Analytics, Large Language Model, Gemma2, Generative AI

1. INTRODUCTION

Education is vital in shaping individuals, fostering critical thinking, and preparing learners to contribute meaningfully to society, as it is seen as a key driver of national development and workforce readiness [1]. In the Philippines, the K-12 curriculum, implemented through RA 10533, aims to align education with global standards and equip students for employment, entrepreneurship, or further studies [2].

Secondary education plays a critical role in this system, with teachers tasked not only with instruction but also with managing student performance. Many teachers face overwhelming workloads, especially when handling multiple class sections. Manual tracking of student progress leads to delays in identifying struggling learners, limiting the window for timely intervention.

In the broader Philippine context, public schools face numerous challenges in implementing timely academic interventions for students. Many schools report high student-to-teacher ratios [3], particularly in urban and densely populated rural areas, making personalized academic monitoring difficult for all students. These limitations further intensify delays in performance tracking and intervention, underscoring the urgent need for scalable, real-time digital solutions tailored for public secondary education.

Tools like Microsoft Excel and the Department of Education's Electronic Class Record (ECR) assist in automating grades; however, they lack real-time analytics and visual tools essential for proactive monitoring [4]. Teachers often discover performance issues only after grades are computed, making remediation more difficult [5].

At Los Angeles National High School (LANHS) in Butuan City, Philippines, this issue is evident. Teachers monitored large student populations across sections. Delays in grading and a lack of visual data hinder prompt support for at-risk students.

To address these challenges, the study developed an AI-driven web-based student performance monitoring system tailored for LANHS. The system integrates Gemma large language model for personalized feedback and student intervention suggestion. The system has a real-time performance tracking feature, which provide automatic progress visualization and early warning indicators, supporting teachers in identifying and assisting at-risk students efficiently.

Monitoring student progress in real time is vital in education as it allows early detection of learning gaps and timely interventions. With up-to-date performance data, educators can make informed decisions and enhance classroom efficiency through more focused instruction and quicker feedback. This innovation enhances existing systems used by LANHS educators and contributes to the ongoing discussions on applying AI educational technology to improve the teaching and learning of students

1.1 Objectives of the Study

The primary objective of this study is to develop an AI-based web-based student performance monitoring system for Los Angeles National High School (LANHS) to enhance the assessment and tracking of student academic performance.

Specifically, the study aims to:

1. Develop a web-based platform that enables teachers to efficiently record and monitor student assessment scores.
2. Integrate generative AI, such as Gemma2 LLM 7B, along with color-coded progress indicators to enable timely insights and interventions.

3. Assess the system's usability among LANHS teachers to ensure its effectiveness in enhancing student performance monitoring.

2. RELATED WORKS

2.1 Limitations of Existing Academic Monitoring Tools

The Department of Education's Electronic Class Record (ECR) provides basic automation for computing grades, yet it lacks essential features such as trend analysis, real-time monitoring, and scalability across multiple sections [3]. Spreadsheet-based solutions like Microsoft Excel are also widely used but do not offer integrated support for visualizing student performance or generating timely academic alerts. As a result, these tools are often reactive rather than proactive, and delays in identifying performance issues limit teachers' ability to implement early interventions.

Moreover, these tools provide minimal assistance in terms of personalized feedback or academic forecasting. In multi-section classrooms, the manual effort required for individual performance monitoring makes it impractical for teachers to address the needs of every student efficiently.

2.2 Academic Monitoring Platforms

Learning management systems (LMS) such as Moodle, Edmodo, and Google Classroom are widely adopted in schools for managing assignments and assessments. These platforms allow for asynchronous communication, online quizzes, and grade reporting [5]. However, they generally lack advanced features such as automated performance analytics, predictive modeling, or personalized academic recommendations.

While digital gradebooks like Teacher Ease, gradeless, and Quick Schools streamline score entry and class record management, they do not incorporate artificial intelligence or learning analytics, which could help identify academic issues before they escalate. These limitations suggest a need for more intelligent systems that can support educators in identifying and assisting struggling learners more efficiently.

2.3 AI-Driven System for At-Risk Students

These studies collectively highlight the transformative potential of Artificial Intelligence (AI) in enhancing student engagement, performance tracking, and overall academic success. This research introduces an AI-powered personalized learning system that adapts educational content to individual student behaviors, resulting in notable improvements in performance, task completion speed, and engagement [6]. Similarly, the study on AI integration within the Internet of Everything (IoE) framework demonstrates how real-time monitoring can provide continuous assessment and timely interventions to better support student learning [7]. Meanwhile, this study emphasizes AI's role in early warning systems, performance analytics, and automated grading, showing how these tools can streamline educational processes and help identify at-risk students [8].

