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A Correlational Study on Students' Artificial Intelligence Use, Mathematics Proficiency, and Challenges in Secondary Schools

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ABSTRACT

Students increasingly use artificial intelligence (AI) to solve and check mathematics problems, but local evidence on how this use relates to proficiency and to the demands it places on teachers is limited. This study examined the relationships among students' AI use, mathematics proficiency, and the challenges experienced by secondary mathematics teachers in General Santos City, Philippines, during School Year 2025–2026. Anchored on the Technology Acceptance Model, Constructivist Learning Theory, and Self-Determination Theory, the study used a descriptive-correlational design with 256 students and 121 teachers selected through simple random and quota sampling. Validated questionnaires (Cronbach's $\alpha = 0.84$) measured five dimensions of AI use, five domains of proficiency, and five areas of teacher challenges on a four-point scale, and data were analyzed using descriptive statistics and correlation analysis. Students showed a Good level of AI use ($M = 3.12$), strongest in accuracy verification, and a Good level of proficiency ($M = 3.14$), weakest in problem-solving. Teachers experienced a high level of challenges ($M = 3.16$), particularly in ensuring academic integrity and obtaining institutional support. Access to devices, frequency, purpose and type of AI use, and math average were more consistently related to AI use and proficiency than age or gender, and teachers' education, experience, and training were related to classroom-level challenges. All dimensions of AI use correlated significantly and positively with proficiency ($r = .432$ to $.841$), and both AI use and proficiency correlated strongly with teachers' challenges, most strongly with academic integrity (r up to .836). The study concludes that AI is closely bound to students' mathematical performance and to rising instructional demands. Structured AI integration, integrity policies, focused teacher training, and stronger institutional support are recommended.

Introduction

Artificial intelligence (AI) has entered secondary mathematics classrooms faster than schools have been able to prepare for it. Students now turn to chatbots, problem solvers, and tutoring platforms to check answers, generate step-by-step solutions, and study on their own, and recent evidence documents a steep rise in such use for academic tasks, including mathematics (Kasneci et al., 2023). The question for mathematics educators is whether this use builds genuine proficiency or substitutes for it.

The evidence so far points both ways. AI can support learning through immediate feedback, worked solutions, and adaptive practice that improve engagement and efficiency (Holmes et al., 2022), and a recent meta-analysis found a small but positive effect of AI interventions on

K–12 mathematics achievement (Yi et al., 2025). Yet overreliance on AI can weaken problem-solving and deep learning, and students may accept outputs without checking them (Susnjak, 2022). For teachers, AI tools that produce complete solutions make it harder to judge what students actually know and to protect academic integrity (Zawacki-Richter et al., 2019).

In the Philippines, access to digital devices has improved, but responsible and effective AI use remains uneven, with persistent gaps in digital literacy, ethical awareness, and instructional support (Lucas et al., 2021; Co, 2025). Mathematics teachers report difficulty monitoring AI-assisted work and adapting instruction, and many have had little formal preparation for these tasks. Mapping the existing competencies of Filipino teachers has been shown to be a necessary step before professional development can be targeted with confidence (Panela, 2025d), and the same logic applies to AI integration in mathematics.

In General Santos City, secondary students use AI with differing levels of confidence and independence, while their teachers face growing demands in monitoring, assessment, and integrity. Local evidence that examines students' AI use, mathematics proficiency, and teachers' challenges together is lacking. This study therefore determined, for School Year 2025–2026, (a) the profiles of student and teacher respondents; (b) the level of students' AI use in mathematics; (c) students' level of mathematics proficiency; (d) the level of challenges experienced by mathematics teachers; and (e) the relationships among profiles, AI use, proficiency, and teachers' challenges, as a basis for an intervention plan on responsible AI integration in mathematics.

