

**Learning Management System with AI
Generated Reviewer for Rizal High School Students**

A Software Engineering Project presented to
the College of Computer Studies of
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In partial fulfillment of the requirements for the degree of
Bachelor of Science in Information Technology

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Chapter 1

Introduction

1.1 The Problem and its Background

The traditional way of learning is time-consuming and costs money, (Joshi, 2020). Statistica (2024) announced that the Philippines approximately produced paper worth 29.5 billion Pesos from 2008 to 2023 and the annual consumption of paper per capita is 19kg, (Board of Investment, 2023). This simply proves that the traditional way of learning, specifically in reviewing, contributes to the production and consumption of paper materials. In addition to that, writing tools such as ballpens are also used in order to take notes for creating reviewers which costs roughly from P18.00 to P37.00 (DTI, 2023).

Additionally, taking notes and creating flashcards are some of the traditional ways of reviewing. The average time spent of a high school student in reviewing is 2 hours per day (Nelson, 2024), and creating review materials such as flashcards and notes consumes a student's time instead of going ahead in reviewing. Moreover, taking notes does not necessarily mean rewriting the entire lesson but rather, reading the whole lesson and jotting down important details which also consumes time to identify details to consider as "important".

With the concerns mentioned above, the researchers thought of creating a modern way of reviewing that uses Artificial Intelligence for it is proven that AI

can enhance students' critical thinking, problem-solving skills, creativity, and digital literacy (World Economic Forum, 2024). Furthermore, integrating it with the proposed Learning Management System (LMS) will aid the students' concentration, learning, and satisfaction according to Saeid (2024). Not only does the LMS provide a more sustainable way for learning (i.e., professors' distribution of lessons to the class and students' output submission) but it also makes learning materials more accessible for the students now that the internet and devices are mostly used and owned by them. Hence, adding the reviewer generator powered by AI in the proposed LMS will make the reviewer more accessible for the students and enable them to review past lessons regularly and strengthen the retention of knowledge (Nobes, 2019).

Many students at Rizal High School still tend to write down notes, repetitive reading, flashcards, blurting or sometimes do not review at all but rather depend on their memories. Unfortunately, those manual methods restrict the amount of information they can remember in preparation for exams and assignments. For this reason, the researchers proposed an AI-Generated Reviewer to be integrated in a Learning Management System (LMS). The reviewer is based on the learning materials of the course, which makes the review process easier, and more importantly allows the students to concentrate only on the appropriate topics thus enhancing their retention and performance.

Moreover, the platform helps teachers by relieving them of all the burdening and consuming activities such as controlling the course structure, designing assessments, and monitoring students' activities. This way teachers

have more time to concentrate on the students as well as their learning needs. Additionally, the LMS provides real-time information on students' performance, helping educators detect gaps and modify their instructional strategies in a timely manner. With the introduction of artificial intelligence and other technological aspects in education, the process of learning becomes easier and more resourceful for both learners and educators.

1.2 Review of Related Literature

An inclusive review of the literature focusing on the integration of Artificial Intelligence (AI) within Learning Management Systems (LMS) is presented in the following section.

According to Panergayo and Aliazas (2023), students accept Google Classroom as their learning management system highly because it is somewhat easy to use and helpful. Based on the research, "the better the students' confidence in using the platform, the more accepted it will be, as well as more effective.". The LMS that we propose to Rizal High School employs AI in order to make its students more interactive by providing them with personalized study materials. This, in return, will make learning more effective compared to traditional approaches. This points out the necessity of having confident users and an adaptive system to further improve learning results.

Del Campo et al. (2024) agree with the changes from the old traditional chalkboards in classrooms to much more evolved digital tools for accessing better resources and increasing engagement. This rationale supports our recommendation for installing an AI reviewer within the LMS at Rizal High School to benefit its students from enhanced, automatic study materials. Just like the modern teaching tools that close the gap between the classroom and the real world, our system will stream study by automating some of the key review functions and therefore allow students to interact with tailored, interactive content at their own pace.

According to Binhammad et al.'s (2024) research, generative AI really has much promise in creating learning materials customized according to the individual needs of students, thus increasing their level of engagement and academic performance. The study reveals further how AI-generated content can be aligned with specific learning objectives, thus making educational experiences more effective. This would fit well with our proposal to have an AI-run LMS here at Rizal High School, which can reach out to different needs and also offer customized learning resources that meet such needs. And then it will foster an interactive, productive learning environment.

