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Preparedness of Secondary Public-School Students for AI Integrated Mathematics Education: Basis for an Intervention Plan

Gamaliel A. Longa[1], Renith S. Guanzon[1]
1 – STI West Negros University, Philippines

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Abstract

Preparedness for AI Integrated Mathematics Education (AIIME) requires knowledge, skills, and attitudes. With regard to this, the study aimed to determine the level of preparedness of secondary public-school students for AIIME in a large-schools division in Central Philippines. In this quantitative, cross-sectional descriptive research, a total of 385 respondents were junior (STE) and senior (STEM) high school public-school students. Samples were drawn purposively from an unknown number of populations. A self-developed survey questionnaire was used to collect data by passing the test for validity and reliability. Ethical considerations were applied to data collection via Google Forms, and data were processed statistically using SPSS. In addition, descriptive and inferential statistical tools were utilized. As a result, findings showed no significant difference in the level of preparedness of public-school students for AIIME in the areas of knowledge and skills when grouped according to high school level, home location, sex, and average family monthly income. However, a significant difference exists in the domain of attitude when grouped according to sex. To conclude, overall preparedness was moderate. Last, to mitigate the weaknesses identified in knowledge, skills, and attitude, the study proposes a strategic intervention plan for DepEd's systematic implementation.

Keywords: *AI Integrated Mathematics Education (AIIME), Student Preparedness, Knowledge, Skills and Attitudes (KSA), Cross-sectional Descriptive Research, Secondary Public-School Students, Strategic Intervention Plan, DepEd's systematic implementation*

I. INTRODUCTION

A. Nature of the Problem

Artificial Intelligence (AI) is quickly changing how education works, especially in math classrooms. AI can help students solve problems, get personalized lessons, and give teachers useful data for decision-making (Holmes et al., 2019). In math, using AI means students can benefit from adaptive learning, smart tutoring, and tools that predict learning needs, all of which can boost understanding and engagement (Luckin et al., 2016). But for AI to really help, students need to be ready with the right knowledge, skills, and attitudes. This readiness lets them use AI tools effectively and responsibly in school (OECD, 2021). Supporting this effort also helps reach the United Nations Sustainable Development Goal 4, which aims for quality, inclusive education and lifelong learning for everyone (United Nations, 2015).

In the Philippines, the Department of Education (DepEd) has worked to include 21st-century skills like digital literacy, critical thinking, and tech skills in the K to 12 curriculum. This matches global goals that encourage students to be ready for AI so they can keep up in a digital world (UNESCO, 2021). Even with these efforts, not all students have the same access to technology or experience with AI, and many are not fully ready to use new tools. Research shows that while students often have basic digital skills, they still lack advanced abilities and positive attitudes toward using technology, especially in math classes (Claro et al., 2018). These differences show why it is important to check how prepared students are for AI in math education, especially for different groups, so everyone has a fair chance to meet SDG 4 goals.

As a teacher, researcher, and math specialist, the researcher has seen that students are at different levels when it comes to using technology in class. Seeing these differences, along with the growing need for AI in education, led him to study how prepared students are in terms of what they know, what they can do, and how they feel about AI. Knowing these details is important for creating programs that help students where they need it most. This study aims to give clear evidence to help the Department of Education plan and carry out AI in math classes, so students can learn better and be ready for the future.

B. Current State of Knowledge

The current literature sheds light on the growing involvement of Artificial Intelligence (AI) in the enhancement of educational practices, with a special eye on increasing student engagement and learning. The study conducted by Guanzon et al. (2024a), an extensive meta-study, shows that AI integration has triggered personalized learning, adaptive instruction, and an array of delivery modalities in assessment systems where the texts contribute to enhanced academic performance. However, the study argues the great necessity: the essence of AI is ultimately established through learners' readiness, which refers to knowledge, skills, and attitudes regarding technology. Thus, readiness plays an important role in producing meaningful interaction-from the application of AI within the area of mathematics education.

On a similar note, Guanzon et al. (2024b) tackled constraints and issues observed in ed-tech implementation. They pointed to issues like inadequate infrastructure, digital competence, and professional development, all acting as initial roadblocks for the technology integration process. The study emphasized that implementations of access to digital resources only create a big digital gap that prevents students from benefiting at all, particularly in public-school settings. This suggests the necessity of conducting a readiness check on the part of students intending to avail the intervention of AI in practice to educate them better, especially in mathematics, where both conceptual understanding and technological ability are highly appreciated.

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In a similar study, Reyes et al. (2021) examined Filipino students' preparedness for e-learning, where the students were found to have adequate technological skills, but their metacognitive and self-directed learning preparation for e-learning was lacking. Such an assertion indicates readiness in at least two dimensions and goes beyond mere technology skills to cognitive and behavioral abilities. These findings suggest that with all the technological skills, lacunae in independent learning skills could affect students' ability to engage effectively in AI-supported learning environments.

Fraillon et al. (2019) also reported in the International Computer and Information Literacy Study that many students in the world had only moderate levels of digital literacy, particularly in terms of higher-order skills like critical thinking, problem-solving, responsible technology use. The study stressed that not just technical knowledge, skills, or tools are important; the new digital literacy involves an able engagement with digital tools in meaningful and ethical ways. This reflects an exigency that demands an assessment of students' preparedness in knowledge, skills, and attitudes for the successful integration of the integration of AI into the teaching process of mathematics.

Another case in point illustrating the power of technology in instruction being on the lines of mathematical education is the study of Arciosa (2022) whereby ICT software using instruction turned out to substantially improve the levels of learner performance in secondary school geometry compared to the traditional instructional method. The study highlighted the fact that learning through the aid of technology aids in the promotion of visualization, engrossment, and comprehension of concepts. However, it also implies that students need to have the requisite competence and readiness to make effective use of these tools. Our present study aligns entirely with this by stating that technology, even an AI, may boost mathematics education, with success riding upfront on whether the students are ready or not, already then requiring an effective strategic intervention plan.

