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Artificial Intelligence and Mathematics Learning: Lived Experiences of Students and Teachers

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Abstract
This study explores the lived experiences of students and teachers regarding the integration of artificial intelligence (AI) tools in mathematics learning. Using a descriptive phenomenological approach, the research captures participants' experiences of how AI affects conceptual understanding, problem-solving skills, academic integrity, and pedagogical practices. Data were collected through in-depth interviews and qualitative surveys with eight students and five mathematics instructors and analyzed using Colaizzi's method to identify emerging themes. For students, findings are categorized under the A.C.E. framework: "Advantage," such as enhanced conceptual understanding and personalized learning; "Challenges," including overreliance on AI and weakened problem-solving skills; and "Ethics," reflecting concerns about academic dishonesty and responsible use of AI. For teachers, experiences align with the A.C.T. framework: "Adapt," highlighting how AI supports the instructional design and differentiated learning; "Caution," noting the risk of diminished student engagement and critical thinking; and "Teach," emphasizing the need for guided, balanced integration of AI tools in the classroom. Though AI tools can potentially have deeper learning and instructional effectiveness, they can be harmful if abused. The research concludes that the use of AI can potentially undermine learning integrity and student autonomy in the absence of ethical standards and pedagogical management. Suggested solutions include incorporating AI literacy into the curriculum, establishing rules and ethical guidelines for AI use, and providing professional development to instructors. These findings offer vital insights for teachers, policymakers, and developers looking to use AI to transform and ethically guide mathematics.

Keywords: Artificial Intelligence, Mathematics Education, Student and Teacher Experiences, Overreliance, Academic Integrity, Ethical Use

Introduction

Background

Artificial intelligence (AI) increasingly affects modern education, especially mathematics education, offering chances and significant challenges (Hwang & Tu, 2021) [19]. AI has revolutionized mathematics education with distinct solutions to teaching practices and student learning issues (Orhani, 2021; Hwang & Tu, 2021) [30, 19]. AI technologies enable adaptive problem-solving models, provide instant feedback, and enable personalized learning (Maulida *et al*., 2024; Orhani, 2021) [24, 30]. AI augments the understanding of intricate mathematical concepts, improves engagement, and enhances computational skills from a mathematical learning point of view. In addition, AI contributes to instructional efficiency by supporting teachers in automating grading and lesson planning and providing data-driven insights (Maulida *et al*., 2024) [24].

While integrating AI into learning mathematics has several advantages, it is confronted with challenges requiring critical investigation (Gupta & Sarda, 2025) [16]. Despite the growing body of literature on AI's potential in education, limited research exists on how students and teachers interact with and perceive AI tools in real-world classroom and home learning settings. Key challenges include AI access inequality, the need for adjustments in teaching approaches to integrate AI into teaching and learning, and ethical considerations surrounding AI-driven assessments and student data privacy (Maulida *et al*., 2024) [24]. In addition, research identifies concerns including students' excessive use of AI (Zhai *et al*., 2024) [47], reduced critical thinking skills of students (Kenedy, 2024) [21], and academic integrity concerns (Schiff, 2022) [34]. All these concerns have negative math learning consequences if not addressed appropriately. Learners will not understand math concepts and become over-

dependent on applying the AI tools at their disposal, at the cost of negative critical and problem-solving thinking.

Should the above issues remain unresolved, rampant use of AI in mathematics can result in shallow learning, where the students learn by heart to give correct responses without internalizing problem-solving skills. If these mishaps in mathematics learning happen, this could undermine the long-term goal of AI tools development for education, its effectiveness in enhancing mathematics education, and students' ability to apply mathematical concepts in real-world scenarios. It is important to fill the knowledge gaps on the impact of AI on students' learning outcomes and ethical issues. The issues of over-reliance, critical thinking skills, and unequal access to AI in mathematics education could continue if further research is not conducted.

Existing research has extensively examined the effectiveness of AI-assisted learning in improving mathematical performance, yet limited studies explore the qualitative experiences of students using AI for mathematics learning. According to several research studies, AI tools can either help or impair learning depending on how they are created and used; nevertheless, there is still a lack of understanding about how students perceive and navigate AI-driven learning environments. While AI technologies support independent learning and more in-depth mathematical exploration, little research has been done to see whether students actively solve problems or use only AI-based solutions. Resolving these issues ensures that AI supports substantial learning rather than superficial interaction.

AI has transformed mathematics education with unique solutions to pedagogical practices and student learning issues (Orhani, 2021; Hwang & Tu, 2021) [30, 19]. AI technologies enable adaptive problem-solving models, provide instant feedback, and enable personalized learning (Maulida *et al*., 2024; Orhani, 2021) [24, 30]. However, concerns persist regarding the ethical use of AI, students' overreliance, reduction in critical thinking, and access inequality (Gupta & Sarda, 2025; Zhai *et al*., 2024; Kenedy, 2024; Schiff, 2022) [16, 47, 21, 34].

