Students & AI Tools: Attitudes & Perceptions

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Article Info

Abstract

With the widespread use of artificially intelligent (AI) technology among students, educators are faced with new realities that must be addressed. This study investigated students' attitudes towards the use of AI tools in the classroom, their perceptions of its effect on their learning, and their perceptions of its benefits and disadvantages. Seventy-seven university students participated in this study. Data was collected using a 5-point Likert-type survey with two free response questions. The results of the study indicated that students had a positive attitude toward the use of AI tools in the class. They believed it had a positive effect on their college learning experience and improved their learning. However, students' responses indicated that the use of AI tools didn't increase their interaction with their instructor and classmates. Students listed understanding the class concepts as a main benefit to using AI tools. They also mentioned becoming lazy and dependent on these tools as one of the main disadvantages of using these tools.

Introduction

As artificially intelligent (AI) technology is now widely available, students are becoming increasingly familiar with its applications, some broadly applying the tools to generate completed assignments and others minimally applying it. As ideas about AI technology have spread across educational spaces in both awareness and use, there is a need for educators to familiarize themselves with these issues regarding the mindset of students. It is important to examine students' attitudes and perceptions of this specialized technology. In fact, what are the students' attitudes and perceptions toward the use of AI in the classroom? The answers to these questions can be helpful when establishing meaningful standards and expectations for implementing AI in classrooms.

Educators are establishing and applying regulations for the use of AI technology in their school settings. Calculus courses tend to see large enrollment at colleges and universities, and they tend to supply heavy-handed content that might warrant consideration for AI use (Smith, 2025). For this reason, we have limited our investigation to a pool of undergraduate university students enrolled in calculus courses. A survey instrument is used to collect self-reported data from the participants, students who were willing to communicate about their attitudes and perceptions about their personal use of AI in their calculus coursework. Findings from this study can be useful in establishing institutional-level and course-level policies that surround implementing AI into university mathematics classrooms.

Framework

It seems that many people in the educational arena loosely use the expression "AI" when describing brand name AI technologies. According to International Business Machines (IBM), AI is defined as the technology that "enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy." IBM also defines Generative AI as artificial intelligence that can "create original content such as text, images, video, audio or software code in response to a user's prompt or request."

Additionally, Large Language Models (LLMs) are defined as tools capable of understanding and generating natural language and other types of content to perform a wide range of tasks such as handling sequences of words and capturing patterns in text (Stryker, 2025). In this study, Artificial Intelligence (AI) represents the above-mentioned collection of technical terms, though narrowly used to describe brand-name LLMs, such as Google Gemini and ChatGPT. These LLMs can analyze functions in the calculus coursework including, but not limited to, differentiation, integration, and expressing the origins of the subject.

We consider every brand of LLMs to be an artificially intelligent apparatus that students are referring to when they report details about their attitudes and perceptions. Students were asked about their use of AI, although there were no guidelines to specify which LLM brand the students would reference in their survey responses. To help contextualize students' attitudes and perceptions about using AI in the calculus classroom, we will explore general ideas around AI in academia.

Literature Review

Current Trends with using Artificial Intelligence in the University Classroom

The Arrival of AI in Education

Like the advent of the handheld calculator and other novel technologies, AI has challenged the status quo of the modern educational system with an irresistible efficiency that has the potential to significantly simplify work-intensive tasks (Schiff, 2020). Educators can use AI to produce an exam study guide within five seconds, rather than the five hours that it may have taken to write one in the past. Students can use AI to produce a detailed explanation of a challenging math problem in five seconds, rather than waiting for the next time they can speak to their professor or tutor. Large Language Models (LLMs) house enormous measures of data that allow them to operate as statistical prediction machines (Stryker, 2025). As a result, a computational problem that involves differentiation or integration of a complex function can be executed and explained in only a few seconds, where the user is simply required to input a reasonably legible example problem. These LLMs can navigate very well-written script, math-font text, poorly written text or text with spelling/grammar errors, images of text, sketches, and more. These models work fast and tirelessly.