C. Theoretical Underpinnings

The research is closely anchored in the Connectionism Theory of Edward Lee Thorndike, which understands learning as the establishment of associations or connections between stimuli and responses under experience. One of the central principles of this theory, the law of readiness, stipulates that positive learning takes place when the learners are at ease on physical, mental, and emotional platforms to participate in the learning act. A prepared state of being presents the prerequisite for the learning act to be possible and rewarding; conversely, unpreparedness would lead to learning frustration and negligible retention (Thorndike, 1932).

In a perspective from AI-Integrated Mathematics Education (AIIME), Thorndike's Law of Readiness is a strong theoretical link towards the preparedness of the students who presumably include the knowledge, skills, and attitudes by which they have developed a solid footing for further understanding in mathematics, technology, problem-solving, and digital literacy-artistic feelings about AI approach. These students are more likely to make full use of AI-assisted learning environments in their lessons. On the other hand, poorly prepared students will not be able to do well in harnessing the benefits of the learning experience, making everything ineffective. Hence, readiness becomes a basic requirement for interaction to be meaningful in the learning of mathematics with AI.

Generally, this theory substantiates the significance of assessing learners' preparedness before AI educational innovations can be introduced. If readiness gaps are properly identified, educators and policymakers such as DepEd may come up with interventions aimed specifically at

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enriching the learning and skill base of students in AI matter and boosting positive attitudes towards its integration. Hence, the theory of Connectionism was put across by Thorndike, especially the Law of Readiness as an apt and fundamental bill for understanding and enhancing student preparedness for AIIME.

D. Objectives of the Study

This study aimed to determine the level of preparedness of secondary public-school students for AI Integrated Mathematics Education (AIIME) in a large-sized DepEd Schools Division in Central Philippines during the School Year 2024 – 2025 as a basis for an Intervention Plan.

Specifically, it aimed to determine 1) the profile of respondents according to the variables high school level, home location, sex, and average family monthly income; 2) level of students' preparedness for AIIME according to the areas knowledge, skills, and attitude; 3) whether a significant difference exists between the levels of preparedness of students for AIIME when grouped and compared according to the variables; and 4) the formulation of an intervention plan based on the findings of the study.

II. RESEARCH METHODOLOGY

This portion presents a discussion of the research methodology used, the subject-respondents of the study, the research instrument used, the validity and reliability of the instrument, the procedure for data gathering, conduct of the study, and the statistical tools and procedures for data analysis.

A. Research Design

This study aimed to determine the level of preparedness of secondary public-school students for AIIME in a large-sized DepEd Schools Division in Central Philippines during the School Year 2024 – 2025 as a basis for an Intervention Plan. The goal of descriptive research is to precisely and methodically characterize a population, circumstance, or phenomenon. It can respond to inquiries about what, where, when, and how, but not why (McCombes, 2023).

In this study, the descriptive research design helped the researchers obtain the profile of the respondents in analyzing and interpreting the results on the levels of preparedness of secondary public-school students for AIIME in the following selected variables: high school level, home location, sex, and average family monthly income.

B. Study-Respondents

The respondents were the JHS (STE) and SHS (STEM) students from a large population of the DepEd's School's Division in Central Philippines during the School Year 2024-2025. Due to an unknown total population size, the researchers employed purposive sampling and the sample size was set at 385 using Cochran's formula, which is statistically acceptable for large unknown populations at the 95% confidence level, with a 50% population proportion and a ±5% margin of error (McCombes, 2023). The sample size ensures statistical representation and generalizability regarding students' preparedness for AIIME.

C. Instrument

The researchers gathered the necessary data for this study using a self-developed questionnaire. The questionnaire was divided into two parts: Part one consists of the respondents' profile—name, high school level, home location, sex, and average family monthly income. Part two was the respondents' preparedness for AIIME. This part assessed the level of the respondents' preparedness in terms of knowledge, skills, and attitudes. Each part contains ten questions, with a total of 30 items. A five-point Likert scale was utilized for each item, with the response categories “Always”, “Often”, “Sometimes”, “Rarely”, and “Almost Never.”

D. Data Gathering and Procedure

After administering the validity and reliability tests, and upon approval of the Schools Division Superintendent, the questionnaires were administered to the target respondents through Google Forms. The questionnaires were gathered, recorded, and analyzed. The data gathered from the responses of the respondents were tallied and tabulated using the appropriate statistical tools. The encoded data were processed using SPSS.

E. Data Analysis and Statistical Treatment

Objective No. 1 used the descriptive analytical scheme and frequency count and percentage scoring to determine the profile of the respondents. Objective No. 2 used the descriptive analytical scheme and mean to determine the level of respondents’ preparedness. Objective No. 3 used the comparative analytical scheme, and Mann Whitney U, and Kruskal-Wallis H tests to determine if a significant difference exists between the level of preparedness of the respondents when grouped and compared to the aforementioned variables.

F. Ethical Considerations

The study strictly observed ethical research standards by ensuring the protection of respondents’ rights and welfare throughout the research process. The researchers secured written informed consent from the respondents prior to data collection. Participation in the study was voluntary, and respondents were clearly informed of the purpose of the study, the procedures involved, and their right to withdraw at any time without penalty. To minimize potential harm, the confidentiality of all responses was guaranteed, and the anonymity of the respondents was maintained during data gathering, analysis, and reporting. Moreover, the study complied with the provisions of Republic Act No. 10173, otherwise known as the Data Privacy Act of 2012, which mandates the lawful, fair, and secure processing of personal and sensitive information.