Despite the global conversation on AI in education, limited research reflects how AI is experienced and implemented in specific learning environments. In particular, qualitative explorations into how students and teachers use AI in mathematics classrooms within real-world, context-specific settings are lacking, especially in localized educational systems adapting to the rise of AI technology.

This study addresses this gap by looking at the lived experiences of students and teachers using AI tools to learn mathematics. Through qualitative phenomenological research, it seeks to discover a deeper meaning and understanding of how AI influences learning mathematics, problem-solving capacity, and teaching methodology.

This research provides meaningful insights by exploring students' and teachers' lived experiences of using AI in mathematics learning. The findings will guide educators, policymakers, and AI developers in refining AI tools, ensuring their practical use as educational aids rather than replacements for human intelligence.

Domain of Inquiry

This study explores the lived experiences of students and teachers using artificial intelligence (AI) tools in mathematics learning at Cebu Technological University—Moalboal. It seeks to understand their experiences using AI tools in mathematics learning, particularly regarding conceptual understanding, problem-solving skills, engagement, and academic integrity. This study also examines how AI influences instructors' pedagogical approaches and views regarding integrating AI in the classroom.

Artificial Intelligence in Mathematics Education

Artificial intelligence (AI) is a multidisciplinary field focusing on developing intelligent computers capable of doing tasks usually performed by humans (Mohamed *et al*., 2022). AI includes researching, building, and implementing algorithms and systems to make decisions based on what they see and experience in their environment. Artificial intelligence (AI) includes machine learning, natural language processing, computer vision, robotics, expert systems, and other subfields (de-Lima-Santos & Ceron, 2021; Deng & Liu, 2018). Artificial intelligence (AI) revolutionized math education by shifting how learners engage with mathematics and solve problems.

AI tools and software provide personalized learning (Hwang & Tu, 2021) [19] and offer instant feedback on students' work, which is significant when solving math problems, allowing students to correct mistakes and strengthen their understanding of mathematical concepts (Gupta & Sarda, 2025) [16]. AI plays a crucial role in helping teachers accomplish tasks such as automating classroom assessment and evaluation processes, thus becoming time-efficient and assisting educators to get more accurate results than traditional assessment (Chen *et al*., 2022) [6]. These systems can also identify patterns in student errors, enabling teachers to create focused interventions that target frequent errors and knowledge gaps.

Artificial Intelligence technologies incorporate interactive elements such as virtual simulations, AI-powered chatbots, and augmented reality applications (Maulida *et al*., 2024) [24]. Numerous AI-based math solution programs have surfaced that offer solutions beyond definitive answers. They present detailed, step-by-step solutions. This enhancement enables students to understand logical steps towards problem-solving (Smodin, 2023). Blending AI in mathematics teaching and learning develops a flexible learning setting that enables educators to raise students' motivation levels and decrease anxiety when doing mathematics and learning technologies that utilize AI foster teamwork, enabling students to collaborate to solve AI-mediated problems.

Opportunities of AI in Mathematics Learning

AI offers many opportunities and advantages in mathematics education. Its features transform the way students learn and interact with the subject and improve teachers' technological and pedagogical knowledge. One main benefit of incorporating AI into the classroom is the capacity to develop customized and personalized learning processes. Algorithms in AI can provide individualized learning that enables students to learn math at their own pace (Capinding, 2024) [5] and enables the students to fill knowledge gaps. Access to AI-driven problem-solving tools at home provides additional support for students, improving their ability to apply concepts in different contexts. AI-powered tools and software can provide additional activities to students if they have difficulties understanding a math concept, enabling

them to practice problem-solving at their own pace (Chen *et al*., 2022) [6]. AI provides real-time feedback, which benefits students seeking to verify their solutions and refine their approach (Opesemowo & Ndlovu, 2024) [29].

Other research revealed that AI can make learning environments more interactive, reducing stress associated with mathematics (Opesemowo, 2025) [27]. AI technologies such as virtual simulations and gamification create engaging learning experiences (Bennani *et al*., 2022; Kumar, 2022). Studies also reported that AI tools and software for mathematics learning foster active engagement and hands-on use of mathematical skills, making math more accessible (Stefanova & Georgiev, 2024) [38]. AI can drive online mathematics contests and challenges that offer participants flexible and challenging problem sets. These contests create a competitive yet fun environment that inspires children to develop their mathematical abilities.

AI also assists teachers in improving their teaching practices and strategies (Luckin *et al*., 2022) [23]. AI can automate mathematics assignment and assessment grading, allowing teachers more time on other aspects of teaching practice (Owan *et al*., 2023). These tools foster active engagement and hands-on use of mathematical skills, making math more accessible (Stefanova & Georgiev, 2024) [38]. AI can help math teachers with individualized professional development (Orhani, 2021; Reina-Parrado *et al*., 2024) [30, 33].

