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AI as a Bridge Between Theory and Practice in Teacher Education: How Textual and Metaverse-Based ChatGPT Modalities Shape Help-Seeking

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Abstract. This study explored whether immersion mode affects the efficacy of artificial intelligence (AI) driven learning modalities in developing teaching efficacy among pre-service teachers. This study explored the potential of AI-based technologies to improve pre-service special education teachers' self-efficacy in solving classroom challenges, such as managing student behavioral problems, that are often difficult to master through traditional college courses. This study examined the experiences of pre-service teachers (n=17) utilizing an AI expert system grounded in chat generative pre-trained transformer (ChatGPT) via two modalities: virtual reality (VR) and text-based settings. The participants were divided into three groups to examine self-efficacy regarding help-seeking behavior from (1) a traditional web search group as a comparison, (2) a text-based ChatGPT group, and (3) a VR-based voice interactive ChatGPT group, exploring different modes of immersion. The findings indicated that text-based ChatGPT was the most effective in improving pre-service teachers' self-efficacy with managing problematic behaviors, followed by VR-based ChatGPT, while the web search group showed comparatively low efficacy. These findings highlight the importance of simplicity, cognitive efficiency, and user-friendly interfaces of text-based ChatGPT in educational technology design. This study emphasizes the potential benefits of integrating AI systems into teacher training programs, intended to connect theoretical knowledge with practical application in special education settings. This study holds considerable research value and significance, suggesting that text-based ChatGPT can be an effective medium that can help pre-service special education teachers in interpreting theoretical educational content acquired in college to actual educational environments.

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1. Introduction

Pre-service teacher education often faces challenges in reducing the differences between theory learning in campus-based training and practice in school classrooms, making it difficult for student teachers to apply their theoretical knowledge in real classroom settings (Hamilton & Margot, 2019). Pre-service teachers frequently report their unpreparedness for classroom teaching to effectively implement pedagogical approaches in real classroom settings, despite their theoretical content knowledge in teacher education programs (Dicke, 2014; Olawale, 2024; Pillips & Condy, 2023).

With limited practical experience due to insufficient real-world exposure and a lack of mentor support in managing diverse classroom scenarios, pre-service teachers face difficulties in addressing diverse student needs, implementing differentiated instruction, managing unpredictable classroom situations, and fostering meaningful communication with students (Hamilton & Margot, 2019; Olawale, 2024). Therefore, it is important to enhance pre-service teachers' efficacy, improve their ability to make sound decisions in classroom situations, and ensure their access to mentorship that provides constructive feedback. To address these challenges in pre-service teacher education, artificial intelligence (AI) driven learning environments may encourage pre-service teachers by providing opportunities to practice and engage in classroom scenarios.

Recent advancements in the field of AI, including deep learning generative AI and intelligent tutoring systems, offer new opportunities in teacher education. These advancements improve pedagogical knowledge and promote teacher professional development (Wen & Wen, 2024). They also transform pedagogical methods and the role of educators (ElSayary, 2024), redefining the roles in AI-supported teaching environments (Nazaretsky et al., 2022) and delivering real-time guidance on practical knowledge. These AI-driven opportunities in teacher education are considered because AI technologies show significant potential to overcome many of the long-standing issues faced by traditional teacher education. For instance, AI-driven approaches, by providing immediate and customized support, can personalize training and transform traditional teacher training programs, which predominantly rely on face-to-face training similar to conventional classroom instruction (Pokrivcakova, 2019).

Furthermore, while traditional teacher education has emphasized theory-driven curricula over the development of practical knowledge and skills applicable in real classroom settings, recent AI technologies can create opportunities to enhance practical knowledge and skills effectively (Lee et al., 2024). Despite the increase of online teacher training, traditional teacher training methods often suffer from a lack of interaction, a sense of belonging and participation, and individualized feedback, all of which are critical for enhancing a trainee's engagement in the training. Additionally, AI-driven online training has the potential to address these gaps by strengthening the engagement of individual trainees (Cowin et al., 2023).

