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Students' Familiarity and Utilization of Artificial Intelligence Tools in Mathematics Learning

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Abstract

This undertaking analyzed the Level of Student's Familiarity with and Utilization of AI Tools in learning Mathematics. Specifically, it sought answers to the following questions: 1). How familiar are students with various AI Tools used in learning mathematics content? 2). What is the level of students' AI Tools Utilization in learning mathematics content? 3). Is there a significant difference in the level of students' familiarity and utilization of AI tools in learning mathematics content? 4). What intervention can be proposed to enhance the familiarity and utilization of AI Tools in learning mathematics content?

This study utilized quantitative method. Responses of the student were converted to numerical figures to facilitate computation. Descriptive-Evaluative design was used in this study.

Students were poorly familiar with the different AI Tools. They moderately utilize AI Tools in learning mathematics. There is a significant difference in the level of familiarity and utilization of AI Tools by students in learning mathematics.

Keywords: Familiarity, AI Utilization, Mathematics Learning

INTRODUCTION

Artificial intelligence (AI) refers to computational systems designed to simulate human cognitive processes such as learning, reasoning, and problem-solving (Russell & Norvig, 2022). In educational contexts, AI-powered platforms—including adaptive learning systems, intelligent tutoring systems, and generative applications—are increasingly accessible to students as tools for independent learning. In mathematics education, these technologies enable learners to receive immediate feedback, access step-by-step problem explanations, and engage in personalized practice activities. As a result, students are no longer passive recipients of instruction but active users of AI-supported environments that can shape how they approach mathematical tasks and construct understanding.

Students' familiarity with AI tools plays a crucial role in determining how effectively these technologies are utilized for learning. Familiarity encompasses awareness of available AI applications, understanding of their functions, and the ability to navigate them appropriately for academic purposes. Research suggests that when learners are knowledgeable about digital tools and their affordances, they are more likely to use them strategically rather than superficially (Holmes et al., 2019). In mathematics learning, such strategic use may include employing AI platforms for conceptual clarification, procedural practice, error analysis, and self-assessment. Conversely, limited familiarity may result in underutilization or misuse, thereby reducing the potential instructional benefits of AI technologies.

The issue of effective AI utilization is particularly relevant in the Philippine educational context, where

mathematics achievement remains a significant concern. The 2022 results of the Programme for International Student Assessment (PISA) indicated that Filipino learners performed substantially below the Organisation for Economic Co-operation and Development (OECD) average in mathematics (OECD, 2023). These findings highlight persistent gaps in conceptual understanding and problem-solving proficiency. In this context, AI tools offer opportunities for supplementary support outside formal classroom instruction. Adaptive systems can diagnose learners' strengths and weaknesses, provide scaffolded exercises, and adjust task difficulty based on performance, thereby promoting individualized learning pathways.

Beyond personalization, AI utilization can influence learners' engagement and self-regulated learning behaviors. AI-driven platforms often incorporate interactive and gamified features that sustain attention and encourage sustained practice. Immediate feedback mechanisms help students identify misconceptions in real time, fostering metacognitive awareness and iterative improvement. However, effective utilization depends not merely on access but on students' capacity to use AI tools responsibly and purposefully. Overreliance on automated solutions without critical evaluation may hinder the development of mathematical reasoning skills. Thus, understanding how students balance AI assistance with independent problem-solving is essential.

Policy frameworks further emphasize the importance of digital competence among learners. National initiatives promoting digital transformation in education underscore the need to equip students with technological literacy and 21st-century skills (National Economic and Development Authority [NEDA], 2023). Similarly, global education agendas advocate for the responsible integration of emerging technologies to ensure inclusive and equitable quality education (UNESCO, 2021). Within this broader agenda, students' familiarity with and utilization of AI tools represent critical components of contemporary mathematical literacy.

