Research Article

The use of ChatGPT in addressing Algebra anxiety and promoting confidence

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ARTICLE INFO	ABSTRACT
	ChatGPT was a learning revolution known as an online program for learning Algebra; it changed what we knew about the teaching medium and molded the learning platform into a more engaging way of teaching. This research determines the use of ChatGPT in addressing math anxiety and promoting the confidence of college students enrolled in algebra at a Philippine state university. Using a purposive sampling technique the descriptive correlational method was utilized by employing a three-part questionnaire to 320 selected students using purposive sampling. The gathered quantitative data were treated using frequency, mean, standard deviation, and Chi-square test of independence. The study revealed that most respondents are enrolled in the College of Arts and Sciences, aged 22 to 23, female, and full-time first-year students who agreed that ChatGPT addressed Algebra anxiety and promoted Algebra confidence, resulting in a very good score on the Algebra performance test. Also, it reveals that students' Algebra performance is significantly related to the college to which they belong and the respondents' ages. Furthermore, the study shows that the students' Algebra performance correlates with using ChatGPT to promote Algebra confidence. Using ChatGPT in algebra instruction has shown promising results in raising student confidence, and it suggests including ChatGPT in algebra instructional materials. The researcher suggests integrating ChatGPT into the algebra course materials to promote more diverse and practical learning settings. **Keywords:** teaching mathematics, ChatGPT, Algebra anxiety, Algebra confidence

INTRODUCTION

Artificial intelligence (AI), especially ChatGPT, is quickly changing mathematics education. It is the power of personalized learning environments. ChatGPT can customize explanations and practice questions for each student's level, needs, and pace according to different learning styles to help students understand and retain mathematical concepts more effectively. Additionally, being so accessible reduces financial and geographic barriers to quality education in the Philippines.

With Algebra help, college students can receive the academic aid required regardless of their location, allowing students with everyday technology challenges to build inclusivity and inequality. ChatGPT supports mastery learning through formative assessment, detecting where students struggle, and providing personalized interventions. Thus, providing these dynamic interactions with the computer makes the learning processes vivid, engaging, and funny, enhancing motivation and helping students quickly learn Algebra. However, issues like data privacy, algorithmic biases, and the digital gap must be resolved to guarantee fair access and the moral use of AI in mathematics education. AI, especially ChatGPT, can drastically change mathematics education and enable Algebra students to attain unprecedented comprehension and success if implemented and supervised carefully.

Algebra students in college in the Philippines face several issues that make it difficult for them to perform well in school. One perennial problem with earlier educational level shortcomings is that new entrants sometimes need to return to more basic mathematics skills. This knowledge gap makes mathematical concepts challenging, slowing progress and breeding frustration. Also, the issue is made worse by crammed classrooms and insufficient instructional resources, which reduce the availability of tailored help and personalized learning opportunities. Socioeconomic issues sometimes require students enrolled in a state university to balance financial capability and school, which reduces their capacity to commit enough time to learning mathematics.

Despite the technical issues that may be encountered, ChatGPT stands out as an essential tool in learning Algebra. Being a customizable feature, it can meet every learner's preferred learning pace and style. To foster inclusiveness, students who do not have much technology employment can still use ChatGPT in offline and low bandwidth modes. Moreover, as it is always accessible, the learning can be done anytime and anywhere, even with a busy schedule or intermittent internet access. With ChatGPT's concept explanations, practice questions, and immediate feedback regarding performance, students can learn Algebra through ChatGPT using the self-directed learning approach. Even in high-stakes scenarios, a conversation about why ChatGPT is beneficial for algebraic studies can bridge the

learning gaps and help ameliorate the learning output if only the technical issues are resolved first. This research evaluated the benefit of ChatGPT in alleviating Algebra anxiety and encouraging students taking College Algebra to develop a positive attitude toward learning the course. Also, it aims to test the significance of the relationships between the students' anxiety in Algebra and their confidence in understanding the subject using ChatGPT.

FRAMEWORK

This study is anchored on Sweller's (1988) Cognitive Load Theory (CLT), Bandura's (1977) Social Learning Theory (SLT), Bandura's Self-Efficacy Theory (SET) (1986), and Vygotsky's Zone of Proximal Development (ZPD) (1978).

