Using T-Robot Board Games to Enhance Learning Gains of Rural Elementary School Students

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Abstract: This study used T-Robot board games to create an interactive and enjoyable English language learning environment for the purposes of reducing learners' anxiety while also enhancing their speaking skills. The participants of this study were 28 fourth-grade students with limited English proficiency from a rural area of Taichung City, Taiwan, and multiple data sources using mixed methods were also adopted for data analysis, including pre-and post-tests, questionnaires, and interviews. Quantitative results showed significant improvements in both speaking ability and reduced anxiety, and positive qualitative feedback was also displayed from the interviews. The integration of robotic board games provided a promising alternative to traditional teaching methods, particularly for lower-proficiency students.

Keywords: Robot board game, Speaking anxiety, Enjoyment

1. Introduction

In today's globalized world, English proficiency is crucial for success. However, the rural area of Taichung City faces a challenge with low English proficiency among elementary students, particularly in speaking, leading to heightened anxiety in communication. Ho (2010) highlighted how traditional teaching methods and reliance on commercial materials hinder cognitive development and critical thinking skills. To overcome this, an innovative approach incorporating board games and robots into the curriculum has been explored. Notably, Huang Qianyi's 2018 study introduced board games tailored for elementary students to enhance English conversation skills. The combination of these games with the engaging T-Robot aimed to improve learning enjoyment and reduce anxiety. By offering an interactive and appealing English learning experience, the goal was to elevate proficiency and foster a greater sense of enjoyment in the learning process. To investigate the effectiveness of the proposed teaching method, the following three research questions guided this study:

1. To what degree did robot board games alleviate elementary school students' oral communication anxiety in English language learning?
2. To what degree did the integration of Robot board games improve students' English-speaking proficiency?
3. How did students perceive the use of Robot board games in enhancing their enjoyment of speaking English?

2. Research methods

The study utilized a robot board game as a teaching tool to integrate English language learning for 29 fourth-grade students in the rural area of Taichung City. The research aimedto evaluate the learning effect and feedback of students after a 10-week experiment, consisting of two 40-minute classes per week. In the first week, students were administereda pre-test of English-speaking proficiency and English ability, along with a pre-questionnaireon anxiety. Throughout the teaching process, illustrated in Fig. 1, the teacher began by teaching the necessary vocabulary for the students to apply in their work. Next, students were instructed to work collaboratively in groups to create a school map, incorporating places, treasures, monsters, and a route, while simultaneously practicing the oral speaking part for their final presentation, which would take place during weeks 2-7. During the final week, students completed a post-test of English-speaking proficiency and ability, as well as a post-questionnaire. The study used pre-test, post-test, and questionnaires as assessmenttools, including the modified test and questionnaire which was adapted from Luo, K. M. (2019). The speaking test comprised three parts: cloze, multiple choice, and oral tests, and the modified questionnaires included 10 questions items. In addition to quantitative analysis,the study also conducted qualitative one on one interviews with 12 students and classroom observations to gain an in-depth understanding of this innovative instruction. The interview protocol asked two questions about students' enjoyment of the course and their feelings about the robot. The study sought to answer three research questions related to the improvement of English-speaking anxiety, enjoyment, and English-speaking proficiency score.

Fig. 1 Students collaborating as a team to use coding cards and make T-Robot move

2.1 T-Robot (Assisted by Reading & Rhythm Co., Ltd.)

T-Robot, a robotic board game, utilized coding cards for directing the robot's movement. The game involved students interpreting and executing commands from these cards on a map. With dimensions of 106x71x71 mm, the robot was designed for easy handling, featuring wheels for smooth movement. Command cards provided visual symbols and English explanations for user-friendly interaction.

3. Findings

The study found that incorporating the T-Robot board game into English teaching effectively reduced speaking anxiety, improved enjoyment, and enhanced speaking abilities.

3.1 To What degree did robot board games alleviate elementary school students' oral communication anxiety in English language learning?

The study showed significant reduction in oral communication anxiety using T-Robots. A five-point Likert scale pre-intervention (M = 3.66, SD = 0.744) and post-intervention (M = 4.16, SD = 1.023) demonstrated a -0.500 difference. The 95% confidence interval (-0.851 to -0.149) supports this change. A t-value of -2.923, 27 degrees of freedom, and p-value of 0.007 confirm the anxiety reduction. T-Robots effectively alleviate language-related anxiety, highlighting technology's role in addressing student challenges in language learning.

Table 1

Pre- and Post-English Oral Communication Anxiety Questionnaire

	Mean scores	SD	Mean difference (Pre-Post)	SD	Std. Error Mean	95% CI of the Difference		t	df	Sig. (Two-tailed)
						Lower	Upper			
Pre	3.66	1.023								
			-.500	.905	.171	-.851	-.149	-2.923	27	.007**
Post	4.16	.774								

**P<0.01

3.2 To what degree did the integration of Robot board games improve students' English-speaking proficiency?

In RQ2, Table 2's analysis for the English-Speaking Proficiency Test revealed a significant reduction in oral communication anxiety (mean difference: -12.857, pre-test: M = 31.43, post-test: M = 44.29, SDs provided). The highly significant t-value of -7.586 (27 degrees of freedom, p = 0.000) reinforces this finding. Improved English-speaking proficiency is indicated by increased post-test scores and reduced variability. These results guide educators towards effective strategies for enhancing learners' oral communication skills.

