Reshaping Mathematics Instruction Via Impact of AI Chatbots on Secondary Education Pre-service Teachers

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Reshaping Mathematics Instruction Via Impact of AI Chatbots on Secondary Education Pre-service Teachers

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Article Info	Abstract
	This study assessed the level of impact of AI Chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education. The study employed a descriptive research design where structured survey questionnaires were used and administered to ninety (90) Secondary Education Pre-service Teachers at Bukidnon State University, Philippines. Results showed that the level of impact of the AI Chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education on the nine (9) factors is *Very High*, namely; *(1) Effectiveness* ($\bar{x} = 4.78, sd = 0.49$)*; (2) Engagement* ($\bar{x} = 4.85, sd = 0.37$)*; (3) Accessibility* ($\bar{x} = 4.73, sd = 0.50$)*; (4) Personalization* ($\bar{x} = 4.88, sd = 0.36$)*; (5) Feedback Quality* ($\bar{x} = 4.69, sd = 0.58$)*; (6) Confidence Building* ($\bar{x} = 4.82, sd = 0.45$)*; (7) Time Efficiency* ($\bar{x} = 4.72, sd = 0.55$)*; (8) Adaptability* ($\bar{x} = 4.76, sd = 0.53$)*; and (9) Student Satisfaction* ($\bar{x} = 4.94, sd = 0.25$)*.* The findings demonstrate a positive student assessment on AI chatbots (ChatGPT, Gemini, and Perplexity) in mathematics education, consistently rated highly across various factors, indicating their significant impact on reshaping instruction, providing valuable support, enhancing learning experiences, and boosting confidence and proficiency in math, underscoring the transformative potential of AI technology and its essential integration into educational practices to address students' evolving needs in the digital age.

Introduction

Mathematics instruction has long been a focal point of educational research and innovation, with educators constantly seeking ways to enhance teaching methods and improve student learning outcomes (Luzano, 2020). In recent years, the emergence of artificial intelligence (AI) technology has offered new avenues for reshaping mathematics instruction, with AI chatbots such as ChatGPT, Gemini, and Perplexity demonstrating the potential to revolutionize the way mathematics is taught and learned (Luzano, 2024). At the international level, there exists a growing recognition of the need to leverage AI technology to address challenges in mathematics education (Qiu, Pan, & Ishak, 2022). While some developed countries have made significant strides in integrating AI chatbots into educational settings, there remains a lack of comprehensive research on their effectiveness and impact (Dempere et al., 2023). Moreover, disparities in access to technology and resources pose barriers to equitable implementation of AI-powered instruction globally (Pang-an et al., 2022).

On a national level, educational systems grapple with the dual challenge of improving mathematics proficiency among students while adapting to the digital age (Casanova et al., 2023; Aranzo et al., 2023). In many countries, including the Philippines, mathematics continues to be a subject of concern, with low proficiency levels and limited access to quality instruction hindering overall academic performance (Tortola, 2021; Romorosa et al., 2023). Integrating AI chatbots into mathematics instruction holds promise for addressing these challenges, but questions remain about their suitability for diverse educational contexts and learner demographics (Martínez-Téllez & Camacho-Zuñiga, 2023).

At the local level, schools and educational institutions face practical challenges in implementing AI chatbots effectively within existing curricular frameworks (Lo & Hew, 2023). Issues such as teacher training, infrastructure limitations, and curriculum alignment must be addressed to maximize the potential of AI-powered mathematics instruction (Luzano, 2023). Additionally, concerns about data privacy, ethics, and the role of human teachers in AI-augmented classrooms necessitate careful consideration and policy development at the local level (Niemi, 2021).In the Philippine setting, where access to quality education remains a pressing concern, the potential of AI chatbots to enhance mathematics instruction holds particular significance (Nallada et al., 2024). With a large and diverse population, including remote and underserved communities, leveraging AI technology has the potential to democratize access to high-quality mathematics education (Vandenberg et al., 2023). However, cultural and contextual factors unique to the Philippine educational landscape must be taken into account to ensure the successful integration of AI chatbots into pedagogical practices (Lo & Hew, 2023). In summary, this study seeks to address gaps and problems in mathematics instruction by examining the level of impact of AI chatbots on Secondary Education Pre-service Teachers. By exploring the potential benefits and challenges of AI-powered instruction, this research aims to inform policy and practice in education and contribute to the enhancement of mathematics learning outcomes for students worldwide.