According to Shimada et al. (2023), the paper describes an automatic method for preparing customized review materials corresponding to the behavior of students interacting with e-learning systems. They point out that quiz response analysis and subsequent text mining correspondingly improve the recall of lecture material by a student, an essentially augmented review material. This is more aligned with our Rizal High School AI-driven LMS proposal that will provide students with personalized experiences of learning requirements. If this can be adapted, then learners will have higher engagement rates as well as enhanced academic performance through the individualized support given to the students.

According to Samson and Yango in the year 2023, the efficiency of LMS largely depends on the techno-pedagogical skill of instructors and the involvement of students. The survey concludes that although numerous educational centers utilize LMS, succeeding in it would typically depend on their

ability to employ technology aptly in their teaching instruction. This is the crucial input for our proposal in Rizal High School, wherein an AI-powered LMS is planned to be implemented that personalizes learning. However, the system would not be optimized without proper teacher training and support to achieve the whole potential benefit of the system, which is a pressing area for improvement.

The study conducted by Azrul and Rahmi (2023) indicates that the integration of e-learning at secondary school levels has great potential but also raises significant challenges relative to our plan for an LMS at Rizal High School. Although many of the students rely on personal computers and smartphones for e-learning, the persistence of meaningless content and security concerns over the data of the students are at the top. From this perspective, these results provide a key rationale for our LMS to improve the experience of users and develop stringent filtering of accessible materials to create more effective learning. Lastly, they put an emphasis on immediate feedback and systems for support—their usage in our LMS will be essential if a richer and safer learning environment is to be created.

According to Asroriyah, Maskuroh, and Amanah (2023), in the learning outcome of the students, massive improvement has been observed following a well-planned Telegram quiz. Bot-English vocabulary and sentence structure were much better understood by the students. Our proposed LMS impacts student

learning in a similar way by creating reviewers for specific vocabulary, for example, thus potentially increasing not only interest but also understanding. This study proves that interactive tools are stimulating and provide immediate feedback while being a prime component we want to integrate into our LMS. Their findings also emphasize learning style differences, meaning that our system must be adaptive for each student to be served better. Their adaptability may further optimize the learning experience and academic success.

Based on the review that Vergara et al. (2024) had done, integrating artificial intelligence into LMS allows for adapting and improving the learning process in educational environments. AI integration within the proposed LMS for Rizal High School was developed, and with an AI-generated reviewer, its students would be facilitated with improved learning experiences through customized feedback as well as learning resources. In addition, while pointing out the growing importance of AI in education, the paper emphasizes that it should be used in practice and students's characteristics should be taken into account, as some affect the effectiveness of our proposed system. Therefore, personal review generation can bring about better engagement and motivation of students and bring about a more effective learning process

According to Wecksa et al. (2024), it has been established that using AI tools like ChatGPT significantly negatively influences the performance of students academically by lowering their assessment scores compared to those that had not used them. This indicates a concern for our proposal because it has

shown that reliance on AI tools lowers the outcome of learning rather than raising it. Though our system promises to provide personalized feedback and support, it is also important to take into account students' interactions with AI-generated content so as not to inadvertently undermine their academic performance. Thus, the proper implementation of the guidance will be crucial to ensure the effective supportiveness of our AI reviewer to students without undermining their learning potential.

Based on the study by Gao, Brantley, and Joachims (2024), the REVIEWER2 framework improves the quality of the AI-generated review by the use of aspect prompts and, therefore, leads to more specific and focused feedback for authors. This goes very much in line with our proposal for an LMS carrying the feature of an AI reviewer that aims to give students a personalized kind of feedback on their drafts. Our system may make the prompt generated more specific and related to the review; this, in turn, can eventually help students identify and improve their mistakes. Findings highlight the need for varying prompts that can bring in maximum outcomes from AI systems; we can use the LMS in our case, which can thus utilize this strategy as well in creating better academic outcomes.

As discussed by Wu et al. (2024), large language models that generate automated reviews will further speed up the process researchers use to review literature as well as lighten the researchers' workload. This is followed in our proposed AI reviewer generator for LMS in the case of Rizal High School to

facilitate customized review material for the students concerned based on their performance. Especially through content automation, the AI will deliver targeted review questions and summaries pertinent to individual gaps to the students, which would enhance the education experience. Therefore, the students themselves would get the customized feedback they require one after another.