Students can now choose to schedule time with a human tutor, time limited to the availability of the tutor, or the students can consult any LLM at whatever time of day or night to ask the very same question(s). The only apparent limitation that the student would face regards their individual access to technology. Therefore, we find that many run-of-the-mill websites now house primary or secondary options to access these LLMs. For instance, what used to be a Google search engine for producing a series of relevant webpage links is now Google Gemini generative AI. It outputs predicted results that were formulated from massive quantities of text. Meanwhile, in educational spaces, what used to be webpage links that lead to connecting with a human tutor has now become a "tutorbot" links to LLMs (Katsantonis, 2024). And much like what might have been upon the arrival of the handheld calculator, some educators are supportively onboard while others are not. Some researchers argue that AI should be more extensively applied in the higher education classroom (Slimi, 2023), but such change hardly comes without first appealing to the powers that be.

Institutional Response to AI

An overwhelming majority of institutions of higher education recognize AI as an integral part of their curricula, uniquely applied to perform the duties of instructional agents such as textbooks and teachers (Chen et al., 2020). Thesify, an organization dedicated to empowering learners through innovation and technology, has published a list of AI policies provided by a series of ivy-league universities (Thesify, 2025). Oxford, Harvard, Cambridge, and Stanford, among others, all have entire webpages dedicated to communicating the expectations of implementing AI in the university experience. The University of Cambridge goes so far as to lump AI with the policies on Blended Learning. Oxford University offers a free ChatGPT educational account to all their students while Princeton University offers free access to Microsoft CoPilot. A general theme of anticipating new ways of teaching and learning emerges from pursuing these university's AI policy webpages.

Classroom Response to AI

Research shows that AI can be used as a winning tool for teaching (Tashtoush et al., 2024). Classroom educators have noticed the capacity for the AI programs to work efficiently and to customize output that can serve large groups or individuals. AI implementation has delivered promising results, with students demonstrating increased motivation for learning, embracing challenges, and engaging in educational competition. Specifically, applying AI to modern teaching techniques has proven successful by aligning educational materials with students' skills and interests, and delivering the content in a speedy fashion. Meanwhile, some educators have chosen to prohibit all use of generative AI in their coursework, providing strong language against the use and penalties for violation of the policies. According to the blog post titled, "What Happened the Year I Banned AI?" the classroom teacher Chanea Bond found that students often default to the use of AI when they believe their teacher-leader seeks an academic voice within writing assignments. The students in this writing class were reported to have believed that their individual voices were not academic. So, attempting to rise to the perceived level of expectation, they chose to use AI (Bond, 2025). Meanwhile, professor of mathematics Dave Richeson of Dickenson College strictly banned the use of "generative artificial intelligence…to perform non-trivial tasks." This prohibition is provided in the official technology policy for the math class (Richeson, 2023).

Underlying Attitudes and Perceptions of AI in Higher Education
Positive Perceptions

Some educators perceive that using AI in the classroom increases motivation to learn, promotes skills development, is cost-effective, and reduces workload (Gökçearslan et al, 2024). Gökçearslan et al (2024) found that both students and educators enjoy these benefits that result from the implementation of AI. Students have been shown to demonstrate more motivation about learning content due to the promise that AI offers to provide some reasonable access to ideas and solutions. For instance, in a mathematics classroom, where students are often in search of an answer to a computation problem, an artificially intelligent program facilitates the acquisition of new knowledge and skills (Slimi, 2023). Slimi found most students believe that AI provides "better learning styles and teaching methods in higher education than humans." However, only 8% of the study's participants would like to see robots replace humans in the instructional role. These students believe that the future holds a positive outlook as it relates to and a result of the impact of applying AI to the higher education classroom. They may not want to be rid of the human teacher, but it seems they would like to see the human supplement instruction with AI.

Negative Perceptions

The human role cannot be replaced. This position, one that many educators take with respect to AI in the classroom, has led to strong opposition against substituting AI for textbooks or face-to-face instruction (Miranda, 2025). In Miranda's study, an overwhelming 81% of teachers disagreed with using AI to replace textbooks while 87% disagreed with using AI to replace human face-to-face instruction. It is noteworthy that the difference between the opposition expressed among educators versus opposition expressed among students about

replacement is statistically significant, with the opposition stronger among educators.