This study examined whether immersion modes affect the efficacy of AI-driven help-seeking modalities in developing self-efficacy among pre-service teachers. This comparative analysis aimed to find the most effective modality for improving pre-service teachers' readiness and offering insights into the development of AI-enhanced and immersive teacher training programs. Distinct conditions are compared: 1) World Wide Web (web) search-based learning using a non-immersive method, whereby participants gathered information independently; 2) text-based chat generative pre-trained transformer (ChatGPT) interaction using a semi-immersive method, involving question-and-answer sessions with an expert-AI; and 3) voice-interactive ChatGPT in a virtual reality (VR) environment using a fully immersive approach in a virtual classroom with voice commands. Thus, this study aimed to identify the effective modality for improving self-efficacy.

2. Knowledge-Practice Gap in Pre-Service Teacher Education

Pre-service teachers often encounter challenges in applying the theoretical knowledge acquired in teacher education programs into practice in real-world settings (Dicke et al., 2014; Hamilton & Margot, 2019; Olawale, 2024). This problem is usually referred to as the theory–practice gap, highlighting its significance in bridging the gap in teacher education (Korthagen, 2017). Although formal teacher education provides various ways to enhance the connection between knowledge of scientific theories and practice, such as enhanced internships or teaching by schoolteachers, the design of university courses to apply pre-service teachers' knowledge for handling real classroom challenges is not sufficient for when they are actually exposed to real-world challenges (Baier et al., 2021; Korthagen, 2017).

The knowledge possessed by pre-service teachers frequently goes unused and is mainly declarative, limited to the comprehension of facts and principles (Dicke et al., 2014). Pre-service or novice teachers tend to feel that they are not well enough prepared in practice when they have an opportunity to be engaged in classroom management practice (Dicke et al., 2014). Pre-service teachers face challenges such as insufficient real-world exposure and structured mentorship programs, management of diverse student needs, effective implementation of differentiated instruction, and the ability to address unpredictable classroom dynamics (Dicke et al., 2014; Hamilton & Margot, 2019; Olawale, 2024; Phillips & Condy, 2023).

To apply knowledge effectively, studies highlight strategies to bridge the gap between theory and practice in teacher education. This includes engaging in mentoring and analyzing complex real-world classroom scenarios through texts or videos (Mostert, 2007). Classroom management strategies seem to be effective only when acquired in contexts similar to the ones in which they will be applied (Renkl et al., 1996). Formal teacher education remains inadequate in establishing the necessary conditions to reduce the difference between theory and practice. However, recently, new advancements in AI technology offer opportunities to enhance teacher education environments and help reduce this gap effectively.

3. AI Technology's Role in Bridging the Gap

The recent advancement of AI has led to the development of new models such as ChatGPT, developed by OpenAI, the most popular tool based on large language models (Bahrini et al., 2023). It is an advanced natural language processing model built on the generative pre-trained transformer architecture, trained on an extensive dataset consisting of billions of web pages and documents. This enables it to generate human-like text responses with high coherence and contextual relevance (Szandała, 2025). ChatGPT has shown remarkable results in various fields requiring large-scale information processing and automation, such as educational tutoring (Pardos & Bhandari, 2024), medical diagnosis (Caruccio et al., 2024), financial forecasting (Bi et al., 2024), and coding and software development (White et al., 2024).

ChatGPT exhibits performance that aligns with that of human experts across various domains, because of its technological progress, which includes an extensive knowledge base, a strong capacity for generalization, and rapid information retrieval abilities. ChatGPT is adept at synthesizing information and providing structured and balanced responses, but it differs from human experts in its inability to weight information contextually, justify reasoning transparently, and make nuanced trade-offs based on expertise (Salekpay et al., 2024). Despite certain constraints, the advanced features of ChatGPT can serve as a valuable resource to address the ongoing disconnect between theory and practice, particularly for pre-service teachers in teacher education, in which formal coursework often lacks opportunities for hands-on practice.