According to Sweller (1988), CLT proposes that cognitive load, or the information that must be remembered in the short term, should be managed in such a way that it does not exceed the scope of functioning capacity of working memory in humans at a specific time interval (Daniel, 2023; Glover, 2023). This is where ChatGPT can facilitate cognitive overload as it offers clarifications in a sequential format and breaks down complex concepts, reducing anxiety-inducing overload (Azaria et al., 2023; Javaid et al., 2023).

CLT (Sweller, 1988) highlights the importance of optimizing cognitive resources to enhance learning through intrinsic, extraneous, and germane cognitive loads. Anxiety about learning algebra creates a complex intrinsic load, made worse by inefficient teaching (Bertoglio, 2024; Leonard, 2023)-a double whammy of extraneous loads for college students struggling with algebra. The complexity of numerous problems coupled with the lack of support from teachers leads to various obstacles which can be resolved by utilizing ChatGPT as an intelligent tutor because it can break down complex problems and provide step-by-step solutions to students according to their understanding level (Azaria et al., 2024; Ghomrani Kawther, 2024; Sridhar, 2024).

Conversational, low-stakes exchanges with ChatGPT alleviate the stress of a classical problem-solving scenario, reducing the extraneous load (Hmoud et al., 2024). It can support learning through problem decomposition, echoing germane load principles to help build schemas. Furthermore, the immediate feedback and personalized explanations allow students to tackle misunderstandings and gain confidence bit by bit. Consider how the interactive environment promotes participation, stimulating mastery-oriented learning behaviors that may ameliorate cognitive and emotional obstacles to Algebra success (Essel et al., 2024; Hattie, 2024).

Bandura (1977) formulated the Social Learning Theory (SLT) based on the principle that there exists learning by imitation of a particular behavioral pattern through social observation (Khushk et al., 2023). This suggests that learning involves environmental contact, leading to a relatively enduring alteration in knowledge and behavior, which benefits humans (Etcuban et al., 2019; Latif et al., 2023; Qureshi et al., 2023). Bandura's SLT points out that students, through participation, learn from each other and from the social context in which the learning occurs (Rumjaun & Narod, 2020). In situations where they are exposed to reinforcing or rewarding situations, they learn by observing, understanding, and copying other people's actions (Abdullah et al., 2020). It can be placed under SLT that people operate through wise engagement in other people's actions and their outcomes (Badghish et al., 2024; Bandhu et al., 2024). The interactive dialogue created by ChatGPT helps the learner explore strategies for solving problems through imitation, promoting positive image, and reducing anxiety (Hawanti & Zubaydulloevna, 2023; Yee et al., 2023).

Self-efficacy entails the belief that an individual can strategize and successfully implement everything needed for success within the specified domain (Peteros et al., 2019). It is satisfying to report that self-efficacy has been considered a significant factor in motivation and learning of various behaviors in other studies. In this view, it seems to be something like self-confidence relative to a particular task (Arcallana et al., 2018; Wang & Chuang, 2024; Weinhandl et al., 2024). ChatGPT can enhance students' belief in their ability to learn Algebra by offering immediate feedback and tailored support, empowering them to tackle challenging problems and alleviate math anxiety (Matzakos et al., 2023; Wardat et al., 2023).

According to Vygotsky's theory of ZPD (1978), a gap exists between what a student is capable of and what that student could achieve if paired with a competent partner and adequately supported. Pals et al. (2024) explain that it is about students being able to reach a level of development that they are currently unable to get but, with some assistance, can. ZPD refers to the graduated bands of tasks an individual fails to perform single-handedly and can accomplish with some support. Education is most successful in this realm since the task exceeds the capabilities of the individual. Sufficient effort should be made in the operations as students should be given tasks out of their scope. Therefore, out-of-reach tasks cause maximum cognitive development to take place. ChatGPT works inside the students' ZPD by extending their abilities and providing them with the assistance they currently do not have, which allows for the learning process to occur gradually and lessens any feeling of shame the student may have (Simms, 2024).

The ZPD refers to the range of tasks guided by someone with expertise that a learner can achieve but cannot do without help (Vygotsky, 1988). Students at the college level dealing with algebra anxieties can use ChatGPT as an active MKO that delivers ZPD suitable for their needs (Li & Zaki, 2024). By offering explanations step by step and hints (target hints), ChatGPT closed the gap between the student's ability to solve an Algebraic concept and what the student potentially can achieve (Choustoulakis, 2024). This navigational advice encourages students to make their way into problems they might otherwise find too intimidating, building incremental improvements in understanding without causing extreme frustration. The interactive nature of ChatGPT enables students to ask questions, seek clarification, and review alternative problem-solving techniques, facilitating cognitive development (Khurma et al., 2024; Tabib & Alrabeei, 2024). Also, support fades as skills and confidence increase, leading to independent mastery. ChatGPT thus simultaneously alleviates Algebra anxiety using ZPD principles while nurturing a more profound and lasting problem-solving knowledge and self-confidence in math (Lee et al., 2024; Upadhyay et al., 2024).

