The Interplay Between Preservice Teachers' AI-Based Collaborative Reflection and Emotional Intelligence to Promote Reflective, Collaborative, and Emotional Practices in the Digital Era Through ChatGPT

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ABSTRACT

Collaborative reflective practice (CRP) and emotional intelligence (EI) are critical in fostering preservice teachers' social, emotional, and reflective development by enabling the construction and reconstruction of their personal and professional knowledge, practices, and emotional states. This study investigated how artificial intelligence (AI)-supported collaborative reflection and EI might be integrated to potentially foster reflective, collaborative, and emotional practices among preservice English-as-a-foreign-language (EFL) teachers in the context of Iran. The research involved 10 Iranian preservice EFL teachers participating in an English language teaching course, incorporating ChatGPT to facilitate collaborative reflection and emotional growth. Findings from qualitative analyses revealed that ChatGPT-supported CRP showed potential in enhancing EFL teachers' EI development and facilitating reflective, social, and emotional learning. The teachers successfully transformed negative emotions into positive ones through AI-mediated collaborative reflection, improving their emotional regulation and well-being. Additionally, EI was found to reinforce CRP practices, as positive emotions such as satisfaction, enjoyment, self-efficacy, and emotional regulation supported deeper reflection and collaboration. The findings suggest that incorporating ChatGPT into CRP and EI frameworks can significantly improve the quality of teacher education by fostering reflective, collaborative, and emotionally intelligent teaching practices.

Keywords: artificial intelligence, collaborative reflection, emotional intelligence, preservice EFL teachers, teacher education

Introduction

Teacher education programs have historically treated preservice teachers as passive recipients of knowledge, focusing on the transmission of teaching principles without granting them sufficient agency (Freeman & Johnson, 1998). However, contemporary perspectives now view preservice teachers as active agents capable of creative thinking as well as cognitive and affective action (Lehtinen et al., 2023). This shift underscores the significance of nurturing preservice teachers' regulation of thinking and emotions for their emotional, cognitive, and professional development. However, the role of emotions in developing preservice English-as-a-foreign-language (EFL) teachers has received little attention (Fathi et al., 2023; Ghanizadeh & Moafian, 2010; Noughabi et al., 2020; Yang et al., 2022).

Although previous research has investigated the emotions of preservice EFL teachers, very little information is available on understanding, regulating, and improving the emotional aspects of these EFL teachers (Arefian, 2023; Bullough & Draper, 2004; Cowie, 2011; Freeman & Richards, 1996). Given that preservice EFL teachers' emotions meaningfully affect their decisions, actions, and attitudes (Smith & Firth, 2018), preparing them to use strategies to regulate and boost their emotions is critical. Preservice teachers frequently experience emotional fluctuations throughout teacher education programs, mainly during practicum sessions, as they adopt various roles as students, teachers, and researchers (Golombek & Doran, 2014; Sutton & Wheatley, 2003). These emotions, positive or negative, emerge from interactions with different situations, students, and colleagues, as well as the gap between instructional expectations and realities (Cowie, 2011; Hascher & Hagenauer, 2016; Nguyen, 2014; Poulou, 2007). Hence, preservice teachers must cultivate emotional intelligence (EI) to efficiently regulate their emotions. EI, described by Salovey and Mayer (1990) as a range of skills contributing to the accurate expression and regulation of emotions, can significantly improve preservice EFL teachers' effectiveness, because it can nurture positive attitudes, engagement, and a sense of belonging within professional communities (Corcoran & Tormey, 2012). This, in turn, will increase positive emotions, such as satisfaction, well-being, and resilience (Brackett et al., 2010).

Recent studies suggest that EI is closely linked to self-awareness and reflective practices (Arefian, 2022, 2023; Farrell, 2022). Reflective practice enables preservice teachers to analyze their teaching, evaluate their context, and take responsibility for their future actions. Through reflection, preservice EFL teachers can address challenges, adapt their practices, and foster emotional and social development (Gkonou & Miller, 2020; Loughran, 2002). Additionally, collaborative reflection enhances emotional performance during teaching practices (Mills & Satterthwait, 2000). Both positive and negative emotions considerably impact reflective and collaborative practices (Schön, 1983, 1987), establishing the interconnectedness of reflection, collaboration, and emotions in instruction.

Given that emotions are socio-cognitive constructs influenced by internal and external stimuli, preservice teachers must learn to reflect and collaborate meaningfully to regulate their emotions. Collaborative reflective practice (CRP) fosters teacher development through reconstructing personal knowledge, practices, and emotions (Arefian, 2022; Richards & Lockhard, 1994). By engaging in collaborative planning, action, observation, and reflection, preservice EFL teachers can enhance their EI, regulate positive emotions, and mitigate negative ones (Cole et al., 2018). Shahivand and Moradkhani (2019) call for more qualitative research to explore how EI and reflective practice can be integrated to develop preservice teachers' reflections, collaborations, and emotions.