In technology-integrated teacher education, numerous efforts have been attempted to combine theoretical learning with practical application via simulations, virtual classrooms, and intelligent tutoring systems (Nyaaba, 2024). A recent study highlights that generative AI can serve as a transformative tool in teacher education, particularly in addressing pedagogical gaps by facilitating access to diverse educational resources and helping in the acquisition of content knowledge (Nyaaba, 2024). In order to prepare future educators for digital learning environments, South Korea is improving the integration of AI into pre-service teacher education. The Republic of Korea's Ministry of Education (2023) stated that the main goal is to increase AI literacy. The use of ChatGPT and other AI tools in the classroom is becoming increasingly emphasized in teacher education.

Furthermore, to foster problem-solving and adaptive teaching strategies, AI is being integrated into practicum projects and instructional design. Additionally, to guarantee that all pre-service teachers finish their teacher preparation programs, the Ministry of Education requires that teacher training institutions incorporate digital education courses into their curricula. This approach reflects national education policies that aim to strengthen digital competencies and promote innovative teaching practices.

In this continuum, ChatGPT, as a learning partner, can help the weakness of the theory-practice gap in formal teacher education by delivering real-time feedback,

simulating real-world classroom scenarios, facilitating interactive learning experiences, and offering personalized guidance on classroom management. Leveraging its ability to synthesize vast educational resources and provide real-time interactive feedback, ChatGPT has the potential to support preservice teachers in bridging the theory-practice gap by offering simulated teaching scenarios and personalized guidance. The ability of AI to promote active engagement and adaptive learning experiences aligns with efforts to prepare future educators for real-world classroom challenges (Nyaaba, 2024).

4. AI-Driven Help-Seeking Modalities

Considering the potential of AI technologies in teacher education, it is important to examine the efficacy of various AI-driven learning modalities and their level of immersion in enhancing teaching efficacy, decision-making skills, and classroom readiness among pre-service teachers (Wu & Yang, 2022). When integrating new technologies into educational practices, assessing learner immersion is important, because these factors significantly influence learning outcomes and the rich adoption of technology-enhanced instructional methods. Immersion influences the extent of learners' engagement with educational contents, influencing knowledge remembering, skill acquisition, and the ability to transfer theoretical knowledge into practical contexts (Johnson-Glenberg et al., 2021).

Currently, ChatGPT depends on text-based input and output as its fundamental modality for information retrieval and response generation. However, its capabilities can be further enhanced to facilitate multimodal interactions, integrating voice communication, visual processing, and embodied AI with virtual or augmented reality environments (Agrawal et al., 2018). For instance, voice-enabled ChatGPT could enhance accessibility and create more natural conversational interactions, while vision-integrated models can analyze photos, videos, or diagrams to deliver more context-sensitive explanations (Dogan et al., 2023).

Moreover, fully immersive AI settings, such as VR-integrated models, could allow pre-service teachers to participate in interactive classroom simulations, providing prompt feedback on classroom management and pedagogical strategies. These advancements may bridge the gap between theoretical knowledge and practical application, fostering more dynamic and experiential learning opportunities, while also focusing on the cognitive challenges related to highly immersive AI interactions.

5. Methods

5.1 Participants and Context

The population for this study was 17 pre-service teachers majoring in special education who volunteered to participate in the study. Demographics of the 17 participants were 58.8% (n=10) female and 41.2% (n=7) male and 16 freshmen (first year) and 1 sophomore (second year) student. Additionally, their background experiences with ChatGPT and VR devices were examined. All participants had experience using ChatGPT (100%) and 94% had experience with VR devices. On a 5-point scale (1=very low, 5=very high), their perceived level of

ChatGPT usage was M=3.47 (SD=0.87), while their perceived level of VR devices usage was M=2.53 (SD=1.07). Comparatively, the participants reported a lower proficiency level of using VR devices. Furthermore, 100% of the participants (n=17) reported witnessing problematic behaviors by students with special needs during their educational volunteer activities, as shown in Table 1.