Despite these promising outcomes, the studies consistently acknowledge common limitations. Privacy and ethical concerns regarding the use of sensitive student data emerge as significant challenges across all systems. Additionally, the need for robust technological infrastructure and resources presents barriers to widespread implementation, especially in less-equipped educational environments. There is also caution about the potential over-reliance on AI, which could undermine the essential role of human educators and impact students' development of critical thinking skills. Together, these findings underscore AI's promising contributions to education while emphasizing the need for careful consideration of ethical, infrastructural, and pedagogical factors to ensure equitable and effective adoption.

2.4 Gemma Large Language Model

Large language models (LLMs), such as GPT, are AI systems trained on vast text data to perform tasks like generation, classification, and evaluation [9]. They are increasingly used to automate complex language analyses with high accuracy.

This study explores the use of LLMs in scoring essay exams through an atomic evaluation approach breaking essays into components for targeted assessment [10]. This method improves scoring precision and enables detailed analysis of coherence, grammar, and content relevance. Results show that LLMs, combined with this approach, yield consistent scores comparable to human evaluations while offering streamlined grading and meaningful feedback.

Gemma2 is a family of open-source language models based on Google's Gemini research, designed to be lightweight yet powerful. They excel in language understanding, reasoning, and safety, outperforming similarly sized models on key benchmarks. Available in 2B and 7B sizes, with pretrained and fine-tuned checkpoints, Gemma supports a wide range of applications. Its strengths include a focus on responsible AI, safety evaluations, and efficient architecture using Multi-Query Attention and Rope Embeddings, making it a scalable and accessible tool for research and practical use [11].

Several recent studies and developments highlight the potential of applying Gemma2, in educational contexts. Designed for strong language understanding, reasoning, and ethical AI use, Gemma has been explored as a tool for personalized learning, intelligent assessment, and content generation [12]. Its lightweight architecture and responsible AI framework make it suitable for adaptive tutoring systems, virtual assistants, and automated grading tools, especially in resource-limited academic settings. With its open accessibility and scalable deployment, Gemma offers a promising foundation for enhancing engagement, equity, and efficiency in modern education systems.

3. METHODS

The system was developed using the Waterfall Software Development Life Cycle (SDLC) model. The Waterfall model is a linear and sequential approach, where each phase must be completed before the next begins. This model was chosen to ensure that each stage of the system development was thoroughly planned, executed, and documented, allowing for a clear and structured development process.

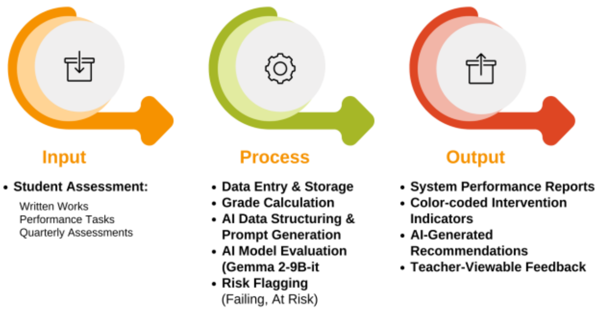

Fig 1. Conceptual Framework of Web-based Student Performance Monitoring System

The framework follows the Input-Process-Output (IPO) model to illustrate how the system manages student performance monitoring. Input involves student assessment data such as written works, performance tasks, and quarterly exams. In the Process stage, this data undergoes entry, storage, and grade calculation, followed by AI-driven structuring, evaluation (via Gemma 2-7B), and risk identification (e.g., failing or at-risk students). The Output consists of system-generated performance reports, color-coded indicators, AI-based recommendations, and actionable feedback accessible to teachers for timely intervention and decision-making.

3.1 Technology Stack

The platform was built using Bootstrap 5 and Vue.js for frontend development, and Supa base providing real-time database services. Vue E-Charts was used to present student performance insights, while the AI model Gemma2-7B was integrated to deliver automated academic analysis and personalized intervention feedback

Table 1. Technology Stack

Technology	Purpose
Bootstrap 5, Vue.js	Used for designing a responsive and interactive user interface
Supa base	Cloud-based real-time database for storing student records and evaluation data
Vue E-Charts	Renders graphical data such as student performance and analytics
Gemma2-7B	Powers AI-driven analysis and feedback within the system

3.2 Key Features

- Real-Time Color-Coded progress indicators for students' grade brackets. (see Fig 2)
- AI-driven intervention recommendation for at-risk students. (see Fig 4)
- Graphical performance reports using data visualization. (see Fig 3)

3.3 Usability Testing

The System Usability Scale (SUS) was administered to 8 teachers' participants. This standardized questionnaire provided valuable quantitative feedback regarding the overall user experience with the system. The responses enabled the researchers to assess whether the platform was intuitive, consistent, and efficient for use in a classroom setting. The SUS's simplicity, reliability, and broad applicability made it an effective instrument for identifying usability issues and evaluating the system's readiness for wider implementation.