Literature Review

AI in Mathematics Learning

AI systems in education personalize instruction by adapting content to individual needs, providing immediate feedback and customized practice that help students correct errors as they work (Holmes et al., 2022). Reviews of AI in mathematics education report that intelligent tutoring systems and AI-driven feedback improve problem-solving and procedural skills when they interact adaptively with learners, though teachers' readiness to integrate them remains a constraint (Ximenes, 2025; Panqueban & Huincahue, 2024). Meta-analytic evidence shows a small but positive effect of AI on K–12 mathematics achievement, with gains that depend on context and instructional design (Yi et al., 2025). AI can also make learning more engaging when integrated responsibly (Luckin et al., 2016), but its educational value depends on how students evaluate and integrate its outputs (Zawacki-Richter et al., 2019). Generative tools in particular require users to apply judgment to avoid errors and misinformation (Kasneci et al., 2023), and information literacy is a key skill in engaging with AI-generated content (Galagala & Bacarrisas, 2025).

AI Integration in Philippine Schools

Philippine reviews describe AI integration as advancing unevenly, with higher education ahead of basic education and with infrastructure gaps and teacher training deficits as recurring barriers (Co, 2025; Estrellado & Miranda, 2023). Digital divides shape how students access and use AI (Escorial & Pajo, 2025), and while AI tools can raise engagement and support personalized learning, students need guidance to use them responsibly (Pajo & King, 2025). Pre-service

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teachers require deliberate competency development before they can use AI effectively in STEM instruction (Vera et al., 2025).

Mathematics Proficiency

Mathematical proficiency comprises interrelated strands, including conceptual understanding, procedural fluency, strategic competence, and adaptive reasoning (Kilpatrick et al., 2001). Conceptual and procedural knowledge develop in mutual support rather than in a fixed sequence (Rittle-Johnson et al., 2015), and classroom teaching that attends explicitly to concepts strengthens both (Hiebert & Grouws, 2017). Critical thinking involves analysis, evaluation, and reflective judgment (Facione, 2015; Lai, 2018), and applying mathematics to real contexts is central to current curriculum frameworks (National Council of Teachers of Mathematics [NCTM], 2014; OECD, 2019; Boaler, 2016).

Teachers' Challenges With AI

Teachers face new demands when students use AI. Academic integrity becomes harder to secure when AI can generate complete answers (Bretag, 2019; Eaton & Turner, 2020), and assessment must be redesigned to capture reasoning rather than final products (Black & Wiliam, 2018). Integrating technology into teaching depends on teachers' knowledge, confidence, beliefs, and school culture (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017), and on technological pedagogical content knowledge that combines subject, pedagogy, and technology (Mishra & Koehler, 2006). Policy guidance stresses training and institutional support as conditions for responsible AI use in schools (UNESCO, 2022a, 2023b).

Theoretical Framework

The study was anchored on the Technology Acceptance Model, which holds that perceived usefulness and perceived ease of use shape attitudes toward a technology and the intention to use it (Davis, 1989). External factors such as device access, digital literacy, and teacher support influence these perceptions. Constructivist Learning Theory complements this view by treating learners as active builders of knowledge who integrate new information with existing structures (Piaget, 1967); in this lens, AI is a mediator of learning rather than a replacement for it. Self-Determination Theory adds that autonomy, competence, and relatedness drive motivation and engagement for both students and teachers (Deci & Ryan, 2000). Together, these theories frame students' profiles as inputs that shape AI use, AI use and proficiency as linked learning processes, and teachers' challenges as the instructional context in which both unfold.

Methodology

Research Design

A quantitative descriptive-correlational design was used to describe students' AI use, mathematics proficiency, and teachers' challenges as they naturally occurred and to determine the strength and direction of relationships among them without manipulating any variable (Creswell & Creswell, 2018; Ary et al., 2014).

Respondents

The respondents were 256 secondary students from Grades 7 to 12 and 121 secondary mathematics teachers from selected schools in General Santos City, Philippines. Simple random and quota sampling were applied, and only those who voluntarily agreed to participate were included, yielding a total of 377 respondents.