Table 2

Pre-test and Post-test Results for English Speaking Proficiency Test

	Mean scores	SD	Mean difference (Pre-Post)	SD	Std. Error Mean	95% CI of the Difference		t	df	Sig. (Two-tailed)
						Lower	Upper			
Pre	31.43	16.322								
			-12.857	8.968	1.695	-16.335	-9.380	-7.586	27	.000***
Post	44.29	15.258								

***P<0.001

3.3 How did students perceive the use of Robot board games in enhancing their enjoyment of speaking English?

RQ3 interviews revealed students' enjoyment of robot board games due to their engagement and interactivity. They valued the challenges and teamwork, with one student expressing increased enthusiasm for English class. These findings highlight the games' potential to enhance English learning enjoyment, encourage participation, and improve proficiency, particularly for students with lower language skills.

4. Conclusion

Incorporating innovative teaching methods like using games in the English curriculum has the potential to improve learning outcomes, especially for less proficient students. This study's results supported the effectiveness of the Robot board game method in enhancing English proficiency, reducing anxiety, and increasing learning enjoyment. Therefore, integrating this method can create a more engaging and effective language learning experience, ultimately benefiting students' academic and professional achievements.

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PTP

How teachers' conceptions of student engagement influenced their actual strategy implementation, and student online engagement

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Abstract: In this study, we explored the interplay between teachers' conceptions of student engagement, their strategy implementation, and student engagement in a videoconferencing-based fully online learning environment. The mixed-method multi-case study involved two postgraduate courses, with data collected via surveys and semi-structured interviews. Findings illustrated diverse conceptions of student engagement among instructors, influencing their teaching strategies and ultimately affecting student engagement. Instructors with a comprehensive, multidimensional understanding of engagement encompassing behavioral, emotional, and cognitive aspects were more likely to employ effective strategies, resulting in improved student engagement.

1. Introduction

The COVID-19 pandemic triggered a transition to online learning, utilizing videoconferencing for synchronous learning. However, research points to low student engagement in this setting (Maimaiti et al., 2021). Engagement, a key factor in learning outcomes and positive behaviors (Martin & Bolliger, 2018), is greatly influenced by the instructor (Farrell & Brunton, 2020). Yet, discrepancies often exist between teachers' conceptions and practices (Ndeke & Keraro, 2021). This study investigates how teachers' engagement conceptions influence their strategies and its subsequent effect on student online engagement. It seeks to answer: (1) How do instructors conceptualize student engagement? (2) How do their conceptions affect their implementation of engagement strategies? (3) How does their strategy implementation affect student engagement?

2. Method

This study, using a multi-case approach, quantitative and qualitative methods, explored two postgraduate courses at a Hong Kong university that had moved to online learning due to the pandemic. Participants, selected through convenience sampling, provided data via interviews and a survey. We conducted online interviews with 24 students (12 students from each course). Each interview took about 35 minutes. Pedler et al.'s (2020) engagement strategies framework (as shown in Figure 1) is used to guide question design. This framework offers instructors guidance for fostering behavioral, emotional, and cognitive engagement. Our research focused on these strategies within teaching practices, addressing gaps in previous studies that either ignored engagement's multidimensional aspects (e.g.,Nafukho & Chakraborty, 2014) or concentrated on student strategy use (e.g., Redmond et al., 2018). Along with the interview, we also used a self-reported engagement

questionnaire adapted from Skinner et al. (2008) and Rotgans and Schmidt (2011). This 14-item questionnaire, validated with Cronbach's alpha values over 0.8 (Lo, 2017), gathered data on behavioral, emotional, and cognitive engagement. We received 47 valid responses, with internal consistency of 0.89.

The interview data was analyzed using deductive content analysis with Pedler et al.'s framework as the coding matrix, and the survey data was descriptively analyzed and tested for significant differences between the two courses.
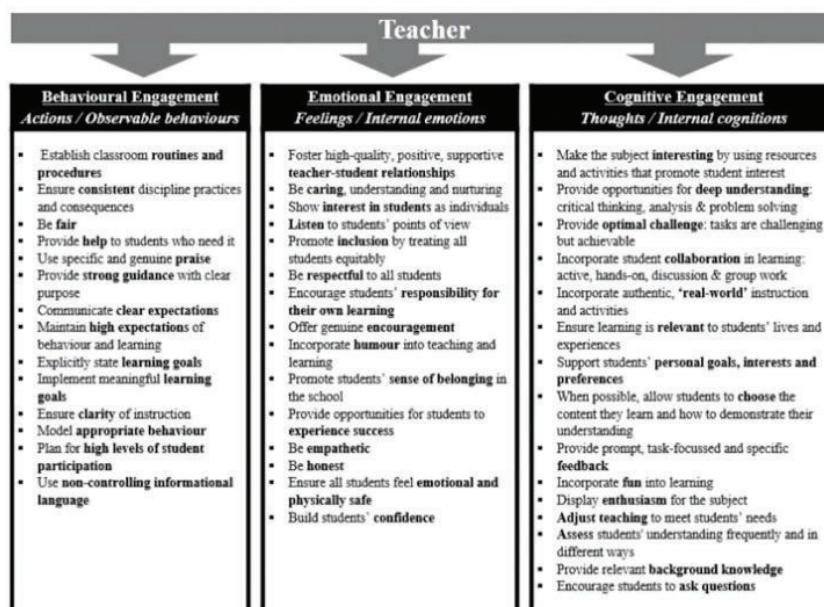

