Using Self-Regulated Learning Supported by Artificial Intelligence (AI) Chatbots to Develop EFL Student Teachers' Self-Expression and Reflective Writing Skills

By

Dr Mahmoud M. S. Abdallah

Associate Professor of Curriculum & English Language Instruction (TESOL/TEFL)

Faculty of Education, Assiut University

Email: mahmoud.abdallah@aun.edu.eg

Mobile: (+2) 01011953743

Citation: Abdallah, M. M. S. (2024). Using Self-Regulated Learning Supported by Artificial Intelligence (AI) Chatbots to Develop EFL Student Teachers' Self-Expression and Reflective Writing Skills. *Academic Journal of Faculty of Education, Assiut University 40*(9) (Sep, 2024), 1-50

Abstract

This research study explores the potential of a pedagogical model of self-regulated learning supported with Artificial Intelligence (AI) chatbots to enhance self-expression and reflective writing skills for novice EFL student teachers at Faculty of Education, Assiut University. The study adopted a pre-post quasi-experimental design, that starts with the identification of the necessary self-expression and reflective writing skills for the target participants (50 fresh EFL student teachers at Assiut University who were purposively selected using a screening questionnaire based on their basic IT literacy skills). A pre-test was administered to assess their initial skill levels in self-expression and reflective writing. Then, an intervention was implemented in the form of a pedagogical model designed around the principles of self-regulated learning and situated language learning, which guided the use of AI chatbots (Bing, ChatGPT, and Google Bard). This model was initially piloted on a small sample (n = 10) of EFL student teachers to check validity and reliability and then experimented with the research participants for 8 weeks during the first semester of the academic year 2023/24. Following the intervention, a post-test was conducted to measure the participants' levels of self-expression and reflective writing skills after being exposed to the interventional model, aiming to identify any improvements gained from the intervention. The results indicated a positive effect with noticeable enhancements in the EFL student teachers' skills.

This suggests the potential effectiveness of the model in fostering self-expression and reflective writing skills and developing EFL student teachers' general language proficiency and IT literacy.
***Keywords*:** AI chatbots, EFL student teachers, self-expression, self-regulated learning, reflective writing.

المستخلص باللغة العربية

تستكشف هذه الدراسة البحثية إمكانية تطبيق نموذج تعليمي يقوم على فلسفة التعلم المنظم ذاتياً المدعوم بروبوتات الدردشة الذكية المدعومة بالذكاء الاصطناعي بهدف تحسين مهارات التعبير عن الذات والكتابة التأملية لدى طلاب الفرقة الأولى بشعبة اللغة الإنجليزية في كلية التربية - جامعة أسيوط. اعتمدت الدراسة تصميمًا شبه تجريبي قبلي -بعدي، بدأ بتحديد المهارات اللازمة للتعبير عن الذات والكتابة التأملية للمشاركين المستهدفين (50 طالبا جديدًا بشعبة اللغة الإنجليزية في جامعة أسيوط تم اختيارهم بعناية باستخدام استبيان فحص/غربلة بناءً على مهاراتهم الأساسية في تكنولوجيا المعلومات). تم إجراء اختبار قبلي لتقييم مستوى مهاراتهم الأولية في التعبير عن الذات والكتابة التأملية. بعد ذلك، تم تنفيذ التدخل التجريبي في شكل نموذج تربوي مصمم حول مبادئ التعلم المنظم ذاتياً والتعلم الموقفي للغة، والذي قاد ووجه عملية استخدام روبوتات المحادثة الذكية Bing، ChatGPT، Google Bard وتم اختبار هذا النموذج مبدئيًا على عينة استطلاعية صغيرة بلغ عددها 10 طلاب للتحقق من الصلاحية والثبات ومدى ملاءمة النموذج التعليمي المقترح، الذي تم تطبيقه فيما بعد على المشاركين الأساسيين في الدراسة (ن = 50) لمدة 8 أسابيع خلال الفصل الدراسي الأول من العام الدراسي 24/2023. بعد انتهاء التدخل التجريبي، تم إجراء اختبار بعدي لقياس مستويات المشاركين في مهارات التعبير عن الذات والكتابة التأملية نتيجة تعرضهم للنموذج التعليمي المقترح، بهدف قياس مدى التحسن المكتسب من التجربة. وأشارت النتائج إلى وجود أثر إيجابي دال إحصائياً انعكس في تحسن ملحوظة في مهارات طلاب شعبة اللغة الإنجليزية كلغة أجنبية في التعبير الذاتي والكتابة التأملية. وتشير النتائج أيضاً إلى الفعالية المحتملة للنموذج في تعزيز مهارات التعبير عن الذات والكتابة التأملية وتطوير الكفاءة العامة في اللغة الإنجليزية كلغة أجنبية لدى الطلاب ومهاراتهم الرقمية في تكنولوجيا المعلومات.

INTRODUCTION AND LITERATURE REVIEW

Introduction

Language learning is a complicated process that needs metacognitive awareness and organisation in order to be effective and fruitful. For English language learners to achieve the desired learning goals and fruitful outcomes, they should develop some reflective and self-regulation skills. Besides, they need to employ the available technological tools, devices and applications in a way that supports language learning and practice. The way that technology is employed can make a difference in learning. In other words, language learners need to recognise the affordances enabled by the technological tools and facilities that are currently available in everyday life communication and interaction and approach them from a self-regulated learning perspective and a situated language learning standpoint.

In the realm of language learning, the interaction between self-regulated learning and technology plays a crucial role. This role is comparable to that of metacognitive awareness, organization, and the strategic use of technology for effective language learning purposes. Exploring the profound insights on how technology influences language learning in various ways, Jones (2018) argues that "technologies influence language learning in at least four ways. First, they influence the kinds of meanings that can be made with language, and thus, the kinds of meaning-making processes that learners are given the opportunity to practice. Second, they determine the ways we can record, preserve and transmit language, affecting the type and quality of input learners are exposed to and what they are able to do with that input, as well as how they are able to reflect on their output. Third, they affect the kinds of interactions learners are able to have with the language, the kinds of people they are able to interact with, and the roles they are able to play in these interactions. Finally, technologies play a role in learners' ability to develop autonomy in their learning, to determine their own learning trajectories, and to apply what they have learned to authentic situations." (p. 320)

Self-regulated learning (SRL)

SRL is currently highly valued in language education, and its importance has been acknowledged in various research studies (e.g. Su, Lee & Lee, 2019; Wang, 2017; Yang & Wang, 2016; Zimmerman, 1989; Zimmerman, 2002; Zheng & Chen, 2019; Zubbir & Khalil, 2023; Zubbir et

al., 2023). For example, Zheng, Chen and Chen (2019) studied the intricate relationship between online self-regulation and related variables among EFL learners. Also, Khalil (2020) concludes that SRL has been widely acknowledged as crucial and essential in fostering academic performance and autonomous learning abilities among students, particularly in language learning contexts.

SRL is a cyclical process that involves three phases: forethought, performance, and self-reflection. It helps learners regulate their learning through cognitive, metacognitive, motivational, and behavioural processes (Zimmerman, 2000). SRL is especially important for online writing, as it involves planning, drafting, revising, redrafting, and editing (Huang, 2010). Online writing presents challenges like a lack of social presence, interaction, and feedback, which can affect motivation and self-efficacy. Therefore, learners need to use SRL strategies to improve their writing skills and outcomes (Huang, 2010; Zimmerman, 2000).