1.3 Significance of the Study

Rizal High School (Organization)

The result of this study will benefit Rizal High School by having an AI-enabled reviewer within the LMS to support more effective study sessions for the students. Our proposed AI reviewer addresses issues in the traditional way of reviewing by generating fast, concise, and adaptive content or reviewers for any school lesson. This tool will improve the academic support system of Rizal High School, creating and providing a modern learning system that is more responsive and supportive to the diverse and different needs of its students, thereby improving academic performance.

Students and Teachers (User)

An LMS that has an AI-powered reviewer generator greatly benefits the teachers and students of Rizal High School positively. Current methods of reviewing course material prove to be a struggle on the part of the students, thereby making it difficult for them to fully understand and retain the lesson. Such a feature will give students a concise reviewer of the lesson and study guides that could adapt to individual needs for better retention and understanding. This feature will also make the workload of teachers easier because it will take care of some routine processes like creating a reviewer for the students for the upcoming exam. It will provide efficiency and assurance to the instructors, knowing that their students can easily retain their lesson. This will enable educators to focus more on the quality of teaching and work towards providing

better support to the student, thereby making the course of education more optimized.

The Researcher

This research will give the researcher with more in-depth understanding, knowledge, and experience regarding technical and managerial aspects. The researchers will gain important experience on software development by developing and implementing a learning management system powered by AI features and machine learning technologies, enhancing their technical competence in terms of system design and programming. Furthermore, pursuing this study will, in so many ways, develop the skills of the researcher in project management and problem-solving.

Future Researchers

This study serves as a basis for future development. It gives insights to AI-driven Learning Management Systems. Further researchers can extend, continue, and broaden this study for deeper implementation of AI into learning management systems and to the education as a whole. This study also acts as a starting point for re-engineering the system in order to make it more personalized and efficient, improving the system to unlock the full potential of using learning management systems in education, to also further the study towards making those educational tools optimized for different needs of education.

1.4 Statement of the Problem

This study aims to explore the development of a Learning Management System (LMS) integrated with artificial intelligence (AI) to enhance class performance, student participation, and ease of instructional workload by incorporating automated reviewer generation. The system seeks to tackle the following key challenges:

1. How to develop a LMS integrated with artificial intelligence that will enhance student's learning?
2. How to automate features that will boost student engagement, making learning more effective and enjoyable?
3. How to develop a tool that will help the students to automate the review process allowing them to review accurately?
4. How to develop a system that turns lectures into organized, summarized notes, and questionnaires, capturing every detail while understanding the learning materials?

By addressing these problems, the proposed system aims to improve the overall learning experience for students while alleviating the burden on educators in creating review materials and tracking student performance.

1.5 Scope and Limitation of the study

The proposed LMS for Rizal High School will include:

Students Module

The part of the system with a user interface for the students. It is made for the students to access learning materials uploaded by the professors, submit their academic works, access the AI reviewer generator, and overall, to keep track of their academic tasks and performance.

Faculty Module

It is the website for the professors where they can upload learning materials, can create, update, and delete an assignment, view the submitted output of the students, and view the branches.

Institute Module

Institute have a dashboard to monitor the faculties, students, and branches. Institute also can apply CRUD to students, faculties, and branches. Institute also has the control to class creation.

Branches (strand)

Can be created, updated, and viewed, in the institute module.

Uploading

Both students and professors have a designated user interface for uploading files in the system.

AI reviewer Generator

Students have an interface for the ai reviewer generator. Students can upload a document to the AI and then a review material will be provided. Also, students can prompt questions regarding the material.

However, the limitations of the proposed system are as follows.

1. Scoring output function is to be added on future updates.
2. The LMS does not have a video conferencing feature. This is due to the availability of free APIs that the researchers could afford and use in the development of the system.
3. Time restriction to add a video conferencing feature.
4. Stable internet connection is necessary in order to make use of the system. This includes account creation, logging in, creating class and adding students to the class, viewing and uploading materials, submitting and viewing, scoring outputs, and generating reviewers using the integrated AI.
5. Computer devices such as Laptop, Desktop, mobile phones and tablets are necessary to use the system.
6. Users' familiarity and knowledge of using technology is necessary.