Figure 1. A framework of guidelines for teachers to promote student engagement (Pedler et al., 2020, p. 55)

3. Findings

Instructors from two courses held distinct conceptions of student engagement. Course One's instructor focused on learning experience design and alignment of activities with learning outcomes, viewing engagement as students mentally navigating through the learning process. Conversely, Course Two's instructors conceptualized engagement more specifically in terms of behavioral, emotional, and cognitive aspects, underlining the importance of active participation, enjoyment, and content understanding.

Course Two implemented all engagement strategies outlined by Pedler et al. (2020), while Course One's implementation was more selective. Course One's instructor used a rigid course outline, limiting opportunities for behavioral engagement. Students desired more interactive activities. Similarly, emotional engagement strategies were deficient in Course One due to the instructor's lack of emphasis on interaction, making students feel distant and disengaged. In contrast, Course Two fostered positive teacher-student relationships by creating interaction opportunities. Cognitive engagement strategies were partially implemented in Course One, with a focus on self-directed learning but limited measures to ensure student understanding and application of the content and promote student interest. Course Two, on the other hand, utilized all cognitive engagement strategies, employing diverse resources and activities to make lessons interesting, interactive, and practical.

Quantitative survey data of a T-test as showed in Table 1, indicated that students in Course Two exhibited significantly higher levels of behavioral, emotional, and cognitive engagement compared to students in Course One, which aligned with the interview findings.

Table 1. *T-test result of students' behavioural, emotional, and cognitive engagement*

Engagement dimension	Course	N	Mean	t-test	p-value
Behavioral engagement	Course One	25	3.592	-4.323	<.001
	Course Two	22	4.264		
Emotional engagement	Course One	25	3.3920	-4.211	<.001
	Course Two	22	4.0364		
Cognitive engagement	Course One	25	3.0400	-3.832	<.001
	Course Two	22	3.6136		

4. Accessibility

This research investigated how instructors' engagement conception affect their strategy implementation and consequently, online student engagement. Instructors' unique conception, perhaps influenced by their research interests and other elements, significantly affected strategy effectiveness. The instructor of Course One focused on behavioral engagement strategies, leading to lower student involvement due to limited interaction and disregard for student interests. However, Course Two's instructors, who employed a broader engagement conception, utilized diverse strategies, enhancing student engagement. They fostered behavioral, emotional, and cognitive engagement via group activities, personalized communication, and practical application. The study highlights that instructors' engagement understanding informs their teaching strategies and affects student engagement online. It implies a comprehensive engagement conception can direct effective strategy execution. Future research could delve deeper into factors influencing instructors' conceptions of student engagement and involve larger participant sample size.

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ICCE 2023 Exploring the Social Media Discourse: the Impact of ChatGPT on Teachers' Roles and Identity

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Abstract: As the use of ChatGPT in education becomes more prevalent, it is important to examine the potential impact on teachers' roles and identity. This study aimed to investigate how ChatGPT may shape teachers' roles and identity by conducting a thematic analysis of contents from WeChat posts that discuss the use of ChatGPT by teachers. The analysis focused on identifying themes related to the impact of ChatGPT on teachers' perceived self, pedagogical roles, and relationships with students. The findings suggest that ChatGPT may have both positive and negative impacts on teachers' roles and identity. On the one hand, ChatGPT can bring new possibilities to teachers allowing them to focus more on students' qualities and soft skills development and personalise feedback and assessment for students, which could reduce the workload of teachers and enhance their effectiveness. On the other hand, the use of ChatGPT may threaten the professional identity of teachers, leading to feelings of inadequacy or a loss of control over the teaching process. Furthermore, the use of ChatGPT may give rise to ethical issues in teaching and lead to a trust crisis between teachers and students. This study highlights the need for further research on the impact of ChatGPT and provides insights into the implementation of ChatGPT in education.