SRL might be essential and pivotal for developing and enhancing students' self-expression and reflective writing skills since it incorporates crucial aspects that are fundamentally important in EFL education (Zubbir et al., 2023). Having been recognized as a significant factor in enhancing students' academic performance and fostering their autonomous learning abilities (Bandura, 1986; Zimmerman, 1989), SRL might play a crucial role in the development of these linguistic skills and competencies. It is deemed vital here because it encompasses essential aspects of learner autonomy development, such as self-motivation, planning, goal setting, use of learning strategies, self-monitoring, help-seeking, self-evaluation, and attention control.

Moreover, in the context of language teacher development, SRL plays a crucial role in enhancing and improving the same expressive and productive skills. By engaging in SRL practices, EFL student teachers can become more autonomous learners who are capable of identifying their strengths and weaknesses, setting goals, planning strategies, monitoring progress, and evaluating outcomes (Abadikhah, Aliyan & Talebi, 2018; Khalil, 2020). These elements and components are essential for written performance that needs a reasonable degree of self-confidence and organisation.

Artificial Intelligence (AI) Chatbots

SRL can be supported by various tools and technologies (e.g. chatbots). AI chatbots rely on artificial intelligence (AI), which is defined as 'the ability of machines to carry out functions that are normally associated with human intelligence, such as reasoning, correcting, making self-improvements and learning through experience' (Richards & Schmid, 2002). Being a branch of computer science, AI enables machines to simulate human intelligence and perform tasks that typically require human cognitive abilities. In the education field, AI has emerged as a promising tool to enhance both language learning and teaching practices, offering personalised and interactive learning experiences for learners (Hwang et al., 2020). This way, AI-assisted language learning tools can provide learners with adaptive feedback, suggestions, and alternatives to improve their language major and minor skills, such as grammar, vocabulary, reading comprehension, writing, and speaking (Kim et al., 2019; Liang et al., 2021; Chen et al., 2022). Moreover, on the psychological scale, AI-powered language learning tools can foster and reinforce learners' motivation, engagement, and self-regulated learning, which are crucial aspects of language proficiency and learners' autonomous (independent) learning (Carpio Cañada et al., 2015; Ebadi & Amini, 2022; Hsu et al., 2023).

Many studies have investigated the impact of AI-assisted language learning tools on various language learning outcomes and perceptions among EFL learners. For instance, Xu et al. (2022) found that AI-assisted language learning tools using speech recognition features improved learners' language learning achievement and interaction. In their meta-analysis of the impact of AI on learning achievement and learning perception, Zheng et al. (2021) reported more significant effects of AI on learning achievement than on learning perception. Also, Hsu et al. (2023) examined the effects of AI-assisted image recognition technologies on EFL learners' vocabulary knowledge, self-regulation, and anxiety, revealing that learners utilising AI tools demonstrated significant improvement and outperformed their peers in vocabulary knowledge. In the same vein, Utami et al. (2023) explored the impact of AI-powered language learning on the academic research writing of three Indonesian EFL learners showing that the AI-powered language learning approach enhanced the learners' academic research writing by giving them the required feedback, comments, and alternative sentences.

These studies suggest that AI-assisted language learning tools have the potential to revolutionise language learning and teaching and to provide learners with optimal learning experiences that are tailored to their individual needs and preferences. However, some limitations and challenges exist concerning the integration of AI in language instruction, such as many ethical, social, and pedagogical issues, that need to be addressed and resolved. Therefore, further research is needed to explore the long-term effects, sustainability, and generalisability of AI-mediated language instruction, and to provide evidence-based guidelines and best practices for educators and researchers interested in incorporating AI-powered platforms into language learning/teaching settings.

More specifically, AI chatbots have emerged as a novel tool in educational settings, providing personalised and interactive support to learners (Johnson & Lester, 2016). They can provide feedback, guidance, motivation, and interaction for EFL student teachers, thus enhancing their self-expression and writing skills (Klimova & Ibna Seraj, 2023). In this regard, many research studies sought to explore the use of SRL, supported with AI chatbots, in the context of EFL student-teacher education, focusing on the benefits, challenges, and implications for practice (e.g. Belda-Medina & Calvo-Ferrer, 2022; Chang, Lin, Hajian & Wang, 2023; Goda, et al., 2014; Huang, Hew & Fryer, 2022; Kim, Cha, & Kim, 2021). These studies highlight the possibility of this approach and these AI tools in opening new venues and opportunities for EFL teachers and candidates to develop many linguistic skills, and reinforce their independent and lifelong learning abilities.

Being able to converse with human users via natural language, AI chatbots have opened new possibilities for language learning and teaching. For example, they can provide learners with opportunities to practise their language skills, receive feedback, and engage in authentic and meaningful interactions (Huang, Hew & Fryer, 2022). Thus, AI chatbots opened new opportunities for facilitating SRL and the processes it includes (i.e. setting goals, monitoring progress, and adjusting strategies to achieve the desired outcomes). This might lead – in one way or another - to developing self-expression skills among EFL student teachers (Huang, Hew & Fryer, 2022; Klimova & Ibna Seraj, 2023; Lin, Chang & Wang, 2023; Liu, 2022; Zheng, Chen & Chen, 2019; Zubbir & Khalil, 2023).

Additionally, with using chatbots, students can have more positive attitudes towards foreign langage learning. To be specific, by talking to a machine rather than to a human being, learners would feel more relaxed and less anxious. Since the chatbot is willing to repeat the same material endlessly without getting bored or losing patience, students feel more comfortable and less nervous about learning a foreign language (Kim & Kim, 2021).

The use of AI chatbots in EFL settings has been a growing trend, with studies highlighting their effectiveness, motivation, and satisfaction (Klimova, 2023). These chatbots are particularly useful in promoting SRL and positive attitudes in students (Maharsi, 2018). In the specific context of EFL speaking classes, for example, AI chatbots have been shown to encourage student engagement and task success (Yang, 2022). However, there is a need for further research on the use of AI chatbots to develop self-expression and reflective writing skills in EFL student teachers, as well as on the attitudes of these students towards SRL strategies (Abadikhah, 2018).

Integrating AI chatbots with self-regulated learning principles holds the potential to enhance EFL student teachers' reflective and productive skills in many language learning settings including practicum. In this regard, several key principles have been proposed for the integration of chatbots in education, including goal setting, feedback, and personalisation (Chang, Lin, Hajian, & Wang, 2023). Research has shown that AI-supported teaching, such as chatbots, can facilitate communication between learners, provide personalised feedback, and support the development of self-regulation and metacognitive skills (Chang et al., 2023; Hajian et al., 2023). Furthermore, chatbots have been identified as valuable tools for supporting self-regulated learning and metacognitive skills in education (Chang et al., 2023; Lin et al., 2023). Additionally, AI-powered chatbots have been found to offer advantages in personalised learning, skills development, and student engagement (Chang et al., 2023; Wang et al., 2023).