III. RESULT and DISCUSSIONS

In this section, the data gathered were further treated, presented, analyzed, and interpreted to focus on the study's specific objectives.

A. Profile of the Respondents

Table 1
Profile of Respondents

Variable	Category	Frequency (f)	Percentage (%)
High School Level	Senior High School (SHS-STEM)	187	48.60
	Junior High School (JHS-STE)	198	51.40
Home Location	Urban (City)	36	9.40
	Suburban (Town)	79	20.50
	Rural (Bario)	197	51.20
	Remote/Isolated (Sitio)	73	19.00
Sex	Female	259	67.30
	Male	126	32.70
Average Family Monthly Income	Higher Income (≥ ₱21,000.00)	120	31.20
	Lower Income (< ₱21,000.00)	265	68.80
	Total	385	100.00

Table 1 displays the demographic information of the respondents which includes their high school level, home location, sex, and average family monthly income. The distribution of respondents provides a contextual basis for understanding their preparedness for AI-Integrated Mathematics Education (AIIME).

The respondents show nearly equal distribution between their two high school levels since 198 students or 51.40 percent attended Junior High School (JHS-STE) and 187 students or 48.60 percent attended Senior High School (SHS-STEM). This balanced representation ensures that both groups are adequately reflected in the study, allowing for reliable comparisons. The majority of respondents come from rural areas which account for 51.20 percent while suburban areas make up 20.50 percent and remote or isolated areas account for 19.00 percent and urban areas represent 9.40 percent. The data indicates that most respondents live in areas with minimal urban development which impacts their ability to access technology and AI educational resources.

The respondents identify as female in 67.30 percent of cases while male respondents make up 32.70 percent of the sample. The study sample shows a female majority which researchers need to consider when they study sex-based differences. The majority of family monthly income distribution shows 68.80 percent of respondents belonging to the lower-income group while 31.20 percent belong to the higher-income group. The data shows that most respondents come from families who face financial difficulties which limits their ability to access digital resources needed for AI-integrated learning. The profile shows that learners come from rural areas and low-income backgrounds which provides essential context for studying their readiness to study AIIME.

Descriptive Analysis of the Level of Preparedness of Students for AI-Integrated Mathematics Education

Table 2
Level of Preparedness of Students for AI-Integrated Mathematics Education in Knowledge

Items	Mean (μ)	Interpretation
As a student, I…		
1. understand the basic concepts and the use of Artificial Intelligence (AI) in Mathematics Education.	3.49	High Level
2. can express how artificial intelligence can be used to learn mathematics.	3.42	Moderate Level
3. can find mathematics learning materials with AI-powered platforms.	3.31	Moderate Level
4. can search mathematical concepts using AI platform.	3.36	Moderate Level
5. can construct complex mathematical problems for AI to solve with a scalable solution.	3.14	Moderate Level
6. can predict mathematical problem solutions using AI applications.	3.11	Moderate Level
7. can compare how AI tools like ChatGPT, Copilot, Wolfram Alpha, Desmos, GeoGebra, and other Apps help in solving math problems.	3.23	Moderate Level
8. can summarize the use of AI tools in Mathematics Education.	3.25	Moderate Level
9. can bullet-point the limitations of AI tools in learning mathematics education.	3.24	Moderate Level
10. can outline the ethical considerations involved in using AI in Mathematics education.	3.22	Moderate Level
Overall mean (μ)	**3.28**	Moderate Level

Table 2 presents the level of preparedness of students for AI-Integrated Mathematics Education (AIIME) in terms of knowledge. It shows the mean scores and corresponding interpretations of the respondents' self-assessed knowledge on various AI-related competencies in mathematics education.

Collectively, the students demonstrated a moderate level of preparedness with an overall mean of 3.28. This indicates that while students possess a foundational understanding of AI in

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mathematics education, their knowledge is not yet fully developed to a high level of proficiency. Among the items, the highest mean was obtained by item 1, "understand the basic concepts and the use of Artificial Intelligence (AI) in Mathematics Education" with a mean of 3.49, interpreted as High Level. This suggests that students are generally familiar with the basic concepts of AI and its applications in mathematics learning. On the other hand, the lowest mean was recorded by item 6, "can predict mathematical problem solutions using AI applications" with a mean of 3.11, interpreted as Moderate Level. This implies that students have limited ability to utilize AI tools for predictive and higher-order mathematical tasks.

The relatively low mean in predicting mathematical problem solutions using AI applications may be attributed to students' limited exposure to advanced functionalities of AI tools. While learners may be familiar with basic AI applications, higher-level tasks such as prediction, modeling, and analytical problem-solving require deeper conceptual understanding and guided practice. Additionally, insufficient integration of AI tools in classroom instruction and a lack of hands-on experience may hinder the development of such competencies. This indicates a need for structured instructional support and targeted interventions to enhance students' higher-order knowledge in AI-integrated mathematics learning.

These findings support the study of Zawacki-Richter et al (2019), which examined research trends in artificial intelligence in higher education and found that most applications of AI focus on basic support functions such as content delivery and assessment, with limited emphasis on higher-order cognitive processes such as prediction, modeling, and complex problem-solving. The study emphasized that learners often lack opportunities to engage deeply with AI tools at an advanced level, which may hinder the development of sophisticated analytical skills. This aligns with the present findings, which show that students demonstrate stronger foundational knowledge but lower proficiency in the predictive use of AI, highlighting the need for enhanced instructional integration.