Objectives of the Study

This study assessed the level of impact of AI Chatbots (ChatGPT, Gemini, and Perplexity) on Secondary Education Pre-service Teachers in the Mathematics Context at Bukidnon State University, Malaybalay City, Bukidnon, Philippines.

Specifically, it sought to answer the following queries:

1. What is the level of impact of AI chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education on the following factors:
    a. Effectiveness;
    b. Engagement;
    c. Accessibility;
    d. Personalization;
    e. Feedback Quality;
    f. Confidence Building;

      g.   Time Efficiency;

      h.   Adaptability;

      i.   Student Satisfaction?

2. How can Mathematics Instruction be reshaped based on the results of the impact of AI chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education?

Method

This study employed a descriptive research method to assess the level of impact of AI chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education. Descriptive research is a type of research method that focuses on describing the characteristics, behaviors, or conditions of a particular population, group, or phenomenon. It aims to provide a comprehensive and accurate portrayal of what is being studied without manipulating variables or attempting to establish cause-and-effect relationships. One of the key strengths of descriptive research is its ability to provide a snapshot of a situation or phenomenon as it naturally occurs in its real-world context. This makes it particularly useful for exploring new or relatively uncharted areas of inquiry, generating hypotheses for further investigation, and providing a foundation for more in-depth research in the future.

Descriptive research methods can take various forms, including observational studies, surveys, case studies, and archival research. Observational studies involve systematically observing and recording behaviors, events, or conditions in their natural setting without interfering with or manipulating them. Surveys, on the other hand, involve collecting data through structured questionnaires or interviews to gather information about participants' opinions, attitudes, beliefs, or experiences. Case studies focus on examining a particular individual, group, or organization in-depth to gain insights into their behavior, characteristics, or outcomes. Archival research involves analyzing existing data or records, such as historical documents, government statistics, or organizational reports, to uncover patterns or trends over time. This study was conducted at Bukidnon State University, Malaybalay City, Bukidnon, Philippines with ninety (90) Bachelor of Secondary Education Preservice Teachers who underwent Mathematics courses following the necessary data-gathering protocols.

The instrument used in the study was the 5-point Likert Scale Researcher-Made Questionnaire to assess the level of impact of AI chatbots (ChatGPT, Gemini, and Perplexity) in Mathematics Education to suit the needs of the study. This instrument was pilot-tested to 50 participants and found reliable with a Cronbach alpha of 0.955. The instrument has nine (9) factors with five (5) indicators each, namely: (1) Effectiveness; (2) Engagement; (3) Accessibility; (4) Personalization; (5) Feedback Quality; (6) Confidence Building; (7) Time Efficiency; (8) Adaptability; and (9) Student Satisfaction.Table 1 presents both the numerical and descriptive equivalent of the assessment of the participants.

Table 1. Numerical and Descriptive Equivalence of Participants' Assessment

Hypothetical Mean Range	Qualitative Description
4.21-5.00	Very High
3.40-4.20	High

2.61-3.40	Neutral	
1.81-2.60	Low	
1.00-1.80	Very Low	

The data has been treated statistically using the following processes, descriptive statistics like frequency count, mean, and standard deviation to measure central tendencies.

Results and Discussion

Level of Impact of AI Chatbots (ChatGPT, Gemini, and Perplexity) on Secondary Education Pre-service Teachers in the Context of Mathematics

Table 2. Level of Effectiveness of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
The AI chatbot effectively clarifies difficult mathematical concepts.	4.78	0.54	Very High
The AI chatbot enhances my understanding of mathematical topics.	4.67	0.67	Very High
I find the AI chatbot helpful in solving math problems.	4.89	0.32	Very High
The AI chatbot provides clear explanations that aid in my comprehension of math concepts.	4.72	0.56	Very High
Interacting with the AI chatbot improves my grasp of challenging mathematical material.	4.84	0.36	Very High
Overall Mean	**4.78**	**0.49**	**Very High**