To effectively utilise AI chatbots in education in general and language learning in particular, it is important to establish pedagogical principles that align with the goals of teaching and learning. The first principle is ‘goal setting’, which involves prompting students to set specific learning objectives and monitor their progress. By incorporating goal setting into AI chatbots, students

become empowered to take ownership of their own learning and develop SRL skills (Chang, Lin, Hajian, & Wang, 2023). The second important principle is ‘self-assessment and feedback’, which is considered a crucial aspect of SRL. More specifically, AI chatbots can provide timely and constructive feedback to students, helping them understand their strengths and areas for improvement. This feedback can be personalised to each student's needs, allowing for targeted interventions and support. In this sense, chatbots can provide students with timely and constructive feedback on their work, helping them identify areas of improvement and develop self-reflection skills. This feedback can be personalised to each student's needs and learning style, allowing for targeted interventions and support (Chang et al., 2023; Hajian et al., 2023). The third principle is ‘personalisation’, which is a key aspect of effective AI chatbot integration. By personalising the learning experience, these chatbots can cater to the unique needs and preferences of each student. This can be achieved through adaptive learning algorithms that tailor the content and delivery of instruction based on individual learner data (Chang, Lin, Hajian, & Wang, 2023). Thus, incorporating goal setting, feedback, and personalisation in AI-based pedagogy can empower students to become self-regulated learners. Also, by harnessing the power of AI chatbots, educators can create a learning environment that promotes autonomy, responsibility, and lifelong learning.

In addition, AI chatbots can support SRL in online writing by providing various forms of assistance (e.g. goal setting, feedback, personalization, and scaffolding). For example, some chatbots can help learners set specific and attainable writing goals, monitor their progress, and remind them of their goals (Chen et al., 2018). They can provide immediate and adaptive feedback on learners' writing in specific aspects, such as grammar, vocabulary, content, and structure (Foltz et al., 2019). They can personalise the learning experience by adapting to learners' preferences, needs, and levels (Chen et al., 2018). Some chatbots can also scaffold learners' writing process by providing prompts, hints, examples, and questions (Foltz et al., 2019). These forms of assistance can enhance learners' SRL skills, such as self-monitoring, self-evaluation, self-regulation, and self-reflection, as well as their writing skills and outcomes (Chen et al., 2018; Foltz et al., 2019).

As a fundamental aspect of language education, SRL is essential for students' academic achievement and autonomous learning abilities in language education. Therefore, the use of AI chatbots in conjunction with SRL has the potential to significantly contribute to the development

of EFL student teachers' expressive, reflective and productive performance (Klimova & Seraj, 2023). According to Klímová and Seraj (2023), chatbots have been used in university EFL settings for various purposes, such as developing speaking, listening, reading, and writing skills, as well as fostering critical thinking, intercultural competence, and learner autonomy. They also point out that chatbots can facilitate the application and integration of existing theories and concepts used in EFL teaching and learning, such as CEFR (Common European Framework of Reference for Languages), mind mapping, or SRL theory, suggesting that chatbots can help EFL learners set their own learning objectives, plan their learning activities, monitor their progress, reflect on their performance, and adjust their strategies accordingly. Moreover, they argue that chatbots can provide personalised and adaptive feedback, as well as emotional support and encouragement for EFL learners.

Through real-time analysis of students' responses, these chatbots can identify areas for improvement and provide targeted suggestions for enhancing reflective and productive skills. This personalised feedback helps students track their progress, recognise strengths, and address weaknesses effectively. Furthermore, AI chatbots can facilitate self-regulation by promoting metacognitive awareness among EFL student teachers. By engaging in conversations with the chatbot, students are encouraged to think critically about their thought processes while expressing themselves or reflecting on their writing.

The integration of AI-based chatbots into language education, including their potential to enhance EFL students' learning experiences, has been a subject of review and research (e.g. Chang et al., 2023; Lin et al., 2023; Hajian et al., 2023; Hapsari & Wu, 2022; Wang et al., 2023). For example, Hapsari and Wu (2022) highlight the potential of AI chatbots in enhancing EFL speaking skills, especially in relieving speaking anxiety, improving learning enjoyment, and fostering critical thinking. They propose an AI chatbot learning model that involves a preceding conversation with an AI chatbot before engaging in a formal speaking task with peers or instructors. They claim that this model can help EFL students overcome their fear of speaking (i.e. speaking anxiety) in public, increase their interest and engagement in ELL, and develop their ability to analyse, evaluate, and synthesise information. They also report that the AI chatbot can provide immediate and

constructive feedback on some linguistic aspects, such as the students' pronunciation, grammar, vocabulary, fluency, and coherence.

Also, Liu (2022) examines the use of chatbots in EFL writing instruction, specifically in teaching logical fallacies. He compares the effects of a chatbot-based learning system with a website-based learning system on the students' knowledge acquisition, motivation enhancement, and perception change. He finds that the chatbot was perceived as slightly less effective than the website in developing target knowledge, but more effective in improving motivation. Further, he explains that the chatbot was advantageous in providing high-quality human-computer interactions, study plan-making, and high accessibility. He also notes that the chatbot was able to detect and correct the students' logical fallacies in their writing samples.

Self-expression

Self-expression is a crucial aspect of language development that enables learners to communicate their thoughts, ideas, and emotions effectively (Vygotsky, 1978; Schumm, 2005). Therefore, it holds immense potential for enriching EFL learning experiences (Schumm, 2005). EFL student teachers in particular can nurture and develop their own self-expression, and subsequently enhance their pedagogical skills and foster similar growth in their future students.

Creative writing as one of the most flexible and accessible mediums for self-expression allows us to explore our identity, voice, and imagination through words (Writing Forward, 2021). By using AI chatbots, EFL student teachers can engage in authentic and meaningful conversations, practising their language skills and receiving instant feedback to improve their self-expression abilities (Wang & Johnson, 2018). This interactive and personalised support from AI chatbots can promote their confidence and motivation to express themselves in the target language.

Language teachers need to develop strong self-expression skills as they play a vital role in facilitating effective communication in the classroom. Through SRL supported by AI chatbots, student teachers can practise expressing themselves creatively while receiving instant feedback and guidance from chatbots. This interaction enables them to refine their language use and develop confidence in expressing their thoughts (Wang & Johnson, 2018).

Self-expression in EFL learning contexts fosters a person-centred approach (Rogers, 1995), promoting learner autonomy and fostering positive emotional connections to language. By incorporating expressive activities like creative writing, drama, and personal narratives, pre-service teachers can model their own openness and self-exploration (Kumaravadivelu, 2003), creating a safe space for their prospective students to do the same. This can lead to deeper language acquisition, as learners connect the language to their personal experiences and identities (Üstünlüoğlu, 2009).

Additionally, self-expression helps pre-service teachers hone their reflective and critical thinking abilities (Tomlinson, 2023). They can analyze their own prejudices and presumptions by participating in expressive activities like journaling or critical language analysis, which is essential for creating culturally responsive teaching methods (Ebersole, Kanahele-Mossman & Kawakami, 2016). Through introspection on their personal language learning journeys and experiences, they might acquire important perspectives on the difficulties and rewards that await their future pupils.

Moreover, encouraging pre-service teachers to express themselves in EFL teacher education contexts contributes to the development of authenticity and passion in teachers (Latta & Kim, 2009). Classrooms become more dynamic and interesting when teachers are encouraged to share their individual viewpoints and pedagogical approaches. This genuineness can encourage student instructors to discover their own voices as educators and inspire them, which will spread the act of self-expression throughout the educational/learning process.

Therefore, encouraging self-expression in EFL instruction has major advantages for both professional and personal growth, especially for pre-service teachers and student instructors. EFL education can enable teachers and students to engage with the language more deeply by placing a strong emphasis on self-exploration, critical reflection, and authentic expression. This can lead to a truly transforming and enjoyable learning experience for all involved.