Many educators seek to preserve traditional methods of instruction that are tried and true. One study found most students believe that using AI to assist with completing assignments is considered cheating (Garrote Jurado et al., 2023). This can create a culture of suspicion, and even unfairness in scoring, as some students avoid using AI upon the basis of their principles, while others may not be so affected. Another negative perspective about the use of AI in the classroom lies with mathematical errors (known as hallucinations) that are sometimes generated with a high degree of frequency (Massenon et al., 2025). Generative AI models are known for hallucinations, evidenced by the disclaimers that populate at the conclusion of the results generated—a disclaimer used to warn users of the potential for inaccurate responses.

AI in the Discipline: Impact on Mathematical Learning

Following an exploration of views on academic integrity and accuracy, we also explore AI's impact on skills-based disciplines, particularly mathematics skills. There exist both the computational and the psychological challenges that can be easily identified as the driving force of AI application in advanced mathematics studies. Functional analysis (the umbrella field of math that houses calculus) seems to be the area where many students anticipate major challenges with understanding. If students enter a calculus class lacking confidence in their abilities to learn the subject matter, this can potentially drive their interest in using AI in the classroom.

The Computational Challenge

The latest in a long line of technologies that support mathematics learning (calculators, graphing tools, online solvers such as PhotoMath), AI for mathematics computation appears to be the most advanced and robust tool of them all. LLMs can provide numerical results and explanations that work faster than human capability (Xinzhel, 2025). Step-by-step solutions, descriptions, and specific responses to specific questions that can potentially remove the computational burden from learners. However, if used properly, LLMs can improve a student's computational skills. The models provide fast processing and access to information that can promote understanding when understanding is potentially inhibited by the burdens of complexity (Tashtoush, 2024).

Sometimes, students are stuck on a math problem because the problem is relatively difficult. Real-world example problems sometimes become challenging due to the extra layer of thoughtfulness that is required to translate words into mathematical statements before finding the solution. A math student may be stuck on a difficult integration problem because the algebraic process involves multiple occurrences of combining fractions with unlike denominators. Will students abandon the inherent responsibility of grasping difficult concepts, or will they default to the easy way out where an LLM can do all the work and the student can simply copy and paste? Then there are the "plug-and-chug" problems. In a calculus course, students may be introduced to a complex function yet only be required to explore the output value given some basic input value. In the world of pencil and paper, a calculus student presumably has no trouble substituting and simplifying to find values. But there exists the world of LLMs today, where students may also use the AI models for basic and mundane tasks, if nothing more than for

convenience or increased certainty. What are students' attitudes about AI use in the classroom?

The Psychological Challenge

Research shows that self-efficacy in math is positively correlated with achievement in mathematics (Zakariya et al., 2020). As a learner's confidence about their ability to succeed increases, the learner's achievement increases. Research also shows that technology use in the math classroom is positively correlated with student achievement in mathematics (Hansen & Gonzalez, 2014). Hansen and Gonzalez found that the positive correlation held even when instruction shifted across various fields of science and ethnic minority groups. Since confidence in math and technology both positively influence student achievement, then applying tools that will help increase a student's confidence about their abilities might be applied. AI models, despite their potential to make errors, have become increasingly reliable for accuracy due to ongoing AI model training projects (Outlier, 2025).

Models are often trained to improve their ability to navigate and predict solutions to complex math problems. We can therefore expect that as the models' measure of accuracy improves, users' measure of trust will increase. These ideas about the challenges that we face when introducing AI to university mathematics bring us to the most important question with respect to this study: What are students' perceptions about AI use in the classroom?

Research Questions

The purpose of this study is to investigate students' attitudes and perceptions of using AI tools in the classroom. This research study aims at answering the following six questions:
1. What are the attitudes of students toward the use of AI tools in their classes?
2. What are the perceptions of students of the effect of using AI tools on their learning?
3. What are students' perceptions of the effect of using AI tools on their class participation and interaction with their classmates and instructors?
4. What are students' perceptions toward their interaction with AI tools?
5. What are students' perceptions of the benefits of using AI tools in the class?
6. What are students' perceptions of the disadvantages of using AI tools in the class?