In the past few years, the emergence of more sophisticated AI systems has changed the landscape of many domains, including education. One such system is ChatGPT – a state-of-the-art large-scale language model built by OpenAI. Some of this technology's possibilities include automated feedback, increased accessibility, active engagement, assessment, and alternative ways of understanding complex ideas. At the same time, ChatGPT has its drawbacks in terms of usage, including using AI-generated text for learning purposes,

loss of analytical skills of users, and problems over content produced using ChatGPT tools (Rahman & Watanobe, 2023). Rane (2023) examines the problem of incorporating chatbots into teaching and learning processes, including the case of ChatGPT, the study's focus area. Care should be taken when integrating chatbot technology into the educational sector. Remoto's (2023) findings supported the potential of using AI chat models, like ChatGPT and Bard, to describe, show, and resolve conversation prompts. It was remarkable that these AI models could comprehend written symbols about integration, derivatives, limits, fractions, exponentials, and intervals.

In some cases, AI models would execute an erratic response or use a wrong approach to solve the problem, and even so, they can provide an accurate answer after the second request to the chat. However, these results have a revolutionary pedagogical impact because such easy-to-use AI models may enable students to grasp basic mathematics concepts quickly. The pilot study established the effectiveness of AI models in mathematics instruction while underscoring the need to support learners and evaluate their learning outcomes.

It was impressive to think of how far it could take student performance and classroom experiences with the integration of these models. AI is the tool that opens your mind and develops your ideas. The AI models can also brainstorm ideas and delve into intricate topics among students. Things can also be considered from a multilemma perspective. There is also a reduction of academic anxiety in self-regulated learning that uses artificial intelligence models, Toribio's (2023) research suggested. AI-guided personalized learning will put students in charge of their knowledge, developing a sense of self-efficacy and growth mindset. AI helps students stay on task and eliminates stress from academic expectations through detailed explanations and step-by-step coaching. In turn, AI intelligently employed will revolutionize the whole education process to bring forth well-rounded, capable, confident students for whatever challenges the future has.

A new AI Chatbot, ChatGPT, is taking the world by storm in many human-led fields where human interaction is possible. The Chatbot is likely to influence education. Sharma and Yadav's study (2022) postulates that although ChatGPT is in the formative stages of its development, it can be used as a tool for teaching and learning. At the same time, teachers and students must learn how to use this technology responsibly.

This study has explored students' attitudes to using ChatGPT as a learning tool. The results of Ajlouni et al. (2023) provide an overall positive attitude toward using ChatGPT as a learning tool. The study also confirms that how students perceive ChatGPT as a learning aid is practical and based on sound behavioral and cognitive foundations.

ChatGPT has raised several concerns and enthusiasm regarding the adoption of language models by students in higher education. Only some empirical studies have examined the intention to use ChatGPT among students in the UK and Nepal, two higher education settings. Budhathoki et al. (2024) report that social influence, performance expectation, and effort expectancy significantly influenced both countries' intention to adopt ChatGPT.

Patero's (2023) study looks at how ChatGPT can support individual learning, problem-solving in an interactive environment, and dynamism in engagements toward improved achievement in mathematics. Through simulation results based on qualitative insights, which highlighted this tool's function for promoting collaborative learning settings, favorable results toward a change of attitude, increase in self-efficacy, and students' learning outcomes came into view. This paper focused on the use of AI in making math instruction change for the transformation and empowerment of students to face the challenge that the changing world has been presenting as education advanced in its evolution. Téllez et al. (2024) investigated feedback given by teachers and ChatGPT in students' solutions. They analyzed the results to outline potentialities and challenges for improving feedback about math problems and adapting the students' learning strategies.