Given these developments, examining students' familiarity with and utilization of AI tools in learning mathematics is both timely and necessary. Understanding the extent to which learners are aware of AI applications, how frequently and purposefully they use them, and how such utilization relates to mathematics learning outcomes can inform instructional strategies and policy directions. By focusing on students as primary users of AI technologies, this study seeks to contribute empirical evidence on how AI-supported learning environments shape mathematical engagement and achievement in the Philippine context.

Thus, this undertaking analyzed the Level of Student's Familiarity with and Utilization of AI Tools in learning Mathematics. Specifically, it sought answers to the following questions: 1). How familiar are students with various AI Tools used in learning mathematics content? 2). What is the level of students' AI Tools Utilization in learning mathematics content? 3). Is there a significant difference in the level of students' familiarity and utilization of AI tools in learning mathematics content? 4). What intervention can be proposed to enhance the familiarity and utilization of AI Tools in learning mathematics content?

MATERIALS AND METHODS

This research used a descriptive-evaluative design using a quantitative methodology. During the academic year 2024–2025, the concentration was on Mathematics teachers at Pasacao district. Using stratified random sampling, 664 senior high school students was established as respondents of the study. The study tool, a validated *AI Utilization Survey Questionnaire* with reliability index of 85% ($\alpha = 0.85$) using Cronbach alpha, designed by the researcher, was utilized to gather information on the level of fam-

iliarity and utilization of AI tools by the students.

Calculating means for level of familiarity and utilization were all part of the data analysis process. Significant variations in the Level of Familiarity and Utilization were found using Analysis of Variance.

RESULTS AND DISCUSSIONS

Level of Familiarity with Artificial Intelligence Tools by Students

One of purpose of this study was to examine the level of familiarity with the different AI Tools by students in learning mathematics. These AI Tools were categorized as *AI Writing and Language Tools, Assessment and Engagement Tools, Math Assistance Tools* and *Communication Tools*.

Table 1. Level of Familiarity with AI Tools by Students

Categories of Artificial Intelligence Tools	Mean	Interpretation	Rank
AI Writing and Language Tools	0.39	Low Familiarity	2
Assessment and Engagement Tools	0.07	Low Familiarity	4
Math Assistance Tools	0.25	Low Familiarity	3
Communication Tools	0.43	Low Familiarity	1
Average	0.29	Low Familiarity	

Legend: 0.00 - 1.00 – Low Familiarity
1.01 - 2.00 – Slight Familiarity
2.01 - 3.00 – Moderate Familiarity
3.01 – 4.00 – High Familiarity

The results presented in Table 1 indicate that the respondents achieved a combined mean score of 0.29, corresponding to the interpretation of *Low Familiarity*. Specifically, for the AI Writing and Language Tools, the students recorded a mean score of 0.39 (*Low Familiarity*), for Assessment and Engagement Tools, the mean score decreased to 0.07 (*Low Familiarity*), for Math Assistance Tools, the mean score increased to 0.25 (*Low Familiarity*), while the Communication Tools yielded a mean score of 0.43 (*Low Familiarity*). Based on the rankings, the *Communication Tools* ranked first, followed by the *AI Writing and Language Tools*, then the *Math Assistance Tools*, with the *Assessment and Engagement Tools* ranked last.

The results presented indicate that the respondents achieved a combined mean score of 1.56, corresponding to the interpretation of *Slight Familiarity*. Specifically, for the AI Writing and Language Tools, the teachers recorded a mean score of 3.75 (*High Familiarity*), for Assessment and Engagement Tools, the mean score decreased to 1.5 (*Slight Familiarity*), for Math Assistance Tools, the mean score decreased to 0.5 (*Low Familiarity*), while the Communication Tools yielded a mean score of 1 (*Low Familiarity*). Based on the rankings, the *AI Writing and Language Tools* ranked first, followed by the *Assessment and Engagement Tools*, then the *Communication Tools*, with the *Math Assistance Tools* ranked last.