Reflective Writing

Reflective practice is important and significant for EFL student teachers' professional growth since it helps them critically analyse their teaching practices and come to wise judgments and informed decisions (Farrell, 2015; Zeichner & Liston, 2013). Student teachers can analyse their teaching experiences, pinpoint areas for growth, and create objectives for future practice by integrating AI chatbots with self-regulated learning strategies (Wang & Johnson, 2018; Liaw et al., 2020). Prompt and immediate feedback and direction provided by AI chatbots can improve the quality of student teachers' reflections and support their growth and development as reflective practitioners.

Reflective writing is a useful tool for introspection and personal growth. Student instructors can gain insight into their own teaching approaches, identify areas for improvement, and create goals for future development by reflecting on their own learning experiences. This introspective approach fosters metacognitive awareness and improves critical thinking abilities. The advantages of self-expression and reflective writing in self-regulated learning are further enhanced by integrating AI chatbots.

Reflective writing is a useful tool for EFL teachers and students alike. In this regard, both Moghaddam (2019) and Roux (2012) emphasise the advantages of reflective writing for EFL teachers, with Moghaddam focusing on how it affects teacher awareness and practice and Roux highlighting how it promotes student participation in the classroom and enhances academic writing skills. Macías (2023) provides more evidence in favour of these conclusions, highlighting the beneficial effects of reflective journals on EFL students' writing abilities. However, Abednia (2013) has highlighted difficulties such as poor English proficiency and the requirement for in-depth reading, indicating the need for additional help and direction in this area. Moreover, Huang, Hew, and Fryer (2022) discussed journal writing as a helpful reflective approach in their study. Students can use journal writing to track their progress in learning, assess their learning strategies, and control their motivation and emotions. Furthermore, by giving learners the freedom to select their own topics and write in any genre, journal writing can support self-expression and the development of interests.

One of the most influential models of reflective writing is Schön's (2017) distinction between reflection-in-action and reflection-on-action. Reflection-in-action refers to the process of thinking about what one is doing (right now) while doing it and making adjustments accordingly. Reflection-on-action, on the other hand, refers to the process of thinking back on what one has done after the action is completed so as to contemplate it and analyse the reasons and outcomes of his/her actions. Schön argues that both types of reflection are essential for professional development, as they enable practitioners to learn from their experiences and improve their practice.

Gibbs' (1988) reflective cycle, which consists of six stages - description, feelings, evaluation, analysis, conclusion, and action plan - is another well-known model of reflective writing. With the help of Gibbs' model, students can thoroughly describe an experience, examine their feelings and ideas about it, assess its advantages and disadvantages, examine its causes and effects, come to conclusions about what they learned from it, and make plans for applying what they have learned in the future. Since it aids students in organising their reflective texts and honing their critical thinking abilities, Gibbs' model is frequently utilised in EFL writing contexts.

A third influential model is Moon's (2013) framework for reflective learning, which suggests four stages of reflection: descriptive writing, descriptive reflection, dialogic reflection, and critical reflection. The lowest level of reflection is descriptive writing, which merely records events without providing any further analysis or judgment. The next step is descriptive reflection, which offers a rationale or explanation for what transpired. The third level, known as dialogic reflection, is a more thorough examination of one's own presumptions, convictions, attitudes, and viewpoints in light of the experience. The highest form of reflection is critical reflection, which examines many viewpoints and possibilities while challenging one's own and others' opinions. With the aid of Moon's framework, students can evaluate their current degree of reflection and advance to more advanced stages of reflective learning.

For EFL teachers and students, reflective writing offers numerous advantages. It is a useful tool for educators to track their own progress, pinpoint areas of strength and weakness, get input from

colleagues and students, and make plans for future development (Farrell & Voskoglou 2021). Reflective writing can assist students in tracking their own language learning process, defining their learning objectives and tactics, requesting feedback from peers and teachers, and making plans for future study (Liu et al., 2023). Furthermore, it can help students and teachers become more interculturally competent by encouraging them to consider their own cultural backgrounds and values, contrast them with those of other cultures, and increase their intercultural sensitivity and awareness (Huang, 2021).

For EFL teachers and students, reflective writing is a useful tool or technique to improve language learning outcomes and professional growth. The utilisation of many models and frameworks for reflective writing, including those proposed by Schön (2017), Gibbs (1988), and Moon (2013), can facilitate the organisation of reflective texts and promote more profound levels of reflection among EFL educators and students. Through the facilitation of cross-cultural comparison and comprehension, reflective writing can also support intercultural competency in EFL environments.

AI chatbots can have a significant impact in improving the reflective writing process. There are a number of benefits to using these chatbots for reflective writing. First, in the context of reflection writing tasks, AI chatbots are capable of providing objective and constructive feedback. Such feedback may help EFL students' teachers identify areas for growth and improve the way they teach. Second, AI chatbots could be useful to EFL teacher assistants for organising their thoughts and ideas. Second, AI chatbots can help EFL student instructors arrange their ideas and thoughts. Student teachers can express their opinions and get ideas and prompts for more research by interacting with an AI chatbot. Critical thinking abilities can also be developed by EFL student teachers through the use of AI chatbots in language instruction. Student teachers can learn from many viewpoints and hone their arguments and ideas by conversing with AI chatbots. AI chatbots can help EFL student teachers express themselves more fully and advance their careers by being incorporated into the reflective writing process. By assisting student teachers in their reflective practices and developing their pedagogical skills, these chatbots act as helpful resources.

Self-expression and Reflective Writing

Both self-expression and reflective writing are crucial EFL student teachers because they allow them to share their ideas, emotions, and experiences in a foreign language and to critically analyse their own methods and ideologies as educators (Farrell, 2013). These skills are crucial for language instructors because they foster critical thinking and ongoing professional growth. But mastering these abilities can be difficult, particularly in virtual learning settings where students might not receive enough direction, encouragement, or feedback (Huang, 2010). Supporting students' self-regulated learning (SRL) in online writing assignments is crucial because SRL enables them to set objectives, track their progress, assess their results, and modify their tactics as necessary (Zimmerman, 2000). One way to support SRL in online writing is to use artificial intelligence (AI) chatbots, which are computer programmes that can interact with learners through natural language and provide various forms of assistance (Woolf, 2010).

Reflective writing and self-expression are important components of EFL instruction. By enabling them to express their thoughts, feelings, and opinions in the target language, these abilities help student teachers become more fluent language learners overall. Through self-expression, EFL student teachers can share their own viewpoints and life experiences, which promotes originality and creativity in the classroom. Students can express themselves authentically through self-expression, which results in more meaningful and engaging interactions with teachers and peers.

By providing prompts, feedback, and suggestions for improvement, these chatbots can guide students through the reflective writing process. Moreover, they can adapt to individual learning needs by analysing students' writing patterns and identifying areas for growth (Chang, Lin, Hajian, & Wang, 2023). Through AI chatbot-assisted self-regulated learning, EFL student teachers can enhance their reflective writing skills in several ways (e.g. gaining access to immediate feedback and guidance throughout the writing process).