Keywords: ChatGPT, Artificial intelligence (AI), social media, teacher identity, teaching roles, thematic analysis

1. Introduction

Research on artificial intelligence (AI) is not new but becomes newly and unprecedentedly fashionable due to the emergence of ChatGPT (Generative Pre-trained Transformer), a powerful natural language processing model developed by OpenAI that can generate human-like text based on a given prompt and can be trained as a conversational agent responding to a wide variety of commands from end users (Jalil et al., 2023). In a remarkably short time following its release, ChatGPT has spurred widespread discourses across a diverse range of societal spheres (A.Shaji George et al., 2023; Biswas, 2023; Surameery & Shakor, 2023), among which the educational sector is one area where ChatGPT has the potential to make a significant impact. Many educators have conveyed enthusiasm about the potential for these tools to introduce innovative pedagogical opportunities (Jalil et al., 2023). Others, however, are concerned about the potential of technology to dehumanise the learning experience driven by fear of commercialisation or neo-liberal ideologies wrapped up in technology (Cox, 2021).

With artificial intelligence and robots providing customised instruction to students, teachers' roles may shift toward overseers who design and select machine-led instruction, monitor student progress, and provide support (Edwards et al., 2018). Teachers play a critical role in shaping the learning experiences of students, and their professional identity is an important aspect of their work; as such, research on teachers' professional identity formation contributes to our understanding of what it feels like to be a teacher in the face of rapidly advancing technologies and how teachers respond to these changes (Beijaard et al., 2004). From this point of view, it is crucial to understand how teachers consider their identity in the teaching profession. What is found relevant to the profession, especially with the

increasing introduction of artificial intelligence into education, may clash with a teacher's values and beliefs about what constitutes effective teaching practices (Beijaard et al., 2004).

2. Literature Review

2.1 Teacher Identity

Teacher identity has been variously defined in the literature (Beijaard et al., 2004). Gee (2000) defined teacher identity as a certain "kind of person" or "several different kinds" acting and interacting in a given context' (Gee, 2000, p. 99). However, Hoffman-Kipp (2008) believe that teacher identity is not a fixed point that individuals interact with the world, but 'the intersection of personal, pedagogical, and political participation and reflection within a larger sociopolitical context' (p. 153) (Beijaard et al., 2004). While there is no consensus regarding what constitutes teacher identity, there is a general acknowledgement that teacher identity plays a key role in decisions teachers make about their teaching practices, the content they teach, the kind of relationships they maintain with their students (Beijaard et al., 2004), as well as 'where they place their effort, and whether and how they seek out professional development opportunities' (Hammerness et al., 2005, pp. 383–384).

In this study, teacher identity is understood from a socio-cultural point of view, which holds that teachers do not develop their identity in a vacuum, but rather in a context that brings social and cultural forces to bear upon that development (Holland & Lachicotte, 2007). The concept of teacher identity encompasses three key dimensions, 1) perceived self refers to the personal and subjective sense of self that teachers develop as they navigate their role as educators, which includes a teacher's beliefs, attitudes, values, and emotions, 2) pedagogical roles related to teaching and learning that involves the knowledge, skills, attitudes, and values that define a particular profession and distinguish it from others, and 3) their relationships with students (Beijaard et al., 2004).
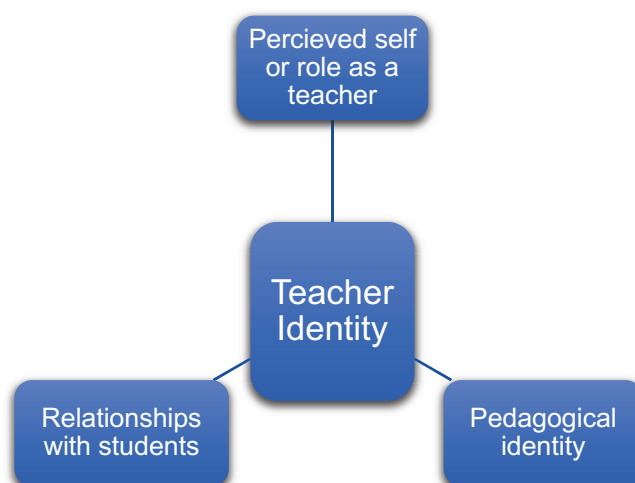

Figure 1. Conceptualising teacher identity

2.2 The Impact of ChatGPT on Teachers' Identity

The use of technology in education has raised concerns about its potential impact on teachers' roles and identity. For example, some studies have suggested that the use of technology in the classroom can enhance teachers' professional identity by enabling them to be more innovative, creative, and effective in their teaching practices (Donaghue, 2020; Koehler & Mishra, 2009; Zhong et al., 2022). Other studies have highlighted the potential negative impact of technology on teacher identity, such as feelings of inadequacy or a loss of control over the learning process (DiGregorio & Liston, 2018; Hill & Uribe-Florez, 2020).

While ChatGPT is a relatively new technology, there have been several studies exploring its potential impact on teacher identity, with mixed results. ChatGPT can assist teachers in completing their roles in teaching practices. For instance, the AI-powered system can help teachers provide customized feedback to individual students, saving them time and effort (Lund & Wang, 2023). It can be used to create intelligent tutors that provide personalised guidance and feedback to students as they progress with their studies (Kalla & Smith, 2023; Markel et al., 2023). Despite the benefits, Shidiq (2023) indicated that the role of human teachers cannot be replaced by ChatGPT because education requires direct interaction, emotional connection, creativity, and the ability to capture nuances and learning styles of individual students.