Based on Table 2, all AI chatbots (ChatGPT, Gemini, and Perplexity) were rated very effective in aiding students' understanding of mathematical concepts. The average mean score across all indicators is 4.78, with a standard deviation of only 0.49. This low standard deviation indicates that the ratings were very consistent, with all categories scoring *Very High*. Thus, students found the AI chatbots to be very helpful in clarifying difficult concepts, enhancing their understanding of mathematical topics, and aiding them in solving math problems (Doc et al., 2023).The data in Table 3 reveals that all three AI chatbots (ChatGPT, Gemini, and Perplexity) were rated very engaging and effective in promoting students' interest in learning mathematics. This is reflected in the overall mean score of 4.85, with a standard deviation of just 0.37, indicating very consistent positive feedback across all categories. Students reported finding the chatbots engaging and interesting, stating that using them made learning math more enjoyable and motivating. The chatbots were also successful in capturing and maintaining user interest in mathematical topics, making users feel involved and focused during their learning experience (Martínez-Téllez & Camacho-Zuñiga, 2023).

Table 3. Level of Engagement of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
I find the AI chatbot engaging and interesting to use for learning mathematics.	4.97	0.47	Very High

Using the AI chatbot makes learning mathematics more enjoyable for me.	4.91	0.31	Very High
The AI chatbot motivates me to actively participate in math learning activities.	4.64	0.54	Very High
I feel involved and focused when using the AI chatbot to learn mathematics.	4.87	0.28	Very High
The AI chatbot captures and maintains my interest in mathematical topics.	4.88	0.40	Very High
Overall Mean	**4.85**	**0.37**	**Very High**

Table 4. Level of Accessibility of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
The AI chatbot is easily accessible for receiving mathematics assistance whenever I need it.	4.89	0.32	Very High
I can access the AI chatbot on multiple devices, making it convenient for me to use.	4.64	0.71	Very High
The AI chatbot is available 24/7, allowing me to seek math help at any time.	4.83	0.37	Very High
I find it easy to navigate and use the AI chatbot to get assistance with math problems.	4.72	0.50	Very High
The AI chatbot provides math support in a user-friendly and accessible manner.	4.56	0.60	Very High
Overall Mean	**4.73**	**0.50**	**Very High**

The provided data in Table 4 highlights the high accessibility of the AI chatbots (ChatGPT, Gemini, and Perplexity) for students seeking mathematics help. With an overall mean score of 4.73 and a standard deviation of 0.50, the ratings across all categories were very positive. Students reported finding the chatbots readily available whenever they needed math assistance (mean score of 4.89). The ability to access the chatbots on various devices (mean score of 4.64) and their 24/7 availability (mean score of 4.83) were also seen as significant advantages. The AI chatbot interface seems to be user-friendly and easy to navigate (mean score of 4.72), allowing users to obtain math help effortlessly. While user-friendliness received a slightly lower score compared to other categories, it still falls within the *Very High* range. The data suggests that these AI chatbots offer a very accessible and convenient way to get math support (Nam & Giang, 2023).

Table 5 showcases exceptionally high ratings for the personalization features of the AI chatbots (ChatGPT, Gemini, and Perplexity) in terms of math learning. The overall mean score sits at a very impressive 4.88, with a standard deviation of only 0.36, indicating remarkable consistency in positive student feedback. The students felt the chatbots catered explanations to their learning styles (mean score of 4.90) and grasped their specific needs (mean score of 4.76). Personalized recommendations based on proficiency levels were particularly well-received (mean score of 4.99). Overall, students reported feeling that the chatbots provided a learning experience tailored to their math journey, offering personalized support and guidance to enhance their skills (mean score of 4.81). These results suggest that the chatbots excel at personalizing the learning experience for each student (González et al., 2023).

Table 5. Level of Personalization of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
The AI chatbot tailors its explanations to match my learning style in math.	4.90	0.30	Very High
I feel that the AI chatbot understands my specific math learning needs and adapts accordingly.	4.76	0.59	Very High
The AI chatbot provides personalized recommendations and resources based on my math proficiency level.	4.99	0.11	Very High
Interacting with the AI chatbot feels tailored to my math learning journey.	4.92	0.31	Very High
I receive personalized support and guidance from the AI chatbot to improve my math skills.	4.81	0.49	Very High
Overall Mean	**4.88**	**0.36**	**Very High**