Chatbots can analyse students' written statements and expressions using natural language processing algorithms and offer feedback on grammar, vocabulary usage, and general coherence (Goda et al., 2014; Huang, Hew & Fryer, 2022). Furthermore, by creating writing prompts that promote reflective writing, these smart systems enable student teachers to freely explore their

feelings and ideas. EFL student teachers can practise self-expression in a secure (safe) and non-judgemental environment by integrating AI chatbots into their learning process (Kim, Cha & Kim, 2021; Klimova & Ibna Seraj, 2023).

AI Chatbots and Language Learning

Promising outcomes, including enhanced student engagement, motivation, satisfaction, and performance, have been observed in the studies that have been conducted on the use of AI chatbots to support SRL in online writing (Chen et al., 2018; Foltz et al., 2019). But there are also certain drawbacks and difficulties, like technological/technical issues, ethical concerns, instructional design, and learner readiness (Woolf, 2010). Future studies should so address these problems and investigate the following avenues: (1) creating increasingly sophisticated and dependable AI chatbots that can manage a variety of intricate writing assignments and situations; (2) researching the moral and societal ramifications of utilizing AI chatbots for online writing, including privacy, accountability, and trust (Woolf, 2010); (3) designing effective (evidence-based) pedagogical models/strategies for integrating AI chatbots in online writing curricula and instruction (Huang, 2010); (4) examining the learner factors and conditions that influence the use and effectiveness of AI chatbots in online writing, such as learner characteristics, preferences, and attitudes (Chen et al., 2018; Foltz et al., 2019).

In the same vein, Liu et al. (2023) proposed in their study a reflective thinking promotion mechanism-based AI-supported English writing (RTP-AIEW) approach to deepen and expand learners' thinking and also improve their EFL writing quality/performance. To investigate the effectiveness of this learning model/approach, a quasi-experiment study was conducted in two EFL writing classes at a university: the first class (50 students) was the experimental group learning with the proposed RTP-AIEW approach, while the other class (53 students) acted as the control group that was learning with conventional AI-supported EFL writing. The results indicated that the proposed approach or model not only improved the experimental group students' English writing performance significantly, but also improved their self-efficacy and self-regulated learning, and significantly reduced their cognitive load.

Also, Kim, Cha, and Kim (2021) conducted a study that aimed at investigating how AI chatbots affected the communication skills of EFL students as well as how they felt about utilising chatbots for language practice. The experiment included 49 university students, who were split into two proficiency groups: low and intermediate. Over the course of a semester, they spent 10 to 15 minutes per class using three AI chatbots: Replika, Andy, and Google Assistant. Pre- and post-test designs were employed in the study to assess the students' progress in speaking abilities, including content, pronunciation, intonation, stress, and fluency. A questionnaire was also administered to identify students' attitudes and opinions on the employment of chatbots.

The findings also showed that the two groups' speech abilities in terms of intonation, stress, and substance differed significantly from one another. In general, the students' opinions of utilising chatbots were positive, as they stated that the chatbots enhanced their English proficiency, gave them chances to practise language, and produced a comfortable and engaging learning environment. They did, however, also highlight numerous disadvantages of chatbots, including poor communication, trouble identifying errors, and a narrow range of topics. Regardless of their proficiency level, the study found that AI chatbots can help EFL students improve their motivation and communication abilities. Additionally, the study made various recommendations and implications about the use of chatbots in EFL contexts.

Similarly, Belda-Medina and Calvo-Ferrer (2022) examined the use of chatbots as AI conversational partners in language acquisition among aspiring teachers. They reached the conclusion that chatbots can give language learners the chance to improve their communication skills in a genuine and natural setting while also receiving support and feedback from the chatbots. The motivation, self-assurance, and enthusiasm of language learners as well as their knowledge of artificial intelligence and chatbot technology can all be improved via chatbots. While chatbots can be incorporated into language learning environments as supplementary resources, they should not be replace human peers or teachers because they still have significant limits and drawbacks, especially when it comes to ethics, accuracy, and flexibility. Depending on the level and objectives of each language student, chatbots can be customised to meet their personal requirements, preferences, varying goals and learning styles.

In addition, several studies explored the effects of chatbot-assisted language learning on various aspects of linguistic competence and learner perception. For example, Kim (2017) investigated the impact of voice-based and text-based chatbots on EFL students' speaking skills and found that both types of chatbots improved students' pronunciation, fluency, and accuracy, as well as their motivation and confidence. Similarly, Haristiani and Danuwijaya (2019) examined the use of chatbots for learning logical fallacies in EFL writing reporting that chatbots enhanced students' critical thinking, enjoyment, and self-efficacy. Finally, Hapsari and Wu (2022) conducted a meta-analysis of experimental studies on CALL and concluded that chatbots had a positive effect on language learning outcomes, especially on speaking and writing skills.

Conclusion

In a nutshell, one of the challenges that EFL student teachers face is developing their self-expression and reflective writing skills, which are essential for their professional development and lifelong learning. Research shows that SRL supported with AI chatbots can be a promising approach in this regard by offering various benefits for EFL student teachers, such as feedback, guidance, motivation, interaction, personalisation, adaptation, emotion regulation, anxiety reduction, enjoyment enhancement, and critical thinking development. However, there are also some challenges and limitations that need to be addressed when using chatbots in EFL education, such as technical issues, ethical concerns, pedagogical design, teacher training, and learner readiness.

Definitions of Research Terms

Self-regulated learning: Self-regulated learning (SRL) is a learning process where individuals actively monitor and control their cognitive processes (Zimmerman, 2002), promoting learner autonomy. SRL is crucial in language education, as it allows students to manage their cognition, motivation, and behaviour during academic activities (Bandura, 1986; Zimmerman, 1989). It emphasises the active role of learners in managing their learning processes and outcomes, such as setting goals, monitoring progress, applying strategies, and evaluating results. SRL is a major predictor of students' online language learning (Zubbir et al., 2023) and is considered a key factor for successful language learning. It enables learners to become more autonomous and motivated, making it a crucial aspect of language education (Pintrich, 2004; Su, Lee & Lee, 2019;

Üstünlüoğlu, 2009; Wang, 2017; Zimmerman, 2002). In this study, self-regulated learning refers to the process whereby learners actively manage their own learning by setting goals, monitoring their progress, and adjusting strategies to achieve desired outcomes. It involves the ability to independently control and regulate cognitive, motivational, and emotional aspects of learning, particularly in an environment enhanced by AI-driven tools.

Artificial Intelligence (AI): Richards and Schmid (2002) define Artificial Intelligence as 'the ability of machines to carry out functions that are normally associated with human intelligence, such as reasoning, correcting, making self-improvements and learning through experience.' Artificial Intelligence in the context of this study is defined as the use of advanced algorithms and computational techniques that enable machines to mimic human-like cognitive functions such as learning, reasoning, problem-solving, and decision-making. The AI technologies examined in this research focus on their applications in educational settings, particularly in supporting self-regulated learning and enhancing reflective writing practices.