Table 3
Level of Preparedness of Students for AI-Integrated Mathematics Education in Skills

Items	Mean (μ)	Interpretation
As a student, I…		
1. can solve simple and complex problems with AI-powered tools.	3.18	Moderate Level
2. can test the accuracy of manual solution on the given problems and compare it to AI tools solution.	3.28	Moderate Level
3. can illustrate digital graphs and charts using AI tool (Example, creating normal distribution graph).	3.08	Moderate Level
4. can link AI-powered learning resources into my study routine in Mathematics.	3.04	Moderate Level
5. can compose computer program code from mathematics equations using AI solution (Example, Fibonacci sequence using Python programming code).	2.74	Moderate Level
6. can draw geometric and trigonometric figures using AI tools (Example, drawing octagon & describing inscribed angles).	2.82	Moderate Level
7. can examine, different AI tools platform applicable on mathematical problem.	3.06	Moderate Level
8. can integrate AI tools into mathematics problem solving techniques.	3.13	Moderate Level
9. can execute the AI technologies introduced in mathematics education.	3.10	Moderate Level
10. can manage AI tools limitation to mathematics integration.	3.30	Moderate Level
Overall mean (μ)	**3.07**	**Moderate Level**

Table 3 presents the level of preparedness of students for AI-Integrated Mathematics Education (AIIME) in terms of skills, showing the mean scores and corresponding interpretations of their competencies in utilizing AI tools for mathematical tasks.

Taken as a whole, the students demonstrated a moderate level of preparedness with a mean of 3.07. This indicates that students possess basic to developing skills in applying AI tools in mathematics, but they have not yet achieved a high level of proficiency. The highest mean was obtained by item 10, "can manage AI tools limitation to mathematics integration" with a mean of 3.30, interpreted as Moderate Level. This suggests that students are relatively more capable of recognizing and handling the limitations of AI tools when applied to mathematics. On the other hand, the lowest mean was recorded by item 5, "can compose computer program code from mathematics equations using AI solution (Example, Fibonacci sequence using Python programming code)" with a mean of 2.74, interpreted as Moderate Level. This implies that students have difficulty performing more advanced and technical tasks involving programming and AI integration.

The relatively low mean in composing computer program code from mathematical equations may be attributed to students' limited exposure to programming languages and computational thinking within the mathematics curriculum. Coding requires not only mathematical understanding but also familiarity with syntax, logic structures, and algorithmic processes, which may not be fully developed among students. Furthermore, the integration of programming and AI tools in mathematics instruction may still be minimal, resulting in insufficient practice and confidence in performing such tasks. This highlights the need for structured learning experiences that incorporate coding and AI applications to strengthen students' technical and problem-solving skills.

This finding is supported by the study of Selwyn (2019), which found that while students are increasingly exposed to digital technologies, many still lack advanced digital and computational skills required for tasks such as coding and complex problem-solving. The study emphasized that effective use of educational technology requires deliberate instruction and sustained practice, particularly in higher-order technical skills. This aligns with the present findings, where students demonstrate moderate proficiency in general AI-related skills but encounter challenges in more complex applications, underscoring the need for targeted instructional interventions.

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Table 4
Level of Preparedness of Students for AI-Integrated Mathematics Education in Attitude

Items	Mean (μ)	Interpretation
As a student, I…		
1. am excited to learn mathematics through the integration of AI tools in education.	3.30	Moderate Level
2. find AI-tools helpful for solving mathematical problems.	3.48	Moderate Level
3. enjoy exploring new technologies that enhance my learning experience.	3.79	High Level
4. feel comfortable trying out new AI-based applications in my math class.	3.31	Moderate Level
5. believe AI can make learning mathematics more engaging and effective.	3.25	Moderate Level
6. am confident in learning and adapting to AI tools for mathematics.	3.21	Moderate Level
7. view the integration of AI in mathematics as a positive development in education.	3.25	Moderate Level
8. am open to shifting from traditional learning methods to AI-enhanced approaches in mathematics.	3.06	Moderate Level
9. am open to seeking help if I face challenges using AI tools in my math lessons.	3.36	Moderate Level
10. believe that using AI in mathematics prepares me for future challenges in technology and academics.	3.34	Moderate Level
Overall mean (μ)	**3.34**	**Moderate Level**

Table 4 shows the level of preparedness of students for AI-Integrated Mathematics Education (AIIME) in terms of attitude, reflecting their perceptions, openness, and disposition toward the use of AI tools in mathematics learning.

Taken as a whole, the students demonstrated a moderate level of preparedness with a composite mean of 3.34. This indicates that students generally have a positive but not yet strongly developed attitude toward AI integration in mathematics education. The highest mean was obtained by item 3, “enjoy exploring new technologies that enhance my learning experience” with a mean of 3.79, interpreted as High Level. This suggests that students show strong interest and enthusiasm in engaging with new technologies, indicating readiness to explore AI tools in learning. On the other hand, the lowest mean was recorded by item 8, “am open to shifting from traditional learning methods to AI-enhanced approaches in mathematics” with a mean of 3.06, interpreted as Moderate Level. This implies that while students are generally receptive to technology, they may still exhibit hesitation in fully transitioning from traditional to AI-supported learning approaches.

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The relatively low mean in openness to shifting from traditional learning methods to AI-enhanced approaches may be attributed to students' familiarity and comfort with conventional teaching strategies. Learners may perceive AI integration as complex or unfamiliar, leading to uncertainty or resistance to change. Additionally, limited exposure to structured AI-based instruction and a lack of confidence in using such tools may contribute to their reluctance. This suggests that students need gradual and guided exposure to AI-integrated learning environments, along with support systems that build confidence and reduce apprehension toward new technologies.

This finding is supported by the study of Insigne et al (2021), which investigated the perceptions and attitudes of senior high school students toward online learning in the Philippines. The results revealed that while students generally exhibited positive attitudes toward technology-enhanced learning, they also showed limited familiarity and hesitation in fully engaging with non-traditional learning approaches. This aligns with the present findings, where students demonstrated enthusiasm for exploring new technologies but only a moderate level of openness in shifting from traditional to AI-enhanced mathematics learning. The study highlights that although learners recognize the benefits of digital tools, full acceptance and adaptation require continuous exposure, support, and structured integration in the learning process.