The incorporation of artificial intelligence (AI) into CRP provides a transformative opportunity to improve preservice teachers' reflective, collaborative, and emotional practices. In this study, we specifically leverage ChatGPT, a large language model, to enhance collaborative reflection and emotional growth. During collaborative reflection sessions, preservice teachers build on ChatGPT to personalize their teaching experiences. These cues formed their group discussions, empowering participants to analyze emotions and teaching decisions iteratively. However, it also has limitations, including its inability to fully analyze detailed emotional states, potential biases in response generation, and a limited contextual awareness particular to classroom dynamics. In spite of specific AI emotion-recognition tools, ChatGPT relies only on textual input, which may neglect non-verbal affective cues vital in teaching contexts. Even though these limitations exist, ChatGPT provides an accessible and interactive platform for preservice teachers to participate in systematic, data-informed reflection, enhancing emotional awareness and collaborative learning. This study explored how ChatGPT-supported CRP and EI can be used to foster preservice EFL teachers' reflective, collaborative, and emotional practices within teacher education programs. By probing this intersection, the study tries to contribute to the development of innovative approaches that leverage AI to support emotional and professional development in preservice teachers.

Literature review

Theoretical Framework of the Study

This study is built upon an integrative sociocognitive-emotional model that synthesizes Vygotsky's (1978) sociocultural theory, Gross's (2015) process model of emotion regulation, and Schön's (1983) reflective practice theory. Vygotsky's framework describes how tools like ChatGPT work as psychological mediators that scaffold collaborative reflection within a community of practice, while Gross's model illustrates the emotion regulation processes through which teachers recognize, regulate, and appraise emotional experiences during AI-mediated reflection. Schön's theory shows how dynamic cycles of reflection-in-action and reflection-on-action change emotional experiences into professional ideas. This tripartite model posits that AI tools will strengthen reflective practice through external mediation, collaborative reflection will foster emotion regulation strategies, and successfully regulated emotions will consequently empower deeper reflective cycles. This theoretical model offers a lens for exploring how preservice teachers' AI-based CRP interacts with their emotional intelligence

development.

Additionally, Vygotsky's (1978) sociocultural theory openly enlightens the role of ChatGPT as a mediating tool in CRP, scaffolding preservice teachers' reflective dialogues and lengthening their cognitive and emotional processing within a collaborative learning community. Gross's (2015) emotion regulation reinforces the study's focus on EI, explicating how teachers' awareness, reappraisal, and modulation of emotions during AI-mediated reflection contribute to adaptive professional development. In the meantime, Schön's (1983) reflective practice connects CRP and EI by framing in-action and on-action reflection as the mechanism through which emotionally charged experiences are transformed into actionable instructional understandings. As such, ChatGPT will be used as a mediating tool in this study to boost sociocognitive scaffolding, which structures CRP to involve emotion regulation strategies, thereby supporting reflective cycles that improve both EI and professional practice.

AI-based Collaborative Reflective

Practice Reflective practice emerges as a key approach for EFL teachers' professional development. Unlike top-down approaches as in workshops or webinars, reflective practice emphasizes situational and intentional learning, enabling teachers to move from repetitive, unconscious actions to more deliberate and conscious ones (Freeman, 2016; Tanis & Dikilitas, 2018; Wyatt & Oncevska Ager, 2016). Reflection involves analyzing and transforming teaching experiences, beliefs, practices, and emotions to improve instructional quality (Farrell, 2007; Nagamine, 2008). For preservice EFL teachers, reflective practice fosters active decision-making, personalizes theoretical knowledge, and helps them navigate the challenges of early teaching experiences. It also supports emotional regulation, creativity, and autonomous development (Arefian, 2022, 2023; Farrell, 2022; Meanwell & Kleiner, 2014). CRP also amplifies these benefits by enabling teachers to plan, act, observe, and reflect collectively within a community of practice. By means of discussions, peer observations, team-teaching, and scaffolding, CRP enhances professional development (Cole et al., 2018; Esfandiari & Arefian, 2023; Moradkhani, 2019). Preservice EFL teachers, therefore, benefit from scaffolding and mediation during CRP, empowering them to jointly negotiate, discuss, and modify practices and beliefs (Mann & Walsh, 2017).

The addition of ChatGPT into CRP suggests transformative potential for preservice EFL teachers. ChatGPT can foster collaborative reflection by offering structured frameworks for evaluating instructional experiences, recognizing affective patterns, and providing personalized feedback. For instance, ChatGPT can monitor emotional reactions, provide strategies for managing emotions, and support positive emotional states. By leveraging ChatGPT, preservice teachers can involve in more systematic and data-informed reflection, nurturing profounder emotional awareness and collaborative learning. ChatGPT also supports cooperative learning by enabling teachers to share ideas, receive feedback, and implement strategies collectively within a social system. Furthermore, ChatGPT can assist in modifying belief systems and identities, promoting self- and social-awareness, and fostering higher-order thinking through continuous, collaborative reflection (Arefian, 2022; Barkhuizen, 2017; Cirocki & Farrell, 2017; Korthagen, 2004).