AI Chatbots: AI chatbots are defined as computer programmes that simulate natural language conversations with human users (Chang, Lin, Hajian & Wang, 2023). AI chatbots are based on natural language processing and machine learning techniques, which enable them to understand and generate natural language responses (Woolf, 2010). By simulating natural language (human-like conversations) that are common between people, these chatbots can provide adaptive and personalised responses based on the user's input (Wolf, 2010) and offer immediate feedback, guidance, and scaffolding to learners (Wang & Johnson, 2018). AI Chatbots in this research are interactive software applications powered by AI (ChatGPT, Bard and Bing) that can simulate conversations with learners. These chatbots are designed to facilitate self-expression and reflective writing by engaging students in dialogue, providing feedback, and guiding them through various learning activities. The chatbots serve as digital assistants to support students' self-regulation and reflective practices

Self-expression: Self-expression is defined as the ability to communicate one's thoughts, feelings, and experiences authentically and functionally. In other words, it is the act of giving form to our thoughts, ideas, experiences, and emotions, and it is part and parcel of all forms of art (Vygotsky,

1978; Schumm, 2005). In this study, self-expression is defined as the process by which students convey their thoughts, feelings, and ideas in a manner that is authentic to their personal experiences. Self-expression is facilitated by AI tools, particularly in writing tasks, where students articulate their reflections and insights through written communication.

Reflective writing: Reflective writing is a type or mode of writing that requires one to critically examine his/her own experiences, convictions, and deeds and connect them to pertinent ideas and theories (Williams, Woolliams & Spiro, 2020). Writing reflectively can help us grow as critical thinkers, gain insight from our experiences, and perform better in both our academic and professional lives (Learning Centre, University of Sydney, 2019, p. 3). Reflective writing in the context of this research refers to a writing practice where students critically engage with their learning experiences, articulating their thoughts, feelings, and reflections in a structured manner. Reflective writing is supported by AI technologies, which provide feedback and guidance to help students deepen their understanding and enhance their self-regulation skills.

RESEARCH PROBLEM & OBJECTIVES

Background of Research Problem

Effective communication skills and language competence are essential for language learners, necessitating sustained dialogue practice and exposure to diverse linguistic contexts. However, language teachers often encounter the challenge of students unwilling to express themselves, particularly in the first or other languages. The potential to address this challenge through the use of educational chatbots has been suggested by chatbot researchers (Lu et al., 2006; Wang, Petrina, & Feng, 2017). Although the last two decades have seen exploration into the use of educational chatbots for language training, the impact on language learning among EFL student teachers remains underexplored, as highlighted by the limited studies in this area (Huang, Hew & Fryer, 2022). Besides, there has been a notable shortage of studies that actively engage teachers and instructional designers to determine the most effective ways to incorporate these AI tools in classroom settings (Chang, et al., 2023).

Self-regulated learning (SRL) is a pivotal skill for language learners, especially in online environments (Goda et al., 2014). For EFL student teachers, self-expression and reflective writing

are vital for professional identity and critical thinking development (Lin & Chang, 2020). Despite this importance, there is a notable gap in empirical studies examining how AI chatbots can facilitate SRL and enhance self-expression and reflective writing skills among EFL student teachers. Thus, this study aims to investigate the effects of SRL-supported AI chatbots on the development of EFL student teachers' self-expression and reflective writing skills.

However, existing studies on Computer-Assisted Language Learning (CALL) have predominantly focused on learning outcomes rather than the learning process. Limited research has explored how chatbots can specifically support the development of SRL skills and strategies in the context of EFL teacher education. EFL student teachers must not only enhance their language proficiency but also develop self-expression and reflective writing skills critical for professional growth and identity formation. Hence, there is a pressing need to explore how chatbots can facilitate EFL student teachers in becoming more self-regulated, expressive, and reflective in language learning and teaching.

AI chatbots have been used for various educational purposes, such as providing information, tutoring, assessment, and feedback (Graesser et al., 2004). However, research on using AI chatbots to support SRL in online writing, especially for EFL student teachers, is still scarce. While there is existing research on self-regulated learning and the use of AI chatbots in educational settings, limited studies have explored the specific impact of using self-regulated learning supported with AI chatbots to develop EFL student teachers' self-expression and reflective skills. This research aims to fill this gap by examining the effects of this innovative approach on the professional development of EFL student teachers.

Drawing on the situated learning theory and the self-regulated learning theory, the study proposes a chatbot-based learning model. This model integrates these two theories, providing EFL student teachers with opportunities to practice writing, receive feedback, and reflect on their learning experiences. The anticipated contribution of this study lies in providing empirical evidence and practical implications for using chatbots to enhance language learning and teaching among EFL student teachers.

Reflective writing, a crucial skill for EFL student teachers, fosters critical thinking, self-expression, and professional development. Self-regulated learning, defined as goal-setting, progress monitoring, and strategy adjustment, is vital for lifelong learning. Despite the importance of these skills, many EFL student teachers struggle, hampering their professional development. The integration of AI chatbots into self-regulated learning approaches can address this challenge by providing personalised, interactive experiences that encourage self-reflection and effective articulation of thoughts.

Developing self-expression and reflective writing skills is essential for EFL student teachers, enabling them to communicate thoughts, feelings, and experiences effectively and critically. Challenges faced by EFL student teachers, such as lack of motivation, feedback, guidance, and practice opportunities, highlight the need to explore effective support mechanisms. Thus, the integration of self-regulated learning supported by AI chatbots becomes imperative. This approach allows student teachers to receive tailored feedback and guidance, aligning with the recognized importance of SRL in academic development (Zimmerman, 2002; Pintrich, 2004). Huang, Hew, and Fryer (2022) further propose the self-regulation view in writing-to-learn, emphasizing that writing can scaffold self-regulated learning by providing cognitive offloading and prompting self-regulatory processes.

Furthermore, EFL student teachers at the Faculty of Education, Assiut University, face a unique challenge rooted in their secondary stage education. Accustomed to the restrictive bubble sheet examination system that does not allow for self-expression or reflective writing, these students struggle with tasks requiring expressive and accurate academic writing upon entering university. This struggle is exacerbated by their preference for objective tests, hindering the development of their linguistic skills, particularly in writing. When they enter university, they encounter different types of writing tasks that demand them to express themselves and reflect on their learning experiences in academic standard English. However, they lack the necessary linguistic competence, cognitive skills, and motivational factors to cope with these tasks. As a result, they tend to avoid or perform poorly on subjective tests that involve writing, and their overall academic achievement and professional development suffer. Consequently, there is a critical need to

investigate innovative approaches to support EFL student teachers in overcoming these challenges and enhancing their self-expression and reflective writing skills.

To empirically confirm the existence of the problem, a short test of self-expression and reflective writing was administered to a sample of novice EFL student teachers (n = 30) that required them to freely express their opinions on some current events and reflect on their language learning experiences. Results indicated that most students (80%) were unable to express themselves properly in standard English. In addition, their written accounts demonstrated an awkward use of English to communicate ideas effectively in a personal fashion.

Statement of Research Problem

Therefore, there is a need to design and implement a pedagogical model or intervention that can help EFL student teachers overcome these difficulties and enhance their self-expression and reflective writing skills. The proposed study aims to investigate the effectiveness of using SRL supported with AI chatbots as a pedagogical tool to achieve this goal. As stated above, AI chatbots are computer programmes that can simulate natural human conversations and provide feedback, guidance, and support to learners in various domains. The study hypothesizes that by using SRL supported with AI chatbots, EFL student teachers will be able to:

- set specific, measurable, achievable, realistic, and time-bound (SMART) goals for their writing tasks;
- monitor their progress and performance through self-assessment and peer feedback;
- apply appropriate strategies to plan, draft, revise, and edit their writing;
- evaluate their outcomes and reflect on their strengths and weaknesses;
- develop their self-efficacy, self-regulation, and self-expression in writing; and
- improve their reflective writing skills and academic achievement.