As Trubić and Črnjarić (2024) mentioned, today's trends have significant influences on the new generations of students: their lack of concentration in class, lack of interest in the course content, and lack of patience in solving the assigned tasks make students seek the support and rely on that kind of tool. One cannot stop or ban the progress of technology and AI's use. The stakeholders in the learning process must all adjust to its use effectively and efficiently. This is the study done by Zafrullah et al. (2023), where the interest in learning mathematics students was analyzed after using ChatGPT. The study shows that their interest in learning mathematics through ChatGPT is excellent; this can, therefore, make it possible for ChatGPT to be used as a motivation factor in learning. ChatGPT comes with high-level benefits regarding accessing information or assisting in learning, but it can make the student dependent on the technology more than at any other time, overlooking the vital role teachers can play in the learning process.

This is again supported by the study of Asare et al. (2023), which recommended integrating ChatGPT into mathematics education, with the caveat that dependence on AI should complement rather than replace traditional modes of learning. This paper adds to the body of literature the importance of students' nuanced interest in using technology-enhanced learning tools to succeed in mathematics. The study of Shirawia et al. (2023), teacher logical-mathematical intelligence challenge rests in taking a traditional approach to teaching mathematics, resulting in poor student performance. Academic achievements in mathematics were found to have a significant effect when considering the logical-mathematical intelligence of female students.

AlAli and Wardat (2024) identified the potential benefits and challenges of implementing generative AI in educational systems. It discusses how Generative AI holds the promise of enriching learning experiences in new and profound ways, personalizing education to the needs of individual learners, and more. However, it also must face challenges such as ethical issues, data privacy protection, algorithmic bias, and transformation of the role of teachers. Education tools can make a positive difference for educators; however, this study shows that training teachers on using them effectively and providing professional development opportunities is critical. So, here are some of the ethical, social, and pedagogical implications of generative AI and how we integrate it into our educational practices.

A study conducted by Alneyadi and Wardat (2024) demonstrated higher levels of engagement, understanding, problem-solving abilities, and perceived relevance among the experimental group. The need for more excellent explication and visual aids creates challenges. This research highlights how ChatGPT could improve and incorporate learning activities into curricula.

Progress from AI-based learning software, such as Khan Academy, Photomath, and aleks.com, has been greatly supported by overcoming such algebra anxiety through pre-structured lesson plans and procedural steps in finding problem solutions and system-seeking (Alomair, 2024; Holman, 2024). Tools like these clarify procedural knowledge and promote basic problem-solving skills. However, they cannot tackle students' emotional impediments or offer personalized, conversational support (Belaid & Mata, 2024; Omene et al., 2024; Singh et al., 2025).

ChatGPT provides a different experience, merging educational assistance with real-life conversational interaction. Unlike Photomath, which offers a solution to a specific problem, ChatGPT, when harnessed correctly, enables scaffolding, guiding students to discover problem-solving pathways, understanding concepts through flexible, variable explanations, and refining its approaches to students' individual needs through feedback. Having the freedom and flexibility to explore the depth of their misunderstanding confidently helps students grow at their own pace without fearing being judged (Opesemowo, 2025; Trpin, 2024).

In contrast to ALEKS, the widely used, adaptive assessment platform that drives individualized math instruction, the communication style of ChatGPT is dialogue-based, making it a perfect companion for students who experience math anxiety as they respond well to reassurance and encouragement. Moreover, ChatGPT can provide more engaging and real training examples that students can relate to and, in that manner, reduce their fear of algebra (Ojanperä, 2024; Peng et al., 2024). A traditional learning platform can improve math skills through structure, practice, and repetition. On the other hand, ChatGPT's conversational ability, as well as its capacity to tailor to individual learning styles, may level up a student's emotional or cognitive approach to algebra anxiety, especially in college students (Taylor & Marino, 2024; van Rensburg & Reedy, 2024; Yu, 2024).

The theories and associated research are crucial for understanding cognitive theories, such as knowing the psychological processes of anxiety, which influence how ChatGPT has been engineered to respond- the aim is to give personalized responses. The integration of ChatGPT into the instructions of Algebra is informed by theories of education, which ensures congruence with the needs of the students and pedagogical intentions. Based on the researcher's observations about problems encountered by students in learning mathematics, they opted to use ChatGPT to assist them in studying mathematics and, therefore, lessen their anxiety.

METHODOLOGY

This section presents the research design, environment, respondents, instrument, data analysis, privacy, and ethical considerations.

Design

This study employed the descriptive-correlational method to gather data using ChatGPT to address math anxiety and promote Algebra confidence. Furthermore, it aims to establish the relationship between the variables (profiles, math anxiety, and algebra performance).