Chapter 2

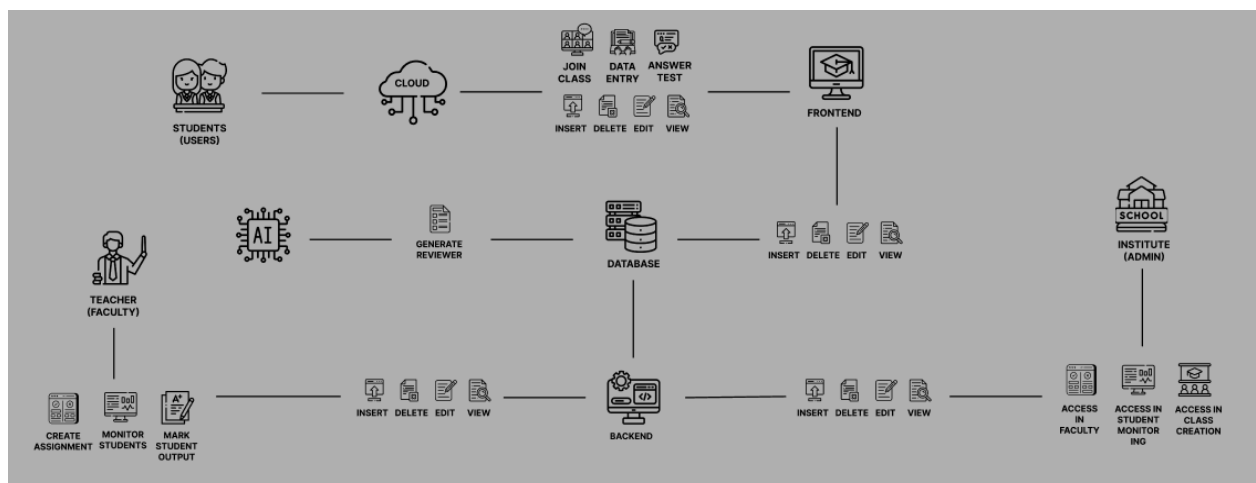
Methodology

This chapter discusses the research design, methods of data collection, and analysis techniques applied to this work of research that would contribute to the validity and reliability of the outcome of the study. The study further describes the structured approach designed for this investigation concerning the implementation of a learning management system with the use of an AI-generated reviewer system. This chapter describes the methodology for gathering and interpreting student feedback so that it can be meaningfully applied in improving the LMS-based learning experience.

2.1 Methods and Frameworks

Architectural Framework

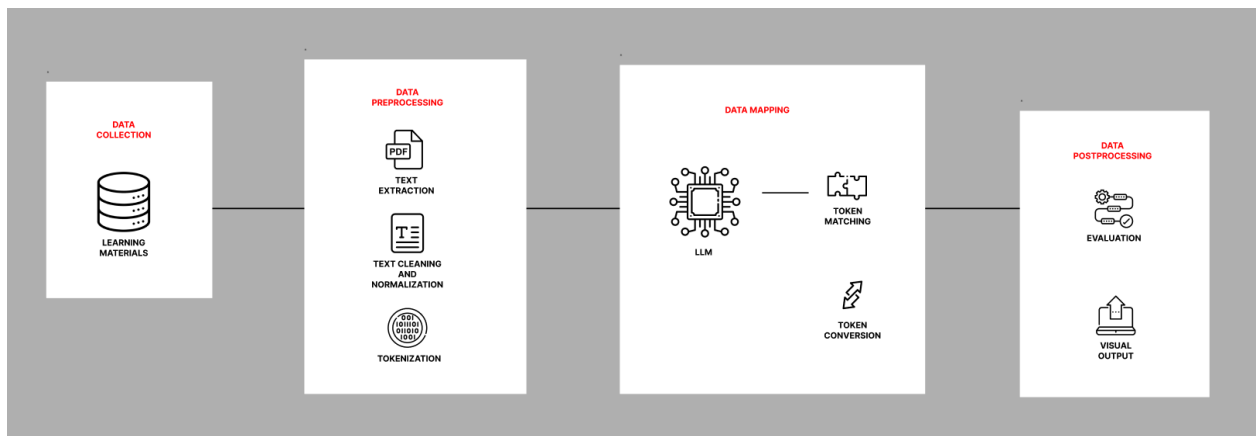
Figure1: “Learning Management System”



The **Figure1** indicates that the students have access to the website through the cloud wherein they can be added to classes, enter their data and perform academic tasks. The student interface serves as the front-end of the system which is able to manipulate data which is saved to the database. The database which holds learning materials is accessible by the AI in order to generate reviewers. Also, the database can be accessed by the back-end which are the institute and the teachers (faculty). The institute as an admin can perform CRUD to the faculty, students, and can create a class. On the other hand, the teachers (faculty) can create assignments, monitor students, and mark the student output; hence the faculty can perform CRUD.