Additionally, the pedagogical dimension of teacher identity may be impacted by the potential for ChatGPT to automate certain aspects of grading and assessment (Kalla & Smith, 2023). For instance, a study using questions from a software testing book by Ammann and Offutt indicated that ChatGPT can provide correct or partially correct answers in 55.6% of cases, provide correct or partially correct explanations of answers in 53.0% of cases, and that prompting the tool in a shared question context leads to a marginally higher rate of correct responses (Jalil et al., 2023). However, Tack and Piech (2022) have developed a solution for testing the abilities of an AI teacher by running conversational agents in parallel to human teachers and comparing their responses in terms of speaking, understanding, and helping students. The findings indicated that while AI performs well on conversational uptake, they are quantifiably worse than real teachers on several pedagogical dimensions, especially with regard to helpfulness (Tack & Piech, 2022). Pickell & Doak (2023) have highlighted that while integrating ChatGPT into teaching, instructors should focus on creating better assignments that require critical thinking and analysis rather than a mere recollection of facts and that they should remain vigilant in detecting plagiarism and cheating.

It was also noted that the introduction of ChatGPT may affect the teachers' relationship with students. ChatGPT can be used to develop innovative projects and resources and create interactive games and activities that engage students more meaningfully (Kalla & Smith, 2023). A study by Markel et al. (2023) found that ChatGPT provides the opportunity for teachers to get valuable teaching practice without the pressures of affecting students, allowing them to iterate their responses both during each session and across sessions. ChatGPT can simulate social dynamics in student-teacher teaching settings, giving teachers the chance to practice mediating peer-peer learning interactions in a safe setting.

2.3 Research Questions

Given the nascent nature of ChatGPT, there is currently a lack of solid empirical studies related to how the use of ChatGPT may shape teachers' identity. This paper aims to fill this gap by conducting a content analysis of websites to investigate how ChatGPT may shape teachers' identity. Specifically, the study examined how ChatGPT may impact teachers' beliefs, attitudes, and values related to their role as educators, and how it may dynamically shape teachers' "collective" identity. The following research questions guided the inquiry:

RQ 1. In what ways does ChatGPT impact the roles of teachers?
RQ 2. How do teachers integrate ChatGPT into teaching pedagogies?
RQ 3. How does ChatGPT change teachers' relationships with students?

3. Methodology

3.1 Research Design

In this study, we employed thematic analysis to analyse the contents of posts or articles published on the WeChat platform, a highly influential social media platform in mainland

China. The posts or articles were centred around the potential impact of using ChatGPT on the roles and identity of teachers. Thematic analysis is a qualitative research method that is particularly useful for analyzing the content of textual data (Vaismoradi, et al., 2016). It is a flexible and systematic approach that can be used to provide a comprehensive and nuanced understanding of the underlying meanings and perspectives in the data (Braun & Clarke, 2006).

3.2 Data Collection

To collect data for this study, we conducted a search of relevant posts and articles using a combination of keywords, including "ChatGPT," "teacher," and "education" through one search engine WeChat platform to identify articles that are related to the use of Chat GPT by teachers, rather than crawling all public posts on the use of ChatGPT in education. Specifically, we used the following selection criteria to manually identify websites for inclusion in the study: 1) posts and articles discuss the use of ChatGPT in education and its potential impact on teachers' identity, 2) posts and articles published by reputable sources, such as academic institutions, educational organisations, or educational bloggers, 3) posts and articles that discuss the use of ChatGPT in education, and that provide information on the potential impact of this technology on teachers' identity, 4) sources published within two months from February 1, 2023 to March 31, 2023, in order to ensure that the data is up-to-date, and 5) the articles published on the platform have more than 100,000 reads to ensure that the articles selected for analysis have achieved a certain level of popularity or readership on the platform and are representative of the most widely read and influential articles on the platform. As a result, 133 articles and posts were retrieved. We further excluded articles that are identical and too short. Identical articles may indicate a lack of diversity or originality in the content, while very short articles may not provide enough context or details to fully understand the topic at hand. The WeChat platform system requires original articles to have a word count greater than 300. Regarding the nature of the platform, articles that did not meet the word requirement were excluded. Finally, 32 articles met the inclusion criteria after eliminating duplicates. At the time of the final analysis, six sites were defunct, leaving 26 articles and posts in the final sample.

3.3 Data Analysis

In this study, thematic analysis along with a deductive approach was used for analysing the contents of the articles. The deductive approach is a top-down technique that involves starting with a clear framework and using it to guide the analysis of the data (Braun & Clarke, 2012). This study was guided by the conceptual framework on teacher identity (Figure 1), which provides an understanding on the impact of ChatGPT on three dimensions of teacher identity, including perceived roles as a teacher, teachers' pedagogical identity, as well as teachers' relationships with students. As shown in Appendix 1, the articles included in the analysis covered one or more dimensions of teacher identity.