Challenges of AI Integration in Mathematics Learning

Integrating AI in mathematics learning comes with significant challenges, such as students' over-reliance on AI-tool-based solutions at the expense of their ability to develop independent problem-solving capabilities. Excessive over-reliance on problem-solving mechanisms can constrain learners' ability to think independently and analytically (Marzuki *et al*., 2023). Students excessively dependent on AI for answers will likely get stuck on complex or non-routine problems and fail to replicate their knowledge for novel or uncommon situations.

According to a study (Zhai *et al*., 2024) [47], students may struggle to analyze and generate solutions independently when they become too dependent on AI-based solutions in solving math problems. Too much dependency on AI-generated solutions can also lead to passive learning, where students accept AI-generated answers without fully engaging in the reasoning process required for mathematical proficiency. AI-generated answers do not fully understand the reasoning behind them. Without active participation in mathematical problem-solving, students may face difficulties when tackling unfamiliar or complex problems (Dolapcioglu & Doğanay, 2022); Insorio & Librada, 2021; Leader & Middleton, 2004). Students who rely on AI algorithms for quick mathematics solutions may miss out on the opportunity to participate in this cognitive process (Alam, 2022).

Another key difficulty is the ethical implications of artificial intelligence in education. Data privacy is a significant problem since AI-powered platforms collect substantial student data to adapt learning experiences. Without sufficient protection, sensitive student data can be misused or exposed to cybersecurity threats (Schiff, 2022) [34]. AI algorithms may unintentionally disadvantage certain student groups due to differences in learning styles, access to technology, or educational backgrounds (Guo *et al*., 2024) [15]. Addressing these ethical concerns requires clear policies and regulatory guidelines so that AI can be applied responsibly and securely.

In addition, teachers' roles in AI-enhanced math classrooms must be well established. Although AI can mechanize some aspects of instruction, it cannot replace the role of educators in providing guidance, mentorship, and contextual explanations (Kenedy, 2024) [21]. Educators worry that AI will alter traditional teaching approaches, potentially reducing human interaction in the classroom. Professional development training must be introduced to enable teachers to successfully integrate AI tools within their instruction while sustaining a balanced approach to technology-enhanced education.

Technical challenges and implementation difficulties may impede the practical introduction of AI in mathematics education. Most AI systems must be constantly updated and improved to be effective, which is resource-demanding for educational institutions (Opesemowo, 2025) [27]. Furthermore, AI-based learning platforms must be designed to align with curriculum requirements and instructional objectives so that they do not interfere with but complement existing practices. Without adequate planning and continuous support, AI integration can introduce challenges that may outweigh its intended benefits in math education.

Materials and Methods

Research Design

This study uses a descriptive phenomenological technique from Edmund Husserl's (1970) work. Descriptive phenomenology seeks to investigate experiences as they are lived without the researcher's interpretation to uncover the nature of phenomena (Moustakas, 1994). A descriptive phenomenological design ensures that participants' experiences are examined in their purest form without imposing previous concepts or interpretations, as AI in education is still a current phenomenon (Creswell, 2013) [8]. Descriptive phenomenology requires researchers to set aside prior assumptions through bracketing (epoché) to describe the experiences objectively and systematically (Giorgi, 2009) [14].

The phenomenological qualitative research approach best fits in exploring the experiences of students and teachers regarding AI in mathematics learning. This approach helps understand how individuals perceive and experience AI tools, particularly in teaching and learning, over-reliance, and academic integrity concerns. This design allows for deep, focused exploration of the participants' subjective realities (Vagle, 2018; Valentine *et al*., 2018) [43, 42]. This method is ideal for comprehending how teachers and students see AI in math classes since it enables the investigation of personal viewpoints about AI's effects on learning, engagement, problem-solving, and ethical issues. This design will help the researcher understand the challenges and opportunities of using AI in mathematics learning.

Research Participants

The research participants are the Bachelor of Secondary Education Major in Mathematics (BSED Math) students and faculty handling mathematics at Cebu Technological University (CTU) Moalboal. The participants are chosen as they fit the research requirements, given their academic background and experiences. Their views help interpret the opportunities and challenges of incorporating AI tools in the

mathematics learning process. The number of participants is set based on qualitative principles. Creswell and Poth (2018) [9] advise that a qualitative study usually has 5 to 25 participants, depending on the research design and depth. Considering this recommendation, this study will include 8 students of and five teacher participants to ensure the collection of rich, in-depth data.

The participants are selected using a purposive sampling technique focused on a particular group of students and teachers who best represented the characteristics relevant to the research questions. According to Palinkas *et al*. (2015) [31], purposive sampling is widely used in qualitative research. It allows the researcher to select participants who can provide detailed and meaningful information about the studied phenomenon. The inclusion criteria for the student participants include at least one year of residency in the university, being a currently enrolled BSED Math student at CTU Moalboal, belongs to quartile 4 and quartile 1 performer in the previous semester and being willing to participate in the study. For the teachers, it includes: must be a teacher handling mathematics at CTU Moalboal, must have at least 1 year of teaching experience, and must be willing to participate in the study.