The continuous support provided by AI-enhanced CRP helps preservice EFL teachers take greater agency, enabling them to thrive professionally, socially, and emotionally as they transition into novice teaching roles. Research indicates that reflection is often triggered by collaboration and socialization, with emotions playing a critical role in enhancing collaborative reflection within communities of practice (Arefian, 2023; Soodmand Afshar & Farahani, 2018). Reflective practice, supported by ChatGPT, can help preservice teachers monitor and regulate their emotions, address socioemotional challenges, and enhance their EI. Despite these benefits, there has been limited exploration of how CRP, particularly when augmented by ChatGPT, can develop preservice teachers' EI, and how EI, in turn, influences CRP to enhance reflective, collaborative, and emotional practices. This study seeks to address this gap by investigating the intersection of AI-supported CRP and EI, offering insights into innovative approaches for fostering professional and emotional growth in preservice EFL teachers.

In this study, ChatGPT functions as the main AI tool for enhancing collaborative reflection. It involves producing structured feedback, empowering asynchronous reflective dialogue, and providing scalable, on-demand interaction for preservice teachers. However, different studies challenge the efficacy of AI-mediated reflection. For example, although Nguyen (2018) found that preservice teachers in online CRP showed surface-level reflection because of decreasing nonverbal prompts, Arefian (2022) reported that AI tools can oversimplify complex emotional experiences when implemented without human mentorship. Limitations of AI tools, therefore, need to be acknowledged. As a text-based model, ChatGPT lacks the ability to accurately interpret emotional states or contextual classroom situations. Despite multimodal AI tools (e.g., affect-aware systems with voice/visual analysis), it depends heavily on textual input, which may oversimplify emotional regulation. Moreover, its responses can reflect training-data biases or generic recommendations, potentially misaligning with teachers' particular affective needs. These constraints underscore the need for cautious implementation while identifying its utility in scaffolding reflective practice.

Teachers' Emotional Intelligence

The shift of focus from cognition to emotions has indicated how teachers and learners can manage and regulate their emotions through emotional competence (Richards, 2020). Emotions are multifaceted phenomena with numerous constituents and are stimulated by internal and external factors related to the context, culture, community, and personality (Pekrun, 2006). Teachers' emotions, which usually emerge from interactions with the setting contextually, involve feelings about their colleagues, students, parents, stakeholders, context, curriculum, materials, policies, and themselves (Richards, 2020). Specifically, preservice EFL teachers experience a wide range of positive and negative emotions, such as fear, anger, anxiety, unhappiness, hopelessness, optimism, joy, resilience, grit, passion, and enthusiasm (Dewaele et al., 2018; MacIntyre & Vincze, 2017; Seligman & Csikszentmihalyi, 2000). The positive emotions can enhance preservice EFL teachers' teaching and learning quality, increase the interest and concentration in the teacher education process, foster a supportive and safe learning environment for teachers' professional development, provide greater engagement, motivation, and resilience to survive and develop and facilitate autonomous professional development (Fathi et al., 2023). By contrast, negative emotions have dire consequences for their

professional development and may cause attrition and burnout. EI can improve teachers' well-being and satisfaction, (Yin et al., 2013), regulate their emotions (Salovey & Mayer, 1990), affect their beliefs and thoughts (Anderson, 2004), produce positive emotions to develop intellectually, socially, and emotionally (Wong & Law, 2002), and predict their attitudes and how they identify and solve problems (Isen, 1993).

The socio-emotional intelligence, skills, and competencies of preservice EFL teachers are crucial to their engagement in AI-mediated CRP. EI's role in AI-mediated CRP is vital, as emotional regulation considerably impacts reflective and collaborative outcomes. For example, preservice teachers with higher EI-leveraged AI feedback to regulate negative emotions (e.g., anxiety) into constructive reflection. These competencies empower them to generate awareness of themselves and others, relate with students and peers interpersonally and intrapersonally, and explore emotional challenges by means of ChatGPT (Barrot, 2023). They can become flexible in different settings, change their practices creatively, and professionally work with students and colleagues (Caires et al., 2012). Despite the chief positive framing, Yin et al. (2013) showed that high EI does not always influence teaching effectiveness in high-stress contexts, offering cultural and contextual boundaries of EI's role. As such, Loh and Liew (2016) argue that heavy focus on emotion regulation may bring about emotional labor burnout, mainly in rigid teaching contexts.

Although previous research has shown that EI can influence language learners' L2 learning, achievement, and cognition (Pishghadam, 2009), developing and enhancing preservice EFL teachers' EI have to be further investigated (King, 2016; Mansfield et al., 2016; Yuan & Lee, 2015). While numerous researchers have found an effective relationship between reflection and EI (Arefian, 2023; Nagamine et al., 2018; Nguyen, 2018; Shahivand & Moradkhani, 2019), almost no studies have explored the relationship between AI-based CRP and EI for improving reflection, collaboration, and emotion. Since collaboration and reflection can be regarded as two common sources of initiating teachers' emotions internally and externally, preservice EFL teachers can take advantage of ChatGPT-based CRP in order to enhance their EI. Moreover, preservice EFL teachers with greater EI are supposed to facilitate their collaboration and reflection with other colleagues logically and systematically (Arefian, 2023; Farrell, 2022). Thus, this study aims to probe the way AI-based CRP and EI can be related to foster preservice EFL teachers' collaborative, reflective, and emotional practices in their teacher education programs.