Table 1: Participant demographics and background experience

Category	Detail	Value
Total Participants	Pre-service special education teachers	17
Gender	Female	10 (58.8%)
	Male	7 (41.2%)
Academic Year	Freshman	16
	Sophomore	1
ChatGPT Experience	Participants with prior ChatGPT use	17 (100%)
VR Device Experience	Participants with prior VR device use	16 (94%)
Perceived ChatGPT Use Level	5 Likert scale (1 = Very Low, 5 = Very High)	M = 3.47, SD = 0.87
Perceived VR Use Level		M = 2.53, SD = 1.07
Problematic Behavior Observed	Witnessed problematic behavior by students with disabilities	17 (100%)

This study took place at a medium-sized Korean National University in November 2024. As preservice teachers, the participants have to participate in volunteer activities; the educational volunteer activities totaling over 60 hours (2 credits) are required by the Ministry of Education to obtain a national certification of teacher. The participants who attend this study are majoring in special education and frequently volunteer at special schools, local centers, or programs for children with special needs.

During educational volunteering activities or teaching practicums, pre-service teachers encounter various and complex problematic behaviors from children with special needs who have different types and levels of disabilities. When they face problematic behaviors from children, which require more urgent management knowledge and skills compared to those in general schools, immediate intervention is required without the opportunity to seek help from mentors or professors.

Problematic behaviors shown by children with special needs vary widely, ranging from physical aggression, such as hitting and biting, to social skill issues, such as defiance and rule violations. As pre-service teachers face these behaviors in educational volunteering activities, the need for help-seeking or self-directed learning aimed at developing behavior management skills has been highlighted.

5.2 Study Design

This study evaluated the effectiveness of help-seeking efficacy in AI-driven modalities using textual and immersive ChatGPT environments for a 'Mentor AI

Expert' in supporting pre-service teachers in managing problematic behaviors of students with special needs. For this study, the participants were randomly assigned to one of three experimental groups: 1) five participants in the conventional web search group (web search group), 2) six participants in the text-based ChatGPT group (text AI group), and 3) six participants in the VR-based immersive ChatGPT group (VR-AI group).

Each group utilized their assigned medium (web search, text AI, or VR-AI) for a 30-minute session to acquire strategies for managing challenging behaviors in students. For the web search group, the participants utilized typical online search platforms (Naver.com, a Korean representative search engine) for help-seeking for the task. For the text AI group, the participants engaged in interactive sessions with ChatGPT via text prompting. For VR-AI group, the participants participated in a VR environment integrated with a voice-enabled ChatGPT.

To implement VR-based immersive ChatGPT environments, a 3D software platform for developing immersive VR content was created using Unity. It was designed to replicate realistic educational scenarios, including a virtual classroom environment (Figure 1). In the VR classroom, a non-player character (NPC) was the expert teacher used as a mentor to provide help for pre-service teachers. The NPC was powered by ChatGPT API for natural language processing, enabling text-to-speech for verbal responses from the NPC, as well as speech-to-text for voice interaction between users and the NPC.

The user interface design considered voice input functionality, text display and dialogue log, and interactive feedback to create an immersive experience in which pre-service special education teachers felt as though they were conversing with a knowledgeable teacher mentor. In an immersive environment, the participants record and submit questions verbally. It displayed NPC responses and maintained a conversation history for reference. Also, it integrated visual and auditory feedback for engaging and intuitive user experience.

Figure 1: VR-based immersive ChatGPT environment

To provide pre-service teachers with specialized guidance for managing problematic behaviors in students with special needs, the text AI group and VR-AI group were initially given a prompt, which was designed by the authors of the study, as follows:

> ''*You are a special education teacher with 20 years of experience working in special schools. Pre-service special education teachers will now ask you questions. You are an expert with professional knowledge and skills in handling problematic behaviors according to the type and severity of disabilities in children with special needs. Therefore, you must provide detailed consultation to pre-service teachers who lack real-world school experience. Your responses should be presented in a natural conversational style and include specific examples of how a teacher should respond to such behaviors. Once a pre-service teacher's question and your response are complete, the process will be repeated with another question.*'

5.3 Measures

5.3.1 Background characteristics

Questions regarding background characteristics about gender and grade were collected. Additionally, we collected participants' ChatGPT usage experience (yes/no), ChatGPT proficiency level (1=no proficiency and 5=very proficiency), VR usage experience (yes/no), VR proficiency level (1=no proficiency and 5=very proficient), and experience with observing problematic behaviors (yes/no).