Respondents

The study was conducted at the main campus of a premier technological university in Cebu City, Philippines. The state university has 26 campuses across the Cebu province and specializes in technology, education, engineering, and agriculture. It has been awarded the top university for national and international accredited programs in the Philippines. The researcher chose the study samples in a university setting. The target respondents were the college freshmen enrolled in College and Advanced Algebra during the school year 2023-2024. The researcher employed the probability sampling technique to identify the 320 respondents using purposive sampling.

Table 1 shows that most respondents are enrolled in the College of Arts and Sciences, with 67 respondents (20.94%) aged 22 to 23 years old (169, 52.81%), female (162, 50.63%), and full-time students (301, 94.06%). According to the research, first-year students between the ages of 22 and 23, especially women, have distinct possibilities and problems in their social and academic settings. They are marginally older than most first-year students, which might make you feel alone among your younger classmates. However, their maturity and life experience might work in their favor, making it easier for them to focus and withstand the demands of school.

Table 1. Profile of the respondents

Profiles	Frequency	Percentage
A. College		
Arts and Sciences	67	20.94
Engineering	58	18.13
Education	52	16.25
Information and Communication Technology	49	15.31
Technology	47	14.69
Management and Entrepreneurship	47	14.69
B. Age [in years old]		
18 – 19	110	34.38
20 – 21	41	12.81
22 – 23	169	52.81
Mean: 20.84		
StDev: 1.74		
C. Gender		
Female	162	50.63
Male	158	49.38

Table 1 (Continued). Profile of the respondents

Profiles	Frequency	Percentage
D. Type of Student		
Full-time	301	94.06
Part-time	19	5.94

Instrument

This study utilized a three-part questionnaire. The first part gathers the demographic profile of the respondents. The second part is a 30-item researcher-made questionnaire using ChatGPT to address Algebra anxiety and promote Algebra confidence. The third part is a 25-item multiple choice researcher-made Algebra test.

Part 1 of the questionnaire gathers the respondents' profiles, including the college they belong to, age, gender, and the type of students. In this section, the students were advised to write their information in the space provided. Part 2 gathers the students' perceptions of the use of ChatGPT and is categorized into two sections: 15 items on the use of ChatGPT in addressing Algebra anxiety and 15 items on the use of ChatGPT in promoting Algebra confidence.

This 30-item questionnaire was validated and pilot-tested on 15 first-year college students from another university campus, resulting in a Cronbach alpha of 0.86 (Reliable). In these sections, the respondents are advised to rate the items using the 4-Likert scale: 4 points for Strongly Agree, 3 points for Agree, 2 points for Disagree, and 1 point for Strongly Disagree. Part 3 of the questionnaire is a 25-item researcher-made multiple-choice Algebra test. It underwent content validity and pilot-testing activity, resulting in a Cronbach alpha of 0.95 (highly reliable). In this part, the researcher advised the respondents to answer by encircling the letters of the correct answers.

Data Analysis

The researcher used frequency, simple percentage, mean, and standard deviation to treat the gathered demographic profiles. Weighted mean and standard deviation were used to measure the respondents' perceptions of using ChatGPT. The Chi-square test of independence was used to treat the significant relationships between the two variables.

RESULTS

In this section, the researcher presented the study's findings through tables of the variables considered in this study.

The Use of ChatGPT

The data presented in **Table 2** indicates that the statement "Using ChatGPT makes it easier for me to tackle new algebraic concepts" received the highest mean score of 3.54 (Strongly agree) with a standard deviation of 0.51. On the other hand, the statement "It is more fun to practice mathematics using ChatGPT" received the lowest mean score of 2.50 (Agree) with a standard deviation of 0.50.