Research Questions

This study aims to probe the way AI-based CRP and EI can be related to foster preservice EFL teachers' collaborative, reflective, and emotional practices in their teacher education programs.

1. How are preservice EFL teachers' ChatGPT-based CRP and EI related during teacher education programs?
2. In what ways do preservice EFL teachers' ChatGPT-based CRP and EI improve collaborative, reflective, and emotional practices in their teacher education programs?

Methods

Participants and the Setting

This study involved 10 Iranian EFL six male and four female student teachers from an English language teaching course at Islamic Azad University in Tehran, Iran. Although this study offers effective insights, the findings are based on a small, context-specific sample of Iranian preservice EFL teachers from a single university, which may limit generalizability to other teachers in other contexts. The teachers' ages ranged from 19 to 22 (M = 20), and six had one or two years of teaching experience, and the others had no experience of real teaching (Table 1). The researchers adopted a purposive sampling procedure, a purposeful data collection approach to choose the participants and settings to involve the most potential participants who are partially or fully aware of the process of AI-based CRP or have done it during their teacher education program (Ary et al., 2018). After selecting them purposefully, they were invited to take part in the study, and all accepted eagerly to participate in the study. Also, the consent forms were collected from the participants. They were all at the same university studying teaching English as a foreign language (TEFL) and chosen from one of the teaching methodology classes. The participants were informed about the process and duration of the research and were assured that their names would be kept confidential. They revealed that the process needs to be conducted in English as they were motivated to use the English language for their communications and interactions. Then, they had a meeting with the lead researcher to talk about the process of AI and CRP.

The teachers studied TEFL for to receive their Bachelor of Arts (BA) degree within 8 semesters. Each year, they followed two semesters, so it took them four years to complete the program. Also, they received knowledge regarding language proficiency, teaching language skills and sub-skills, pedagogy, assessment, research, second language acquisition, curriculum, among others. Moreover, they had practicum after two years of studying to teach English and observe other teachers in real classrooms in order to put theories into practice.

Table 1

Demographic Information of participants

Number	Gender	Age	Experience	Major
1	Male	19	1 year	TEFL
2	Male	19	None	TEFL
3	Male	21	2 years	TEFL
4	Male	20	None	TEFL
5	Male	20	2 years	TEFL
6	Male	21	None	TEFL
7	Female	21	None	TEFL
8	Female	20	1 year	TEFL

| 9 | Female | 19 | 2 years | TEFL |
| 10 | Female | 22 | 1 year | TEFL |

Research Design

In this study, to know how AI, CRP, and EI are connected and can influence EFL student teachers' emotional, social, and professional practices, the researchers adopted a qualitative transcendental phenomenological design. A phenomenology is used to indicate how participants (EFL student teachers) perceive and describe their social, emotional, and professional experiences individually and collectively through AI-based CRP (Moustakas, 1994). A phenomenology can show how a particular phenomenon and the essence of the experience are commonly understood and perceived among a group of participants by collecting and analyzing data from participants' lived experiences (van Manen, 2014). Therefore, it reveals "what" participants have experienced and "how" they have done it. Moustakas (1994) described transcendental phenomenology as a qualitative approach to interpret participants' experiences from their own perspectives. Additionally, epoch, or bracketing, can be implemented to obtain participants' novel experiences and perspectives toward the phenomenon. To bracket preconceptions, the lead researcher kept a reflexive journal documenting personal assumptions about AI's role in reflection. This journal was reviewed by a second coder during thematic analysis to recognize and mitigate potential interpretive bias. Hence, transcendental phenomenology considers new experiences of participants (Moustakas, 1994).

Pereira (2012) has detailed the components and procedures of phenomenological research from a novice teachers' viewpoint and stated that phenomenological research should include the following stages (Table 2).

Table 2

Procedures of Phenomenological Research (Pereira, 2012, p. 17)

Stages	Aim	Description of the process
1	Determine if the research problem is bet examined by using a phenomenological approach.	In this study, EFL student teachers' perspectives regarding their experiences of ChatGPT, CRP, and EI were examined to see how ChatGPT-based CRP and EI influenced emotional, social, and professional practices.
2	Identify a phenomenon of interest to study, and describe it.	The researchers probed EFL student teachers' experiences of ChatGPT-based CRP and how they were connected to their EI. Emotions, collaborations, reflections were, therefore, the major experiences the researchers examined.
3	Distinguish and specify the broad philosophical assumptions of the phenomenology.	Bracketing EFL student teachers' experiences concerning their ChatGPT-based CRP and EI practices.