Research Environment

This study was conducted at the Cebu Technological University—Moalboal Campus, Poblacion West, Moalboal, Cebu, Philippines (Fig 2).

Cebu Technological University Moalboal Campus is a satellite campus under the Cebu Technological University system. It is a public, nonsectarian, coeducational, state-funded higher education institution, formerly Cebu State College of Science and Technology (CSCST). Cebu Technological University became a state university on November 10, 2009, under Republic Act No. 9744. The college institution offers bachelor's degree courses in Teacher Education, Hospitality Management, Fisheries, Industrial Technology, and Arts. These graduate courses and the university's Elementary and Secondary Education programs are accredited by the Accrediting Agency of Chartered Colleges and Universities in the Philippines, Inc. (AACUP).

CTU Moalboal is selected as the research environment since it serves as a training ground for future licensed professional teachers majoring in mathematics and offers a reputable teacher education program, particularly in mathematics, making it an ideal setting for the exploration of the academic experiences of the students and teaching strategies in the evolution of AI learning tools and education.

Research Instrument

This study utilized an unstructured questionnaire for the in-depth interview and qualitative survey. Unstructured surveys are qualitative research tools that use open-ended questions to allow respondents to express their opinions freely (Bryman, 2016). This approach is beneficial in exploratory studies where researchers aim to gain deep insights into participants' experiences, perceptions, and attitudes (Creswell & Poth, 2018) [9]. The questionnaires, although researcher-made, follow the guidelines from published articles such as the published work of Reina-Parrado *et al*. (2024) [33], "Learning to teach AI: Design and validation of a questionnaire on artificial intelligence training for teachers." and Capinding (2024) [5], "Development and validation of instruments for assessing the impact of artificial intelligence on students in higher education." The items in the questionnaire will undergo content validation by subject matter experts (SMEs), followed by a pilot testing phase with a small group of participants.

Data Gathering Procedure

The researcher secured an ethical clearance form from the research committee, after which, to gain access to the participants, a transmittal letter explaining the purpose of the study and the importance of the participant's involvement is sent to Dr. Charmaine Antecristo, Campus Director of Cebu Technological University—Moalboal Campus, where the respondents are connected. Upon approval, the researcher connected with identified participants, inviting them to participate voluntarily. An informed consent form and ethical clearance were given to all the participants so that they are adequately aware of their role in the study, that their participation is entirely voluntary, and that the information that will be collected will be kept confidential, anonymous, and will be used only for the study.

During the data gathering process, the researcher see that the survey and interview process is conducted smoothly, ethically, and effectively to gather meaningful insights from the participants. The researcher established a comfortable mood in the environment, asked permission for audio recording, took notes to capture essential highlights of the response, and allowed the participants to use their preferred language. After this, the data gathered in the study will be transcribed as early as possible to ensure accuracy, data integrity, and verification. The researcher will also provide transparency, credibility, and traceability by maintaining a well-documented audit trail.

Data Analysis

Colaizzi's Descriptive Phenomenological Method is the primary method used in this study to analyze qualitative data. The Husserlian phenomenology-derived method is rigorous, systematic, and ordered. The technique is designed to preserve participants' richness and essence of lived experiences (Colaizzi, 1978) [7]. To ensure that findings are solely derived from participant accounts, it strongly emphasizes bracketing, or epoché, to set aside researcher biases and assumptions (Moustakas, 1994). This method is widely used in descriptive phenomenology to analyze data in health sciences, psychology, and education because it systematically uncovers the meaning of experiences (Shosha, 2012) [36].

Colaizzi's method facilitates the exploration of the obstacles and potential linked with AI in mathematics instruction among students and teachers. It aids in understanding the participants' experiences with AI in education. It also aids in extracting honest and thorough reports of participants' experiences and the methodical analysis of data to discover common themes and vital meanings. Colaizzi's method offers an avenue for exploring the opportunities and challenges accompanying students' and teachers' use of AI in mathematics lessons. The method assists in offering authentic and honest accounts of the participant experiences and meticulous analysis of the evidence to determine pervasive themes and salient meanings. The systematic method in Colaizzi's process also offers validity and transportability of the findings, offering practical insights to practicing teachers, policymakers, and technology

developers to improve AI use in education. The data gathered were analyzed using Colaizzi's steps, repeated reading of the scripts, identifying significant statements, formulating meaning, clustering themes, developing exhaustive descriptions, producing fundamental structure, and finalizing validation. To ensure credibility, member checking was conducted by submitting the analyzed results to participants for validation and confirmation.

Ethical Consideration

The researcher strictly uphold all the ethical considerations the university's ethics guidelines committee sets. The researcher ensured that all the procedures for the study are presented in the paper, that the administration is aware of the study's conduct, that the researcher reports any changes in the procedures before implementation, and that the researcher secures ethical clearance from the institution's research ethics committee.

In compliance with the Data Privacy Act of 2012 (RA 10173), the researcher is committed to protecting and securing the personal information involved in this study. The researcher only collect data in any form once the review process has been completed and the research proposal has been approved. Participation in the interview is entirely voluntary.