Table 2. The use of ChatGPT in addressing Algebra anxiety

#	Indicators	Mean	StDev	Interpretation
1.	Using ChatGPT makes it easier for me to tackle new algebraic concepts.	3.54	0.51	Strongly agree
2.	Algebra difficulties are easier for me to grasp because of ChatGPT's concise explanations.	3.47	0.51	Strongly agree
3.	I can monitor my development and identify my algebraic strengths and weaknesses with the aid of ChatGPT.	3.46	0.52	Strongly agree
4.	I feel less stressed on Algebra exams when using ChatGPT for preparation.	3.44	0.50	Strongly agree
5.	Using ChatGPT has positively impacted my overall attitude towards Algebra.	3.43	0.50	Strongly agree
6.	Using ChatGPT reduces my anxiety towards Algebra tasks.	3.40	0.50	Strongly agree
7.	ChatGPT has been a valuable tool in managing my Algebra anxiety.	3.38	0.64	Strongly agree
8.	My algebraic problems are successfully answered via ChatGPT.	3.34	0.65	Strongly agree
9.	ChatGPT helps me stay calm when working on Algebra problems.	3.33	0.58	Strongly agree
10.	ChatGPT clarifies my doubts and questions in Algebra effectively.	3.32	0.62	Strongly agree
11.	I can break down complex algebraic problems into small steps with the help of ChatGPT.	3.29	0.64	Strongly agree
12.	My ability to solve algebraic problems has improved thanks to ChatGPT.	3.18	0.68	Agree
13.	ChatGPT makes Algebra more accessible and less intimidating.	2.50	0.50	Agree
14.	ChatGPT offers helpful assistance for my algebraic study.	2.50	0.50	Agree
15.	It is more fun to practice mathematics using ChatGPT.	2.50	0.50	Agree
	Aggregate:	**3.21**	**0.56**	**Agree**

Table 3 shows that the indicator "I find it easier to approach new Algebra topics with the help of ChatGPT" got the highest mean of 3.52 (Strongly agree) with a standard deviation of 0.55. Also, it shows that the indicator "Using ChatGPT, I have become more proficient at handling algebraic issues independently" got the lowest mean of 2.51 (Agree) with a standard deviation of 0.53. This might indicate that the introduction of ChatGPT into algebra education has significantly altered first-year students' attitudes about learning new ideas.

Table 3. The use of ChatGPT in promoting Algebra confidence

#	Indicators	Mean	StDev	Interpretation
1.	I find it easier to approach new Algebra topics with the help of ChatGPT.	3.52	0.55	Strongly agree
2.	ChatGPT provides clear explanations that help me understand Algebra problems.	3.49	0.56	Strongly agree
3.	Using ChatGPT has made me more independent in solving Algebra problems.	3.43	0.54	Strongly agree
4.	When I use ChatGPT, my motivation to study mathematics increases.	3.39	0.64	Strongly agree
5.	I am more motivated to study Algebra when using ChatGPT.	3.36	0.62	Strongly agree
6.	ChatGPT assists me in breaking down complex Algebra problems into manageable steps.	3.21	0.72	Agree
7.	I feel more confident when solving algebraic problems because of ChatGPT.	3.17	0.71	Agree
8.	ChatGPT helps me track my progress and understand my strengths and weaknesses in Algebra.	3.16	0.64	Agree
9.	My attitude toward mathematics has improved overall due to using ChatGPT.	3.09	0.68	Agree
10.	ChatGPT helps me better understand complex Algebra concepts.	2.97	0.73	Agree
11.	Using ChatGPT makes Algebra practice more enjoyable.	2.91	0.68	Agree
12.	I find that ChatGPT keeps me composed when doing algebraic issues.	2.80	0.73	Agree
13.	ChatGPT helps me develop problem-solving strategies in Algebra.	2.74	0.66	Agree
14.	ChatGPT provides adequate support for my learning in Algebra.	2.61	0.60	Agree
15.	Using ChatGPT, I have become more proficient at handling algebraic issues independently.	2.51	0.53	Agree
	Aggregate:	**3.21**	**0.56**	**Agree**

There were cases where the integration of ChatGPT in learning environments helped students understand the learning of algebraic concepts more precisely. This is to say that students are anxious about approaching new material in Algebra simply because the subject matter is abstract and challenging. Nevertheless, this could make learning even more accessible, interactive, and adaptive with ChatGPT. It provides speedy, customized explanations and breaks down complicated algebraic problems into smaller segments, thus making the concept more comprehensible.

Moreover, the technology gives step-by-step feedback, allowing students to enhance insight and eradicate mistakes quickly. For example, Dempere et al. claim that, based on the evidence provided in the study results, users of ChatGPT develop more engagement and participation in mathematics learning and, hence, suggest that AI technologies will improve mathematics learning. In various mathematical courses, including algebra, ChatGPT has been shown to produce learning gains comparable to those achieved with human instructors, demonstrating its effectiveness in promoting comprehension (Egara & Mosimege, 2024). Most significantly, the potential of the program ChatGPT in transforming and rewording issues related to other academic domains enhances accessibility and develops a more profound interest among students in accessing some of the highly abstruse concepts concerning algebra. Although ChatGPT may be helpful in inspiring students to learn algebra, one needs to find out how far and effectively it would work. It heavily depends on prior knowledge of specific content and learning environment issues.