Architectural Framework (LLM)

Figure 2: “Reviewer Generator / Algorithm”



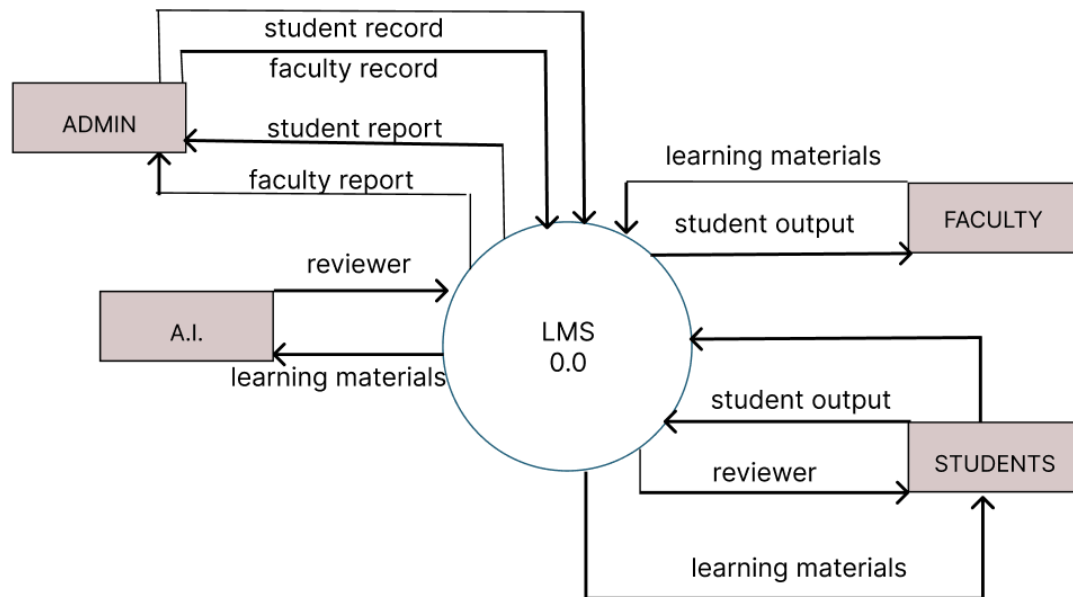
The **Figure2** shown is the procedure of applying a Large Language Model that starts with data collection, the system aggregates all relevant learning materials that teachers provide. These are the bases for creating meaningful

content that helps students. Upon collection, the data will then undergo a critical phase called preprocessing. That means it follows several steps, starting with text extraction. It isolates the essential content from the source, eliminating unnecessary information or formatting. Then, text cleaning ensures the content is free of errors such as grammatical ones or unwanted symbols. After that, tokenization transforms the text into smaller, more feasible pieces known as tokens or words/phrases, which are easier for the model to analyze.

Next, the data mapping phase transforms these tokens into a format that the LLM could understand. The model's vocabulary is matched against the tokens, and numerical presentations of these tokens are created to allow the model to correctly process and analyze the data. Data postprocessing refers to the following stage where the LLM will produce outputs based on the processed data. These outputs will be judged for relevance, coherence, and accuracy to see if they meet the purpose. Lastly, the outcome is formatted and presented in an easily readable interface, such as an AI-generated reviewer to make the information accessible and practical for students. This structured approach ensures that the model would always generate high-quality outputs that are tailored to learning objectives.

Level 0 DFD

Figure 3: "LMS DATA FLOW DIAGRAM"



The **Figure3** shows the Level 0 Data Flow Diagram of the Learning Management System represents how the system interacts with the main users, that being ADMIN, FACULTY, and STUDENT. The ADMIN supplies LMS with student and faculty information that is used to run an account and a role inside the system. LMS produces reports and records assisting the ADMIN in overseeing the whole business. The LMS of FACULTY will contain learning materials in the forms of lessons, and assignments, which they have to do for receiving student outputs such as quiz results and submissions to be evaluated.