The first and second authors of the study examined ideas that are relevant to the framework and then identified evidence of these ideas from the data. We began by conducting a preliminary analysis of the data to identify common themes and patterns under each dimension of teacher identity. We then developed a coding scheme and use it to systematically code the contents (Appendix 2). The coding scheme was designed to capture data related to how ChatGPT may impact teachers' roles and identity from three dimensions (i.e., changes in teachers' roles, changes in pedagogy, and changes in the teacher-student relationship). We analysed the coded data to identify patterns related to how ChatGPT may impact teachers' identity. To ensure the validity and reliability of the study, the two authors used a systematic and transparent approach to data analysis. The authors maintained a detailed audit trail of the entire research process, including decisions made and changes implemented. The data analysis involved several rounds. In the first round, the first author and second author read the articles to gain a comprehensive understanding of themes on

each dimension of teacher identity. In the second round, the two authors independently coded the data and kept diaries to record thoughts and questions that emerged during the coding process. The two authors then reviewed and compared their results and grouped themes. Their inter-coder agreement was 0.9, indicating an excellent inter-coder reliability (Miles & Huberman, 1994). Disagreements on contested contents were addressed through discussions between two authors until a 100% consensus was reached.

4. Results

RQ 1. How may ChatGPT impact the roles of teachers?

The qualitative analysis of relevant posts on the WeChat platform revealed several subthemes related to the impact of ChatGPT on teachers' perceived self as a teacher. One of the major concerns was related to whether Chat GPT would replace the role of teacher. Many believed that the development of Chat GPT will pose a threat to the teaching occupation (Source 7). "Due to the ability of ChatGPT to automatically perform repetitive tasks such as grading, providing feedback, and creating educational content, it may lead to some teachers becoming unemployed" (Source 2). Others pointed out that while teachers can not be replaced by AI for the time being due to the difficulty for AI technology to replace human decision-making in complex situations, especially those that require the integration of emotions, experience, and scientific knowledge (Source 4,6, 23), educators, however, should begin to consider changing their teaching methods when AI is providing an increasingly personalised education for students. As AI will continue to evolve, teachers are compelled to think of their 'irreplaceable value' in the future (Source 2, 4).

Additionally, teachers' role as traditional knowledge transmitters was questioned. "In the traditional teaching model, students mainly acquire knowledge through textbooks and teacher lectures, with limited learning materials and inadequate connection between learning activities and real-life situations. However, in the future of education, students can obtain a more diverse range of knowledge through artificial intelligence technologies such as ChatGPT" (Source 4). The solid mastery of factual knowledge through rote memorization is considered one of the advantages of East Asian education. However, with the emergence of ChatGPT, these advantages turned into disadvantages (Source 1, 4, 21, 22, 24, 25, 26). As a result, "teachers should go beyond knowledge transmission and pay greater attention to the quality of learning" (Source 25). Firstly, "teachers need to explore and transform the educational value of human-machine dialogue, create more diverse learning methods, rethink what to teach and what to learn, and ultimately use information technology to comprehensively improve the learning of students" (Source 24). Secondly, teachers should emphasize more on quality cultivation and soft skills development (Source 20, 22). As it was indicated in one article, "what truly leads to a person's success is the ability to focus on learning, to elevate from interests to aspirations, and to become a unique individual with distinctive personal qualities. It is also reliant on responsibility and resilience, as well as the ability to persevere and persist in the face of difficulties. Additionally, it is dependent on good interpersonal relationships and a spirit of collaboration" (Source 22).

Furthermore, the relationship of teachers with AI technologies was also the focus of many articles and posts. One of the most discussed topics is in what ways will ChatGPT help reconstruct the relationship between teachers and machines. Some viewed it as "an opportunity to reevaluate the value of human teachers and reshape teacher capabilities" (Source 21). Others believed that "in the process of teaching, human teachers and intelligent tools should have a collaborative relationship, namely human-machine collaboration. Human teachers and intelligent assistants should divide their work reasonably, cooperate, and jointly complete teaching tasks" (Source 7).

RQ 2. How would teachers integrate ChatGPT into teaching pedagogies?