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Comparative Analysis in the Level of Preparedness of Students for AI-Integrated Mathematics Education

Table 5
Significant Difference in the Level of Preparedness of Students for AI-Integrated Mathematics Education in Knowledge When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Kruskal - Wallis H-Test	Mann - Whitney U-Test	*p*-value	∝	Interpretation
High School Level	JHS (STE)	198	187.20		17365.000	0.293		Not Significant
	SHS (STEM)	187	199.14					
Home Location	Remote/ Isolated	73	168.23	6.17		0.104		Not Significant
	Rural	197	194.13					
	Suburban	79	212.90					
	Urban	36	193.36				0.05	
Sex	Female	259	188.53		15160.500	0.259		Not Significant
	Male	126	202.18					
Average Family Monthly Income	Lower Income	265	195.03		15362.000	0.595		Not Significant
	Higher Income	120	188.52					

Table 5 represents the study of significant differences in the level of preparedness of students for AI-Integrated Mathematics Education (AIME) in terms of knowledge and the groups based on high school level, home location, gender, and average family monthly income using Mann-Whitney U Test and Kruskal-Wallis H Test.

The survey results showed that there is no significant difference in the readiness level of students in knowledge based on all the variables studied, as all computed p-values are below the level of significance of 0.05. Specifically, among high school levels, Junior High School (JHS-STE) had a mean rank of 187.20, while Senior High School (SHS-STEM) had a slightly higher mean rank of 199.14, with a p-value of 0.293, suggesting no potential difference; and in terms of location, although the suburban students secured the highest score (212.90) and the remote students the lowest (168.23), the computed p-value is 0.104, showing the difference not being statistically significant.

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One thing revealed in terms of sex was that major social issue in the world and also interesting in this matter. Female students nearly outscoring male students at 188.53 to 202.18; nevertheless, it did not approach statistical significance at p = 0.259, consistent with their preparedness to knowledge. As for another parameter- mean rank-the study of family in the monthly income left us with no choice but to conclude that there was only a minor edge in eloquence in the seasoned lower income group; that hill was 195.03, as opposed to 188.52 in the higher income groups. This is another "no bet" for those days in science with p = 0.595. That progress within plateaus occurs into suits automatically infers that no matter what plane of the world the student stands in, there are standard floors of knowledge preparedness in AIIME.

The data provided fails to show any considerable variance in exposure to AI-related knowledge and basic digital concepts among students; this could be linked to the fact that these skills have been evenly disseminated among them owing to the standardization of the curriculum and ubiquitous access to basic digital tools; the uniformity might as well stem from a concession that, overall, students seem to share the same limitations in their deeper understanding of AI applications in mathematical contexts, regardless of their backgrounds. Under the circumstances, it would only be prudent to advocate for universal instructional strategies that would help to engage all students in learning activities, rather than a strictly demographic approach.

The study results of Reyes et al. (2021) argued that basic readiness levels for online learning among Filipino students are not significantly influenced by demographic variables. It further highlighted that foundational digital competencies are largely unvaried among a wide range of learners, despite a few differences that might exist in special circumstances. Such a perspective conjoins with the current results in finding no significant difference. Hence, there should be less focus on bridging gaps between groups and all the more on building strong knowledge bases in general for our students.

Table 6
Significant Difference in the Level of Preparedness of Students for AI-Integrated Mathematics Education in Skills When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Kruskal - Wallis H-Test	Mann - Whitney U-Test	*p*-value	∝	Interpretation
High School Level	JHS (STE)	198	193.37		18439.000	0.946	0.05	Not Significant
	SHS (STEM)	187	192.60					
Home Location	Remote/ Isolated	73	176.43	4.56		0.207		Not Significant
	Rural	197	194.96					
	Suburban	79	210.99					
	Urban	36	176.42					
Sex	Female	259	188.19		15072.000	0.224		Not Significant
	Male	126	202.88					
Average Family Monthly Income	Lower Income	265	194.84		22672.500	0.629		Not Significant
	Higher Income	120	188.94					

Table 6 presents the test of significant difference in the level of preparedness of students for AI-Integrated Mathematics Education (AIIME) in terms of skills when grouped according to high school level, home location, sex, and average family monthly income using the Mann–Whitney U Test and Kruskal–Wallis H Test.

Taken collectively, the results reveal that no significant difference exists in the level of preparedness of students in skills across all variables, as all computed p-values are greater than the 0.05 level of significance. Specifically, when grouped according to high school level, Junior High School (JHS-STE) students obtained a mean rank of 193.37, while Senior High School (SHS-STEM) students obtained a comparable mean rank of 192.60, with a p-value of 0.946, indicating no significant difference. Similarly, in terms of home location, although suburban students obtained the highest mean rank (210.99) and urban students the lowest (176.42), the computed p-value of 0.207 indicates that these variations are not statistically significant.

In terms of sex, male students obtained a higher mean rank (202.88) compared to female students (188.19), yet the p-value of 0.224 indicates that the difference is not statistically significant. Likewise, when grouped according to average family monthly income, students from the lower-income group had a mean rank of 194.84, slightly higher than those from the higher-income group (188.94), but the p-value of 0.629 confirms that this difference is not statistically significant. These findings suggest that students' skills in utilizing AI tools for mathematics learning are relatively uniform regardless of their demographic characteristics.

