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Digital Competences: Early Childhood Teachers' Beliefs and Perceptions of ChatGPT Application in Teaching English as a Second Language (ESL)

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Abstract. In artificial intelligence (AI), second language learners can get unlimited assistance in learning their language skills through advanced AI-powered chatbots, primarily ChatGPT. This study performed an in-depth investigation into understanding early childhood (EC) teachers' beliefs and perceptions about teaching children English as a second language (ESL) to improve their learning through using ChatGPT. The quantitative method was applied, and the data were collected through an online self-administered questionnaire that was directed to EC teachers (N = 543) from the city of Mecca, Saudi Arabia. The participating EC teachers reported a high need for training associated with their social awareness of applying ChatGPT in teaching practices. The respondents had positive attitudes towards applying ChatGPT in teaching ESL and believed it is a very useful pedagogical tool in EC settings. However, they expressed their concern about the potential risks of ChatGPT on young children who have less knowledge and inadequate digital skills. These valuable results offer decision-makers and educators clear insight into preparing teachers on how to use ChatGPT as an educational tool, review its issues, use it safely and fairly, and have the confidence to take responsibility as digital citizens to be able to achieve the desired learning outcomes. These valuable findings not only outline a clear path to address the practical digital challenges faced by EC teachers but also inspire researchers to conduct further investigations into its role and potential influence in teaching in ESL contexts.

Keywords: ChatGPT; digital competence; early childhood; foreign language; teachers

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1. Introduction

Natural language processing has developed in the past few years, achieving great success in many real-world applications, including but not limited to speech and entity recognition, text generation, language translation, and summarization (Rahman & Watanobe, 2023). Scholars have applied the models of recurrent neural network (RNN) in several applications because of their distinctive and repetitive structure for remembering dependencies in texts (Rahman et al., 2020). Su and Yang (2022) clarified that AI has been recognized in the academic field. AI is the intelligence of programs or machines to mimic the abilities of the human mind to solve problems, make decisions, predict, and sense in specific tasks (Solanki et al., 2021). One of the most stimulating developments in AI is the Chat Generative Pre-Trained Transformer (ChatGPT) application, which is an advanced language model developed by OpenAI (Aljanabi, 2023). It has an incredible ability to generate human-like scripts and respond to complex questions. ChatGPT is a neuro-linguistic programming model developed by OpenAI which was launched in November 2022 (Rahman & Watanobe, 2023). The model of ChatGPT initiates with the GPT-3 pretrained large language model. GPT-3 is competent to handle massive amounts of data on the Internet and is appropriate for a wide range of crosscutting tasks. However, GPT-3 has the drawback of exhibiting poorly characterized behavior (Ouyang et al., 2022). To avoid toxic and insincere output, ChatGPT uses three different effective strategies: (1) moderated fine-tuning, (2) reward modeling, and (3) reinforcement learning (Rahman & Watanobe, 2023). More recently, ChatGPT has had a massive effect on the technological revolution and has contributed to improving human life and changing the manner in which individuals interact with technology (Aljanabi, 2023).

In the field of education, the incorporation of innovative technology into early childhood education (ECE) has become more prevalent recently than ever before (Allehyani, 2023a), creating the need for teachers worldwide to keep up with it (Allehyani, 2023b; Koraishi, 2023). AI is becoming an increasingly interesting subject for educators and researchers, since it appears to significantly contribute to fostering learners' knowledge by personalizing their learning experiences (Su & Yang, 2022). Educators can integrate AI education into cross-disciplinary knowledge with multiple techniques simultaneously to enrich learners' learning (Yang, 2022). In addition, Su and Yang (2022) acknowledged that AI plays a vital role in simplifying teaching, learning, and assessment. Prior literature has clarified the role of AI in reinforcing young children's capacities to access digital content and interact with it through gestures, touch, and speech (Williams et al., 2019). ChatGPT has been applied lately in multidisciplinary education (Baidoo-Anu & Owusu-Ansah, 2023; Rudolph et al., 2023). There is increasing interest in using AI applications in ECE to promote learning and increase the skills of learners in different age groups (Lin et al., 2020; Vartiainen et al., 2020). Nevertheless, there is a lack of literature on AI in the area of research in ECE. Although studies have shown that the concept of AI is capable of effectively increasing early childhood (EC) learning outcomes (cf. Druga et al., 2019; Ge et al., 2021; Kewalramani et al., 2021; Lin et al., 2020; Vartiainen et al., 2020; Williams et al., 2019), there is a paucity of information concerning how these studies

associated with the implementation of AI in educational settings were conducted (Su & Yang, 2022). In practice, there are a growing number of curricula and learning resources for learners to acquire knowledge in relation to AI. However, most of them target students at the secondary school levels and above (Yang, 2022).