As identified in the selected articles and posts, there were several ways of integrating ChatGPT into teaching pedagogies. First, teachers can use ChatGPT to promote

personalised learning. "ChatGPT can help teachers better understand students' learning situations, provide targeted guidance according to their needs, and improve teaching quality" (Source 4, 24). "ChatGPT can understand and generate natural language, possess strong conversational interaction capabilities, and provide students with high-quality and personalised learning content and services, greatly transforming the learning process and methods. For example, ChatGPT can analyse students' learning interests and needs based on their language input and behaviour, generate teaching resources and strategies that match their personalised learning styles, make learning more tailored to students, and improve students' learning enthusiasm and initiative" (Source 4). Second, teachers can integrate ChatGPT with existing tools to promote more interactive teaching. As the functions of ChatGPT continue to evolve, teachers can utilize ChatGPT to generate a wide range of learning resources, such as online videos, games, virtual reality, and other forms, thereby increasing learning interest and motivation (Source 4, 7). Third, the way of providing feedback to students would be more diversified and personalised (Source 4, 10, 26). Teachers can use generative and personalised feedback. "ChatGPT can analyse students' language input and behaviour, and generate feedback that is tailored to their learning styles and needs. This can help teachers to provide more effective feedback that is targeted specifically to each student's strengths and weaknesses, and can therefore improve the overall quality of teaching and learning" (Source 10). Furthermore, ChatGPT has the potential to enhance or change the evaluation process for teachers (Source 4, 9, 10, 22, 26). "Traditional education assessment primarily relies on exam scores and teacher evaluations, which often overlook students' actual learning situations and personalised needs. Future education assessments will be more diversified, utilising artificial intelligence technologies such as ChatGPT, to provide students with more objective and comprehensive evaluations. Students will be able to engage in targeted learning based on the assessment results" (Source 4). "For individual learners, once they possess a 'composite brain' consisting of the inner brain and 'outer brain' of ChatGPT, how do the two brains collaborate and work together? Does the strength of the outer brain make the inner brain stronger, or does it slowly atrophy? Therefore, teachers must rethink current evaluations and develop new thinking for learning evaluations that are in line with the synergy and symbiosis of the two brains" (Source, 9).

Despite the creative integration of ChatGPT into teaching, ethical issues of using the technology in the teaching process were most emphasised in the selected articles. Although ChatGPT can bring new tools and technologies to teachers in the field of education, it is essential to carefully weigh its pros and cons and take appropriate measures to mitigate any adverse effects. Due to the notable deficiencies of ChatGPT, many articles indicated that the rise of general large-scale models and their rapid penetration into education may also exacerbate ethical and security risks (Source, 3, 15, 16). It was suggested that the integration and development of artificial intelligence and education must adhere to a people-oriented approach, focus on cultivating students' high-level thinking, and establish a sound system of corresponding ethical norms (Source, 16). Some ethical and moral issues need to be taken seriously and addressed in the application of ChatGPT in the classroom. It was deemed necessary to regulate and constrain the technical design and application, as well as enhance education and awareness of user safety and data privacy (Source, 15).

RQ 3. How may ChatGPT change teachers' relationships with students?

The use of ChatGPT may change the way teachers interact with students (Source 4, 5, 6, 7, 9, 10, 11, 19, 20, 21, 23, 26). Among these articles examined, some articles mentioned that as teachers withdraw from the dominant role of learning and teaching, it would reduce the hierarchical relationship between teachers and students. Some pointed out that when knowledge becomes more easily accessible, soft skills and qualities development become increasingly important, and skills such as collaboration and creativity will be increasingly stressed. Accordingly, teachers will design more collaborative activities with students.

However, it was pointed out that the use of ChatGPT may also give rise to a trust crisis between teachers and students. "Once ChatGPT is introduced into schools and

students begin to use it for their own purposes, a composite brain is created. The existence of a composite brain can pose a certain academic integrity crisis for teachers when evaluating students' learning status" (Source, 9). In one of articles, it denoted that "cheating using ChatGPT not only undermines academic integrity but also makes it difficult for teachers to assess students' true proficiency, which is of no benefit to the students themselves. In addition to increasing the possibility of plagiarism, the content generated by ChatGPT may also contain biases, one-sidedness, and inaccuracies. This not only affects learning outcomes but also perpetuates stereotypes and negative views, exacerbating the spread of misinformation. Overreliance on artificial intelligence may also cause students to miss opportunities to develop critical thinking and enhance offline interpersonal communication skills. Therefore, it is not entirely unreasonable for some academic institutions to impose a ban on ChatGPT" (Source, 20).

5. Discussion

The findings of this study provide valuable insights into the potential impact of ChatGPT on the roles and identities of teachers. The use of ChatGPT in education creates opportunities for teachers to change their traditional teaching paradigm, explore innovative teaching pedagogies, and foster more collaborative and interactive relationships with students. By automating certain aspects of teaching, ChatGPT can help teachers to focus on higher-order thinking skills, such as critical thinking, problem-solving, and creativity, and to personalise learning experiences for individual students (Elgarf & Peters, 2022). On the other hand, the use of ChatGPT may also require teachers to shift their teaching responsibilities, leading to feelings of inadequacy or a loss of control over the teaching process. Teachers may feel that they are no longer the primary source of knowledge or expertise in the classroom, or that they are being replaced by a machine (Edwards & Cheok, 2018; Selwyn, 2019). Additionally, the integration of ChatGPT in education raises important ethical issues that have not yet been satisfactorily addressed. These issues include concerns over data privacy and security (Bertino et al., 2021), the potential for algorithmic bias and discrimination (Ryan, 2020), and the risk of plagiarism and academic dishonesty (Cotton et al., 2023). If these ethical concerns are not addressed, they may undermine the integrity and effectiveness of educational practices that rely on ChatGPT, and breed a trust crisis between students and teachers. While ChatGPT has the potential to transform and improve teaching and learning, it is important to address the potential risks associated with its use and to provide teachers with the necessary support and training to adapt to the changing landscape of education.