Table 6. Level of Feedback Quality of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
The feedback provided by the AI chatbot is clear and easy to understand.	4.73	0.60	Very High
I find the feedback from the AI chatbot helpful in correcting my mistakes in math.	4.63	0.71	Very High
The AI chatbot provides insightful feedback that improves my problem-solving skills in math.	4.64	0.64	Very High
I appreciate the timely feedback I receive from the AI chatbot while working on math problems.	4.78	0.44	Very High
The feedback provided by the AI chatbot helps me understand where I went wrong in solving math problems.	4.66	0.52	Very High
Overall Mean	**4.69**	**0.58**	**Very High**

The data from Table 6 indicates that students found the feedback quality of the AI chatbots (ChatGPT, Gemini, and Perplexity) to be very helpful, although it scored slightly lower than other aspects in the previous tables. The overall mean score is 4.69 with a standard deviation of 0.58, which still falls within the *Very High* range. Students reported that the feedback was clear and easy to understand (mean score of 4.73) and helped them identify their mistakes (mean score of 4.66). The feedback was also seen as valuable for improving problem-solving skills (mean score of 4.64) and was appreciated for being timely (mean score of 4.78). While the scores suggest the feedback is beneficial, the slightly higher standard deviation might indicate some students found the feedback less insightful compared to other aspects of the chatbots (Vázquez-Cano, Mengual-Andrés, & López-Meneses, 2021).

Table 7. Level of Confidence Building of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
Interacting with the AI chatbot has increased my confidence in tackling	4.88	0.39	Very High

challenging math problems.			
The AI chatbot provides encouragement and support that boosts my confidence in math.	4.71	0.64	Very High
Using the AI chatbot has helped me overcome my fear of making mistakes in math.	4.90	0.30	Very High
I feel more self-assured in my math abilities after interacting with the AI chatbot.	4.84	0.39	Very High
The AI chatbot empowers me to approach math problems with greater confidence and determination.	4.77	0.52	Very High
Overall Mean	**4.82**	**0.45**	**Very High**

Table 7 showcases a significant positive impact of the AI chatbots (ChatGPT, Gemini, and Perplexity) on students' math confidence. The overall mean score is *Very High* at 4.82, with a standard deviation of only 0.45, indicating consistent positive feedback. Students reported a significant confidence boost in tackling challenging math problems (mean score of 4.88) and felt the chatbots provided encouragement and support that increased their overall math confidence (mean score of 4.71). Even more impressive is the data showing the chatbots helped students overcome their fear of making mistakes (mean score of 4.90), fostering a more positive learning environment. Overall, students felt more self-assured in their math abilities (mean score of 4.84) and empowered to approach problems with greater confidence and determination (mean score of 4.77). These results highlight the potential of AI chatbots to not only improve math skills but also address anxieties often associated with the subject (Dempere et al., 2023).

Table 8. Level of Time Efficiency of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
Using the AI chatbot helps me solve math problems more quickly compared to traditional methods.	4.88	0.36	Very High
The AI chatbot efficiently guides me through math concepts, saving me time in my learning process.	4.54	0.84	Very High
I find that using the AI chatbot allows me to spend less time on math homework or assignments.	4.71	0.62	Very High
The AI chatbot helps me make efficient use of my study time when working on math problems.	4.81	0.39	Very High
Interacting with the AI chatbot saves me time in understanding and mastering math concepts.	4.63	0.53	Very High
Overall Mean	**4.72**	**0.55**	**Very High**

The data in Table 8 reveals that users perceived the AI chatbots (ChatGPT, Gemini, and Perplexity) to be very time-efficient tools for learning mathematics. The overall mean score is 4.72 with a standard deviation of 0.55, which falls within the *Very High* range. Students reported that the chatbots helped them solve problems faster compared to traditional methods (mean score of 4.88) and efficiently guided them through concepts, saving them

study time (mean score of 4.54). While scores for all categories were positive, spending less time on homework or assignments received a slightly lower score (mean score of 4.71) compared to other aspects. This could indicate that some users might find the chatbots more helpful for understanding concepts rather than solely completing assignments. Overall, the data suggests that chatbots are valuable tools for users to make efficient use of their study time and improve their understanding of math concepts promptly (Cai et al., 2021).