The absence of significant differences may imply that students, irrespective of background, are exposed to similar levels of technological experiences and opportunities in developing AI-related skills. It may also indicate that while students possess comparable levels of basic skills, they collectively experience similar limitations in advanced applications of AI in mathematics. This highlights the need for comprehensive and inclusive instructional strategies that enhance students' practical and technical skills across all groups rather than focusing on specific demographic differences.

This finding is supported by the study of Ahmad et al (2017), which found that students' ICT competencies tend to show minimal variation across demographic variables when learners are provided with similar access to technology and learning environments. The study emphasized that skill development is more influenced by exposure, training, and instructional support rather than inherent demographic differences. This aligns with the present findings, where no significant differences were observed, suggesting that consistent and inclusive instructional practices are essential in developing students' AI-related skills in mathematics education.

Table 7

Significant Difference in the Level of Preparedness of Students for AI-Integrated Mathematics Education in Attitude When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Kruskal - Wallis H-Test	Mann - Whitney U-Test	*p*-value	∝	Interpretation
High School Level	JHS (STE)	198	190.95		18107.000	0.710		Not Significant
	SHS (STEM)	187	195.17					
Home Location	Remote/ Isolated	73	174.11	3.56		0.313		Not Significant
	Rural	197	193.48					
	Suburban	79	207.94					
	Urban	36	195.88				0.05	
Sex	Female	259	183.40		13831.500	0.015		Significant
	Male	126	212.73					
Average Family Monthly Income	Lower Income	265	194.03		22887.000	0.787		Not Significant
	Higher Income	120	190.73					

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Table 7 shows the results of tests for significant differences in students' attitudes toward AI-Integrated Mathematics Education (AIIME) based on high school level, home location, sex, and average family monthly income. The Mann–Whitney U Test and Kruskal–Wallis H Test were used.

The results show no significant differences in students' attitudes toward AIIME based on high school level, home location, or average family monthly income, since all p-values are above 0.05. For example, Junior High School (JHS-STE) students had a mean rank of 190.95 and Senior High School (SHS-STEM) students had 195.17, with a p-value of 0.710. Suburban students had the highest mean rank (207.94) and remote or isolated students the lowest (174.11), but the p-value was 0.313. For family income, the lower-income group had a mean rank of 194.03 and the higher-income group had 190.73, with a p-value of 0.787. These results all indicate no significant differences.

However, there is a significant difference when students are grouped by sex. The p-value is 0.015, which is below 0.05. Male students had a higher mean rank (212.73) than female students (183.40), showing that male students have a more positive attitude toward AI-Integrated Mathematics Education. This suggests that sex may influence students' attitudes, possibly because of differences in confidence, exposure, or interest in technology.

The difference between male and female students may be due to variations in confidence with technology, interest in digital tools, and previous experience with AI. Male students might feel more comfortable or familiar with new technologies, which can lead to more positive attitudes. Female students may be more cautious, possibly because of less exposure or social factors. This finding shows the importance of using gender-responsive teaching strategies to encourage participation and build confidence in AI-integrated learning.

These results support the investigation of Cai et al (2017), who found the existence of gender differences in students' attitudes toward technology, with male students usually indicating a higher level of confidence, sometimes higher in positive perceptions of digital tools as well. A most recent study by Scherer et al (2019) disclosed that the attitudes of students toward technology are significantly influenced by individual factors like confidence and perceived competence, which seem to vary within gender. It is also suggested by their findings that the difference in attitudes is a function of learners' experiences and self-efficacy in using technology, supporting the fact that sex significantly affects students' attitudes towards AI-integrated mathematics education.

IV. INTERVENTION PLAN

Introduction

This intervention plan is based on DepEd Order No. 21, s. 2019 and aligned with the 'MATATAG' Curriculum, which is concentrated on the construction of 21st-century skills among learners. It is guided by the Basic Systems View of School Administration, proposed by Fred C. Lunenburg and Allan C. Ornstein, as a structured perspective for analyzing areas of concern in the implementation. Notably, definitive Department of Education (Philippines) guidelines have not yet been formulated to guide the integration of artificial intelligence into education, with special focus on Mathematics Education. As a result of the formulation of specific objectives and key performance indicators in this plan, the need to identify gaps in artificial intelligence integration has been grounded in the Philippine Professional Standards for Teachers (PPST) domains, ensuring alignment with nationally recognized competencies.

Moreover, in the future, this intervention plan can serve as a foundation for future researchers and policymakers, especially in developing the AI in Mathematics Education (AIIME) guideline in line with the DepEd request from the national government of the Philippines. The proposed framework lends weight to the conscientious and sustainable assimilation of AI and collaterally prioritizes central alignment while components such as (1) Responsible Use, (2) Learner Protection and Safety, (3) Inclusivity and Fair Access, (4) Ethical Deployment, (5) Data Privacy and Reliability, (6) Teacher and Parent Capacity Building all emerge as educational policy objectives undertaken by the Department of Education (Philippines) during January 2025 and January 2026.

General Objectives

The preparedness of the high school students for AIIME-ME is enhanced by an intervention that is directed toward the weaknesses discovered in the three domains, i.e., cognitive (knowledge), psychomotor (skills), and affective (attitudes), in the perspective of Benjamin Bloom (1956) and his revised cognitive arena by Lorin Anderson and David Krathwohl (2001; 2002). This intervention promotes the systematic, structured development of competencies that range from acquisition to higher-order thinking, skill application, and value formation. In addition, the intervention aligns with the philosophy of DepEd Order No. 42, s. 2017, with a heavy emphasis on learner-centered, inclusive, and developmentally appropriate teaching-learning processes, and includes the following components:

1.To increase the cognitive preparedness of learners by requiring them to define key terms and comprehend the same through posing elucidations and composing summaries; also, using the comprehension to solve mathematical quandaries with experimentation, doing justice to the practical demonstration of the potentials of AI tools in the mathematical education context.