Given the complex and multifaceted impact of ChatGPT on the roles and identities of teachers, further research is needed to better understand the impact of ChatGPTon teachers. One direction for future research is to investigate the extent to which ChatGPT is contributing to teachers' identity crisis, and how this crisis can be mitigated through training and support. Another direction is to explore ways to rebuild trust between teachers and students in the context of AI-assisted teaching, such as providing greater transparency into the decision-making process of ChatGPT and prioritising human interaction and feedback in AI-assisted teaching. Finally, more research is needed to develop ethical guidelines for the use of AI in the process of teaching, including issues related to data privacy, algorithmic bias, and the potential for AI to perpetuate or exacerbate existing inequities in education.

This study would also inform future educational practices. As it is inevitable for human beings to embrace new technology, the study would inform the development of effective strategies for teachers to integrate this technology into their teaching. At the macro level, governments and academic associations should urgently develop relevant policies, regulations, and ethical norms for educational applications of generative artificial intelligence technologies like ChatGPT, and formulate specific, clear, and feasible policy recommendations (Schiff, 2022). At the meso level, schools or universities need to be aware of the identity crisis among teachers with ChatGPT taking part in roles of teachers and the trust crisis between teachers and students due to the deficiencies of Chat GPT in its transparency and reliability (von Eschenbach, 2021). Specifically, schools or universities should introduce AI detection tools for teachers to identify and differentiate between student

works and related materials generated by AI and those created by the students themselves to prevent a trust crisis between teachers and students. Meanwhile, they should provide relevant professional development programs on the ethical use of ChatGPT to prepare teachers technologically competent for future learning and teaching. At the micro level, teachers need to adjust their mindset, staying open yet critical towards the new technologies while integrating them into their learning and teaching.

Despite the valuable insights from this study, the findings should be viewed in light of its limitations. While ChatGPT emerges as a milestone in technological development, some countries, such as China, have banned the use of ChatGPT in education. Thus the data collected from articles and posts published on a single social platform may not entirely capture the impact of ChatGPT on teachers in other contexts. Moreover, the findings based on data from one social media platform may not generalise to the broader population of teachers because different platforms may have different features and norms that can affect the content and nature of the discourse representative. The WeChat platform is likely to attract specific types of users with particular interests, perspectives, and behaviours. Therefore, future studies can include data from a wider range of social media platforms for more comprehensive analysis. It is also advisable to include primary data from various contexts to examine how ChatGPT would impact teachers holistically.

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Appendix 1

The identified sources that encompass three dimensions of teacher identity

No.	Posts/Articles	Perceived self as a teacher	Pedagogical identity	Relationship with students
1	Source 1	X		
2	Source 2	X		
3	Source 3	X	X	
4	Source 4	X	X	X
5	Source 5		X	X
6	Source 6	X	X	X
7	Source 7	X	X	X
8	Source 8		X	
9	Source 9		X	X
10	Source 10	X	X	X
11	Source 11	X	X	X
12	Source 12	X	X	
13	Source 13	X	X	
14	Source 14	X	X	
15	Source 15	X	X	
16	Source 16	X	X	
17	Source 17		X	
18	Source 18	X	X	
19	Source 19	X	X	X
20	Source 20	X	X	X
21	Source 21	X	X	X
22	Source 22	X	X	
23	Source 23	X	X	X
24	Source 24	X	X	
25	Source 25	X	X	
26	Source 26	X	X	X

Appendix 2

Coding scheme for examining the impact of ChatGPT on teacher identity

Dimensions of identity	Subthemes	Contents or quotes from sourses (examples)
Perceived self or role as a teacher	1) Attitudes towards teaching occupation 2) Traditional knowledge transmitter 3) Taking on new roles 4) Human teacher capabilities	e.g., While teachers can not be replaced by AI for the time being due to the difficulty for AI technology to replace human decision-making in complex situations (Source 4,6, 23) (*Attitudes towards teaching occupation*)
Pedagogical identity	1) Personalised learning 2) Interactive learning 3) Feedback 4) Evaluation and assessment 5) Ethics in technological pedagogy	e.g., As the functions of ChatGPT continues to evolve, teachers can utilise ChatGPT to generate a wide range of learning resources, such as online videos, games, virtual reality, and other forms, thereby increasing learning interest and motivation. (Source 4,7) (*Interactive learning*)
Relationships with students	1) Flat or democratic relationships 2) Trust crisis 3) Reduced communication	e.g., "Once ChatGPT is introduced into schools and students begin to use it for their own purposes, a composite brain is created. The existence of a composite brain can pose a certain academic integrity crisis for teachers when evaluating students' learning status." (Source, 9) (*Trust crisis*)