With the release of ChatGPT, there is an urgent need for specific digital competences for teachers and learners that reflect the importance of following a principled approach to integrating these technologies into pedagogical practices (Kartal, 2023). According to Rahman and Watanobe (2023), no research has comprehensively examined learners and educators to discover how ChatGPT enhances learning and teaching, while highlighting opportunities, threats, and strategies in the areas of learning and research. Teachers should acquire digital skills to be capable of developing school-age learners' digital skills (Allehyani, 2023a; Cervera & Caena, 2022). Therefore, teachers, including teachers of English, have a responsibility to enable learners to be competent and critically wise users and digital citizens (UNICEF, 2023). Consistent with this vital perspective and since the majority of young learners in Saudi Arabia acquire English as a second language (ESL) in EC schools (Allehyani, 2023b), we target ChatGPT for our investigation as an invented language learning tool. To the best of our knowledge, this study is the first of its kind to address EC teachers' professional development needs (PDNs) to achieve their digital competences in teaching ESL in Saudi Arabia, in addition to their perceptions and attitudes about the application of ChatGPT in teaching learners ESL in ECE. In doing so, a comprehensive understanding of ChatGPT and its potential in ECE is essential to effectively harness the teaching benefits and address the challenges encountered by this evolving technology. In light of previous studies, the research questions directing this investigation were articulated as follows:

1. What are the PDNs of EC teachers to achieve digital competences of using ChatGPT in teaching ESL?
2. What are the beliefs and perceptions of EC teachers towards using ChatGPT for teaching ESL?

2. Literature Review

2.1 English as a Second Language Learning in the Context of Early Childhood Education

Several scholars have agreed that the first years of schooling are the best time for children to acquire a second language after the first language has already been formed (Albiladi, 2022; Allehyani, 2023b; Al-Jarf, 2023; Filmer-Sankey & Phillips, 2023; Topsakal & Topsakal, 2022). Saudi Vision 2030 focuses on providing critical opportunities to improve teaching practices among English language teachers and learners starting in EC (Albiladi, 2022; Allehyani, 2023b). From this perspective, the Ministry of Education was keen to achieve a high quality of ECE by providing professional development programs targeting English teachers to prepare them to apply modern strategies in teaching children ESL, as it considers it a formal language in the educational curricula in Saudi Arabia (Allehyani, 2023a, 2023b). Policies in the Saudi context show that English is commonly used in formal and informal situations, as it is used as the primary language of communication

alongside the mother tongue, which is Arabic (Alnasser, 2022). A contemporary study by Al-Jarf (2023) revealed that many Saudi mothers believe that the ideal age for teaching English to children is from four to five because children at this age will learn the English language easily. The results of the study show how widespread the English language is and its dominance in all areas of life in Saudi Arabia. Hence the importance of teaching and introducing English to young children as the language of the era. This is specifically in relation to facilitating the digital skills of dealing with technology and software, for which the English language is considered a basic language for decoding and understanding the mechanism of use. In this vein, ChatGPT is one of the recent innovations that is impacting the teaching and learning of English in new areas of research on technology integration in language and second language teaching (Ali et al., 2023; Kim et al., 2023). Drawing on these studies, it is important to focus on children learning the English language at an early age through AI applications such as ChatGPT (Allehyani, 2023b), which has transformed to become more common from the international educational domain to the local one.

2.2 ChatGPT in English as a Second Language Contexts

With a desire to improve learning outcomes in ESL, in 2021, the Ministry of Education in Saudi Arabia introduced teaching ESL for the first time in the EC curriculum from the first grade of primary school, also known in Saudi education as EC schools (Allehyani, 2023b). Several studies have examined the association between digital technology and ECE in terms of the availability and accessibility of technology-enhanced environments and the educational attainment of learners (Herodotou, 2018; Liu & Hwang, 2020; Mantilla & Edwards, 2019). The AI application is easy to use; therefore, ChatGPT can serve as an educational tool to enhance the abilities of teachers and learners to react to rapid change with confidence and understanding (Su & Yang, 2023). During the first years of a child's development milestone, cognitive abilities start gradually developing, and throughout this period, the child can learn a foreign language, which helps to develop those abilities (Allehyani, 2023b; Topsakal & Topsakal, 2022). Javier and Moorhouse (2023) suggested that educators should construct explicit guidelines introducing learners to how to use ChatGPT that is age appropriate in content. Javier and Moorhouse (2023) asserted that ChatGPT can be a valuable tool for students to practice and learn second language acquisition and interactions. Pre-schoolers' interactions with AI games such as robots improve their creativity, empathy, collaborative inquiries, and relevant reading and writing skills (Kewalramani et al., 2021; Su & Yang, 2022). Creativity in writing story scripts could include writing prompts, characters, and storyline development, in which ChatGPT works as a virtual collaborator, offering a variety of suggestions that students can build upon.

Indeed, understanding students' cultural backgrounds, individual needs, and experiences throughout their lives is vital for providing them with proper assistance and direction (Alam, 2022; Adams et al., 2022; Mahoney et al., 2021), which ChatGPT is unable to consider (Limna et al., 2023; Mhlanga, 2023). Even though ChatGPT greatly benefits students' second language acquisition, it must be taken with caution regarding student diversity and identities. Furthermore,

ChatGPT improves teaching models, assessment systems, and the learning environment by empowering the triad structure of teacher–student–technology (Su & Yang, 2023). ChatGPT's large language models can help teachers identify domains where learners experience difficulties, adding to a more accurate assessment of students' learning progress and challenges and helping them excel in their development (Kasneci et al., 2023). Regarding professional development, ChatGPT provides teachers with great language models. In addition, it can help them by offering a variety of resources, summaries, and clarifications of modern teaching methodologies, techniques, and materials (Kasneci et al., 2023).