4	Collect data from the individuals who have experienced the phenomenon by using in-depth and multiple interviews.	EFL student teachers are interviewed and observed.
5	Generate themes from the analysis of significant statements.	Themes and categories were identified through iterative processes and multiples coding procedures.
6	Develop textual and structural descriptions.	The researchers analyzed EFL student teachers' ChatGPT-based CRP and EI experiences to deduce how they could enhance their emotional, social, and professional practices. Also, their social and personal factors are described, such as their interactions, participation, and group work with others collectively, and reflections, self-evaluation, and personalization individually.
7	Report the "essence" of the phenomenon by using a composite description.	The essence of experience about ChatGPT, CRP, and EI was presented through textual and structural descriptions.
8	Present the understanding of the essence of the experience in written form.	The researchers reported on the experience of EFL student teachers through descriptions, extracts, patterns, and themes

Data Collection

The lead researcher arranged a meeting for the teachers to attend each week for three months to practice writing journals and prepare portfolios jointly. The data collection included field notes of observation, journal writing, and interview. Audio files were transcribed later by listening and writing the content and shared experiences of recordings. Also, field notes and transcripts of recordings, including the records, reports, and notes, were put into a portfolio for each group to know the processes, benefits, procedures, experiences, and challenges of AI-based CRP practices for developing EI. The researcher gathered two collective journal writings from each group, after the teachers had written the journals and reported how the problems were identified, solutions were planned, and actions were made related to the role of AI, CRP, and EI in enhancing emotions, reflections, and collaborations. In the end, the researcher conducted an in-depth 20-minute semi-structured interview by eliciting some relevant questions from the literature and having flexibility during the process to know how AI-based CRP and EI were interrelated and the way they could influence their collaboration, reflections, and emotions. The interviews were audio recorded, transcribed, and added to the portfolios to know how their experiences perceived during their CRPs.

To minimize researcher bias, we triangulated data across three sources: (1) audio recordings of CRP sessions, (2) participant journals, and (3) field notes from an independent observer not involved in leading the sessions. Member checking was conducted by sharing interview transcripts and thematic summaries with participants for verification. Discrepancies (e.g.,

interpretations of emotional responses) were resolved through iterative discussion until consensus was reached. To further ensure rigor, we addressed dependability by establishing inter-coder reliability, with the two researchers independently coding and analyzing the data, and the results of coding analysis using Cronbach's alpha ($\alpha = .93$) showed a high degree of agreement. The remaining discrepancies were discussed until full agreement was reached.

Procedure

The lead researcher held two one-hour sessions and workshops to help the teachers learn what procedures, processes, and benefits of AI-based CRP are, how AI-oriented CRP can be focused on regulating and managing emotions, and ways about how to link AI-focused CRP with EI to engage more professional collaborations, reflections, and emotions. Participants used ChatGPT as the sole AI tool to enhance collaborative reflection. ChatGPT was chosen for its accessibility, language-processing capabilities, and cost-effectiveness compared to specialized AI tools (e.g., emotion-tracking software). Its conversational interface also supports reflective dialogue, despite it lacks multimodal emotional analysis. Since they were all familiar with the process of CRP, as they conducted it during their previous semesters, the meeting conducted by the researcher was only in the form of a question-and-answer session to clarify the process of planning, acting, observing, and reflecting in a cyclical approach collaboratively by means of AI tools, such as ChatGPT. After learning about AI-based CRP, three groups were made, for which two groups included three participants (two males and one female), and only one group involved four participants (2 males and 2 females). These groups were made based on their own preference to work with their peers. Each week, groups recorded instructional challenges in a shared journal and then input key excerpts into ChatGPT. The AI responded with questions (e.g., 'What assumptions influenced your reaction?') to scaffold reflection. Participants argued ChatGPT's feedback in pairs before modifying their strategies.

The participants recognized some socio-affective problems and limitations collectively and probed some solutions and options for the negative emotions experienced jointly. EI was measured through observable behaviors during CRP sessions, involving: (1) verbal recognition of emotions (e.g., 'I felt anxious when…'), (2) strategies to regulate emotions (e.g., 'I calmed myself by…'), and (3) empathy toward peers (e.g., 'I understood X's frustration because…'). Moreover, social development was assessed by (1) frequency of collaborative problem-solving (e.g., joint planning in journals), (2) peer feedback exchanges (e.g., 'You could try…'), and (3) rapport-building statements (e.g., 'We supported each other when…'). Next, they were tasked with planning and acting to enhance emotional practices and responses collaboratively with other colleagues and ChatGPT. Finally, they observed, thought, and reflected in a group to enhance their EI to influence personal, social, and professional practices. The lead researcher arranged a meeting for the teachers to attend each week for three months to practice writing journals and prepare portfolios jointly. The data collection included field notes of observation, journal writing, and interview.

All participants offered written informed consent, with particular attention to the following points. The first was data privacy. ChatGPT interactions were anonymized by removing identifiers before analysis. Participants were instructed not to express personal student data. Secondly, emotional Safeguards were considered. A counseling psychologist was on-call during

reflective sessions. Participants could continue or withdraw at any point. As for AI risk mitigation, the researchers reviewed all ChatGPT outputs for harmful content, and the participants received training on AI limitations before implementation. Lastly, for data handling, audio recordings and transcripts were stored on password-protected institutional servers, with access restricted only to the researchers of the present study. Although we implemented safeguards, the study did not assess long-term psychological influences of AI-mediated emotional reflection. Future research needs to assess whether benefits persist without creating dependency on AI tools.