The collected data will be used exclusively as a reference to measure the parameters of this research and for no other purpose. Information will be securely stored for one semester, after which physical records will be disposed of or destroyed according to the disposition procedures outlined by the National Archives of the Philippines.

Results and Discussion

Lived Experiences of the Students

The findings of this study are organized under the thematic framework A.C.E. — Advantages, Challenges, and Ethics to comprehensively understand students' experiences regarding the use of AI tools in learning mathematics. The "advantages" theme reports the positive student benefits of using AI, "challenges" captures students' dilemmas, and "ethics" shows how students behaved about making fair and moral use of AI.

Theme 1: Advantages – AI as a Catalyst for Enhanced Mathematics Learning

This theme demonstrates that AI tools have become essential learning support systems for students, especially in mastering complex mathematical concepts.

The study found out that artificial Intelligence helps improve students' learning experiences in mathematics. AI tools simplify solving complex problems by providing step-by-step explanations, personalized feedback, and assistance in understanding complex concepts faster than traditional methods. A participant said,

> *"AI in learning mathematics has given me instant feedback, personalized practice, and interactive explanations, making math easier to understand and more enjoyable."*

Recent research confirms that artificial intelligence greatly improves students' experiences in mathematics. AI-based technologies like adaptive learning systems and intelligent tutoring systems give customized feedback (Holmes *et al*., 2021), step-by-step problem-solving instructions (Zawacki-Richter *et al*., 2019) [46], and real-time clarifications that allow learners to understand complicated concepts more effectively compared to conventional methods (Awang *et al*., 2025) [2]. Hwang's (2022) [20] research validated that AI technologies enhance math performance through customized instruction to individual needs.

Students appreciated how AI simplified complex concepts through direct explanations and concrete examples, making abstract mathematical ideas more accessible and less intimidating. One of the participants reported that,

> *"AI really helped a lot in learning mathematics, it gives personalized help by explaining topics in an easier way and giving more examples until I understand."*

By giving direct and clear explanations and several examples, AI tools minimize the complexity of mathematical subjects, accommodating individual learning requirements. A study showed substantial gains in math achievement and student interest in students who utilized AI platforms relative to conventional teaching techniques (Swargiary, 2024) [40]. Another study mentioned that students who interacted with AI-driven conversational math tutors had significantly higher math growth scores than students who did not utilize the AI tutor (Henkel *et al*., 2024) [18].

The ability of AI to provide repetitive examples and dissect solutions into simple steps enabled learners to grasp subjects at their own pace, validating the theory of mastery learning. A participant said that,

> *"It makes math concepts simpler to understand by giving direct and multiple explanations and concrete examples."*

A participant added,

> *"AI helps me analyze and visualize difficult math problems. It also enhances my learning in math by providing step-by-step solutions."*

Visualization tools can substantially improve learners' capacity to identify relationships and patterns that may not be readily apparent in textual or numeric forms, thus enhancing conceptual understanding. For instance, working with dynamic tools such as GeoGebra has enhanced visual representation abilities and conceptual understanding of geometry (Veasna & Heng, 2024) [44]. Further, step-by-step solutions are crucial in procedural learning as they dissect complex problems into manageable steps. These solutions help students find the correct answers and endow them with transferable skills to solve similar problems in the future (Svitek *et al*., 2022) [39]. Using visual and step-by-step strategies coincides with evidence from systematic reviews, where it is noted that incorporating such approaches enhances mathematical reasoning and independent problem-solving (Fokuo *et al*., 2023; Medina Herrera *et al*., 2024) [13, 25]. In general, incorporating visualization tools and organized solutions in instructional practices strengthens students' cognitive and analytical abilities in mathematics.

These findings imply that AI may be more formally incorporated into math education as a complementary tool to

support individualized instruction. Policymakers and teachers could create formalized guidelines to leverage AI's positive impacts better while retaining standard learning procedures to support critical thinking.

Theme 2: Challenge – Convenience vs. Complacency

This theme uncovers that although AI brings numerous opportunities and benefits for enhancing the mathematics learning experience, the students reported facing disadvantages and problems like excessive dependency, degraded problem-solving skills, academic misconduct, and incorrect facts. Some even felt that constant AI use made them lazier or more dependent instead of sharpening their math skills.

A major concern was overreliance, where students rely more on AI than consulting traditional and nontraditional resources such as handouts and YouTube videos. A participant expressed,

> *"I tend to rely more on AI; sometimes, I don't open handouts or documents given by our instructor because of AI."*

Another admitted,

> *"Sometimes, I rely too much on AI for answers, making me too lazy to think independently and weakening my problem-solving skills."*

This dependence was closely tied to laziness and procrastination, especially when facing multiple academic demands. As one respondent described,

> *"...mostly due to procrastination and lack of time."*

Another echoed,

> *"...due to laziness and the difficulty level of the problem."*

Duhaylungsod and Chavez (2023) [10] warned that overreliance on AI dialogue systems could erode students' analytical thinking abilities, as learners might accept AI-generated content without critical evaluation. When learners excessively use AI to obtain immediate answers, it can reduce their engagement with the thinking process required to understand the material (Zhai *et al*., 2024) [47]. Copying solutions without knowing how or why they are solved hinders acquiring analytical and critical thinking skills. In classes such as math, where carefully reasoning out processes is essential, omitting this process can disenable long-term understanding. Accordingly, students may struggle on exams where they cannot utilize AI since they become dependent on AI-generated solutions and answers.