STUDENTS submit their outputs, completed assignments and exams, into the LMS and are rewarded with reviewers generated by the system. This implies a faculty learning material from which some base those who review students in an examination or improve understanding. Here again, this DFD concentrates attention on the role of an LMS as a unifying platform for all in integrating data and resource management activities.

SE Paradigm

Requirements gathering and analysis

The first step of our research was to understand the needs and requirements of the school, teachers, and students. We interviewed the Office of the Principal and students in order to collect feedback on the expectations and preferences of these systems. Identified from there, key features were those including user interface and real-time updates, document summarizer, with both administrative and student requirements. The detailed requirements gathered during this stage form the basis of system design and development.

System design

In this phase, we use the collected requirements into a system design that meets the identified needs. Both high-level and low-level designs were created; they specified the architecture of the system, database structures, and user interface. In this phase, we created mock-ups for each module of the system.

Implementation (Coding)

The mockups are now translated into codes, and each module is assigned, which involves the creation of codes for the building up of all the features and functions so that it would result in an intuitive user interface and the backend system would efficiently process its operations. After creating the learning management system, we created and trained the model for our AI reviewer generator. With the help of APIs, we created an algorithm that could

upload and summarize files as well as an AI chatbot that has the capability of answering questions asked.

Integration and Testing

We assembled all the system components and modules that were developed and integrated them into one system. We patched up the AI reviewer generator module on the LMS and then started testing for functionality and performance. The tests conducted are functional testing; we test to determine whether the system works as required and stress testing, which examines how the system responds when it encounters heavy loads of data. This phase ensured that the system would be fully operational and ready for deployment.

Future Plan: Deployment

We will deploy the system after completing all testing and when the system is ready for deployment. Such deployment can be installing the system on the target servers or deploying through the cloud. We will provide training sessions for both student and administrative staff to ensure a seamless transition and the adoption of the system.

Future Plan: Maintenance

In maintenance mode after being deployed, the system continuously receives support and updates and continues, possibly addressing new issues that may occur, optimizing its performance, and adding improved features or new ones. Periodically, security update work and patching of systems will be performed to make the system safe and operational. Maintenance is a very

essential function that must be carried on from time to time to ensure that the system is effective.

Research Design

This study used a descriptive research design that examined the adoption of an AI-generated reviewer in the Learning Management System (LMS) at Rizal High School. Descriptive research proves to be very helpful in educational contexts since it enables one to directly observe the factors involved without any manipulation of the environment, thereby promoting a much clearer understanding of real-world applications (Koh et al., 2000). This would help gather information on whether students make effective use of the AI tool or not. What is important is that it would be possible to gather wide-ranging opinions on how it affects the methods by which students learn.

Using descriptive research, the study can capture a very broad spectrum of student experiences, including how they interact with the AI-generated reviewer about perceived effects on learning processes. It enables more meaningful insight into how students use this tool within their study habits and how effective it is at enriching their learning experience. Moreover, it is descriptive, and the data itself is also both qualitative and quantitative; hence, it is quite comprehensive in terms of giving an overview of the process of implementation. Kaur et al. (2023) found that due to the nature of descriptive research, one can develop meaningful insights that may lead the way toward improvement in educational practices. Overall, a great framework is provided through a choice of a descriptive research design to enable gathering valuable insights into the possible enhancement within the LMS for the AI reviewer generator implementation to inform the result.

Population and Sampling

The participants of this study would come from the Senior High School Department of Rizal High School. Participants will include students from STEM which stands for Science, Technology, Engineering, and Mathematics, ABM or Accountancy, Business, and Management, and HUMSS or Humanities and Social Sciences strands. The participants of the study will be composed of two sections from each strand.

The researcher developed a learning management system (LMS) powered by an AI reviewer-generating system. It is designed to maximize the study habits of students in senior high school by improving the content generated and learning experience with the use of AI. Quantitative feedback gathered will be used in the evaluation. The researchers chose these three strands—STEM, ABM, and HUMSS—so the sample reflects the diversity of academic focuses existing at Rizal High School. The researcher will utilize six sections—one for each strand—consisting of 40 students on each section to stratify the representation of different experiences of students. Such sample size is chosen, keeping it manageable and focused to obtain more comprehensive feedback.