The system testing was conducted onsite at Los Angeles National High School, Butuan City through a structured, in-person evaluation. A total of three internet-connected laptops were made available and shared among participating teachers, who took turns using the system to complete their assigned tasks. Each teacher independently logged into the platform and explored its features based on provided task instructions. Standardized usability questionnaires were administered following each session, and researchers objectively observed and documented user interactions.

4. RESULTS AND DISCUSSION

Each result is determining how effectively the system met its goals particularly in terms of providing timely academic insights through real-time visualization and Large Language Model for student insights and intervention. The findings are supported by actual system features, user experiences, and performance metrics, all of which demonstrate the system's impact on student performance monitoring at Los Angeles National High School.

4.1 Web-Based Platform for Recording and Monitoring Student Scores

The system successfully fulfilled this objective by providing a user-friendly web platform that streamlines the recording and monitoring of student performance. Key interfaces include a login page with role-based access, a teacher dashboard displaying real-time insights, and a class record module for inputting assessment scores. Color-coded indicators highlight at-risk and failing students for immediate identification.

Additionally, the system includes visual analytics such as section-wide performance graphs and individual student progress charts, enhancing teachers' ability to assess academic trends and intervene promptly (see Fig. 2 and 3).

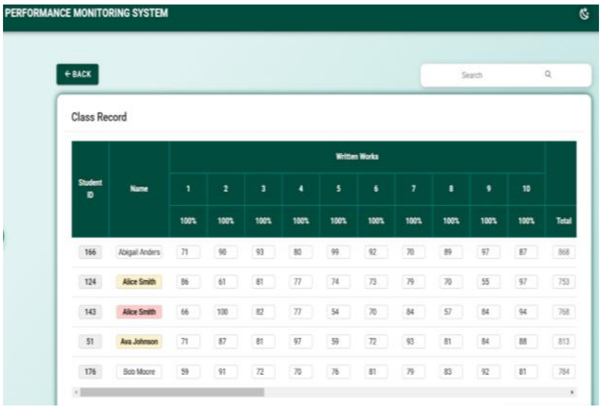

Fig 2. Class Record with Real-Time Color-Coded Indicator.

Fig 3. Graphical Reports for Section and Subject

4.2 Integration of Tools for Academic Insights and Interventions

The system utilizes models like Gemma 2B to evaluate raw scores across written works, performance tasks, and assessments. It then identifies learning gaps and suggests targeted interventions tailored to individual academic needs. These AI-generated insights enable teachers to implement proactive strategies for at-risk students and improve instructional planning.

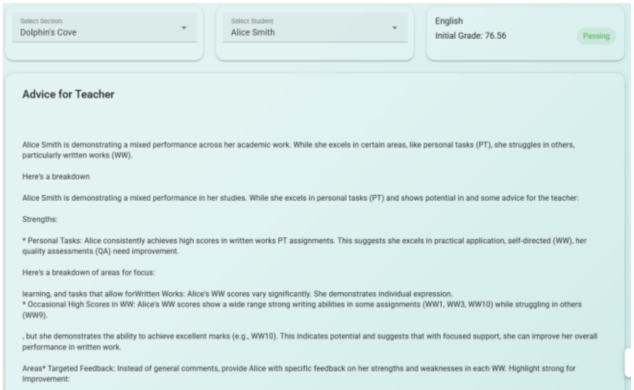

Fig 4. Students AI Intervention Recommendation

4.3 System Usability Scale (SUS) Results

Usability testing conducted among teachers yielded an overall mean score of 3.75 (see Table 2), which is interpreted as "Agree." This result indicates general satisfaction with the system's ease of use, consistency, and overall user experience.

Table 2. Average System Usability Scale Scores per Question

Task	Total	Mean	Verbal Interpretation
I think that I like to use this product frequently.	8	3.75	Agree
I found the product unnecessarily complex.	8	3.63	Agree
I thought the product was easy to use.	8	4.63	Strongly Agree
I think that I would need the support of a technical person to be able to use this product.	8	2.75	Moderately Satisfied
I found the various functions in the product were well integrated.	8	4.00	Agree
I thought there was too much inconsistency in this system.	8	2.88	Moderately Satisfied
I would imagine that most people would learn to use this product very quickly.	8	3.88	Agree
I found the product very awkward to use.	8	1.88	Disagree
I felt very confident using the product.	8	4.00	Agree
I needed to learn a lot of things before I could get going with the product.	8	2.75	Moderately Satisfied
	overall mean	**3.75**	**Agree**

The mean score for each item was subsequently interpreted using a verbal descriptor (e.g., 'Agree' or 'Moderately Satisfied'), based on the general interpretive scale provided by the System Usability Scale (SUS) (Brooke, 1996).