Developing discipline and using AI as a learning tool rather than a shortcut can help maintain and build personal cognitive skills. Some students acknowledged using AI merely for compliance, without genuine engagement:

> *"At first, it did [help]. However, I have observed that in the long run, especially during hell week at school, I tend to let it generate my answer to comply with the deadline and tell myself to check and understand it later. Still, I forgot about it, so I submitted an AI-generated answer without understanding."*

Another revealed,

> *"Instead of practicing or trying to solve the problem, I searched it on AI to make it easier."*

Excessive dependence on AI can discourage students from trying their best to solve problems independently by discovering the steps and enhancing mental ability (Baron, 2024) [3]. Students who allow AI to think for them may not develop strategies for approaching unfamiliar problems or real-world scenarios. Problem-solving is a skill that can be mastered through constant practice, but excessive reliance on AI applications erodes the skill over time.

Students highlighted accuracy issues with AI-generated responses. One stated,

> *"It sometimes provides inaccurate answers and will make its way of solving by not following the correct method."*

Another noted,

> *"AI sometimes provides a source that doesn't exist."*

These concerns prompted many to verify information through textbooks, online videos, or peer discussions. While advanced, AI tools are not perfect and sometimes provide wrong or deceptive solutions. They may apply a general method that doesn't align with the specific instructions or approaches taught by the instructor. Relying too much on AI-generated solutions and answers can disadvantage students unfamiliar with it. They might not notice when an AI-produced solution varies from the proper or accepted process. In topics such as mathematics or science, where accuracy and procedure are critical, adherence to a wrong process can result in poor comprehension and lower grades.

These results suggest an increasing necessity for teachers to emphasize the development of student's critical thinking and problem-solving abilities, which are key to examining and assessing information—particularly in an era where AI tools are openly accessible. Educating students on how to question, check, and cross-verify AI-produced solutions and answers is important in enabling them to prevent misinformation and overdependence and further enrich their understanding. Implementing AI into the educational curriculum means actively exposing students to how specific AI programs and software function, what they can and cannot do, and how to effectively and ethically utilize them. This process removes the AI from the potential cheating partner and makes it an effective learning partner, allowing students to think critically and apply technology correctly.

Theme 3: Ethics – Cheat Code or Study Buddy?

This theme refers to the ethical challenges associated with AI usage.

The study found ethical issues using AI tools and software in mathematics learning. One of the students admitted feeling fear of using AI but was torn between being honest or being able to submit answers.

> *"I used Cici. It was scary, but I didn't know how to solve the problem, so AI was the only option."*

Another shared,

> *"I used AI to get the answer when I did not understand the math problem."*

Lack of time and stress were cited most often as reasons for immoral use. A student quoted,

> *"It's embarrassing to say, but yes. When the given time is short, and I don't understand the lesson, I would opt to use AI tools, so I have something to submit."*

A student added,

> *"I have submitted math assignments by directly inputting problems into AI tools without fully analyzing them myself because I was too busy and I'm tired of going through the process."*

Students confess to being embarrassed about trusting too much on AI responses. Still, they are also held captive by close deadlines and challenging lessons, which cause them to become dependent on AI. They are also aware of the cases where they submit responses generated by AI, which amount to academic dishonesty. This indicates a bigger problem of school workload, time, effort, and improved pedagogical clarity. Research notes that students employ AI tools to cope when overwhelmed, presenting ethical concerns and potential academic dishonesty (Ateeq *et al*., 2024) [1]. Yet another study established that over a third of students have employed chatbots such as ChatGPT for support with exams but usually did not see it as an academic integrity violation. Such action is often caused by academic stress and ignorance of the subject, prompting learners to seek assistance from AI tools as an academic survival tactic. This scenario calls for clear policies and ethical standards so AI does not compromise integrity while enhancing learning.
Academic dishonesty was also observed among peers. Students express frustration and resentment toward peers who use AI dishonestly to gain academic credit.