2.To foster the development of preparedness of learners who might want to face skills industry demands with intelligent preparation in developing higher-order thinking by willingness to analyze the information, compare and contrast arguments, and evaluate outcomes in well stating decisions based on analysis, justification, pro critique features in results, and the intelligent opting for the use of quite creative tech tools and exercises where one can carry out AI-supported designing or implementation in certain mathematics consequences.

3.Promoting students' affective state (attitudes and values) in learning AI for ethical considerations, responsible use, and deliberate judgment on the AI potentials and limitations. This shall promote their accountability for organizing and expressing ideas as they adapt to teaching environments supported by AI, while ensuring that the overarching social and educational values are maintained during the transition from traditional to digitally enhanced instruction.

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INTERVENTION PLAN

Area of Concern	Findings	Objective	Activities	Time Frame	Budget	Persons Involved	Success Indicator
Knowledge	The study found that the area of knowledge where students' weakness of preparedness for AI Integrated Mathematics Education was in Item No. 6, "As a student, I can predict mathematical problem solutions using AI applications", interpreted as "Moderate Level."	1. To equip students with a foundational knowledge and understanding, develop skills, and assess their behavior towards AI integration into mathematics education for learning.	1. Accentuate learners' knowledge in integrating AI into Mathematics Education through the integration of mathematical problem-solving to be solved by the students with collaboration and individually through allocation of utilization for the computer laboratory. 2. Enrich learners' and teachers' skills on content strategy and pedagogy with an AI-supported application for Mathematics Education.	August 2026	Sessions: Teachers' additional pay for all sessions charges as additional services to be determined by the DepEd Schools Division. Rough Estimate: Sessions: Session 1: AI Preliminary = P14,000.00 Session 2: AI Group Collaboration = P14,000.00 Session 3: AI Individual Activity = P14,000.00 Materials: (Air-conditioned room for computer laboratory,	1 - SDO, 1 - Math Curriculum Division Coordinator, 10 - Principal, 20 – JHS STE Math Teachers 20 – SHS STEM Math Teachers and approximately 632 JHS & SHS Students based on population response.	1. Learners will be able to integrate AI tools into daily math instruction. 2. Improve LOTS and HOTS in math's problem-solving. 3. Learners' access to AI tools. 4. Track the effectiveness of AI integration. 5. Promote responsible AI use by knowing its limitations and its ethical use.

			3. Allocate additional sessions to guide students on how to utilize AI ethically.		electricity, and power) P93,600.00 Total Sessions Expenses: P135,600.00		
Skills	Weaknesses in skills found in Item No. 5, "I can compose computer program code from mathematics equations using AI solution (Example, Fibonacci sequence using Python programming code)." Interpreted as "Moderate Level."	1. To equip students with a foundational knowledge and understanding, develop skills, and assess their behavior towards AI integration into mathematics education for learning. 2. For DepEd to review the AI data source on Integrating AI into Mathematics education.	1. Vividly emphasize AI limitations for schooling, its use, and benefits. 2. Elevate learners' and teachers' innovation skills by creating computer programs for educational purposes that may be useful for humanity. Utilizing different programming tools, duly supported by AI, like Python.				Develop students' computational thinking skills by providing hands-on experience with AI to solve various mathematical problems. At the end of the sessions, learners can explain the logic of AI-generated code, not merely copying output, but also generate their own authentic output on written assessments. Improved

							proficiency in AI-assisted applied mathematics to different programming tasks after intervention. DepEd mathematics curriculum review and validation of AI data source and tools appropriate for mathematics instruction by developing enhanced guidelines on AI integration, emphasizing pedagogical purpose, AI limitations, and ethical and responsible use. Aligned AI integration policy for digital literacy and innovation goals.

							Increase students' productivity in innovation, creativity, and problem-solving through feedback for local and global learning outcomes evaluation.
Attitude	Weakness in attitude was in Item No. 8: "I am open to shifting from traditional learning methods to AI-enhanced." Interpreted as "Moderate Level."	1. To stimulate learners' and teachers' utilization of innovative AI Technology for Mathematics Education. 2. DepEd provides and allocates appropriate funds for Secondary Public Schools offering STE and STEM programs for AI Integrated Mathematics Education.	1. Encourage learners and teachers to embrace technological change in the new world. This new generation curates their future, aligning sustainability through AI to preserve the transmitted culture.				Students' increased engagement and willingness to explore new technological innovations in learning processes with AI tools for mathematics education. Empower students on the benefits of AI integration into education, indicating openness to new challenges with critical awareness of

		3. Embracing change in educational settings, however, preserving the culture of education that functions to transfer learning experiences in the real world from then and now.					technology-supported learning by knowing clearly its purpose. Decreased resistance or anxiety towards new learning experiences with AI support. Improved ethical AI use by inculcating non-reliance on AI for generating authentic output, avoiding plagiarism. DepEd should allocate funding appropriate for AI use in education to ensure fairness between upper- and lower-class students in public schooling. Aligned and

							balanced on contextual real-world application, human judgment by retaining the culture in education with the use of AI tools. Demonstrate a balance between innovation and cultural continuity, integrating AI without diminishing core education values.

V. CONCLUSION

Data suggest that the respondents were more or less equally distributed amongst junior and senior high school levels, predominantly female, mostly from rural areas, and hailing from less privileged families. Because the sample made of a mix of rural and two income bracketed learners, the context provides valuable insight in informing the preparedness of these learners for AIIME.

Moreover, preparedness on knowledge ends as particularly relevant since information is one of three probable indicators of the introduction of AIIME. Students learn only information, during their AIIME course, and uses the knowledge to perform simple tasks. Students do not explore higher order AI concepts. Additionally, they realize that an AI program is supposed to be capable of going beyond examples and predictions.