Instruments

Data were gathered through a four-part questionnaire adapted from published instruments on student engagement with AI tools (Al Mashagbeh et al., 2025), mathematics self-efficacy and skills, and teachers' challenges in using AI, and modified for the local context. Part I gathered the profiles: for students, age, gender, grade level, access to digital devices, frequency and purpose of AI use, type of AI tools used, and mathematics general average; for teachers, age, gender, educational attainment, years of teaching experience, and number of AI-related trainings. Part II measured students' AI use in five dimensions; Part III measured mathematics proficiency in five domains; and Part IV measured teachers' challenges in five areas. Items were rated on a four-point scale, and mean scores were interpreted as Excellent (3.26–4.00), Good (2.51–3.25), Less Satisfactory (1.76–2.50), or Least Satisfactory (1.00–1.75), with higher scores indicating higher levels of each variable.

Experts in educational technology, mathematics education, and research methodology validated the content of the modified instruments, and suggestions from the adviser and panel were incorporated. Pilot testing produced a Cronbach's alpha of 0.84, indicating acceptable reliability. Establishing validity and reliability before administration follows the practice of recent Philippine scale development work, which also checks whether instruments function equivalently for male and female respondents (Panela, 2025a).

Data Gathering Procedure

Approval was secured from the research adviser and from the administrators of the participating schools through formal letters. The purpose of the study and the confidentiality of responses were explained to respondents, and questionnaires were distributed to students and teachers who met the inclusion criteria. Respondents were given sufficient time to answer, after which the instruments were collected, checked for completeness, and encoded for analysis.

Data Analysis

Frequency and percentage described the profiles, and weighted mean and standard deviation described the levels of AI use, proficiency, and challenges. Normality was examined through the Shapiro-Wilk test, skewness and kurtosis values, and Q-Q plots. Pearson product-moment correlation was applied to normally distributed variables and Spearman rank-order correlation to those that were not. Point-biserial correlation was used for dichotomous variables such as gender, eta correlation for categorical variables such as grade level and educational attainment, and the Kruskal-Wallis H test for differences among multiple groups. Relationships were judged significant at $p \leq .05$.

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Ethical Considerations

Participation was voluntary, and respondents could decline or withdraw at any time without penalty. Informed consent was obtained before data collection, with consent forms describing the study's purpose, procedures, risks, and benefits. Responses were anonymized, identifiable information was kept separate from survey data, digital files were stored in encrypted and password-protected computers, and paper records were kept in a locked cabinet and shredded after use, in compliance with the Data Privacy Act of 2012.

Results and Discussion

Profile of the Respondents

Table 1

Profile of Student and Teacher Respondents

Variable	Distribution, f (%)	M (SD)
Students (n = 256)		
Age	15 yrs: 72 (28.13); 16: 61 (23.83); 14: 49 (19.14); 17: 38 (14.84); 13: 15 (5.86); 18: 12 (4.69); 19, 12, and 11 yrs: 9 (3.51)	15.33 (1.39)
Gender	Female: 138 (53.91); male: 103 (40.23); LGBT: 15 (5.86)	–
Grade level	G9: 57 (22.27); G10: 52 (20.31); G8: 43 (16.80); G11: 41 (16.02); G12: 34 (13.28); G7: 29 (11.33)	9.06 (1.58)
Device access	Smartphone with internet: 132 (51.56); laptop/desktop: 48 (18.75); tablet: 36 (14.06); shared device: 29 (11.33); none: 11 (4.30)	–
AI use frequency	Few times a week: 81 (31.64); multiple times daily: 67 (26.17); once daily: 58 (22.66); weekly or less: 34 (13.28); rarely/never: 16 (6.25)	–
AI tool/purpose	Chatbots: 96 (37.50); problem solvers: 71 (27.73); learning platforms: 48 (18.75); content creation: 27 (10.55); games/simulations: 14 (5.47)	–
Math average	85–89: 93 (36.33); 80–84: 82 (32.03); 90–100: 46 (17.97); 75–79: 35 (13.67)	84.87 (4.62)
Teachers (n = 121)		
Age	31–40: 36 (29.75); 41–49: 30 (24.79); 21–30: 27 (22.31); 50–59: 18 (14.88); 60–65: 10 (8.26)	39.12 (11.84)
Gender	Female: 74 (61.16); male: 43 (35.54); LGBT: 4 (3.32)	–
Education	Master's: 38 (31.40); master's units: 31 (25.62); bachelor's: 22 (18.18); doctoral units: 18 (14.88); doctorate: 12 (9.92)	–
Experience	11–15 yrs: 26 (21.49); 6–10: 24 (19.83); 16–20: 19 (15.70); 1–5: 18 (14.88); 21 and above: 34 (28.10)	14.62 (9.18)
AI trainings	1–3: 52 (42.98); 4–6: 36 (29.75); 7–10: 22 (18.18); above 10: 11 (9.09)	4.38 (2.91)