> *"Some of my classmates use AI to cheat, and it is very unfair to us who worked our asses off day and night memorizing and analyzing our lessons; they use AI in front of us, feeling like a genius to cheat on almost all of our exams."*

These experiences exemplify academic injustice, whereby students who put time and effort into studying feel demotivated when others gain the same educational results through unfair means. This finding is aligned with Birks and Clare (2023) [4], who contend that AI can create academic dishonesty, bestowing undeserved benefits on some at the expense of disregarding the efforts of hardworking students. Ease of access to and availability of AI tools can unintentionally promote unethical acts. If left unaddressed, this could create a learning environment where integrity is breached, achievement is misrepresented, and the general educational worth is lost.
This finding implies that AI's effect on education cannot be ignored. Educational institutions need to set rules and ethical standards governing the use of AI in classrooms. This involves more than punishing offenders; instead, it teaches students the ethical aspects of AI use, such as originality of thought, equity, and respect for other people's intellectual property. Discussions in class, workshops, and real-life examples can help students develop a sense of responsibility and ethics.

Lived Experiences of the Teachers
The results of teachers' lived experiences of the impact of AI on mathematics learning are categorized, based on three dominant themes: Adapt, Caution, and Teach (A.C.T.). These themes emphasize the adaptation of AI tools by the teachers, caution against Overdependence and abuse, and teach with sensitivity and control.

Theme 1: Adapting Instruction Through AI
This theme emphasizes teachers' role and experience with AI technologies in support of mathematics education and customized learning.
Teachers indicated that they modified AI to give students different ways to explain intricate math concepts, making them more accessible.
A teacher said,

> *"I usually use AI tools to simplify complex concepts in Mathematics, trying to look for an easier way to explain and make them understand the topic. It is helpful, especially when looking for alternative methods to approach specific problems, especially in algebra."*

AI improves the efficiency of lesson planning by providing structured yet individualized learning paths, making preparation faster and more effective. A participant shared,

> *"Improved teaching practices, structured yet personalized learning flow, faster and more efficient class preparation, access to creative and interactive learning materials and activities, and support independent learning."*

Teachers acknowledge that they use AI to personalize the approach to each student's learning style, helping them understand complex topics in ways that best suit their needs. A participant echoed,

> *"AI tools in teaching mathematics help personalize instruction, explain complex topics, and support different learning styles. They allow students to check their work and improve their problem-solving skills. However, proper guidance is needed to prevent misuse."*

AI is utilized to explain concepts when students have difficulty, enhance learning, and build confidence in using mathematical concepts.
A participant noted,

> *"Yes, I allow students to consult on AI when they get confused during class discussions. Along with AI as support, students probe questions at the same time, get visual representations of the topics/concepts, and clarify the concepts. Eventually, their participation and performance improved and displayed confidence in applying the concepts learned."*

Studies on AI adoption in education all point to the fact that if AI is properly utilized, it can increase teaching effectiveness and student interest. AI tools have proven to be assets in teaching mathematics, particularly in making abstract ideas easier to understand and providing other ways of explanation (Fernandes, 2023). AI can deliver customized learning experiences based on various student capabilities. Through adaptive learning models, AI personalizes teaching to students' individual needs, accommodates different learning styles, and encourages problem-solving skills development through instant feedback and opportunities for self-assessment (Tahiru, 2021 [41]; Awang, 2025). Similarly, AI significantly enhances teaching practices by enabling structured yet personalized learning, improving class preparation, and providing access to creative and interactive materials (Ojeda-Bazaran *et al*., 2021) [26]. Moreover, integrating AI in classrooms has enhanced student participation and confidence (Opesemowo & Adekomaya, 2024) [28].

This finding suggests that teachers' incorporating AI into instruction makes students more actively engaged, strengthens problem-solving capacities, and serves their students' differentiated needs. AI can lead to improved learning results when implemented effectively in a classroom.

Theme 2: Caution Against Overdependence and Misuse

The theme represents teachers' concerns regarding students' excessive use of AI and its effect on critical thinking and academic integrity.

Teachers are concerned that excessive use of AI can rob students of developing critical problem-solving and analysis skills, as they depend on AI instead of comprehending the process.

One teacher mentioned,

> *"Students become overly dependent on AI, resulting in self-limitation and deprivation to develop the necessary skills in learning Mathematics."*

Teachers worry that AI may contribute to cheating, laziness, and students' inability to perform well on assessments that require independent thinking. A teacher shared:

> *"The disadvantages or challenges I have observed with using AI tools in learning mathematics are cheating, laziness, dependence on AI that struggles to do tasks independently, and low student performance during face-to-face quizzes and tests."*

Another participant supported,

> *"Some students cheat during quizzes, examinations, and assignments."*

Teachers observe that students often resort to AI for quick answers, which diminishes their ability to think critically and solve problems independently.

A third participant stated,

> *"Students immediately turn to AI for answers, which reduces their independent thinking skills."*

Another added,

> *"Based on my observation, students are sometimes tempted to rely solely on AI-generated solutions without fully understanding the mathematical process. AI tools often provide quick answers, and some students may become focused on the result rather than the steps involved in solving the problem."*

Research has reported the negative impact of AI on learner autonomy and thinking. Kukulska-Hulme & Lee (2020) [22] describes how dependency on technology might decrease cognitive commitment, leaving learners with even less opportunity to engage with the material in depth. Also, Zou *et al*. (2024) [48] established that although AI tools offer instant feedback, they can also promote passive learning when students fail to interact with the material critically. Academic dishonesty and abuse of AI, such as cheating during exams by teachers, are documented in the literature, where the misuse of AI for assignments or exams tends to produce shallow learning outcomes (Shepherd, 2025) [35]. Pesovski *et al*. (2024) [32] indicated that students who used tools such as ChatGPT regularly performed lower on tests, which implies that AI use can inhibit deep learning.