The findings presented in Table 1 reveal that the respondents demonstrated an overall low level of familiarity with AI tools, as reflected in the combined mean score of 0.29. This indicates limited

exposure or experience with AI technologies in their academic environment. Among the specific categories of tools, Communication Tools recorded the highest mean score of 0.43, followed by AI Writing and Language Tools (M = 0.39), Math Assistance Tools (M = 0.25), and lastly, Assessment and Engagement Tools (M = 0.07). While all categories were interpreted as indicating "Low Familiarity," the slight variations in scores suggest differing levels of awareness or access to specific types of AI applications.

The higher familiarity with Communication Tools and AI Writing and Language Tools may be attributed to their broader integration into students' daily digital practices, such as using AI-powered chat platforms, grammar checkers, and writing assistants. These tools are often more accessible and aligned with routine academic tasks like writing and messaging, which may contribute to students' slightly greater comfort with them. In contrast, the lowest familiarity with Assessment and Engagement Tools indicates a potential underutilization or limited exposure to AI-supported formative assessment platforms, intelligent quizzes, or interactive learning assistants. This could suggest either a lack of instructional emphasis on such tools or a gap in teacher facilitation and institutional support for AI-driven student engagement strategies.

Moreover, the low familiarity with Math Assistance Tools, despite their increasing availability (e.g., AI calculators, step-by-step solvers), points to missed opportunities for AI integration in numeracy-focused learning. This might reflect a gap in students' knowledge of such tools or a lack of confidence in their utility and reliability, particularly in subjects that traditionally rely on human-led instruction and problem solving.

Overall, the low familiarity across all categories highlights the need for deliberate exposure, training, and guided usage of AI tools in educational settings. Institutions and educators should consider embedding AI literacy within curricula and providing structured opportunities for students to explore and utilize various AI applications meaningfully. Doing so could enhance students' digital competency, autonomy, and academic support, particularly in the context of a rapidly evolving technological landscape

The finding of uniformly low familiarity with AI tools aligns closely with prior research indicating limited exposure and comfort with AI in educational contexts. For instance, a study by Roe, Perkins, and Ruelle (2024) involving university students and academic staff across Vietnam and Singapore reported "generally low familiarity with GenAI" tools and cautious attitudes toward AI-driven assessment and feedback.

Similarly, Lee et al. (2025) in *Frontiers in Education* observed that over 70% of students and professors held low perceptions regarding the benefits of AI in higher education, suggesting widespread skepticism and limited integration of AI tools. Furthermore, Johri, Hingle, and Schleiss (2024) documented substantial variation and misconceptions in students' understanding and usage of generative AI, especially in areas like writing support and idea generation, highlighting both limited technical awareness and cautious attitudes toward AI. Together, these studies corroborate your results, demonstrating that students exhibit consistently low familiarity across AI tool categories such as communication, writing, math assistance, and engagement tools, with particular weakness in assessment-themed applications.

Level of Artificial Intelligence Tools Utilization in Learning Mathematics

An additional objective of this study was to investigate the extent to which students utilize Artificial Int-

elligence (AI) tools in learning mathematics. This utilization of AI tools was examined across the three stages of learning as outlined in Fitts and Posner's Stages of Learning Model, specifically the Cognitive Stage, Associative Stage, and Autonomous Stage.

Table 2. Level of Teachers' AI Tools Integration in Teaching Mathematics

Stages of Learning	Mean	Interpretation	Rank
Cognitive Stage	2.57	Moderate Utilization	1
Associative Stage	2.475	Slight Utilization	2
Autonomous Stage	2.473	Slight Utilization	3
Combined	2.51	Moderate Utilization	

Legend: 1.00 - 1.75– Low Utilization
1.76 - 2.50– Slight Utilization
2.51 - 3.25– Moderate Utilization
3.26 – 4.00– High Utilization

As presented in Table 8, the respondents obtained a combined mean score of 2.51, which corresponds to the verbal interpretation of *Moderate Utilization*. In the Cognitive Stage, students recorded a mean score of 2.57, also interpreted as *Moderate Utilization*. For the Associative Stage, the mean score was 2.475, interpreted as *Slight Utilization*, and for the Autonomous Stage, the mean score was 2.473, also categorized as *Slight Utilization*. The data reveal that the Cognitive Stage received the highest mean score, followed by the Associative Stage, with the Autonomous Stage ranking last.