ChatGPT has also provided opportunities for enriching education in its ability to deliver personalized learning experiences, supporting the creation of educational content and the overcoming of language obstacles, which has a significant influence on learning outcomes (Adiguzel et al., 2023; Chen, 2023). ChatGPT provides great language models for students to help them develop reading and writing skills (e.g., by proposing grammatical and syntactic corrections) and improve their writing style and critical thinking skills (Kasneci et al., 2023). A recent study by Luo et al. (2023) revealed that ChatGPT offers age-appropriate conversations for young children in addition to offering conversation formats suitable for young children. Therefore, ChatGPT has the potential to enhance young children's language learning skills. Besides, it is important to acknowledge the role of ChatGPT in promoting contextual language development and social conversational skills of young children from diverse approaches. It works as a conversational agent with several main functions, such as answering their questions while satiating their curiosity (Luo et al., 2023).

ChatGPT can support teachers in delivering personalized and individualized guidance to young learners. Based on students' needs and learning styles, ChatGPT can recommend personalized resources and educational activities appropriate to the educational content (Rahman & Watanobe, 2023). For instance, ChatGPT can analyze students' performance progress and identify the relevant areas or concepts where students are struggling. Moreover, ChatGPT can benefit teachers by offering an instant translation service for dialogues, which can be constructive for learners who want to translate texts from their native language into English and vice versa (Kartal, 2023). In addition, the ability of the advanced language model to generate vocabulary feedback in the target and native languages can also support learners' vocabulary acquisition (Hong, 2021; Kartal, 2023). It can explain words and phrases, support learners in understanding a text such as a short story, generate comprehension and expansion questions, enhance learners' reading skills, and promote critical and creative thinking (Kartal, 2023). Furthermore, Weller (2023) argued that ChatGPT might act as a language teacher, evaluate texts, and deliver useful feedback constructed on a rubric. Nevertheless, this may be subject to how skillful teachers are when employing ChatGPT as an assessment tool. Chatting with ChatGPT has positive effects in assisting students in acquiring language skills (speaking, listening, reading, and writing), developing their grammar accuracy, and learning new vocabulary (Hong, 2021, 2023). Among other scholars, Hong (2021) recommended that researchers further

investigate teachers' perceptions of ChatGPT as an educational tool and the possibility of employing it to reduce the teaching overload for teachers.

2.3 Digital Competence and Challenges

The development of digital competences has become an urgent necessity where digital tools based on AI have become the foremost engine globally in all aspects of life, including education. Without doubt, the successful integration of ChatGPT into language education depends on developing specific digital competences in teachers and learners, which includes learning how to interact with ChatGPT, facilitating the implementation of pedagogically useful tasks, and critically evaluating the outputs of this model (Kartal, 2023). Su and Yang (2023) clarified that ChatGPT can be implemented as virtual instructor to facilitate the training of EC teachers in professional development and provide instant feedback to them while observing the class. For instance, if the virtual coach notices that the teacher is not applying enough open-ended questions to endorse critical thinking, the virtual coach can give them feedback on the value of using open-ended questions and propose explicit learning models that the teacher can use in future lessons. However, Mhlanga (2023) argued that teachers who attend training courses to develop their skills in creative and critical thinking could provide adequate support and appropriate individual guidance to students in their classrooms. More precisely, teacher training for computer literacy has long been a critical component of education (Tapalova & Zhiyenbayeva, 2022). In addition, with the increasing integration of AI into education, the possibility exists of the digital divide gradually widening, especially within specific teacher demographics (Jones & Haffner, 2022). Ultimately, Koraisi (2023) argued that gaining a clear insight into what ChatGPT is and how to use it would qualify teachers to make the most of its potential and mitigate any threats or challenges related to its practice, which needs to be examined further.

Even though ChatGPT is an effective model that can generate many relevant responses for a range of subjects, it still has some technical issues, such as a deficiency of emotional intelligence, a deficiency of common sense, difficulty with complex reasoning, and an inability to manage some visual information (Rahman & Watanobe, 2023). The effectiveness of ChatGPT in an educational context depends on how well teachers view the potential benefits, challenges, and risks. If ChatGPT is used responsibly, it can be an effective learning support model. Nevertheless, if not managed properly, it will pose an ethical, social, and artistic threat to the learners (Luo et al., 2023; Mhlanga, 2023). Additionally, ChatGPT is a powerful tool with its capabilities for generating texts and educational interactive learning experiences. However, ChatGPT is not without ethical and social implications (such as bias, racism, privacy, security, misuse of technology, accountability, transparency, and identity) as it is complex and multifaceted; thus, it must be operated carefully (Mhlanga, 2023; Rahman & Watanobe, 2023). Another challenge is the potential threat of applying ChatGPT in EC settings, as it may produce biased or inappropriate content (Sallam, 2023). In the same vein, because ChatGPT is a learning model that is not subject to external supervision, it has the potential to provide users with incorrect or misleading information (Kashefi & Mukerji, 2023). Several scholars (cf. Baskara & Mukarto, 2023; Javier &

Moorhouse, 2023) have argued that considering generative AI tools are an emerging technology specifically in children's education, future studies should delve into the benefits and risks of their use in ECE.