In summary, the research problem addresses the need to comprehensively investigate the potential of a pedagogical model of self-regulated learning supported with AI chatbots to enhance self-expression and reflective writing skills for novice EFL student teachers, encompassing the assessment of its impact on the participants' skills, experiences, and broader competencies.

Research Objectives

The primary objectives of this study are as follows:

1. Identifying the self-expression and reflective writing skills that fresh EFL student teachers need to develop in the context of their pre-service teacher education programme at Faculty of Education, Assiut University;
2. suggesting a pedagogical model of self-regulated learning (SRL) supported by AI chatbots with the goal of developing fresh EFL student teachers' self-expression and reflective writing skills;
3. assessing the impact of a pedagogical model of self-regulated learning (SRL) supported with AI chatbots on developing EFL student teachers' self-expression and reflective writing skills;
4. examining the influence of a pedagogical model of SRL supported with AI chatbots on the reflective writing skills of fresh EFL student teachers at Faculty of Education, Assiut University; and

Research Questions

Thus, the main research questions that the present study attempted to answer are:

1. What are the self-expression and reflective writing skills that fresh EFL student teachers need to develop in the context of their pre-service teacher education programme at Faculty of Education, Assiut University?
2. What will a pedagogical model of self-regulated learning (SRL) supported with AI chatbots to develop fresh EFL student teachers' self-expression and reflective writing skills be like?
3. What is the impact of a pedagogical model of self-regulated learning (SRL) supported with AI chatbots on developing EFL student teachers' self-expression and reflective writing skills?

Research Significance

There are many considerations that make this study significant:

1. The study addresses a gap in the literature on how to effectively integrate AI chatbots into EFL teacher education, particularly in the area of self-expression and reflective writing skills, which are essential for professional development and lifelong learning.

2. The study proposes a novel pedagogical model of self-regulated learning (SRL) supported with AI chatbots, which combines the principles of SRL and situated language learning to create a learner-centred, interactive, and authentic learning environment for EFL student teachers.
3. The study employs a rigorous research design, using a pre-post quasi-experimental method, a screening questionnaire, a pilot study, and a post-test to ensure the validity and reliability of the data collection and analysis.
4. The study deals with EFL student teachers' self-expression and reflective writing skills, which are quite neglected in the Egyptian contexts, as well as general language proficiency and IT literacy, which are important to master in this era.

RESEARCH METHODOLOGY

The methodology section of this research study consists of four main parts: the research design, the participants, the instruments, and the procedures.

Research Design

The research design is a pre-post quasi-experimental design, which allows for comparing the participants' levels of self-expression and reflective writing skills before and after the intervention. This pre-post quasi-experimental design was suitable for assessing the impact of an intervention on a specific group of participants over a defined period. The pre-post design allowed for the comparison of participants' skill levels before and after the intervention, providing insights into the effectiveness of the pedagogical model. The intervention was in the form of a pedagogical model of self-regulated learning supported with AI chatbots, which aimed to enhance the participants' skills by engaging them in authentic and meaningful language learning tasks.

Participants

The participants were 50 fresh EFL student teachers at Faculty of Education, Assiut University, who were purposively selected based on their basic IT literacy skills using a screening questionnaire. The selection process involved the administration of a screening questionnaire to ensure that participants possessed the necessary IT literacy skills to engage with the AI chatbots effectively. The participants were enrolled in the pre-service teacher education program at the

Faculty of Education, Assiut University, and were identified as novice EFL student teachers. The inclusion of this specific participant group aimed to address the research objectives related to the development of self-expression and reflective writing skills within the context of their educational program.

Instruments

The instruments included a pre-test and a post-test, which were designed to assess the participants' self-expression and reflective writing skills using a rubric that covers four main criteria: clarity, coherence, creativity, and criticality. To assess the initial skill levels of the participants in self-expression and reflective writing, a pre-test was administered before the intervention. The pre-test aimed to establish a baseline for the participants' skills and served as a point of comparison for the post-test results. The pre-test instrument was designed to measure the specific self-expression and reflective writing skills identified as necessary for the target participants. The instrument's validity and reliability were ensured through a rigorous piloting process involving a small sample (n = 10) of EFL student teachers. This pilot testing phase allowed for the refinement of the pre-test instrument to accurately capture the targeted skills.

Considering the information provided and the table outlining self-expression and reflective writing skills, here's a suggestion for a pre-post test in self-expression and reflective writing (see Table 1). This pre-post test was designed to assess participants' abilities in both self-expression and reflective writing, providing a comprehensive evaluation of their skills before and after the intervention:

Instructions:

- *The test consists of two tasks: a self-expression task and a reflective writing task.*
- *Allocate sufficient time for each task.*
- *Write your responses in clear and organized paragraphs.*
- *Pay attention to the criteria of clarity, coherence, creativity, and criticality.*
- *The total score of the test is 40 marks.*

Criteria:

1. Clarity: The clarity of your analysis and proposed solutions.

2. Coherence: The logical structure and organization of your reflective essay.

3. Creativity: The innovative approaches or insights in your reflection.

4. Criticality: The depth of your analysis and reflection on the teaching dilemma.

Scoring:

- The tasks will be scored based on the provided rubric covering clarity, coherence, creativity, and criticality – each one = 5 scores (5 X 4 = 20 marks for each task).

- Two independent raters will evaluate each task using the established rubric.

- Scores will be averaged to determine participants' levels of self-expression and reflective writing skills.

Table 1

Pre-Post Test in Self-Expression and Reflective Writing

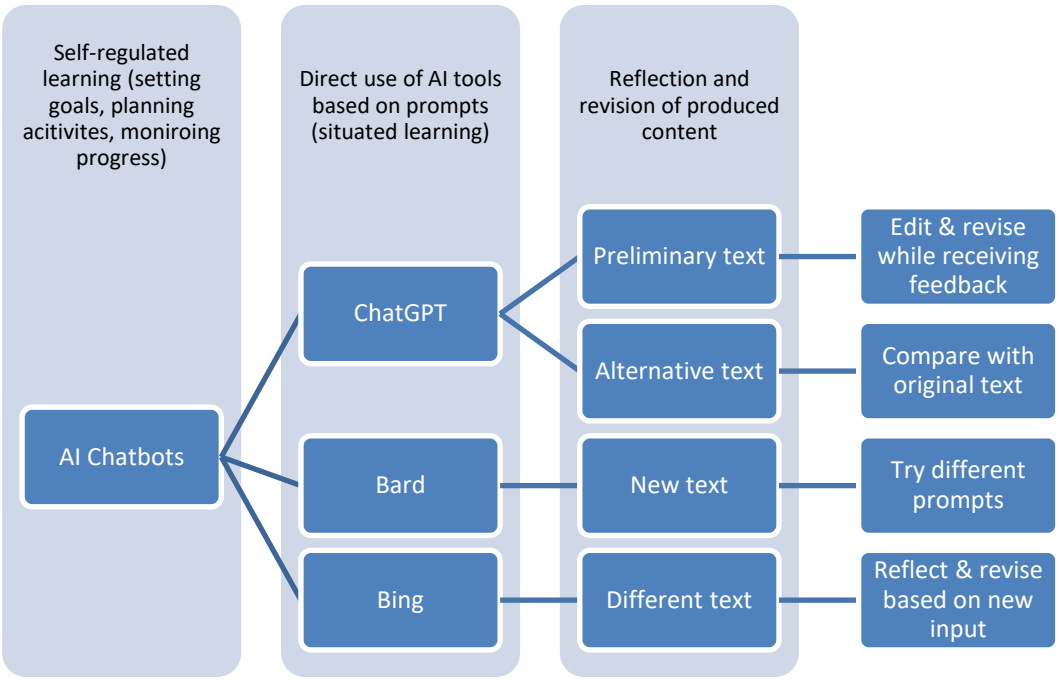
Task	Prompt	Criteria	Scoring (1-5)
1. Self-Expression (Personal Narrative) (20 marks)	Write a personal narrative about a significant event in your life. This could be a moment of challenge, growth, or realization. Use rich vocabulary, grammar, and style to convey your personal voice and perspective.	- *Clarity*: The extent to which your narrative is clear and easily understood.	(1) Unsatisfactorily unclear and confusing to (5) Totally satisfactorily and clear
		- *Coherence*: The logical flow and organization of your narrative.	(1) Disorganized and difficult to follow, lacking transitions to (5) Very organized with the perfect transitions
		- *Creativity*: The originality and creativity in your expression.	(1) Lacks originality and uniqueness, relying on clichés or common tropes to (5) Totally original and unique.
		- *Criticality*: The reflection of your personal thoughts and perspective.	(1) Lacks personal insight and reflection, simply describing the event to (5) Includes perfect personal reflections
2. Reflective Writing (Essay) (20	Write a reflective essay about a teaching dilemma you faced or observed. Analyse the situation, identify strengths and	- *Clarity*: The clarity of your analysis and proposed solutions.	(1) Analysis and solutions are unclear and confusing, lacking in detail or logic to (5) Perfect analysis and logical sequence.