Method

The participants in this study were 77 students at a major university in the USA during Fall 2025. The participants filled in a 5-point Likert-type 18- item survey that the researchers developed based on literature review and the aim of the study. The scale of the survey responses ranged from Strongly Disagree (1) to Strongly Agree (5). The survey consisted of four sections: students' attitudes toward the use of AI tools, students' perceptions of the effect of using AI tools on their learning, students' perceptions of the effect of using AI tools on their class participation and interaction with their classmates and instructors, and students' perceptions toward their interaction with AI tools. In addition, the survey included two open-ended questions about students' perceptions of the benefits and the disadvantages of using AI tools in the class.

Results and Discussion

The data collected were analyzed both quantitatively and qualitatively. Students' responses to the open-ended questions about their opinion of the benefits and the disadvantages of using AI tools in the class were color-coded, tabulated into different categories based on students' responses and analyzed. In analyzing, the survey questions, the designation of "agree" includes all "strongly agree" and "agree" responses while the "disagree" designation includes all "disagree" or "strongly disagree" survey responses. The responses collected from the 5-point Likert-type survey items were grouped into four categories: students' attitudes toward the use of AI tools, students' perceptions of the effect of using AI tools on their learning, students' perceptions of the effect of using AI tools on their class participation and interaction with their classmates and instructors, and students' perceptions toward their interaction with AI tools.

To provide an answer to the first research question about students' attitudes toward the use of AI tools, 62.34% agreed that they felt comfortable using AI tools while 6.5% disagreed. Also, 40.26% agreed that they enjoyed using AI tools while 19.48% disagreed. In addition, only 37.66 % indicated that they would like to use AI tools in other classes, while 24.67 % disagreed. Majority of students (57.14%) thought that using AI tools will have a positive effect on their college learning experience. Students in general felt comfortable and enjoyed using AI tools in the classroom (see Table 1).

Table 1. Students' Attitudes Toward the use of AI Tools

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel comfortable using AI tools in the class.	23	25	24	3	2
I enjoy using AI tools in the class.	18	13	31	13	2
I would like to use AI tools in all classes.	14	15	15	16	3
I think using AI tools will have a positive effect on my college learning experience.	14	30	30	9	3

To provide an answer to the second research question about students' perceptions of the effect of using AI tools on their learning during classroom activities, 59.74% indicated that using AI tools increased their confidence in the class, while 15.58% disagreed. Similarly, 70.13% indicated that using AI tools supported their learning while 7.8% disagreed. On top of that, 68.83% that using AI tools made it easier for them to understand the course concepts while 1.3% disagreed. Majority of students (64.94%) indicated that using AI tools improved their class grade. Students' responses indicated that they believed using AI tools had improved their learning positively (see Table 2).

To provide an answer to the third research question about students' perceptions of the effect of using AI tools on their classroom participation and interaction with their classmates and instructors, 29.87% agreed that using AI tools motivated them to be more engaged in the class discussion while 29.87% disagreed. Regarding classroom interaction with the instructor, 25.97% of students agreed that the use of AI tools increased their interaction with

their instructor, while 46.75 % disagreed. This indicates that majority of students of students felt that the use of AI tools didn't increase their interaction with their professor. Similarly, majority of students (48.05%) felt that the use of AI tools didn't increase their interaction with their classmates.

Table 2. Students' Perceptions of Class Learning

On   the

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The use of AI tools increased my confidence in the class.	18	28	28	8	4
The use of AI tools affected my learning positively.	16	34	34	7	2
The use of AI tools supported my learning in this class.	21	33	33	4	2
The use of AI tools improved my class grade.	19	31	31	7	1
The use of AI tools made it easier for me to understand the course concepts.	30	23	23	1	0

other hand, 48.05% of the students indicated that the use of AI tools motivated them to seek additional help from tutors, instructors, and classmates while 36.36% disagreed. Students' responses indicated that students believed that the use of AI tools didn't increase their interaction with their instructor and classmates (see Table 3).

Table 3. Students' Perceptions of Class Interaction

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The use of AI tools motivated me to be more engaged in the class discussions.	11	12	12	18	5
The use of AI tools increased my interaction with my instructor.	7	13	13	21	15
The use of AI tools increased my interaction with my classmates.	7	14	14	26	11
The use of AI tools motivated me to seek additional help from tutors, classmates, and the instructor.	14	23	23	22	6
The use of AI tools motivated me to offer help to my classmates.	8	18	18	13	8

To provide an answer to the fourth research question about students' perceptions toward their interaction with AI tools, 80.52% of students indicated that it was easy to use the AI tools and majority of them (66.23%) indicated that the AI tools provided direct responses to their questions with 45.45% of them indicating that the AI tools responses were also clear and accurate. Students' responses indicated that they believed to was easy and beneficial to use AI tools in the class (see Table 4).