Data analysis

To analyze the data in the current study, the researchers used a thematic data analysis approach to generate a theory or interpretation inductively (Ary et al., 2018). Inductive analysis is a meaning-making process that the researchers start with reading and analyzing the raw data collected from multiple sources without any preconceived framework. As Braun and Clarke (2006) presented, "inductive analysis is, therefore, a process of coding the data without trying to fit it into a preexisting coding frame, or the researcher's analytic preconceptions" (p. 83).

Initial coding included line-by-line analysis of transcripts, journals, and field notes to produce in vivo codes. Codes were then grouped into categories (e.g., emotional regulation, collaborative reflection) by means of iterative comparison. The researchers read them multiple times to generate meanings, kept the relevant ones, and excluded the ones that were irrelevant. After reaching a holistic understanding, data were perused to find some general categories. By knowing the main categories, they were scrutinized to link them together as sub-categories for more general ones. Finally, the themes were identified by recognizing patterns in the previous data and putting them into themes with the same similarities and differences (Braun & Clarke, 2006). Themes were formed by clustering categories, reviewed through peer debriefing with a second coder. Sample data extracts followed by codes, categories, and themes in Table 3 show the procedures we followed to form theme construction

Table 3

Sample Coding and Thematic Structure

Raw data extract	Code	Category	Theme
PT2: I could collaborate and reflect more with ChatGPT, knowing myself and others better by controlling my feelings and connecting with peers. It helped me replace frustration with patience during group tasks.	AI-supported collaboration	Collaborative Reflection	Reflective and Social Development
PT8: Reflection with peers and ChatGPT let me take ownership of my practices, leaving more space to develop my competency in noticing emotions like anger and anxiety. ChatGPT's prompts guided me to rethink reactions.	Emotional self-regulation	Emotional Growth	
PT7: I felt happy with growing joy during	Positive	Socio-	

collaboration. ChatGPT's feedback helped me address isolation and build resilience.	emotional transformation	emotional Resilience

Findings

Investigation of the First Research Question: How are preservice EFL teachers' ChatGPT-based CRP and EI related during teacher education programs?

Theme 1: ChatGPT-based CRP for Enhancing Emotional Intelligence (EI)

Reflective, Social, and Emotional Development. ChatGPT-based CRP contributed to measurable developments in preservice teachers' reflective practices. PT2, for instance, emphasized the ability to work collectively with peers in a reflective manner, maintaining that "I can collaborate and reflect more in a community and with ChatGPT, knowing myself and others better by controlling my feelings and connecting with peers." This reflective process nurtured socio-emotional development and collective agency, as presented by PT8: "Reflection and collaboration with peers and AI let me take ownership of my practices, leaving more reflective and social space to develop my competency in noticing and controlling emotions like anger, sadness, and anxiety."

ChatGPT played a vital role in improving EFL student teachers' reflective, social, and emotional practices. By offering a structured platform for collaboration and reflection, ChatGPT allowed student teachers to regulate their emotions, replace their negative emotions with positive ones, and cultivate a sense of belongingness within a professional community. ChatGPT also maintained cultural awareness and emotional regulation, promoting both intrapersonal and interpersonal development. Regardless of the challenges, AI-based CRP demonstrated to be an appreciated tool for enhancing emotional intelligence and collaborative practices in teacher education programs. AI-based CRP also helped student teachers manage their emotional reactions and professional performance dynamically. For example, PT1 observed that "Collaboration and reflection with ChatGPT and others influenced my emotional intelligence as I received encouragement, noticed successful experiences, and solved socio-affective concerns." This implies that participants used ChatGPT-generated prompts as starting points for human-led emotional reflection and social connection, improving their overall EI.

Converting Negative Emotions into Positive Ones. AI-based CRP played an essential role in transforming negative emotions, such as stress and isolation, to positive ones, like enjoyment and satisfaction. By participating in a safe learning environment enabled by ChatGPT, student teachers experienced fun, liveliness, and support during interactions. PT7 remarked that "I could enjoy more teaching and learning by interacting and removing isolation." Additionally, AI-directed CRP enhanced the teachers' ability to notice and manage negative emotions, recognize problems, and reflect on solutions. PT7 observed that, "I felt happy with growing joy and satisfaction during collaboration and reflection procedures. I became grittier and more engaged as I had to satisfy others' expectations." This indicates that ChatGPT not only supported emotional regulation but also fostered a sense of belongingness and resilience within a professional community.

Theme 2: EI's Role in Enhancing AI-based CRP

Emotional Regulation and Reflective Practices. Teachers' internal emotional states enabled them to avoid hasty decisions and engage in thoughtful, collaborative reflection. For example, PT9 noted that, "When I expressed kindness, satisfaction, and enjoyment, I could neglect others' mistakes, think positively about progress, and create an affective bond with others." EI also contributed to self-efficacy, satisfaction, and well-being, which in turn supported AI-based CRP. PT4 shared with us an example of emotional growth: "As I could not emotionally control myself during interactions, I became angry and shouted at students. However, my teammate's support helped me solve the problem and enhance our teaching." This highlights how EI, combined with ChatGPT, facilitated emotional regulation and collaborative problem-solving.