In fact, having teachers monitor and examine students' use of ChatGPT is crucial. More importantly, teachers should alert students to verify the accuracy of the information generated from ChatGPT. ChatGPT should be implemented in educational settings in a reliable and ethical manner regarding aspects such as transparency, accountability, informed consent, and respect for individuals' privacy (Mhlanga, 2023). Javier and Moorhouse (2023) argued that teachers should facilitate discussion with the learners about the limitations of ChatGPT and remind them to verify any answers using other approaches, such as searching online or using ChatGPT to engage in "mock role-playing", rather than relying entirely on it as a source of information. They found that student interactions on ChatGPT, teacher feedback, and self-reflection highlighted how teachers provide productive and critical practice related to ChatGPT for language learners. Nevertheless, learners need to acquire specific skills to use ChatGPT to be able to practice a language effectively (Kohnke et al., 2023). To conclude, ChatGPT has the potential to perform some tasks more easily and more efficiently; however, it is not a magic wand that can solve human problems and completely replace human intuition and experience.

3. Methodology

3.1 Research Design

The present investigation applied a quantitative research method. The data were collected through an online self-administrated questionnaire that was directed to EC teachers who teach the English language to reveal their digital competence, beliefs, and perceptions towards the implementation of ChatGPT in the context of ESL. The questionnaire was designed and developed by us to answer the research questions.

3.2 Respondents

The target group of the study included EC teachers in the city of Mecca, Saudi Arabia. The number of respondents was 543, selected from English teachers who teach learners between the ages of 7 and 9 years in the first, second, and third grades in EC schools. Data were collected using a simple random sampling procedure. Before conducting the data collection process, we explained the objectives of this research to the respondents, after which they signed a consent form as agreement for voluntary participation. Respondents were informed that their personal information would be kept confidential to ensure their privacy.

3.3 Ethical Procedure

Before data collection commenced, the questionnaire contents were subjected to examination by specialists of the Ethics Committee of the Islamic University of Madinah to verify the accuracy and credibility of all items and to make sure they were linguistically and scientifically correct and relevant to the topic. The present study's questions, questionnaire, and methodology were submitted to the committee in both Arabic (the mother tongue of the local community) and English

to be ethically evaluated and examined by academics specializing in information technology and ECE. In the following stage, the assessment and recommendations of two specialists in the Department of Higher Scientific Research Ethics Committee were considered in the revised version of the questionnaire. After receiving the official letter of final approval from the university ethics committee, the pre-study self-administered questionnaire was validated by applying it to an experimental group.

3.4 Research Instrument

We designed a self-administrated questionnaire based on the conceptual framework of the current research. The questionnaire is one of the best tools for collecting data because it makes the process of data collection easier for researchers by shortening time spent in data collection and is also considered convenient and less costly (Sriyakul & Jermsittiparsert, 2019). The variables of the current study were conceptualized and constructed from the review of several previous studies. The first part of the questionnaire relates to EC teachers' demographic information, requesting information about their teaching experience in teaching children ESL. The statements in the second part were built upon Kohnke et al.'s (2023) study and relate to English teachers' digital-competence needs in EC settings. The statements in the third part of the questionnaire focus on ChatGPT as a learning tool in teaching ESL, as adopted from the recent studies by Hong (2023) and Kim et al. (2023). The second and third sections of the questionnaire are answered using a 5-point Likert scale because it is commonly used to represent people's opinions and attitudes towards a topic. To elaborate more, the second section includes three main sub-questions which ask EC teachers about their digital-competence PDNs in three main domains (technological proficiency, pedagogical compatibility, and social awareness). Each one of these domains has specific related items that examine particular digital needs. The options on the responding scale are 1 = *no need at all*, 2 = *very low level of need*, 3 = *moderate level of need*, 4 = *high level of need*, and 5 = *very high level of need*. The third section consists of 13 statements which ask teachers about their beliefs and perceptions towards the implementation of ChatGPT in teaching ESL. The options on the responding scale are 1 = *strongly agree*, 2 = *agree*, 3 = *neutral*, 4 = *disagree*, and 5 = *strongly disagree*.

4. Results

4.1 Demographic Information

The demographic information sought from participating EC teachers in this study included only one variable, namely teaching experiences in teaching ESL to children. This variable included three response options, including *below 5 years*, *5 to 10 years*, and *above 10 years* (see Table 1).

Table 1: Distribution of respondents according to teaching experience

Category	Frequency	Percent (%)
Below 5 years	112	20.6
5-10 years	297	54.7
Above 10 years	134	24.7
Total	543	100

Table 1 shows the frequencies and percentages of the respondents according to their teaching experience. The majority of the respondents (54.7%) indicated that they had 5 to 10 years of experience in teaching ESL. Furthermore, only 20.6% of the respondents had less than 5 years of teaching experience.