These findings imply that students tend to rely on AI tools mainly to support early cognitive processes such as understanding concepts, recalling facts, and accessing basic explanations. However, their use diminishes as they move toward skill refinement and automatic application, possibly due to a lack of awareness about how AI can support deeper learning, or because such tools are not widely promoted or designed for these later stages. The lower usage in the Associative and Autonomous stages may also reflect a dependence on more traditional or human-led instruction for higher-order learning tasks, such as critical thinking, analysis, and self-directed practice.

This pattern highlights the need for educators to guide students in leveraging AI tools beyond the initial stages of learning. If properly introduced and scaffolded, AI tools can be used not only for foundational understanding but also to support application, feedback, and refinement of skills. Training students to maximize AI resources across all stages of learning may lead to more consistent and effective utilization, ultimately enhancing their academic independence and self-regulated learning.

In relation to Fitts and Posner's Stages of Learning Model, in the cognitive stage, students moderately utilize AI Tools in the early phase of learning, focusing on understanding the task and developing a mental representation of the skill. Students somewhat utilize AI Tools in trying to work out what to do. The learners try to cognitively understand the requirement and parameters about the lesson with minimum utilization of AI Tools. Students slightly utilize AI Tools in cognitive meaning mental process, knowing learning and understanding things.

During the associative stage, learners utilize AI Tools to refine their skills through practice. They start associating specific actions with specific outcomes and adjusting their performance accordingly with minimum utilization of AI Tools. The learner somewhat utilizes AI Tools in trying to translate declarative knowledge into procedural knowledge. In other words, the learner is trying to transform *what to do* into *how to do it.* This associative stage of learning can continue for varying periods of time depending on the complexity of the task and volume of practice.

In the autonomous stage, individuals have mastered the skill, and the execution becomes more automatic and efficient with minimum utilization of AI Tools. Learners slightly utilize AI Tools to perform learning task alongside other demanding tasks, as their attentional capacity is no longer needed to control action.

The result of this study was supported by Chai et al., (2020) where they highlighted that the aspiration of students to learn AI for the improvement of society is influenced by their proficiency in AI, belief in its capabilities, and understanding of its role in advancing social good.

Meanwhile, Kumar & Raman, (2022) articulated that although students acknowledge the advantages of AI in improving teaching, learning, and administrative procedures, they believe that its influence on admission, examination, and placement processes is restricted.

Additionally, Inoferio et al. (2024) suggest that AI can alleviate math anxiety by offering personalized support and step-by-step explanations, thereby boosting confidence and promoting self-directed learning.

In the Philippine context, Capinding (2023) demonstrates that an AI tutoring app significantly improves Filipino students' performance, self-reliance, and interest in pre-calculus. Furthermore, Angeles et al. (2015) report high satisfaction ratings for E-Math Version 2.0, a learning management system designed for Filipino engineering students preparing for licensure exams, which offers automatic feedback and progress tracking.

Significant Difference in level of Familiarity and Utilization of Artificial Intelligence Tools by Students in learning Mathematics

Added on the purposes of this study were to explore the significant difference in the level of familiarity and integration of the different AI Tools by teachers in teaching mathematics. These AI Tools were categorized as *AI Writing and Language Tools, Assessment and Engagement Tools, Math Assistance Tools* and *Communication Tools*, while the integration of AI Tools were examined on the phases of teaching namely, *Pre-Active Phase, Inter-Active Phase,* and *Post-Active Phase*.

As indicated by the results in Table 3.a, the respondents achieved a *p*-value of **1.16E-85**, which is categorized as *Significant* for ANOVA on level of familiarity with different AI Tools . Similarly, students scored a *p*-value of **0.00475** which is interpreted as *Significant* ANOVA on utilization of AI Tools in learning mathematics.