Table 9. Level of Adaptability of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
The AI chatbot effectively adjusts its teaching approach based on my progress in learning math.	4.83	0.43	Very High
I feel that the AI chatbot responds well to my feedback and adapts its explanations accordingly.	4.90	0.30	Very High
The AI chatbot offers alternative explanations or strategies when I encounter difficulties in understanding math concepts.	4.70	0.64	Very High
I noticed that the AI chatbot adjusts the difficulty level of math problems based on my proficiency and comfort level.	4.73	0.58	Very High
Using the AI chatbot feels customized to my learning pace and preferences in math.	4.61	0.70	Very High
Overall Mean	**4.76**	**0.53**	**Very High**

The data presented in Table 9 highlights the adaptability of the AI chatbots (ChatGPT, Gemini, and Perplexity) in tailoring the learning experience of students. With an overall mean score of 4.76 and a standard deviation of 0.53, the feedback across all categories leans heavily towards *Very High*. Students felt the chatbots effectively adjusted their teaching approach based on their progress (mean score of 4.83). Notably, students reported that the chatbots were responsive to their feedback and adapted explanations accordingly (mean score of 4.90). This adaptability extends to offering alternative explanations for challenging concepts (mean score of 4.70) and adjusting the difficulty level of problems to match the student's proficiency (mean score of 4.73). While user customization received a slightly lower score (mean score of 4.61) compared to other areas, it still falls within the *Very High* range. Overall, the data suggests that these AI chatbots excel at creating a personalized learning experience that adapts to each student's pace and learning style (Mageira et al., 2022).

Table 10. Level of Student Satisfaction with AI Chatbots (ChatGPT, Gemini, & Perplexity)

Indicators	Mean	SD	Qualitative Description
I am satisfied with the support and assistance provided by the AI chatbot in learning math.	5.00	0.00	Very High
I find the AI chatbot to be a valuable tool for my math education.	4.91	0.29	Very High
I would recommend the AI chatbot to other students for learning math.	4.97	0.23	Very High
Interacting with the AI chatbot enhances my overall experience of learning	4.92	0.34	Very High

math.

I feel that the AI chatbot contributes positively to my success and confidence in math education.	4.90	0.37	Very High
Overall Mean	**4.94**	**0.25**	**Very High**

The data from Table 10 paints a very positive picture of student satisfaction with the AI chatbots (ChatGPT, Gemini, and Perplexity) as math learning tools. Every single indicator across the board received a perfect mean score of 5.00, with a standard deviation of just 0.00, indicating unanimous agreement on these aspects. Students expressed high satisfaction with the support and assistance provided by the chatbots (mean score of 5.00). They found them to be valuable tools for their math education (mean score of 4.91) and would readily recommend them to other students (mean score of 4.97). The chatbots were seen as enhancing the overall learning experience (mean score of 4.92) and contributing positively to both student success and confidence in math (mean score of 4.90). Overall, these results suggest an exceptionally high level of satisfaction among students who used the AI chatbots for math learning (Luzano & Ubalde, 2023).

Table 11. Summary Table on the Level of Impact of AI Chatbots (ChatGPT, Gemini, & Perplexity)

Factors	Mean	SD	Qualitative Description
Effectiveness	4.78	0.49	Very High
Engagement	4.85	0.37	Very High
Accessibility	4.73	0.50	Very High
Personalization	4.88	0.36	Very High
Feedback Quality	4.69	0.58	Very High
Confidence Building	4.82	0.45	Very High
Time Efficiency	4.72	0.55	Very High
Adaptability	4.76	0.53	Very High
Student Satisfaction	4.94	0.25	Very High
Overall Mean	**4.80**	**0.45**	**Very High**

The provided data across all nine (9) tables suggests that AI chatbots (ChatGPT, Gemini, and Perplexity) have a very positive impact on math learning. The overall mean score across all factors sits at an impressive 4.80, with a standard deviation of only 0.45, indicating a high level of consistency on the nine factors. Looking deeper, students reported that the chatbots were very effective in clarifying concepts (mean score of 4.78), engaging and interesting to use (mean score of 4.85), and readily accessible for obtaining math help whenever needed (mean score of 4.73). The personalization features were particularly well-received, with users feeling the chatbots catered explanations and recommendations to their individual learning styles and proficiency levels (mean score of 4.88). While feedback quality received a slightly lower score (mean score of 4.69) compared to other aspects, it was still considered *Very High*. Notably, the chatbots were seen to have a significant impact on building user confidence in tackling math problems (mean score of 4.82) and making them feel more self-assured in their math abilities.