Because of its abstract nature, Algebra generally allows students to utilize new information. While it does this, the supportive interactivity with ChatGPT helps mediate such concerns. ChatGPT decomposes very challenging concepts into manageable pieces while offering speed and personalized capabilities for explanation. The said ease ensures the student goes through information at a pace that may be described as convenient, thus enabling a more precise understanding.

ChatGPT's immediate feedback promotes learning and reduces the aggravation of making mistakes. The data suggest that this technique benefits first-year students who typically face mathematics for the first time since it lessens the scary character of unknown subjects. Because they are more confident and equipped to handle challenging assignments, they perform better and have a stronger foundation in mathematics. For this reason, ChatGPT is a valuable tool in modern algebra training.

According to research by Pardos and Bhandari (2024), college students may find using ChatGPT when tackling new algebra themes helpful. The study found that learning improvements in mathematics, including algebra, from ChatGPT-generated aid were statistically significant and on par with learning gains from human tutor support. According to Serhan and Welcome (2024), ChatGPT can help students grasp complicated ideas efficiently. Additionally, students reported a better interest in and engagement with their classes and positive views about ChatGPT assisting them in learning mathematics concepts. However, this must be considered: even as ChatGPT may make learning more effective, sometimes it needs to be corrected, requiring the students to have a solid understanding to follow it correctly. Although ChatGPT has the potential to be a helpful teaching aid for algebra, its efficacy will depend on the intricacy of the subject matter and the user's past expertise (Kumar & Kats, 2023).

Respondents' Performance in Algebra

Table 4 shows that most respondents got raw scores of 16 to 20 (Very Good), with 116 respondents (36.25%), while one respondent scored 0 to 5 (Poor). These results suggest that students who studied for their math examinations using ChatGPT performed exceptionally well.

Table 4. Performance of the respondents in Algebra

Raw Scores	Category	Frequency	Percentage
21 – 25	Excellent	103	32.19
16 – 20	Very Good	116	36.25
11 – 15	Good	96	30.00
6 – 10	Fair	5	1.56
0 – 5	Poor	1	0.31
	Mean: 17.89		
	StDev: 4.07		

These novices could better understand complex subjects thanks to ChatGPT's personalized explanations and step-by-step solutions. This active learning methodology allows them to practice and receive immediate feedback on their shortcomings. Therefore, they would go for the final exams confidently and better prepared for a deeper understanding. These results indicate that ChatGPT can improve students' algebra performance by enhancing their marks with increased comprehension of concepts.

Chaudhry et al.'s study from 2023 showed that ChatGPT-generated assistance, especially in algebra, delivered learning improvements equivalent to those obtained with human tutors, indicating its efficacy in raising student performance. Personalized problem-solving exercises in algebra and interactive conversations have been stressed as ways to engage students and help them develop critical thinking abilities, which ChatGPT enables. The flipped learning methods combined with the integration of ChatGPT have exhibited marked improvements in students' learning outcomes, possibly because the interactive capabilities of this Chatbot make complex content better understood. However, accuracy and other challenges that require human intervention remain real issues. In addition, ChatGPT shows promise for improving algebra instruction; nevertheless, to fully realize these benefits and overcome its drawbacks, more study and cautious application are needed (Huesca et al., 2024; Sandu et al., 2024).

Test of Significance of the Relationship

There is a significant relationship between respondents' profiles and their use of ChatGPT to reduce their fear of Algebra and increase their confidence. **Table 5** displays the outcomes. It shows that the respondents' profiles (college they belong to, age, gender, type of student) do not significantly correlate with using ChatGPT to address their anxiety in Algebra and promote confidence in Algebra. The computed p-values are higher than the alpha value of 0.05; thus, the null hypothesis was accepted.

Table 5. Relationship between the profile of the respondents and the use of ChatGPT

The Use of ChatGPT in	Chi-Square	df	p-value	Significance	Result
A. Addressing Algebra Anxiety					
College	7.222	5	0.20	Not significant	Ho accepted
Age	4.305	2	0.12	Not significant	Ho accepted
Gender	2.126	1	0.14	Not significant	Ho accepted
Type of Student	0.631	1	0.43	Not significant	Ho accepted
B. Promoting Algebra Confidence					
College	5.492	10	0.86	Not significant	
Age	4.381	4	0.36	Not significant	Ho accepted
Gender	4.539	2	0.10	Not significant	Ho accepted
Type of Student	1.972	2	0.37	Not significant	Ho accepted

Data in **Table 5** show that the role of ChatGPT in reducing anxiety or building confidence in Algebra is little related to respondents' profiles. Whatever the differences among students, they all benefit from using ChatGPT. This points out that through the adaptive and personalized qualities of ChatGPT, students overcome their anxieties and grasp Algebra better. Regardless of the demographic profile, ChatGPT has the potential to be an inclusive instructional tool that successfully treats anxiety and fosters confidence in Algebra, as seen by the consistent beneficial impact across a varied range of profiles.