Table 3.a ANOVA for Student's Familiarity with AI Tools

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	54.6667	3	18.22223	142.5972	**1.16E-85**	2.608259
Within Groups	338.8941	2652	0.127788			

Total	393.5608	2655				

Legend: p-value < 0.05– Significant
p-value > 0.05– Not Significant

Table 3.b ANOVA for Student's Utilization of AI Tools

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4.100361	2	2.050181	5.363934	**0.00475**	3.000249
Within Groups	760.2273	1989	0.382216			
Total	764.3277	1991				

Legend: p-value < 0.05– Significant
p-value > 0.05– Not Significant

The results in Table 3.a demonstrate statistically **significant differences** in students' level of familiarity with different AI tools, as evidenced by a remarkably low p-value of **1.16E-85**, which is far below the conventional alpha level of 0.05. This suggests substantial variation in how familiar students are with specific categories of AI tools. Similarly, the ANOVA result for students' utilization of AI tools in learning mathematics yielded a p-value of **0.00475**, also interpreted as **Significant**, indicating meaningful differences in how students use AI tools for mathematical learning tasks. These results imply that not all AI tools are equally known or utilized by students; instead, familiarity and usage vary considerably depending on the type of tool and possibly its perceived relevance, accessibility, or integration into instructional practice.

The significance in familiarity levels may reflect differential exposure, students might be more frequently introduced to general-purpose AI tools (e.g., AI writing assistants or communication bots) than to specialized tools like AI-based math solvers or assessment platforms. This uneven distribution in familiarity is likely influenced by factors such as curriculum design, teacher recommendations, digital literacy levels, and the nature of tasks typically assigned in various subjects.

On the other hand, the significant variation in utilization of AI tools in mathematics suggests that while some students are actively incorporating these technologies into their study routines, others may lack the awareness, access, or confidence to do so.

These findings have important pedagogical implications. They emphasize the need for structured, equitable exposure to a broad range of AI tools across subjects and learning activities. Educators and institutions should ensure that students are not only introduced to AI technologies but are also supported in using them effectively, particularly in content areas like mathematics where cognitive support tools can enhance conceptual understanding, procedural fluency, and problem-solving skills. Tailored training, resource integration, and teacher modeling of tool usage could help close the familiarity and utilization gaps, promoting more inclusive and efficient use of AI across diverse learning contexts.

The observed significant differences in students' familiarity with different AI tools and in their utilization of AI within mathematics learning align with several recent studies. For instance, a study by Setälä, Heilala, Sikström, and Kärkkäinen (2025) employed the Technology Acceptance Model to examine generative AI use in Finnish upper-secondary mathematics. They found that **perceived usefulness** and **compatibility** significantly predicted intention to use GenAI tools, indicating meaningful

variance in tool familiarity and usage depending on how well tools aligned with students' needs .This supports the idea that not all AI tools are equally known or adopted in math contexts.

Similarly, Albalawi, Alqahtani, and Amer (2025) investigated mathematics teachers and discovered that **AI awareness and positive attitudes** significantly influenced their actual usage behavior in math instruction ($\beta = .166$, $p = .001$), highlighting significant variation in utilization linked to familiarity and attitudes . This parallels the significant ANOVA result for mathematics tool use ($p = .00475$) in your study.

Furthermore, a study conducted in Manila by Magat and Sangalang (2024) examined teachers' familiarity with ChatGPT in mathematics instruction. Their findings showed widespread **unfamiliarity**, accompanied by a strong demand for technical and pedagogical training to support effective use, pointing to substantial differences in familiarity that require targeted intervention. This resonates with your extremely low p-value (1.16e-85), signaling pronounced variation in tool familiarity.