5.3.2 Self-efficacy of problematic behaviors

The participants were questioned pre-survey and post-survey regarding their level of efficacy in managing problematic behaviors with children with special needs. All items were designed on a five-point Likert scale of 1 = strongly disagree to

5= strongly agree. The three questions to measure this were 1) "I believe I will not panic when encountering students with problem behaviors in the educational setting"; 2) "I believe I can identify and implement appropriate solutions when I observe problem behaviors in students with disabilities"; and 3) "I have confidence in my ability to manage problem behaviors in the educational setting". The Cronbach's alpha value of this scale for pre-test items was $\alpha = 0.829$, and for the post-test items, $\alpha = 0.865$.

5.3.3 Technology-related help-seeking efficacy

To assess pre-service teachers' self-efficacy regarding the use of a medium for seeking help, we used items adopted from Mun (2024). This measure allowed us to examine self-efficacy in using technology for help-seeking by relating their judgements to problematic behaviors. The three items were adopted to measure "I can easily get the help I need from the (target medium)"; "I find (target medium) convenient to use "; and "I am willing to continue using the (target medium) in the future" "(target medium) helps with self-directed learning in acquiring special education knowledge". The items on a five-point Likert scale from 1 = strongly disagree to 5 = strongly agree. The Cronbach's alpha value of this scale for post-test items was good at $\alpha = 0.741$

5.4 Data Analysis

To analyze the differences in pre-test and post-test scores across three groups and assess changes within each group, non-parametric statistical methods were employed due to the small sample size, of between 6–7 participants, and potential violations of normality assumptions. First, the Wilcoxon signed-rank test, as a non-parametric method, was used to compare pre-test and post-test scores within each group for each item, testing whether the median scores significantly changed after the intervention ($p<0.05$ indicating significance). Then, to evaluate differences between the three groups for each item at both pre-test and post-test stages, the Kruskal-Wallis's test (H-statistic) was applied, which is suitable for comparing independent samples when normality cannot be assumed.

Additionally, the Friedman test (χ^2-statistic) was conducted to assess whether the pattern of pre-test to post-test changes differed significantly across the three groups. Where significant results were found ($p<0.05$), post-hoc pairwise comparisons using Dunn's test with Bonferroni correction were performed to control Type I error. Statistical significance was evaluated at a threshold of $\alpha=0.05$, and effect sizes (e.g., r for Wilcoxon tests, η^2 for Kruskal-Wallis and Friedman tests) were calculated to provide further interpretation of the results. All analyses were performed using Jamovi 2.6.21.0, ensuring robustness and reproducibility of the findings.

6. Results

First, background characteristics were analyzed to understand the participants in the study. All students had prior experience using ChatGPT before the study; however, their level of ChatGPT proficiency was 3.471 (SD=.875). All participants had prior experience with VR environments before the study, but their proficiency level with VR environments was 2.529 (SD=1.068). Additionally, all students had experiences facing a problematic situation involving students with special needs.

Second, Wilcoxon signed-rank tests were conducted to determine whether there was a statistically significant difference between pre-test and post-test scores following the implementation of help-seeking efficacy using technologies including web search, ChatGPT, and VR-oriented ChatGPT. The results revealed a significant difference between the scores before and after the intervention. Table 2 shows that all post-test scores were higher than the pre-test scores.

For web search participants, coping efficacy on problem behaviors (Wilcoxon Z=-.58, p>.05, and r=-.259) and management efficacy (Wilcoxon Z=-1.73, p>.05, and r=-.77) were non-significant on post-test than on pre-test. However, behavioral intervention efficacy was significantly higher on post-test than on the result of pre-test (M=4.00, SD=0.71), Wilcoxon Z = -2.00, p<.05, r = -89.

For text ChatGPT, coping efficacy on problem behaviors (Wilcoxon Z=-2.26, p<.05, and r=-.92) and behavioral intervention (Wilcoxon Z=-2.07, p<.05, and r=-.92) were significantly higher on post-test than on pre-test. However, management efficacy (Wilcoxon Z = -1.63, p>.05, r = -.67) had no significance on post-test than on the result of pre-test.