4.2 Statistical Analysis

Statistical Package for Social Science (SPSS) v. 26 was used to analyze the data. We applied a descriptive analysis method to evaluate the emerging data. Frequencies and percentages were used to summarize the characteristics of the data set in the questionnaire.

4.3 Reliability Test

Reliability is defined as the degree to which measures can be judged to be free from error and yield consistent results (i.e., procedure consistency). If the measurement process consistently provides the same degree of equal values, then the procedure can be judged reliable. We applied reliability analysis (Cronbach's α) to measure the internal consistency of the items in the questionnaire. Reliability analysis calculates the reliability of the degree of internal consistency between variables, calculating the degree to which several items evaluate the same variable that indicates the achievement of constant outcomes. Such analysis is significant to assess the scale's features and internal reliability between the items.

4.4 Tool Validity

We analyzed the correlation between all variables in this study to confirm the validity of the questionnaire. Cronbach's alpha was used to calculate the correlation between variables of the tool. The value of Cronbach's alpha for items of technological proficiency is .708, whereas the value for items of pedagogical compatibility is .709. Furthermore, the Cronbach's alpha value for items of social awareness is .717 and .778 for teachers' digital-competence PDNs to use ChatGPT in teaching ESL overall. Lastly, the Cronbach's alpha value for items of teachers' beliefs and perceptions towards applying ChatGPT as a teaching pedagogy in the EC classroom is .725 and .862 for the overall value of items.

As seen in Table 2, the Pearson correlation coefficient of the items for technological proficiency ranges between .654** and .840**. For the items for pedagogical compatibility, the Pearson correlation coefficient ranges between .751** and .856**. Furthermore, for the social awareness domain, the Pearson correlation coefficient of the items ranges between .772** and .822**. Lastly, the Pearson correlation coefficient of the items for EC teachers' beliefs and perceptions towards applying ChatGPT as a teaching pedagogy in teaching ESL ranges between .386** and .839**.

Table 2: Person correlation coefficient values for questionnaire items

No	Items	Pearson coefficient
Technological proficiency		
1	Awareness of the features of ChatGPT	.840**
2	Understanding how ChatGPT works	.720**

3	Knowing how to construct effective prompts and interact with ChatGPT	.654**
4	Awareness of how to troubleshoot challenges using ChatGPT in the classroom	.707**
Pedagogical compatibility		
5	Using ChatGPT to improve or transform language teaching and learning contexts	.751**
6	Planning to implement activities through using ChatGPT	.856**
7	Guiding students to employ ChatGPT for self-directed learning	.780**
Social awareness		
8	Guiding learners on how to use ChatGPT	.772**
9	Gaining a critical awareness of the drawbacks of ChatGPT before preparing and employing tasks	.805**
10	Understanding how to inform students of the ChatGPT ethical issues, risks, and drawbacks	.822**
EC Teachers' beliefs and perceptions towards applying ChatGPT as a teaching pedagogy in teaching ESL		
1	I think about incorporating ChatGPT as a tool in ESL instruction	.488**
2	I believe ChatGPT can also offer suggestions for age-appropriate learning activities that align with the curriculum	.501**
3	I perceive ChatGPT as a way to deliver instant language support for young ESL students	.498**
4	I perceive ChatGPT as a model that can provide instant feedback on students' grammar, vocabulary, and sentence structure	.389*
5	I believe ChatGPT has the potential to positively impact students' acquisition of ESL	.518**
6	I feel that my knowledge and skills align well with effectively implementing ChatGPT, which could empower students' education	.453*
7	I believe ChatGPT could contribute to spark creative thinking skills for learners in storytelling abilities	.386*
8	I feel that my knowledge and skills fit well with effectively implementing ChatGPT in the context of ESL	.492**
9	I am interested in receiving professional development training to enhance my confidence in using ChatGPT for ESL instruction	.515**
10	I have reservations about the potential drawbacks of using ChatGPT in ESL teaching	.496**
11	I have concerns about the potential challenges in using ChatGPT with ESL for young learners	.493**
12	I consider ChatGPT as a valuable asset to my teaching toolkit for ESL instruction	.519**
13	I recommend considering the use of ChatGPT to my colleagues	.539**

Note: * significant at $\alpha = 0.05$; ** significant at $\alpha = 0.01$

We also measured the means (M) and standard deviations (SD) for each construct and related items. These items were ordered in descending value levels based on the following scale: less than 2.33 = low; 2.34–3.67 = medium; and 3.68–5 = high. Regarding the result of the first research question, the PDNs of EC teachers to

achieve digital competences of using ChatGPT in teaching ESL were analyzed, showing the rank of the mean and its importance level according to the class interval (see Table 3).

The results in Table 3 show that respondents had higher levels of PDNs in relation to social awareness ($M = 3.91$, $SD = 1.35$) compared to pedagogical compatibility ($M = 3.76$, $SD = 1.34$). The overall assessment of this variable yielded a mean of 3.82 ($SD = 1.32$), generating a high level of agreement among respondents.