To provide answers to the last two research questions about students' perceptions of the benefits and disadvantages of using AI tools in the class. We first looked at students' use of AI tools outside the class (Which Ones? How long?) and the purpose of using these tools. All students except 3 indicated that they used AI tools outside. The most used tool was ChatGPT (59% of the students mentioned using it). The second in line was Gemini with 18%. Other AI tools such as Copilot, Claude, DeepSeek. Leonardo AI,…etc were mentioned with a varied percentage between 1% to 4%.

Table 4. Students' Interaction with AI Tools

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I felt that AI tools provided direct responses to my questions.	22	29	29	6	3
I felt that AI tools provided clear and accurate responses to my questions.	16	19	19	9	3
I felt that the use of AI tools is time consuming.	4	23	23	34	11
I found AI tools are easy to use.	25	37	37	2	1

In addition, most of the students indicated using AI tools on a weekly basis, some indicated specific time amount like 30 minutes, 10 hrs, some mentioned the number of times like 2-3 times, 8 times, others stated a general statement without specifying an exact time like handful of times, occasionally, often (see Table. 5).

Table 5. Length of Using AI tools Outside Class

Specific Amount of time	Specific Number of times	General times of use
5min	Once a week	occasionally
30 minutes	Two days a week	sometimes
Not more than an hour a week	4-5days	often
An hour a day	2-3 times	
2-3 hours	Twice a week.	Handful of times
3-4 hours	3times a week	
Couple of hours	3-4 days a week	
10 hrs per week.	5-6 times a week	
	8 times a week	
	everyday	

To answer the question about what the participants used AI tools for. Their replies were organized into two categories: Studying and other uses. Some of them mentioned multiple uses, however most of the Participants (89.61%) mentioned using AI tools for studying, few mentioned using it for other things including shopping, checking weather and everything (see Table 6) for sample replies.

Students' responses to the two open-ended questions about their perceptions of the benefits and disadvantages of

using AI tools in the class were color coded and divided into different categories. Students' responses were categorized into six categories as follows: Understanding, Supplementary Tool, Fast Responses & Checker, Detailed Solutions, Clear Explanations and Other.

Table 6. Use of AI Tools Outside Class

Studying:

- Learning material that I have missed in class.
- Understand topics in a lot more detail.
- To break down topics I didn't understand.
- Explain/help understand homework problems and class concepts.
- -Help me understand some questions that I'm really confused about.
- -Answer homework questions
- -To answer questions that I don't know.
- Clarification on how to do some problems.
- Best ways to approach assignments.
- Check my work.
- Help on hw.
- Help with projects.
- Make study guides
- Assignments that I didn't have time for.
- Anything that I don't understand.

Other uses:

- Entertainment
- Personal daily use
- Cooking
- Shopping
- Brains training
- Making lists
- Set timers or check the weather
- Everything

The main benefits, as indicated by students, AI tools provided deeper understanding of the class concepts and supported the instructor's instruction and demonstrated concepts in a different way. Also, they used to get faster answers and as a checker for their answers. The following table (see Table 7) provides a sample of students' responses.

Regarding the disadvantages of using AI tools in the class, students' responses were categorized into six categories as follows: Dependency & Laziness, Less Engagement, Distraction, Accuracy, Less Critical Thinking and Other. The following table (see Table 8) provides a sample of students' responses.