The student respondents were mostly 14 to 16 years old (M = 15.33), with females forming a majority (53.91%) and all six grade levels represented. More than half relied on a smartphone with internet access (51.56%), fewer had a laptop or tablet, and 4.30% had no regular access to a device. Most students used AI at least a few times a week, chiefly through chatbots (37.50%) and problem solvers (27.73%), and most had math averages between 80 and 89. The teacher respondents were mostly in early to mid-career (M = 39.12 years), predominantly female (61.16%), and well qualified, with 57.02% holding or pursuing a master's degree. Their

exposure to AI training was limited, however, with 42.98% reporting only one to three trainings.

The heavy reliance on smartphones signals a digital divide that may limit the depth of AI-supported learning, since learners without computers or stable internet often depend on mobile devices that restrict what they can do (OECD, 2020). These students also belong to a generation whose schooling was disrupted by the pandemic and moved abruptly onto screens, a period that left documented effects on the well-being of Filipino learners (Panela, 2025b). Frequent use of chatbots for quick answers carries the risk of dependency rather than understanding (Chen et al., 2020), and the age range places students at a stage where technology use is woven into both academic and social life (UNESCO, 2023a). Among teachers, the mix of ages calls for differentiated support, since experienced teachers may need more structured help with new technologies (OECD, 2021b), and the limited AI training points to a gap that professional development must close (UNESCO, 2022b; Holmes et al., 2019).

Levels of AI Use, Mathematics Proficiency, and Teachers' Challenges

Table 2

Levels of Students' AI Use, Mathematics Proficiency, and Teachers' Challenges

Dimension	Mean	SD	Interpretation
Students' AI use in mathematics			
Accuracy verification behavior	3.16	0.71	Good
Complexity of tasks assisted by AI	3.11	0.75	Good
Integration with independent learning	3.11	0.75	Good
Time spent using AI tools	3.10	0.73	Good
Confidence in using AI tools	3.12	0.73	Good
Overall	**3.12**	**0.73**	**Good**
Students' mathematics proficiency			
Conceptual understanding	3.15	0.71	Good
Procedural skills	3.14	0.71	Good
Problem-solving ability	3.11	0.73	Good
Critical thinking skills	3.15	0.70	Good
Application of mathematical concepts	3.14	0.71	Good
Overall	**3.14**	**0.71**	**Good**
Teachers' challenges in managing AI use			
Monitoring students' AI use	3.15	0.72	Good
Ensuring academic integrity	3.18	0.70	Good
Designing assessments	3.15	0.71	Good
Instructional adaptation and strategy	3.14	0.72	Good
Institutional support and resources	3.18	0.70	Good
Overall	**3.16**	**0.71**	**Good**

Note. 3.26–4.00 = Excellent (very high level); 2.51–3.25 = Good (high level); 1.76–2.50 = Less Satisfactory (low level); 1.00–1.75 = Least Satisfactory (very low level).