Enhancement Activity to Strengthen Students' Familiarity and Utilization of AI Tools in Mathematics Learning

One of the central outcomes of this study is the development of a targeted enhancement activity aimed specifically at improving students' familiarity with and utilization of artificial intelligence (AI) tools in learning mathematics. Rather than broadly promoting AI adoption in basic education, this initiative focuses on empowering students as active and responsible users of AI technologies to support conceptual understanding, problem-solving skills, and self-regulated learning. The activity serves as a structured intervention designed to transform passive exposure to AI into purposeful academic utilization.

The findings of the study revealed varying levels of student familiarity and utilization of AI tools. Results indicated a generally low level of familiarity with different categories of AI applications, particularly those designed for formative assessment, adaptive practice, and mathematical problem analysis. Despite this limited familiarity, students demonstrated a moderate level of utilization, with the highest engagement observed during the Cognitive Stage of learning. Moreover, the significant differences identified through ANOVA suggest disparities in access, exposure, or competence, highlighting the need for systematic support to ensure equitable and meaningful AI use in mathematics learning.

In response, the researchers propose a structured program titled **"AI for Mathematical Learning Empowerment Program."** This initiative is designed to enhance students' awareness, skills, and responsible use of AI tools specifically within the context of mathematics education. The program aligns with national educational priorities that emphasize digital literacy, critical thinking, and future-ready competencies. More importantly, it seeks to ensure that AI tools function as cognitive supports rather than shortcuts that bypass mathematical reasoning.

The proposed program is organized into four progressive phases. The first phase, **AI Awareness and Orientation**, introduces students to various AI tools relevant to mathematics learning, such as adaptive problem-solving platforms, AI-powered step-by-step solution analyzers, and automated feedback systems. Emphasis is placed on understanding the functions, strengths, and limitations of each tool.

The second phase, **Guided Utilization in Mathematics Tasks**, engages students in structured activities where AI tools are used to support—not replace—mathematical thinking. Learners practice verifying solutions, identifying errors, comparing multiple problem-solving strategies, and reflecting on AI-

generated explanations. This stage aims to cultivate critical evaluation skills and prevent overreliance on automated outputs.

The third phase, **Independent and Strategic Application**, encourages students to integrate AI tools into homework, review sessions, and remediation activities. Students are guided in selecting appropriate AI applications based on their learning needs, thereby promoting self-regulated and intentional use.

The final phase, **Ethical and Reflective AI Use**, addresses responsible utilization. Students participate in discussions and reflective exercises focused on academic integrity, data privacy, and maintaining ownership of their mathematical reasoning. Clear guidelines are established to ensure that AI serves as a learning aid rather than a substitute for effort and understanding. This enhancement activity directly addresses the gaps identified in the study by strengthening both familiarity and meaningful utilization. By systematically developing students' knowledge of AI tools and their capacity for strategic application, the program promotes deeper engagement with mathematical content. Ultimately, it contributes to a more informed, responsible, and academically productive integration of AI in mathematics learning—equipping students with the competencies necessary to thrive in an increasingly technology-driven educational environment.

Based on findings, students were poorly familiar with the different AI Tools. They moderately utilize AI Tools in learning mathematics. There is a significant difference in the level of familiarity and utilization of AI Tools by students in learning mathematics.

As students were found to have poor familiarity with, yet moderate utilization of, AI tools in learning mathematics, it is recommended that initiatives be undertaken to systematically enhance students' foundational knowledge and competencies in using these tools. The curriculum should incorporate explicit instruction on the effective use of AI tools, supported by guided practice and opportunities for applied learning within mathematics coursework. Such efforts should aim to move students from passive or incidental use toward more deliberate and informed engagement with AI technologies, thereby enhancing their learning outcomes and digital literacy.

CONCLUSIONS

1. The respondents were poorly familiar with the different AI Tools in learning mathematics content.
2. Students moderately utilize AI Tools in learning mathematics content.
3. There is a significant difference on the level of familiarity and utilization of AI Tools by students in learning mathematics content.
4. An enhancement program to strengthen students' familiarity and utilization of AI Tools in learning mathematics content.

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