Also, it was hypothesized that the respondents' profiles do not significantly correlate with students' algebra performance. **Table 6** shows that students' Algebra performance is significantly related to the college to which they belong. The computed p-value of 0.02 is substantially less than its alpha value of 0.05, which leads to the rejection of the null hypothesis.

The data in **Table 6** show that students' college attendance and their level of algebraic skill are significantly correlated. This relationship suggests that important institutional components that affect student outcomes include curriculum quality, teaching tactics, and resource accessibility. Colleges with good algebra departments, skilled faculty, and reliable support networks tend to produce better students. Conversely, an institution that places less emphasis on these components may see a drop in the algebraic proficiency of its students. The educational setting may account for students' algebraic performance differences. Therefore, investment at an institutional level in mathematics education is needed to increase overall algebraic student achievement.

Table 6. Relationship between the profile of the respondents and the performance in Algebra

Variables	Chi-Square	df	p-value	Significance	Result
Performance in Algebra					
College	35.721	20	0.02	Significant	Ho rejected
Age	25.400	8	0.00	Significant	Ho rejected
Gender	2.556	4	0.63	Not significant	Ho accepted
Type of Student	1.870	4	0.76	Not significant	Ho accepted

The table demonstrates a substantial relationship between students' ages and algebra performance. The null hypothesis is rejected since the estimated p-value of 0.00 is smaller than the alpha value of 0.05. According to the study, younger students' less developed abstract thinking skills may make algebra more difficult. On the other hand, older students tend to do better since they have greater exposure to mathematical ideas. To ensure that children of all ages may succeed in algebra, this age-related variation suggests that customized teaching techniques may be required to accommodate varied degrees of cognitive development.

It was also hypothesized that utilizing ChatGPT strongly corresponds with students' success in algebra. **Table 7** demonstrates the relationship between using ChatGPT to boost algebra confidence and students' performance in algebra. The null hypothesis is rejected since the estimated p-value of 0.04 is smaller than its alpha value 0.05.

Table 7. Relationship between the performance of the respondents in Algebra and the use of ChatGPT

Variables	Chi-Square	df	p-value	Significance	Result
Performance in Algebra					
The Use of ChatGPT in Addressing Algebra Anxiety	4.268	4	0.37	Not significant	Ho accepted
The Use of ChatGPT in Promoting Algebra Confidence	16.349	8	0.04	Significant	Ho rejected

Following **Table 7**, one can easily find that students' achievements in algebra go directly with the help of ChatGPT in enhancing confidence in the subject. The regular users reported becoming more comfortable with algebraic issues, improving the examinations' performance. Through ChatGPT, students may resolve misunderstandings interactively and at any time, practice regularly, and approach problems constructively. This link suggests that the confidence-building exercises from ChatGPT are among the most essential methods for helping students become proficient in mathematics.

CONCLUSIONS

The study on using ChatGPT to alleviate algebra fear and build algebra confidence provides evidence that first-year college students might exhibit significantly improved engagement in algebra. Chat GPT is an artificially intelligent learning tool that makes mystifying principles in algebra much easier to understand by giving straightforward explanations and steps in which a challenge in math is solved or where one went wrong on any given problem. How will this be done? How it would be tailored and interactive also means meeting the needs of all learners.

Students who had previously struggled with mathematics or had high levels of anxiety said that their anxiety about the subject had greatly lessened after using ChatGPT. There was a direct correlation between students feeling less alone and more encouraged during their learning process and reduced anxiety and increased confidence. This positive outcome was augmented because ChatGPT could adapt to different ways and velocities of learning, allowing the students to study quickly without feeling pressured to catch up with their peers.

Implementing ChatGPT in algebra instruction has yielded positive results in increasing students' confidence in their ability to do better. The researcher suggests integrating ChatGPT into the algebra course materials as educational technology develops to promote more diverse and practical learning settings. With more research and development, ChatGPT's capabilities may be enhanced, and its effect on other areas of education may grow.

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