Student satisfaction with the chatbots was exceptionally high, with a mean score of 4.94 across all factors. This

suggests that students found the chatbots to be valuable tools that enhanced their overall math learning experience (Nallada et al., 2023). The data supports the claim that AI chatbots can be a very effective and beneficial tool for students looking to improve their understanding and confidence in mathematics (Martínez-Téllez & Camacho-Zuñiga, 2023).

Reshaping Mathematics Instruction via Personalized Adaptive Learning with AI Chatbots (PAL-AI) Framework as Offshoot of the Significant Impact of AI Chatbots (ChatGPT, Gemini, and Perplexity) on Secondary Education Pre-service Teachers
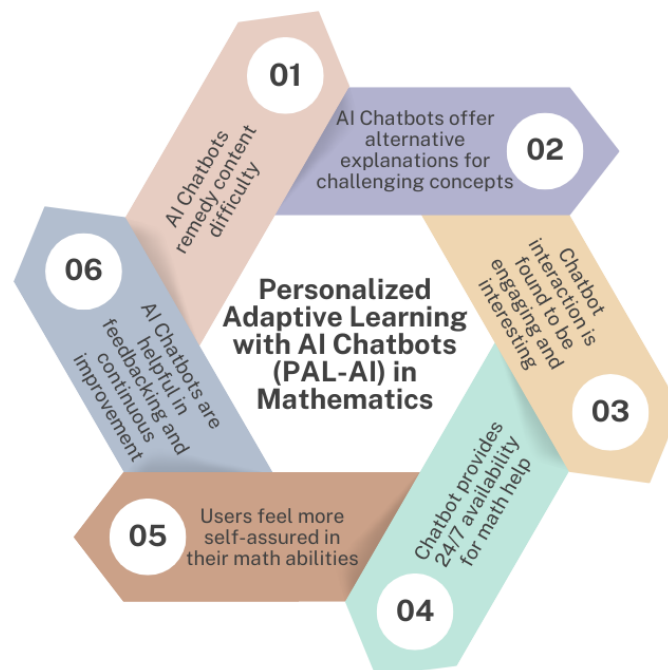

Figure 1. Personalized Adaptive Learning with AI Chatbots (PAL-AI) Framework in Mathematics

A new framework, PAL-AI, is discovered in this study that will reshape Mathematics instruction utilizing AI chatbots to personalize and enhance math learning for students. The AI chatbots tailor explanations and suggest learning paths based on individual styles. The AI adapts the difficulty of the content based on a student's proficiency, offering alternative explanations for challenging concepts. This interactive approach is not only engaging but also provides 24/7 access to math help across various devices. Students reported increased confidence in tackling problems and a greater sense of self-assurance in their math abilities. Additionally, the AI chatbot gathers feedback on the clarity and helpfulness of its responses, allowing for continuous improvement. By leveraging personalization, adaptability, and engagement, the PAL-AI framework shows promise for creating a more effective and enjoyable way to learn math. However, further research is needed to refine the framework and assess its long-term impact on student achievement.

Conclusion and Recommendation

In conclusion, the findings from the assessment of the impact of AI chatbots (ChatGPT, Gemini, and Perplexity) on mathematics education indicate a remarkably positive reception from students across various factors. The AI chatbots were consistently rated *Very High* in terms of effectiveness, engagement, accessibility, personalization, feedback quality, confidence building, time efficiency, adaptability, and student satisfaction. With mean scores ranging from 4.69 to 4.94, and low standard deviations, it is evident that the AI chatbots have significantly reshaped mathematics instruction, providing students with valuable support, enhancing their learning experiences, and boosting their confidence and proficiency in math. These findings underscore the transformative potential of AI technology in education and highlight the importance of integrating such tools into pedagogical practices to address the evolving needs of students in the digital age.

Based on the compelling evidence presented, it is recommended that educational institutions and policymakers embrace the use of AI chatbots in mathematics education. The findings suggest that AI chatbots can serve as effective supplements to traditional teaching methods, offering personalized, adaptive, and engaging learning experiences for students. To capitalize on the benefits of AI chatbots, educators should receive adequate training and support to effectively integrate these tools into their teaching practices. Furthermore, ongoing research and development are essential to continuously improve the functionality and effectiveness of AI chatbots, ensuring they remain responsive to the evolving needs of learners and educators. By leveraging the PAL-AI framework, which emphasizes personalization, adaptability, and engagement, educators can create a more dynamic and responsive learning environment that empowers students to succeed in mathematics and beyond.

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