Research Question 2: In what ways do EFL student teachers' AI-based CRP and EI improve collaborative, reflective, and emotional practices in their teacher education programs?

Theme 3: ChatGPT CRP and EI for Social, Emotional, and Professional Growth

Emotional and Social Regulation. ChatGPT-based CRP enabled EFL student teachers to regulate their emotional experiences by reflecting on their emotions, interactions, and settings more wisely. PT5 pointed out that "Reflection made us more self-aware, emotionally cognizant, and socially alert. It took place in a community of practice through mutual social interactions with others." This suggests that ChatGPT provided a framework for intrapersonal and interpersonal understanding, enhancing both emotional and social intelligence. Furthermore, ChatGPT-based CRP improved cultural awareness as student teachers engaged in constant interactions and respected cultural norms. In this regard, PT7 stated that "We learned how to do reflection and collaboration with ChatGPT tools to manage our emotions autonomously and collectively." This indicates that ChatGPT supported not only emotional regulation but also cultural sensitivity and professional development.

Challenges and Developmental Process. While the link between ChatGPT-based CRP and EI was evident, student teachers acknowledged the challenges of the process. PT7 stated that "the incorporation process needed considerable time and effort from us." Regardless of these challenges, ChatGPT-based CRP enhanced a developmental process by having more scaffolding, support, and collaboration within a professional community. This allowed student teachers to become more autonomous and cooperative in their learning, eventually improving the quality of teacher education. Participants referred to ChatGPT's occasional misalignment with their emotional states (e.g., misinterpreting frustration as disinterest) because of its text-only input. Some also stated generic feedback that needed more human mediation.

Discussion

The findings prove that AI-based CRP considerably facilitate the development of EI, empowering student teachers to shift negative emotions into positive ones, develop their reflective and collaborative skills, and nurture professional development. This supports the integrative sociocognitive-emotional framework of this study: ChatGPT worked as a mediating tool (Vygotsky, 1978) to scaffold collaborative reflection, while teachers' emotion regulation (Gross, 2015) converted negative emotions into practical ideas by means of reflective cycles (Schön, 1983). By participating in AI-supported collaborative environments, student teachers

can improve their teaching repertoire, develop their self-awareness, and support their emotional and social competencies, which are important elements of teacher professionalism (Arefian, 2023; Cole et al., 2018; Moradkhani, 2019). ChatGPT offers a meaningful learning situation for student teachers to reach scaffolding within a social setting, developing emotionally and socially while meeting their professional development goals.

Reflectively, ChatGPT-based CRP appeared to support student teachers in developing self-awareness by knowing their emotions, identities, and professional roles. This process demonstrates Schön's reflection-in-action, as teachers vigorously interpreted AI-generated feedback to modify their practices, while the social mediation offered by ChatGPT, supporting Vygotsky's (1987) sociocultural theory, allowed for the internalization of these reflective processes. By means of AI-driven insights, teachers can achieve a profounder understanding of their affective states and make informed decisions about their teaching practices. This reflective process enhances autonomy and agency, letting teachers to use emotional illustrations and adjust to their practices. Moreover, AI-based CRP improves teachers' ability to notice and solve professional, personal, and emotional challenges, nurturing a growth mindset and a sense of responsibility for their performance (Arefian, 2023; Esfandiari & Arefian, 2023). ChatGPT served as a provocation tool—its neutral, question-based feedback (e.g., What findings support your approach?) lessened defensiveness, letting deeper critique. However, its lack of contextual nuance necessitated peer mediation to interpret responses.

Socially, ChatGPT-based CRP promotes emotional regulation by stimulating empathy, rational understanding of peers and mentors, and amplified social awareness. This reflects Gross's model of emotion regulation, where the AI-mediated reflective space facilitated teachers to identify, reappraise, and modulate emotional responses by means of collaborative dialogue. By leveraging ChatGPT, student teachers can take part in meaningful interactions that nurture constructive feedback and emotional support from teacher educators. These interactions make a safe and trusting environment, decreasing stress and anxiety through initial teaching experiences. Moreover, AI-based CRP boosts liveliness, satisfaction, and joy, empowering teachers to build strong relationships, discuss learning content, and form a sense of belonging within a professional community (Brackett et al., 2010). ChatGPT can also support practical teaching circumstances, supporting teachers to practice and improve their social and emotional skills in a low-stakes environment.