Table 3: Early education teachers' professional development needs in digital competences

N	Axis	M	SD	Rank	Level
3	Social awareness	3.91	1.35	1	Medium
1	Technological proficiency	3.78	1.36	2	Medium
2	Pedagogical compatibility	3.76	1.34	3	High
Overall		3.82	1.32	-	High

These results reflect the urgent need for EC teachers for additional training courses in social awareness. This may be due to concerns associated with their capabilities to gain a critical awareness of the drawbacks of ChatGPT and concerns about how to assist young learners in understanding the risks, ethical issues, and challenges.

4.5 Technological Proficiency

As shown in Table 4, respondents' PDNs in the area of technological proficiency were analyzed to rank the mean and its importance level according to the class interval. Further analysis revealed high-level PDNs by respondents for training to increase their awareness of troubleshooting challenges using ChatGPT in the classroom ($M = 3.90$, $SD = 1.41$). However, analysis showed a medium-level need by respondents to know how to construct effective prompts and interact with ChatGPT ($M = 3.66$, $SD = 1.46$). The overall assessment of this variable yielded a mean of 3.78 ($SD = 1.36$), indicating a high level of agreement among respondents.

Table 4: Early childhood teachers' professional development needs in technological proficiency

N	Item	M	SD	Rank	Level
4	Awareness of the troubleshooting of challenges using ChatGPT in the classroom	3.90	1.41	1	High
1	Awareness of the features of ChatGPT	3.83	1.44	2	High
2	Understanding how ChatGPT works	3.74	1.44	3	High
3	Knowing how to construct effective prompts and interact with ChatGPT	3.66	1.46	4	Medium
Overall		3.78	1.36	-	High

Based on these results, respondents felt frustrated about experiencing any troubleshooting challenges when using ChatGPT, as they expressed a high level

of need for comprehensive guides through training to handle relevant issues in the future.

4.6 Pedagogical Compatibility

As demonstrated in Table 5, the pedagogical compatibility of respondents was analyzed to rank the mean and its importance level according to the class interval.

Table 5: Early education teachers' professional development needs in pedagogical compatibility

N	Item	M	SD	Rank	Level
2	Planning and implementing tasks through using ChatGPT	3.79	1.38	1	High
3	Guiding learners to employ ChatGPT for self-directed learning	3.77	1.44	2	High
1	Applying ChatGPT to improve or transform language learning and teaching contexts	3.72	1.46	3	High
Overall		3.76	1.34	-	High

Analysis revealed that the level of respondents' PDNs regarding specific training in planning and implementing tasks through using ChatGPT within ESL learning contexts was high ($M = 3.79$, $SD = 1.38$). Subsequent analysis revealed a high level of PDNs for respondents in using ChatGPT to improve or transform language learning and teaching tasks ($M = 3.72$, $SD = 1.46$). All in all, the assessment of this variable yielded a mean value of 3.76 ($SD = 1.34$), indicating a high level of agreement among respondents.

4.7 Social Awareness

In relation to ESL, respondents' social awareness associated with applying ChatGPT in teaching young students ESL was analyzed (Table 6).

Table 6: Early education teachers' professional development needs in social awareness

N	Item	M	SD	Rank	Level
3	Understanding how to inform students about ChatGPT risks, ethical issues, and drawbacks	4.01	1.40	1	High
2	Gaining a critical awareness of ChatGPT drawbacks and taking them into account when planning and implementing tasks	3.91	1.40	2	High
1	Guiding learners on how to use ChatGPT	3.82	1.45	3	High
Overall		3.91	1.35	-	High

Analysis showed that respondents expressed that PDN training courses highly enriched their digital literacy and understanding of how to inform learners about ChatGPT risks, ethical issues, and drawbacks, with a high mean value ($M = 4.01$, $SD = 1.40$). Concerning ChatGPT, respondents feared that their students' stored information might be disclosed and their privacy thus breached when using AI. Respondents expressed a lower level of PDNs in training regarding guiding learners on how to use ChatGPT ($M = 3.82$, $SD = 1.45$). The overall assessment of

this variable yielded a high mean value ($M = 3.91$, $SD = 1.35$) as per analysis of respondents' responses.

Subsequent analyses were applied to determine the mean and standard deviation of digital competences of respondents in applying ChatGPT in ESL according to the variable teaching experiences (see Table 7).

Table 7: One-way analysis of variance (ANOVA) for the differences in early childhood teachers' digital-competence domains according to the teaching experiences variable

		Sum of squares	df	Mean square	F	Sig.
Social awareness	Between groups	3.949	2	1.975	1.062	.346
	Within groups	1003.841	540	1.859		
	Total	1007.790	542			
Technological proficiency	Between groups	1.024	2	0.512	0.283	.754
	Within groups	977.977	540	1.811		
	Total	979.001	542			
Pedagogical compatibility	Between groups	4.224	2	2.112	1.166	.312
	Within groups	978.210	540	1.812		
	Total	982.434	542			
Overall	Between groups	2.853	2	1.427	0.817	.442
	Within groups	943.151	540	1.747		
	Total	946.004	542			

As seen in Table 7, the analyses of the digital-competence domains of social awareness, technological proficiency, and pedagogical compatibility in relation to the variable teaching experiences showed that there were no significant differences between these domains and teaching experiences.