For VR voice ChatGPT, behavioral intervention (Wilcoxon Z=-2.04, p<.05, and r=-.83) was significantly higher on post-test than on pre-test. However, coping efficacy on problem behaviors (Wilcoxon Z=-1.63, p<.05, and r=-.67) and management efficacy (Wilcoxon Z = -1.00, p>.05, r = -.41) were not significant on post-test than on the result of pre-test.

Table 2: Wilcoxon signed ranks test results of pre-test and post- test scores related to efficacy of the help-seeking group

Group	Item	Pre-test		Post-test		Mean Diff.	Z	p*	r**
		M	SD	M	SD				
Web Search (n=5)	Coping efficacy	3.60	0.89	3.80	0.84	0.20	-0.58	0.56	-0.26
	Behavioral intervention	3.20	0.84	4.00	0.71	0.80	-2.00	0.05	-0.89
Text ChatGPT (n=6)	Coping efficacy	1.83	0.75	3.33	0.82	1.50	-2.26	0.02	-0.92
	Behavioral intervention	2.33	1.03	3.50	1.23	1.17	-2.07	0.04	-0.85
VR Voice ChatGPT (n=6)	Coping efficacy	2.83	0.75	3.50	0.84	0.67	-1.63	0.10	-0.67
	Behavioral intervention	2.67	0.82	4.17	0.98	1.50	-2.04	0.04	-0.83

Note: * Wilcoxon signed rank test probability; **effect size r = Z score/square root n

Third, Kruskal-Wallis tests were conducted to evaluate difference among the groups' efficacy of help-seeking (through web search, text ChatGPT, VR voice ChatGPT) on median change in the scores. All results between pre-test and post-tests, which were corrected for tied ranks, were non-significant, p>.05 (as shown in Table 3). In addition to the analysis of technology-related help-seeking efficacy after intervening, the participants in the group of text-based ChatGPT showed the highest mean scores among most groups, except the item of support for self-directedness. To get help regarding problematic behaviors, students in two ChatGPT groups tended to show high mean scores. However, all items did not show the group difference among the three groups.

Table 3: Technology-related help-seeking efficacy by group after intervention

Item	Web Search (n=5)		Text ChatGPT (n=6)		VR Voice ChatGPT (n=6)		*F*	*p*
	M	SD	M	SD	M	SD		
Information efficacy	4.20	0.45	4.50	0.55	4.33	0.52	0.48	0.63
Ease of use	4.00	0.71	4.50	0.55	4.17	0.41	1.17	0.34
Support for self-directedness	3.80	0.45	4.33	0.52	4.50	0.55	2.75	0.10
Intention to continue using	4.60	0.55	4.83	0.41	4.50	0.55	0.69	0.52

7. Discussion

This study investigated pre-service special education teachers' self-efficacy in managing problematic behaviors of children with disabilities, comparing three help-seeking modalities: traditional web search, text-based ChatGPT, and VR-based voice-interactive ChatGPT. The findings revealed that pre-service teachers who used both text-based and VR-based voice-interactive ChatGPT perceived greater improvement in their efficacy for managing problematic behaviors compared to those who used web searches.

This suggests that the AI help-seeking system for special education contexts, which incorporates both VR and text-based conversational AI (ChatGPT), was found to have the potential to support pre-service teachers in developing appropriate intervention strategies for any problematic behaviors they may encounter in educational settings involving children with disabilities.

The results showed that participants in two ChatGPT groups showed higher efficacy in utilizing the environments to seek help regarding problematic behaviors of children with disabilities. Particularly, the group of text-based ChatGPT was the most preferred environment for supporting their help-seeking efficacy compared to traditional web search and VR-based ChatGPT environments. Participants appeared to prefer the combined attributes of ease of use and informative results from those help-seeking environments.

The potential causes of the study's findings may have several explanations. When participants were looking for help to address problematic behaviors in children with disabilities, they preferred the text-based ChatGPT environment over the VR-based or web search environments. This preference may reflect a convergence of ease of use and informative quality, which are at the core of effective help-seeking behaviors. User satisfaction and adoption are driven by perceived usefulness and ease of use, according to the technology acceptance model. In our context, Alshammari and Babu (2025) showed that both ease of use and usefulness significantly increased students' satisfaction with ChatGPT, and that this satisfaction then directly influenced their intention to use it.