Emotionally, ChatGPT-based CRP plays an important role in adjusting, managing, and refining teachers' emotional states. The cyclical nature of this process, where emotions inform reflection and reflection transform emotions, exemplifies Schön's concept of knowing-in-action, while the social context of CRP supports Vygotsky's emphasis on culturally mediated development. By cultivating positive emotions, such as satisfaction, enjoyment, and well-being, ChatGPT-based CRP lessens negative emotions like stress and anxiety. The collaborative nature of AI-based CRP confirms that teachers are not lonely, which is often linked with negative emotions (Chi et al., 2020). As a substitute, they consist of interpersonal and intrapersonal interactions that boost emotional development and resilience. ChatGPT can provide instantaneous feedback and support, enabling teachers to identify strategies and regulate their emotions effectively. This emotional regulation is necessary for enhancing motivation and engagement in the teaching

profession (Corcoran & Tormey, 2012, 2013). Nevertheless, limitations appeared when allowing for the theoretical framework. While Vygotsky's theory highlights multimodal mediation, ChatGPT's text-only interface limited its ability to fully interpret emotional states (contradicting Gross's emphasis on comprehensive emotion recognition). Likewise, the ChatGPT's generic feedback sometimes delayed situated reflection, challenging Schön's assumption of contextually-aware reflective practice. These limitations underscore the need for human-AI synergy in teacher education programs.

Emotions play a dominant role in reflective and collaborative practices. EFL student teachers with more negative emotions regularly try to think reasonably without bias and may find it hard to associate socially with others. In contrast, positive emotions nurture reflection and collaboration, as the emotional state of teachers is an essential constituent of any interaction or reflective practice (Arefian, 2022, 2023; Farrell, 2022; Meanwell & Kleiner, 2014). ChatGPT-based CRP offers a supportive environment for student teachers to grow grit, self-efficacy, motivation, enjoyment, and a growth mindset, allowing them to think and reflect more critically and collaborate more actively. For teacher educators working in similar contexts, integrating AI-based CRP with EI might provide one approach to supporting student teachers' emotion regulation, improve their reflective and collaborative practices, and encourage positive emotional experiences during their first teaching practices.

When EFL student teachers leave teacher education programs, they can implement AI-based CRP and EI to escape from expressing negative emotions, nurture emotionally, socially, and professionally, and take agency in leading their cognitive and affective resources. ChatGPT features can enhance their ongoing professional development by establishing platforms for partnership, reflection, and affective management. By understanding the way to reflect on their experiences, cooperate with others, and cultivate positive emotions, they can develop their engagement at school and lead to a more supportive and effective educational environment. The integration of AI-based CRP and EI indicates promise for supporting long-term professional development and emotional well-being in the teaching profession. This study's too much reliance on ChatGPT, while pragmatic, highlights trade-off between accessibility and depth. Despite AI tools with voice/visual emotion recognition (e.g., Affectiva), ChatGPT cannot capture non-verbal cues, potentially restricting emotional granularity.

Conclusion

The main aim of this study was to investigate how AI-based CRP and EI are related to enhance preservice EFL teachers' collaborative, reflective, and emotional practices in their teacher education programs. The results revealed that AI-based CRP could improve Iranian preservice teachers' EI reflectively, socially, and emotionally, transfer negative emotions to positive ones, and improve through EI. AI-based CRP could facilitate preservice Iranian EFL teachers' emotional, social, and personal awareness and understanding. These teachers also had more collective agency in directing their practices, emotions, and collaborations and could control their emotions logically, emotionally, and interactively.

In the Iranian context, the teachers stated that AI-based CRP appear to support their development of responsiveness, belongingness, and autonomy in a community of practice. The teachers also change their negative emotions to positive ones by enhancing their enjoyment, fun, well-being, and other related emotions in a safe, friendly setting. Moreover, they receive more emotional, social, and professional support through a strong rapport. In addition, EI fosters Iranian EFL preservice teachers' AI-based CRP since their emotional moods and states could enhance or filter collaborative reflection, influence individual and collective decision-making activities, and connect with others socially and emotionally.

While previous research has found a correlation between reflection and emotions, no studies have explored the link between AI-based CRP and EI to understand EFL student teachers' emotional, social, and professional development. The study's findings should be interpreted with caution because of the small sample size (n = 10) and the homogeneous context of the Iranian preservice EFL teachers at one university. Future research needs to investigate larger, more diverse cohorts across different cultural and institutional settings to foster generalizability. Thus, while this study qualitatively probed student teachers' perceptions, practices, and attitudes, other studies can use experimental designs by having AI-based CRP and showing how student teachers' EI can be improved. Also, other sophisticated statistical procedures, such as structural equation modeling (SEM) and path analysis, can be used to see if EI, AI-based CRP, and other variables can be correlated. This study was implemented in a semester; further studies can be performed for a longer time to show how AI-based CRP and EI influence student teachers' social, affective, and reflective practices over a longer time.

In similar EFL contexts, teacher educators might think of using AI-based CRP approaches in their teacher education programs to develop their EI. In this way, EFL preservice teachers can direct and manage emotional moods and generate positive emotions through collaboration and reflection. Also, AI-based CRP and EI can be linked to enhance EFL student teachers' social, professional, and emotional practices, which can be crucial factors when they become novice teachers. Teacher educators may equip EFL student teachers with the tools to be prepared for their initial years of teaching which may involve different negative emotions due to lack of expertise in managing social, emotional, and professional factors. Therefore, student teachers will become aware of the significance of AI-based CRP and EI to enhance their emotional, social, and professional practices.

Acknowledgments

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