Purposive sampling is utilized in the choice of participants since selected students attempt to maintain a critical and relevant sample through students belonging to certain strands (STEM, ABM, and HUMSS). The data collected will be used to evaluate how the AI reviewer system influences student learning,

while the author will look for diverse responses that reflect students from different strands' academic needs and preferences.

Data Collection Methods

Instruments: The researchers used questionnaires via google form to collect data from Rizal Senior High School students due to its efficiency.

Procedure: Enlisted below are the sequence of procedures in data collection.

1. The researchers sought the approval of the research adviser for the instrument and content of the questionnaire to be used.
2. Made a request letter signed by the research adviser for Rizal High School.
3. Accomplished the requirements of Rizal High School for the approval of conducting survey to the target participants (2 sections per target strand).
4. Sought the class president of each section of the target participants. The presidents acted as a bridge of communication in order to orient the class regarding the research, data use disclosure, and their informed consent.
5. Lastly, the researchers distributed the google form link to the respondents with the help of their presidents.

5. Data Analysis Procedures

The data from the learning material is used for the LLM to develop reviewers, whose generated responses were compared with manually annotated data to determine whether the results generated by the LLM model would actually align with the expectations of a human.

Further evaluation has been done in the form of a confusion matrix to visualize the relationship between the predicted outputs (from LLM) and the true labels set by humans. This allowed identifying areas where the model may have misclassified or deviated from human responses.

A t-test was conducted to analyze if there were any statistically significant differences from the viewpoint of mean comparison between the human-annotated results and the output produced by the LLM in terms of generation. The study analyzed whether the differences are at a level that they would be interpreted as indicating a meaningful performance gap or if they can be more plausibly due to random variation, finally to test the feasibility of accurate automation in educational content generation.

Ethical Considerations

The researchers ensured that key ethical principles were followed when designing and developing the learning management system. Access was strictly controlled so that sensitive information, for example, grades or personal data, was restricted to authorized users who could be students or teachers. Nobody had access to information outside the system without explicit permission from the user, thereby encouraging trust and security.

In fact, a clear agreement on terms and conditions was integrated that made the users understand why this system was created and who's collecting and using data; it also explained user rights. For instance, the terms established that the system would store user information only for educational purposes and elaborated on measures taken to keep their information secure. Therefore, the user had to accept the terms before accessing the site.

All considerations in terms of data protection were put into place and encrypted as necessary to secure the information; this included periodic security updates for possible breach prevention. In any case, the system would also meet relevant data protection legislation requirements, such as the Data Privacy Act, thus providing user data with adequate and safe treatment.

Accessibility was another big consideration. The system was designed to be accessible to all students, including students with disabilities. Keyboard navigation, screen reader support, and text size and contrast settings have been added in order to open access to learning resources to everyone.

Lastly, ethical use was provided to AI. All the features of AI, like the personalized reviewer, were developed with unbiased and accurate suggestions. The algorithms are transparent, fair, and free from discrimination, and the users are informed about how AI is utilized in the system. So, it maintains trust and does not break the integrity of the system.

Summary

To summarize, the participants of the research are the three academic strands :STEM, ABM, and HUMSS of Rizal High School - applying a purposive sampling method having 2 sections each strand as participants of the survey. Upon accomplishing requirements and gaining approval from Rizal High School, the researchers gathered data from the participants using questionnaires via Google Forms which was distributed to the students after orienting them about the purpose of the study, data use, and informed consent.

Moreover, the data analysis measured the effectiveness of an LLM in producing reviews by contrasting its generated outputs with that of rated data. A confusion matrix helped to focus on areas of disagreement or divergence from the human responses. A t-test also tested differences on the mean responses between the LLM's outputs and the human annotations and ascertained whether the gaps were meaningful or just statistically noisy. In this case, the focus was on how probable it would be to automate educational content reliably through the use of LLMs.

The method used were believed by the researchers to be a fitting way to achieve the following research objectives: develop a LMS integrated with AI to enhance students' learning, automated features for student engagement, creating a tool to automate and increase the reviewing accuracy of the students, and develop a system that organize lectures, summarize notes and questionnaires, to capture details while understanding the learning materials.

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