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AI use. Students' AI use in mathematics was Good overall (*M* = 3.12). Accuracy verification behavior was the strongest dimension (*M* = 3.16): students most often reviewed AI-provided steps (3.24) and checked answers before submitting them (3.21), but were less inclined to compare AI solutions with their own calculations (3.08). Confidence followed (*M* = 3.12), led by feeling capable of integrating AI into study routines (3.18) and trailing in using AI independently to complete work accurately (3.05). Complexity of tasks and integration with independent learning were both rated 3.11; students most often used AI for advanced problems (3.20) and for studying without teacher assistance (3.20), but least often depended on it for higher-level concepts or for planning learning tasks (2.98 each). Time spent was lowest (*M* = 3.10). These results describe students who use AI regularly and with some caution but who have not yet made it a structured part of their learning. This agrees with the view that AI's value depends on how learners evaluate and integrate its outputs (Zawacki-Richter et al., 2019), that AI should support rather than replace critical thinking (Holmes et al., 2019), and that generative tools demand verification skills (Kasneci et al., 2023). It also fits evidence that confidence in technology use shapes engagement (Kauffman, 2015; Scherer & Teo, 2019) but must be paired with digital literacy (Wang & Tahir, 2020), and that consistent rather than sporadic engagement produces stronger learning (Crompton & Burke, 2018; Holstein et al., 2019; OECD, 2021a).

Mathematics proficiency. Proficiency was Good overall (*M* = 3.14) and remarkably even across domains. Conceptual understanding and critical thinking were highest (*M* = 3.15), with students strongest at grasping the meaning behind formulas (3.22) and verifying solutions critically (3.21). Procedural skills and application followed (*M* = 3.14), and problem-solving ability was lowest (*M* = 3.11), particularly in solving unfamiliar problems (3.05). The pattern suggests a solid base of understanding and procedure with less confidence in non-routine problems. It is consistent with the view of proficiency as interwoven strands (Kilpatrick et al., 2001), with the mutual reinforcement of conceptual and procedural knowledge (Rittle-Johnson et al., 2015), with the role of classroom teaching in building conceptual understanding (Hiebert & Grouws, 2017), and with frameworks that emphasize critical thinking and real-world application (Facione, 2015; Lai, 2018; Boaler, 2016; NCTM, 2014; OECD, 2019).

Teachers' challenges. Teachers reported a Good, that is, high, level of challenges overall (*M* = 3.16). Ensuring academic integrity and institutional support were the most pressing (*M* = 3.18 each). The single most difficult task was preventing students from misusing AI in assessments (3.24), followed by limited institutional support (3.23), monitoring how students use AI during lessons (3.22), and insufficient training and guidance (3.21). Monitoring and assessment design were rated 3.15, and instructional adaptation 3.14. These demands come on top of already heavy workloads, and research on Filipino educators shows how workplace stress builds when new expectations arrive without matching support (Panela, 2026). The results agree with studies identifying academic integrity as a central concern in AI-assisted learning (Bretag, 2019; Eaton & Turner, 2020; Kasneci et al., 2023), with the need for assessment that captures reasoning (Black & Wiliam, 2018), with the role of TPACK in adapting instruction (Mishra & Koehler, 2006), and with evidence that institutional support and teacher beliefs shape

technology integration (Tondeur et al., 2017; Ertmer & Ottenbreit-Leftwich, 2010; UNESCO, 2022a).