Table 7. Benefits of Using AI Tools in Class

Understanding	Supplementary Tool	Fast Responses & Checker
-provides a deeper understanding of class material.	- a work checker and a supplementary tool.	-you can ask an infinite amount of questions.
-it can speed up the learning process and help struggling students.	-You get more information	-Fast responses, can generate example problems.
-explain some points that I didn't get from professor.	-asking questions in the exact moment.	-Maybe faster/more comprehensive answers to questions.
-helps explain things when no one else at the time.	- It can help supplement learning when the professor's explanation of a concept is not sufficient or doesn't make sense.	-Help me get the point quickly.
-understanding concepts in depth and getting extra knowledge about stuff.	-It help clarify the concept that is being taught.	-It gets me fast & most the time accurate answers to questions with examples & additional research.
-understanding material that is difficult.	- it helps with finding relevant and reliable sources.	-It helps you get things done faster.
-understanding concepts.	-it allows me to check my work and understand where I went wrong or what I did right.	-get more & fast information.
-it helps me understand difficult concepts.	-fast answer checker.	-immediate responses and help.
-helps explain things in a way easy to understand. Helps improve grade, remove anxiety.	-Having an instructor at the palm of your hand is very convenient.	
Better understanding of material.		

Detailed Solutions	Clear Explanations	Other
-It gives a step by step solution to problems.	-Understanding things more clearer.	-Can simplify things and be used as a staring point.
-Break down questions step by step.	- Clear and tailored understandings.	-They open me to ideas I haven't looked at before.
- Breaking down problems to easier understanding.	-It can help you understand materials and engage in class more.	-Allows students to learn in ways that better suit their learning style.
	-providing a clear response for what I don't understand.	-More interesting

Table 8. Disadvantages of Using AI Tools in Class

Dependency & Laziness	Less critical thinking	Less Engagement
-Some may use it improperly and just get the answers.	-They discourage research and critical thinking for many.	-it lessens engagement and can become a crutch.
-it can allow a person to rely on generated responses and not let	-It takes away from our opportunities to think critically.	- It can affect creativity.
		-It takes away from student

them think for themselves.

-Relying too much on AI makes me lazy.

-sometimes people can overuse AI and become lazy.

- people rely on the tools and don't learn.

- can make people lazier if they use it to just find answers.

-It can make you lazy and unproductive and reliant.

-It can lead to becoming lazy or reliant on the tool and not understanding concepts without it.

-prevents students from trying.

-It can make us more dependent on it.

-it makes people less useful.

-it decreases critical thinking.

-Just ask AI directly, not even thinking about the answer myself.

-It makes you too dependent on AI to the point it hinders your ability to learn & think critically.

-If you're doing homework only with AI-you'll not develop yourself and you'll not study new things.

-passive learning.

-it promotes passing, not learning.

-it prevents students to use their own thought process.

-you think less on your own.

-It does not encourage critical thinking.

participation and engagement with the instructor.

- you are not learning.

-misuse and abuse when you should be learning.

-Less social engagement.

-lowers the motivation to ask for outside help

Distraction

-people get distracted.

- Relying on it too much & not paying attention in class.

-Discourage to learn material because easily replaced.

-Takes attention away from the professor.

Accuracy

-Can sometimes be inaccurate which if you are using it to study it can confuse you.

-It is not always right.

-It's not accurate.

-It can give you the wrong answer because it is a computer you have more confidence in it.

-AI may be wrong at times or misunderstand your questions, leading to wrong answers and faulty explanations.

-It can be inaccurate.

Other

-it makes it so easy to just get an answer and move on without getting any learning out of assignments.

- You lose learning skills.

--cheating

-They are widely unaccepted, so it feels like cheating.

-it discredits honesty.

-Easily to lie on work.

-easy cheating.

Conclusion

As the use of AI technology has spread across educational spaces, the goal of using AI tools in the classroom is to enhance students' understanding and increase students' engagement and interaction in classroom discussions. This study examined students' attitudes and perceptions of the effect of using AI tools on their learning and their interaction with their instructors and classmates. We specifically investigated students' attitude toward using AI

tools in the class and its effect on their learning and their classroom interaction. Participants completed a survey instrument that contains a mix of Likert score questions and free response questions. with those shifts.

The results of the study indicated that students had a positive attitude toward the use of AI tools in the class. They believed it had a positive effect on their college learning experience and improved their learning. However, students' responses indicated that the use of AI tools didn't increase their interaction with their instructor and classmates. Students listed understanding the class concepts as a main benefit to using AI tools. They also mentioned becoming lazy and dependent on these tools as one of the main disadvantages of using these tools. The researchers call for further studies that investigate the correlation between socioeconomical differences and students' attitudes toward the use of AI tools. In addition, studying the effect of implementing AI tools as a major part of the class curriculum on improving student success rate and conceptual understanding.

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