Further analysis was undertaken to answer the second research question. Table 8 shows the results of the analysis of the beliefs and perceptions of respondents towards using ChatGPT for teaching ESL and the rank of the mean and its importance level according to the class interval.

Table 8: Early childhood teachers' beliefs and perceptions towards using ChatGPT for teaching English as a second language

N	Item	M	SD	Rank	Level
1	I think about incorporating ChatGPT as a tool in ESL instruction	4.11	1.17	1	High
3	I perceive ChatGPT as a way to provide instant language support for young ESL students	4.06	1.18	2	High
13	I believe ChatGPT could contribute to sparking creative thinking skills for learners in storytelling abilities	4.03	1.23	3	High
9	I am interested in receiving professional development training to enhance my confidence in using ChatGPT for teaching ESL	4.02	1.16	4	High

5	I believe ChatGPT has the potential to positively impact students' acquisition of ESL	4.01	1.22	5	High
2	I believe ChatGPT can also offer suggestions for age-appropriate learning activities that align with the curriculum	4.00	1.25	6	High
4	I perceive ChatGPT as a model that can provide instant feedback on students' grammar, vocabulary, and sentence structure	3.98	1.23	7	High
N	Item	M	SD	Rank	Level
7	I recommend considering the use of ChatGPT to my colleagues	3.75	1.36	8	Medium
10	I have reservations about the potential drawbacks of using ChatGPT in ESL teaching	3.55	1.48	9	Medium
11	I have concerns about the potential challenges in using ChatGPT with early childhood education ESL learners	3.51	1.50	12	Medium
6	I feel that my knowledge and skills align well with effectively implementing ChatGPT and could empower students' education	2.55	1.50	10	Medium
8	I feel that my knowledge and skills fit well with effectively implementing ChatGPT in the context of ESL	2.54	1.48	11	Medium
Overall		3.69	0.94	-	

As shown in Table 8, results indicate that most respondents considered incorporating ChatGPT as a tool in teaching young students ESL ($M = 4.11$, $SD = 1.17$). Most respondents also perceived ChatGPT as a way to provide instant language support for young ESL students ($M = 4.06$, $SD = 1.18$). Interestingly, respondents believed positively that ChatGPT could contribute to sparking students' creative thinking skills in storytelling tasks, with a high mean value recorded for this item ($M = 4.03$, $SD = 1.23$). The variable of teachers' beliefs and perceptions towards using ChatGPT for teaching ESL received an overall mean value of 3.66 ($SD = 0.94$), showing a medium level of agreement by the study sample. Consequently, it can be derived that ChatGPT has a powerful influence in advancing young students' language practices and acquisition.

5. Discussion

While ChatGPT remains an emerging tool for teaching children a second language, many teachers may not be aware of it or have adequate knowledge about it. Surprisingly, the findings of the present study indicate that there is no significant relationship between teaching experience and teachers' digital competences. Accordingly, our findings draw attention to improving digital competences to enable EC teachers to correctly use the ChatGPT tool. These competences include technological proficiency, pedagogical compatibility, and social awareness. The participating English teachers in EC settings expressed their PDNs and most exhibited positive attitudes towards receiving specific training to enhance their confidence in using ChatGPT. This result is in line with the findings of Mhlanga (2023) and Tapalova and Zhiyenbayeva (2022), who stressed the influence of adequate and effective training courses in computer literacy on teachers' abilities and performance in relation to ChatGPT. PDNs should be

forward-thinking towards revolution in education; nevertheless, many EC schools employ traditional approaches without focusing on current gaps in their teaching skills. Although few of these approaches have the potential and benefit to achieve learning outcomes effectively, other approaches turn out to be outdated in the rapidly changing education system as they were constructed for a different era. Scholars have found that ChatGPT introduces an advanced language model developed by OpenAI which provides language learning possibilities that go beyond traditional pedagogical boundaries in education (Ali et al., 2023; Baskara & Mukarto, 2023; Kim et al., 2023; Kohnke et al., 2023). However, based on our generated findings, it appears that teachers are not yet ready to apply ChatGPT in teaching ESL in their classrooms due to their lack of adequate digital skills and knowledge. Drawing on these significant findings, teachers and their students should be qualified to use ChatGPT, regardless of whether they are likely to use it outside of the school environment.