Relationships Among Profiles, AI Use, Proficiency, and Challenges

Table 3

Correlations Between Students' AI Use and Mathematics Proficiency

AI Use Dimension	CU	PS	PSA	CT	AMC
Accuracy verification behavior	.742*	.684*	.801*	.836*	.592*
Complexity of tasks assisted by AI	.718*	.633*	.824*	.781*	.574*
Integration with independent learning	.764*	.692*	.841*	.808*	.603*
Time spent using AI tools	.641*	.582*	.714*	.688*	.432*
Confidence in using AI tools	.738*	.682*	.806*	.791*	.618*

Note. CU = conceptual understanding; PS = procedural skills; PSA = problem-solving ability; CT = critical thinking skills; AMC = application of mathematical concepts. *p ≤ .05; all p values ranged from <.001 to .006.

Table 4

Summary of Hypothesis Testing

Hypothesis	Significant Pairs	Range of |r|	Decision
H01: Students' profile and AI use	32 of 40	.072–.945	Partially rejected
H02: Students' profile and mathematics proficiency	29 of 40	.198–.742	Partially rejected
H03: Teachers' profile and challenges	16 of 25	.201–.356	Partially rejected
H04: AI use and mathematics proficiency	25 of 25	.432–.841	Rejected
H05: AI use and teachers' challenges	25 of 25	.421–.823	Rejected
H06: Mathematics proficiency and teachers' challenges	25 of 25	.372–.836	Rejected

Note. Significance judged at p ≤ .05. Ranges refer to significant coefficients only.

Students' profile and AI use (H01). Of the 40 profile–AI use pairs, 32 were significant at $p \leq .05$ (Table 4). Age showed the weakest pattern, relating only to integration with independent learning ($r = .200$, $p = .039$) and confidence ($r = .210$, $p = .028$). Gender and grade level each related to four dimensions but not to confidence, with negative coefficients for task complexity and time spent. Access to digital devices related strongly to accuracy verification ($r = .612$) and independent learning ($r = .594$) but negatively to task complexity ($r = -.421$). Frequency of AI use produced the strongest coefficients, especially with task complexity ($r = .801$) and verification ($r = .782$), and type of AI tools and math general average related significantly to all five dimensions, the latter reaching $r = .945$ with integration in independent learning. Students' AI use is thus shaped more by access, habits, and achievement than by age or gender, which is consistent with the Technology Acceptance Model's emphasis on external conditions (Davis, 1989), with evidence on access and personalization in AI-supported learning (Luckin et al., 2016; Crompton & Burke, 2023), and with policy guidance on equitable access to generative AI (UNESCO, 2023b).

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Students' profile and proficiency (H02). Twenty-nine of 40 pairs were significant. Frequency of AI use related most strongly to proficiency, notably problem-solving (r = .742) and conceptual understanding (r = .721), followed by purpose of use and type of tools. Device access related positively to conceptual understanding (r = .512) and critical thinking (r = .591) but negatively to problem-solving (r = −.402). Age related only to procedural skills and critical thinking, and gender to procedural skills, problem-solving, and critical thinking. Notably, application of mathematical concepts was not significantly related to any profile variable. Proficiency, like AI use, follows students' technology habits and academic standing more than their demographics (Holmes et al., 2019; Zawacki-Richter et al., 2019; UNESCO, 2023a).

Teachers' profile and challenges (H03). Sixteen of 25 pairs were significant, all of weak to modest strength (r = .201 to .356). Educational attainment related to four of the five challenge areas, with instructional adaptation (r = .356) and monitoring (r = .332) strongest. Age, gender, experience, and number of AI trainings related to monitoring, integrity, and instructional adaptation. None of the teacher variables related to institutional support, and only educational attainment related to assessment design. Teachers' backgrounds shape how they experience classroom-level challenges, but not their perception of institutional support, which appears to be a shared condition. This is consistent with the TPACK view that teacher knowledge conditions technology integration (Koehler & Mishra, 2019) and with the role of beliefs in technology use (Tondeur et al., 2017). Because the number of trainings was significant, the content of training matters; capacity-building efforts for Filipino teachers succeed best when they address the specific barriers teachers face in their own practice (Panela, 2025e).