Furthermore, Sakirin and Said (2023) found that 70% of participants preferred ChatGPT-based conversational interfaces over traditional methods, citing convenience, efficiency, and personalization as key factors. Hernandez et al. (2023) supported this view by demonstrating that perceived ease of use, usefulness, and convenience strongly influence users' intention to utilize ChatGPT as an information-seeking tool. These results confirm our hypothesis that, in comparison to VR and web search environments, text-based ChatGPT provides a personalized, quick, and low-cognitive-burden support system that improves help-seeking efficacy.

Furthermore, the results can also be examined from the perspective of cognitive load faced by first-year students encountering unfamiliar major fields and help-seeking environments. The cognitive requirements of various surroundings can affect user preferences substantially. Environments that demand less working memory enable users, particularly novice users, to process information more efficiently by minimizing the superfluous cognitive load linked to navigating intricate interfaces or filtering irrelevant features. Lowering cognitive load allows users to give more mental resources to useful cognitive processes, such as integrating and applying knowledge to their specific demands (Sweller et al., 2011).

Although VR-based ChatGPT environments in the study had the potential to create an immersive experience, the implementation in the study relied on voice-based interactions, which did not seem to effectively convey the social presence (e.g., mentor teacher) needed for meaningful engagement for help-seeking. This limitation of VR-based ChatGPT likely lowered users' perceptions of the environment as human-like or relevant, resulting in decreased satisfaction and preference relative to the text-based ChatGPT.

The text-based ChatGPT setting delivered information clearly, simply, and accessible. This contrasts with the VR-based ChatGPT, where the combination of immersive visuals, audio interactions, and navigation requirements likely increased the extraneous cognitive load, making it harder for participants to focus solely on the information retrieval task. Despite lacking nonverbal cues for enhancing social presence in the group of text-based ChatGPT, the clarity and efficiency of text-based communication compensated for the absence of social presence by focusing on task-oriented outcomes rather than relational dynamics.

This highlights the vital role of simplicity in interface design for environments with the goal of supporting help-seeking or learning behaviors, allowing novice users to focus their limited cognitive capacities on their main goals instead of overcoming design-related constraints. Additionally, the unexpected results of the VR-based ChatGPT environments to create meaningful social presence hindered its effectiveness as a support tool.

According to Short et al. (1976), environments that fail to replicate human-like interactions, called social presence, regarding the degree to which a medium enables users to perceive another person as a real and socially present individual during communication, struggle to involve users effectively through interpersonal connection and involvement. These findings have implications for the development and use of AI-driven tools in teacher education for potential special education teachers. Teacher program designers must focus on efficient interfaces to minimize cognitive load and increase user engagement.

8. Conclusion

This study stresses the potential of AI-driven tools, particularly text-based ChatGPT, for enhancing the effectiveness and proficiency of pre-service special education teachers. The results highlight the significance of simplicity and cognitive efficiency in the design of support environments. Although VR-based tools offer immersive experiences, their existing limitations, including elevated cognitive load and insufficient social presence, necessitate further study and improvement.

This research, while making significant contributions, has several limitations. The limited sample size constrains the generalization of the findings, and the short duration of the study lacks the ability to consider the possible long-term advantages or disadvantages of these tools. Our study did not directly assess the completeness or content accuracy of the information provided by ChatGPT itself, even though it confirmed the effectiveness of AI tools—particularly ChatGPT modalities—as help-seeking services in increasing pre-service teachers' self-efficacy. To thoroughly examine the level of accuracy and reliability of information provided by AI, more research is required.

Additionally, because of design limitations, the VR environment used in this study might not fully represent the potential of VR technology. To gain a better understanding of AI's influence on teacher education, future research must investigate this area. Also, future research needs to focus on long-term studies to assess the ongoing effects of AI tools such as ChatGPT on teaching efficacy. Furthermore, studying hybrid environments that integrate the immersive capabilities of VR with the cognitive simplicity of text-based systems might provide new perspectives for the development of effective educational resources.

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