This challenge suggests that while AI can be a powerful learning tool, teachers must actively prevent students from becoming too reliant on it. Teachers should guide students to use AI as a supplementary tool, by encouraging them to work through problems manually and check their answers to ensure that they go through the problem-solving process.

Theme 3: Teaching with Awareness and Control

This theme emphasizes teachers' positive role in governing, directing, and promoting purposeful AI usage while preserving pedagogical integrity.

Teachers prefer other resources, like YouTube or reliable websites, to clarify concepts rather than relying on AI tools, giving students access to a broader range of perspectives.

An instructor said,

> *"I've never really relied on AI during teaching. I find it more helpful when I refer to reliable sources of information such as some YouTube channels and other google sites."*

Teachers limit AI use, allowing it only to check answers, to prevent students from becoming overly reliant on technology to solve problems.

A participant noted

> *"I only allow students to use AI tools when checking their answers, especially when they are unsure. I generally avoid frequent use of AI in class to prevent students from becoming too dependent on it. "*

Teachers encourage peer learning, where students collaborate to explain concepts to each other, reinforcing their understanding and reducing AI dependence.

A teacher said,

> *"Peer learning can be very powerful. Students explain ideas to each other in ways that are more relatable and easier to understand. As classmates share their learning, it also deepens their own understanding of the material, reinforcing their learning while helping others."*

Teachers promote collaborative activities where students share insights, fostering deeper understanding through interaction rather than relying on AI for answers.
A teacher echoed,

> *"I used group activity during my math instruction in which they can share and get some ideas to and from their classmates."*

Teachers encourage students to be cautious when using AI and always compare AI-provided answers with their own work to ensure correctness and understanding.
A participant shared,

> *"To avoid incorrect or misleading information from AI, I used to tell my students to always be vigilant when using search engines or AI because not all the time it will give the 100% correct answer they still need to compare and try to actually solve the math problem on their own."*

Teachers' use of artificial intelligence (AI) in instruction differs as some have shown reluctance because they worry about excessive dependence on AI and the accuracy of information created by AI. A research report by Filiz *et al.* (2025) [11] reveals that although teachers acknowledge the usefulness of AI, technical problems, curriculum mismatches, and ethical issues hinder its implementation. Certain teachers allow AI tools to counteract overdependence on specific tasks, such as answer checking but stress the need for critical thinking and problem-solving abilities (Siham & Sophia, 2024; Haroud, & Saqri, 2025) [37, 17]. Peer learning is effective since it promotes collaborative learning and consolidates student knowledge (Haroud, & Saqri, 2025) [17].
This finding emphasizes the need for teachers to implement a balanced use of AI and non-conventional tools in mathematics learning in the classroom. Teachers must strictly enforce rules and regulations in using AI among students, especially in mathematics classes. Teachers must also guide students actively through complex problem-solving exercises and promote self-discovery and peer-to-peer learning. Through monitoring learners' interactions with AI, teachers ensure that learning is meaningful and that learners are not simply using AI-provided solutions without understanding the underlying principles.

Conclusion

The following conclusion was made based on the results and discussion presented in this study. Integrating artificial intelligence (AI) tools in learning mathematics substantially influences students' learning experiences by providing personalized support, detailed explanation features and solutions, opportunities for independent practice, and facilitating a deeper understanding of complex mathematical concepts, especially concepts that were not fully understood and mastered during classroom instruction. Teachers observed that AI-assisted instruction could complement and reinforce learning among students on complex mathematics concepts when appropriately utilized. However, while AI offers advantages and opportunities to support mathematics learning, its misuse or uncritical acceptance can undermine the development of essential mathematical skills and forfeit AI's purpose as a human aid and not a human replacement. Students and teachers acknowledged that the frequent use of AI tools in learning mathematics can lead to over-reliance, resulting in reduced independent learning and critical thinking skills. Students admitted to academic dishonesty, like cheating in quizzes, tests, and examinations and submitting purely AI-generated answers without critically analyzing the problem. Teachers noted instances of AI-generated outputs submitted by students emphasizing the importance of human interaction necessitating verification through traditional methods or consultation with educators.

Reccomendation

In the light of the results and conclusion made in this study, the following are recommended:
1. Educational institutions should implement workshops and courses to enhance teachers' proficiency in using AI tools and integrating them into their teaching practices.
2. Educational institutions should establish ethical guidelines for students and teachers using AI tools and software.
Educational institutions should integrate AI literacy into the curriculum, with modules or lessons that teach students and teachers how to assess and verify AI-generated solutions critically.

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