In terms of skills, the students exhibit a moderate preparedness which suggests they are apt for performing elementary tasks with AI assistance in Math but face difficulties in more advanced and technically complex assignments such as coding and advanced problem-solving. Hence, this necessitates more hands-on experiences, guided practice, and consistent exposure to AI-integration-tools to enhance their technical and computational prowess.

With regard to attitude, another factor contributing to their moderate rating is an attitude which is generally positive-but-there is a bit of nervousness-seen in AI-integrated learning in mathematics. The learners understand technology as something exciting to fiddle with, albeit being moderately open about going fully away from traditional methods. Eventually, this attitude needs to be quite extensive in fostering increased confidence and openness toward AI use in education.

The findings also pinpoint to the fact that there was no significant difference in students' preparedness of knowledge and skills across variables relating to high schools, home locations, sex, and average monthly income. The students, as a group, may be quite close together in preparedness of knowledge and skills, irrespective of the environment they have grown in; thus, this in itself is attractive, demanding that any instructional intervention program that is supposed to be inclusive revolves around fostering of learning that will meet their common needs.

A significant difference is shown in learners' attitudes through their sex, male students appearing to value more positively AI-integrated Mathematics education. This signifies an influence of gender on learners' attitudes towards and openness to the integration of AI and calls for implementation of gender-responsive measures aimed at enhancing inclusiveness, confidence, and equivalency of learner engagement in AI-based learning environments.

REFERENCES

Anderson, L. W., & Krathwohl, D. R. (2001). A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Longman.

Arciosa, R. M. (2022). Information communication technology (ICT)-based instructional software and its effectiveness in teaching high school geometry. Indonesian Journal of Teaching in Science, 2(1), 51–60. https://doi.org/10.17509/ijotis.v2i1.45271

Bloom, B. (1956). Bloom's taxonomy. Annotation: digital copy available in Google Books.

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. Computers & Education, 105, 1–13. https://doi.org/10.1016/j.compedu.2016.11.00

Claro, M., Salinas, Á., Cabello-Hutt, T., San Martín, E., Preiss, D. D., Valenzuela, S., & Jara, I. (2018). Teaching in a digital environment (TIDE): Defining and measuring teachers' capacity to develop students' digital information and communication skills. Computers & Education, 121, 162–174. https://doi.org/10.1016/j.compedu.2018.03.001

Department of Education (2017). DepEd Order No. 42, s. 2017. National Adoption and Implementation of the Philippine Professional Standards for Teachers.

Department of Education (2019). DepEd Order No. 21, s. 2019. MATATAG Curriculum in Mathematics (Grade 1, 4, and 7). DepEd Order No. 8, s. 2015 and DepEd Order No. 21, s. 2019.

Fraillon, J., Ainley, J., Schulz, W., Duckworth, D., & Friedman, T. (2019). Preparing for life in a digital world: International computer and information literacy study 2018 international report. Springer. https://doi.org/10.1007/978-3-030-19389-8

Guanzon, R., Kilag, O. K., Longa, G., Fuentebella, J., Gallardo, P. M., & delos Santos-Jones, A. C. (2024a). The impact of artificial intelligence integration in education: A systematic review. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE), 1(10), 291–296. https://risejournals.org/index.php/imjrise/article/view/726

Guanzon, R., Kilag, O. K., Longa, G., Roche, M., Bolante, R., Suba, J., & Villarete, E. (2024b). Digital landscape: Key challenges in educational technology implementation. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE), 1(10), 331–337. https://risejournals.org/index.php/imjrise/article/view/742

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign. Open University Research Outputs. https://discovery.ucl.ac.uk/id/eprint/10139722/

Insigne, V. H., Padohinog, E. C., & Balsicas, N. W. (2021). Perceptions and attitudes of senior high school students towards online learning. SDCA Asia-Pacific Multidisciplinary Research Journal, 3, 4–12. https://doi.org/10.5281/zenodo.8022178

Online ISSN: 3082-5121
https://journals.aloysianpublications.com
Volume 2 Issue 4 (2026)

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. Pearson Education. https://static.googleusercontent.com/media/edu.google.com/en//pdfs/Intelligence-Unleashed-Publication.pdf

McCombes, S. (2023). Descriptive Research | Definition, Types, Methods & Examples. https://www.scribbr.com/methodology/descriptive-research/

McCombes, S. (2023). Sampling Methods | Types, Techniques & Examples

https://www.scribbr.com/methodology/sampling-methods/

Organisation for Economic Co-operation and Development (OECD). (2021). OECD digital education outlook 2021: Pushing the frontiers with AI, blockchain and robots. OECD Publishing. https://doi.org/10.1787/589b283f-en

Reyes, J. R. S., Grajo, J. D. L., Comia, L. N., Talento, M. S. D. P., Ebal, L. P. A., & Mendoza, J. J. O. (2021). Assessment of Filipino higher education students' readiness for e-learning during a pandemic: A Rasch technique application. Philippine Journal of Science, 150(3), 1007–1018. https://philjournalsci.dost.gov.ph/images/pdf/pjs_pdf/vol150no3/assessment_of_filipino_higher_education_students.pdf

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach. Computers & Education, 128, 13–35. https://doi.org/10.1016/j.compedu.2018.09.009

Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press. https://eric.ed.gov/?id=ED599636&utm

Thorndike, E. L. (1932). The fundamentals of learning. Teachers College, Columbia University.

UNESCO. (2021). AI and education: Guidance for policymakers. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000376709

United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. https://sdgs.un.org/2030agenda

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—Where are the educators? International Journal of Educational Technology in Higher Education, 16(1), 39. https://doi.org/10.1186/s41239-019-0171-0