Moreover, respondents valued their PDNs in social awareness more highly compared to technological proficiency and pedagogical compatibility. To elaborate, respondents expressed their concern about their young students' lack of critical awareness of the potential risks, challenges, ethical issues, and drawbacks of implementing ChatGPT in the classroom. This finding agrees with previous findings that acknowledge several ethical and legal issues in regards to applying ChatGPT in various learning contexts which relate to learning privacy, bias, copyright, and transparency (Kim et al., 2023; Luo et al., 2023; Mhlanga, 2023; Rahman & Watanobe, 2023). In certain cases, teachers can implement prevention strategies to mitigate the risks of using ChatGPT, such as increasing supervision or monitoring of students during use, establishing specific guidelines for safe use, and making clear what they are expected to achieve. Despite these issues, most of the EC teachers in our study expressed optimistic perceptions and beliefs towards applying ChatGPT in ECE in teaching young students ESL. According to our results regarding the integration of ChatGPT into teaching ESL, respondents' beliefs and perceptions about ChatGPT was that it is a new form of pedagogy and useful source for age-appropriate learning activities aligned with learning in the EC curriculum. This significant finding leads us to think deeply and critically about whether the infrastructure of schools, not only in the Saudi context but also across the world, are ready to make digitalization sustainable in education for the effective application of AI tools.

In the same vein, empowering young students with digital skills to effectively apply the ChatGPT tool will give them equal opportunity to develop their language skills in learning a second language. Interestingly, our results reveal that EC teachers believe that ChatGPT has the potential to positively impact students' second language acquisition. Additionally, EC teachers have a positive response towards applying ChatGPT as a pedagogical tool that could contribute to sparking creative thinking skills for learners' storytelling abilities. This finding is consistent with Kartal's (2023) finding that ChatGPT enhances learners' second language learning by supporting them to comprehend a text such as a short story and to generate comprehension and extension questions, which enhances their reading skills and promotes critical and creative thinking. Regarding assessment,

participating EC teachers in the current investigation reported that they perceived ChatGPT as a model that can provide instant feedback on students' grammar, vocabulary, and sentence structure. These results confirm previous findings that propose ChatGPT as an advanced language model in supporting learners' vocabulary acquisition and empowering the triad structure of teacher–student–technology (Ali et al., 2023; Hong, 2021; Kartal, 2023; Su & Yang, 2023). However, Weller (2023) argued that to experience the full benefits of applying ChatGPT, as well as how to successfully gain the most from it, teachers and students need to be fully skilled and aware of its risks. It can be argued that the integration of AI in the educational system in the current era is inevitable; therefore, EC teachers should prepare learners to do what humans do best by educating them to work effectively with ChatGPT and achieve more successful learning outcomes.

6. Conclusion and Implications

This paper draws a clear conclusion related to applying ChatGPT in ESL learning contexts, which assists young learners in acquiring new language skills. In terms of potential limitations arising from the current study, we primarily used a quantitative research method. Results from a self-administered questionnaire may not reflect the complexity of the current investigation and may not provide us with the richness of the issues related to the topics under study. Despite this limitation, our significant investigation sheds light on the gap occurring in EC teachers' digital competences, in which participating EC teachers expressed a high demand and need to improve their skills to encounter the massive educational pedagogical changes related to AI. We strongly believe that, after the initial ChatGPT adoption, EC teachers will start perceiving the bright side of the transformation so that they can fully embrace the benefits brought by applying innovative technology to educational settings. Despite EC teachers' concerns about ethical issues, our overall results reveal fundamentally optimistic beliefs and perceptions of EC teachers about applying the ChatGPT tool and the role they will perform to facilitate young students' ESL learning. Respondents believed, however, that learning ESL will not happen by itself through applying ChatGPT within classrooms; it requires their continuous monitoring and assessment of students' learning outcomes. To put it briefly, this research contributes to providing clear insight into EC teachers' perceptions and beliefs about ChatGPT as a resource for teaching ESL in the early years. It further highlights the urgent need for improving educators' digital awareness by identifying the multifaceted interplay between benefits, challenges, and pedagogical considerations in using ChatGPT in the context of second language teaching.

Based on our noteworthy findings, we recommend that policymakers, educators, and individuals address the identified concerns and risks of EC teachers in a responsible and ethical manner. In the same vein, we recommend that language teachers in EC settings discover the pedagogical potentials of ChatGPT and practice it to enhance ECE in theoretical stances and principled approaches. Collaboration is important for educational agencies to develop effective policies and pedagogical guidelines related to incorporating ChatGPT in teaching ESL to young learners to ensure its responsible use in their education. The collaborative

process should include the review of the potential of AI in innovative student assessment, in line with the tremendous technological advances that have already reshaped many aspects of education, including second language learning. Certainly, ongoing support for teachers, associated with meeting and considering their PDNs, is crucial before they adopt ChatGPT in the classroom. Based on our constructive findings, we agree with Kohnke et al.'s (2023) results in terms of inspiring English language teachers to further explore the pedagogical possibilities and values of ChatGPT and use it to enrich education explicitly in ECE beyond principled methods. The results of this study attempt to give a clear pathway for closing the gap in the existing ECE literature regarding teachers' needs to receive adequate training in applying AI tools successfully within English learning contexts. Future research in the field of ECE should embrace AI development, evaluation, and its influence on second language learning outcomes; consider potential challenges and ethical aspects; and examine its effectiveness in different educational contexts. Future research is necessary regarding the impact of ChatGPT on students' critical thinking and problem-solving skills in EC contexts.

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7. References

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