AI use and proficiency (H04). All 25 pairs were significant and positive (Table 3), ranging from r = .432 to .841. Integration with independent learning showed the strongest link, especially with problem-solving (r = .841) and critical thinking (r = .808). Accuracy verification related strongly to critical thinking (r = .836), and confidence to problem-solving (r = .806). Time spent showed the weakest links, and application of mathematical concepts was the least associated domain across all AI dimensions. Students who use AI thoughtfully, by verifying, integrating, and applying it to complex tasks, also report stronger proficiency, particularly in higher-order skills. This agrees with evidence that AI enhances learning when it supports rather than replaces cognitive effort (Zawacki-Richter et al., 2019; Holmes et al., 2019) and with reviews of AI in education (Chen et al., 2020). Because the design is correlational, the direction of influence cannot be established; more proficient students may also be the ones best able to use AI well.

AI use and teachers' challenges (H05). All 25 pairs were significant (r = .421 to .823). Ensuring academic integrity showed the strongest associations, peaking with confidence in using AI (r = .823) and integration with independent learning (r = .802). Instructional adaptation and monitoring followed, while institutional support showed the weakest links. As students use AI more extensively and confidently, teachers find integrity, monitoring, and instructional adjustment harder, consistent with research on AI's demands on teachers (Holmes et al., 2019; Zawacki-Richter et al., 2019) and with guidance on generative AI in schools (UNESCO, 2023b).

Proficiency and teachers' challenges (H06). All 25 pairs were again significant (r = .372 to .836). Critical thinking and academic integrity formed the strongest pair (r = .836), followed by problem-solving and integrity (r = .801). Application of mathematical concepts showed the weakest associations, and institutional support was again the least related challenge. Higher proficiency, especially in higher-order skills, corresponds with greater instructional and assessment demands in AI-supported classrooms, perhaps because capable students use AI in more sophisticated ways that are harder to monitor and assess (Holmes et al., 2019; UNESCO, 2023b).

Synthesis

The findings depict a classroom system in which students' AI use, their proficiency, and their teachers' challenges rise together. Students with better access, more frequent use, and higher grades engage with AI more deeply, report stronger proficiency, and present their teachers with greater integrity, monitoring, and assessment demands. Through the Technology Acceptance Model, access and habit shape how useful and easy students find AI; through Constructivist Learning Theory, verification and independent integration are the uses that align with stronger reasoning; and through Self-Determination Theory, students' confidence and teachers' preparedness both condition how AI is used. Application of mathematical concepts stands apart as the domain least connected to AI use and profile, suggesting that it depends on direct instruction rather than on technology.

Conclusion

Secondary students in General Santos City use AI in mathematics at a Good level, verifying outputs more readily than they plan learning with it, and they show a balanced, Good level of mathematics proficiency with problem-solving as the relatively weaker domain. Their mathematics teachers face a high level of challenges, led by academic integrity and limited institutional support. Students' AI use and proficiency are tied more closely to access, frequency, purpose and type of AI use, and academic standing than to age or gender, and teachers' challenges are linked to their education, experience, and training. AI use is strongly and positively related to mathematics proficiency, and both are strongly related to teachers' challenges, especially in maintaining academic integrity.

Schools should therefore build student profiling that captures device access and AI habits; integrate structured, curriculum-aligned AI activities that require students to verify and explain AI outputs; and adopt clear academic integrity policies for AI use with practical monitoring strategies. School-based and continuing professional development should focus on monitoring, integrity, assessment design, and AI-responsive instruction, and institutions should strengthen digital infrastructure, tools, and technical assistance. Mathematics instruction should give direct attention to real-world application, the domain least supported by AI use, and AI literacy should be integrated into mathematics curricula. As AI becomes part of students' daily study, schools should also attend to learners' well-being, which recent Philippine research has shown remains fragile after years of disrupted, screen-based schooling (Panela, 2025c). Future studies should use designs that can test causal direction and should match student and teacher data at the classroom level.

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