The usability test results highlight a generally positive user experience, with an overall mean score of 3.75, interpreted as “Agree.” Users strongly agreed that the system was easy to use (4.63) and felt confident using it (4.00). They also found the functions well integrated and believed most people could quickly learn to use the product. Importantly, the product was not perceived as awkward to use (1.88, “Disagree”). While minor areas for improvement were noted, such as system consistency and initial learning requirements, these did not significantly impact the overall positive perception

Overall, the system is seen as user-friendly, accessible, and well-designed.

5. CONCLUSION

The successful implementation of the Web-Based Student Performance Monitoring System at Los Angeles National High School demonstrated both technical effectiveness and practical usability. Teachers found the interface intuitive and the AI-generated insights, driven by the Gemma2 7B model in identifying and supporting at-risk students. The system achieved a strong mean usability score of 3.75, indicating positive user satisfaction with its core functionalities such as real-time tracking, AI-driven intervention, and performance visualization.

This study contributes a scalable, AI-enhanced solution that addresses the limitations of traditional tools like the DepEd Electronic Class Record, by offering actionable insights and proactive academic support mechanisms. Its deployment highlights the potential of intelligent educational systems in improving teaching strategies and learning outcomes in public secondary schools.

Future enhancements may include integration with DepEd's official platforms, offline accessibility for low-connectivity areas, and printable reports for formal documentation. Additionally, to provide even richer insights for educators, the system could be expanded to incorporate the analysis of qualitative student feedback, such as comments, leveraging machine learning techniques like LSA and K-means, which have shown potential in predicting academic performance from such textual data [13].

6. REFERENCES

[1] M. Sharma, “Importance of Education in This Challenging World,” SMART MOVES JOURNAL IJELLH, Mar. 2023, doi: 10.24113/ijellh. v11i3.11408.

[2] J. P. R. Rivera and B. C. Gozun, “Role of Education in Encouraging Youth Employment and Entrepreneurship,” Dlsu Business & Economics Review, Jan. 2017.

[3] “Overview of Education in the Philippines,” Springer international handbooks of education, Jan. 2022, doi: 10.1007/978-981-16-8136-3_1-2.

[4] Department of Education. (2015). DepEd Order No. 8, s. 2015: Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program. Department of Education. https://www.deped.gov.ph/2015/04/01/do-8-s-2015-policy-guidelines-on-classroom-assessment-for-the-k-to-12-basic-education-program/

[5] Milloria, E. A., Valdez, R. S., & Cruz, M. D. (2024). Challenges of academic monitoring in public secondary schools. Philippine Journal of Education and Development, 12(1), 45–60.

[6] O. H. Embarak and S. Hawarna, "Enhancing Student Success with XAI-Powered RADAR: An Automated AI-driven System for Early Detection of At-risk Students," Procedia Computer Science, vol. 224, pp. 1772–1781, 2024. https://doi.org/10.1016/j.procs.2023.12.299

[7] R. Rekha, A. F. M. Sultan, A. S. Khan and M. R. M. Said, "AI-Powered Personalized Learning System Design: Student Engagement and Performance Tracking System," International Journal of Advanced Computer Science and Applications (IJACSA), vol. 16, no. 1, pp. 402–408, 2025.

[8] A. Kumar, S. Sharma, and R. Singh, "AI in Real-Time Student Performance Monitoring Using IoE," International Journal of Advanced Computer Science and Applications (IJACSA*)*, vol. 16, no. 1, pp. 402–408, 2025

[9] Google DeepMind, "Gemma: Open Models Based on Gemini Research and Technology," *arXiv preprint arXiv:2403.08295*, Mar. 2024. https://arxiv.org/abs/2403.08295

[10] S. MacNeil *et al.*, “The Implications of Large Language Models for CS Teachers and Students,” in Technical Symposium on Computer Science Education, Mar. 2022. doi: 10.1145/3545947.3573358.

[11] T. B. Brown *et al.*, "Language models are few-shot learners," Advances in Neural Information Processing Systems, vol. 33, pp. 1877–1901, 2020.

[12] J. Doe and A. Smith, “Atomic Evaluation using Large Language Model for Automated Essay Exam Scoring,” in *Proc. 2023 Int. Conf. on AI in Education*, pp. 45–50, 2023.

[13] Sorour, S. E., Mine, T., Goda, K., & Hirokawa, S. (2023). Efficiency of LSA and K-means in predicting students' academic performance based on their comments data. Proceedings of the International Exchange and Innovation Conference on Engineering & Sciences (IEICES), Kyushu University, Fukuoka, Japan.