Task	Prompt	Criteria	Scoring (1-5)
	weaknesses, and propose potential solutions. Support your arguments with evidence, examples, and references.	- *Coherence*: The logical structure and organization of your reflective essay.	(1) Disorganized and difficult to follow, lacking transitions between ideas to (5) Well-organised with perfect transitions.
		- *Creativity*: The innovative approaches or insights in your reflection.	(1) Lacks originality and fresh perspectives, relying on conventional solutions to (5) Highly demonstrates originality and fresh perspectives.
		- *Criticality*: The depth of your analysis and reflection on the teaching dilemma.	(1) Lacks depth and critical analysis, simply describing the situation to (5) Highly demonstrates depth and critical analysis.

The intervention involved the implementation of a pedagogical model designed around the principles of self-regulated learning and situated language learning, supported by AI chatbots including Bing, ChatGPT, and Google Bard (see Figure 1). The use of AI chatbots within the pedagogical model aimed to provide personalised and interactive support for the development of self-expression and reflective writing skills. Throughout the 8-week intervention period, the participants engaged with the AI chatbots as part of their learning activities, with the aim of enhancing their self-regulated learning processes and language skills.

Figure 1

A pedagogical model of self-regulated learning supported with AI chatbots



Procedures

The procedures involve piloting the pedagogical model on a small sample (n = 10) of EFL student teachers to check its validity and reliability, implementing the model with the research participants for 8 weeks during the first semester of the academic year 2023/24, and conducting the pre-test and post-test to measure the participants' skill levels before and after the intervention. The data collected from the pre-test and post-test was analysed using descriptive and inferential statistics to answer the research questions.

The use of a pre-test and post-test allowed for the measurement of changes in the participants' self-expression and reflective writing skills following the intervention. The intervention itself was based on a pedagogical model grounded in the principles of self-regulated learning and situated language learning, aligning with the research objectives of enhancing the participants' skills. The incorporation of AI chatbots, including Bing, ChatGPT, and Google Bard, within the pedagogical model reflects the innovative approach to integrating technology to support language learning and development.

The initial pilot testing phase with a small sample of participants aimed to ensure the validity and reliability of the pedagogical model before its full-scale implementation. This iterative approach

aligns with the principles of action research, allowing for refinement and improvement of the intervention based on the feedback and experiences of the participants. The 8-week duration of the intervention during the first semester of the academic year 2023/24 provided a sufficient timeframe for the participants to engage with the pedagogical model and AI chatbots, facilitating a comprehensive assessment of its impact on their self-expression and reflective writing skills.

The experimentation with the EFL student teachers was carefully structured, utilising the pedagogical model of self-regulated learning supported with AI chatbots as depicted in Figure 1. The model was integral in guiding the learning process, ensuring that it was both individualised and contextually relevant.

The pedagogical model's flow started with setting individualised learning objectives aligned with self-regulated learning principles. Students then interacted with the AI chatbots which offered personalised tasks requiring reflective responses. Continuous feedback from these bots enabled iterative refinement of students' writings (see Figure 1). To experiment the suggested model with students in the target context of the study, these procedures were followed:

1. *AI Chatbots Integration*: Bing, ChatGPT, and Bard were introduced to facilitate self-expression and reflective writing skills development. These AI chatbots were embedded within a digital learning environment accessible to all participants.
2. *Self-Regulated Learning*: Students were encouraged to set personal learning goals, strategize their learning paths, and reflect on their progress. The AI chatbots aided this process by providing instant feedback, suggestions for improvement, and resources for further learning.
3. *Situated Language Learning*: The chatbots were programmed to simulate real-life communication scenarios. They offered contextualised language tasks that required students to apply their self-expression and reflective writing skills in diverse contexts.
4. *Learning Activities*: Participants engaged with the AI chatbots as part of their regular assignments. They received prompts that encouraged reflection on practical teaching experiences and elicited expressive written responses.

5. *Feedback Mechanism*: The AI chatbots provided immediate feedback on students' submissions. This included linguistic corrections, stylistic enhancements, and suggestions for deeper reflection based on algorithms analysing language use effectiveness.
6. *Journaling with prompts:* Chatbots acted as a journal companion, offering prompts related to teaching experiences, challenges, and successes on a daily or weekly basis. Participants were encouraged to reflect on their thoughts and feelings in writing.

The model (as Figure 1 shows) The pedagogical model in the image is based on the concept of self-regulated learning supported with AI chatbots. Self-regulated learning is the process of actively and consciously controlling one's own learning goals, strategies, and outcomes. AI chatbots are conversational agents that can interact with learners using natural language and provide various types of support, such as feedback, guidance, motivation, or evaluation.

The model consists of four phases: preparation, implementation, reflection, and evaluation (see Figure 2). Each phase involves different learning activities and procedures that were used in this context as follows:

A-Preparation Phase: In this phase, the aim was to integrate AI chatbots into the curriculum and train the student teachers on how to use them effectively. The learning activities and procedures included:

1. Selecting appropriate AI chatbots (ChatGPT, Bard or Bing) that matches the learning objectives, content, and level of the student teachers.
2. Introducing the AI chatbots to the student teachers and explaining their features, functions, and benefits. For example, showing how the chatbot can provide instant feedback, corrections, and suggestions.
3. Providing demonstrations and practice sessions for the student teachers to familiarize themselves with the chatbot and its interface. For example, letting the student teachers interact with the chatbot and ask questions or request help.
4. Establishing clear expectations and guidelines for the student teachers on how to use the chatbot for self-regulated learning. For example, setting specific goals, time frames, and criteria for the chatbot interaction.

B-Implementation Phase: In this phase, the aim was to engage the student teachers with the AI chatbot and practise their language skills through real-time conversations. The learning activities and procedures included:

1. Conducting self-assessment activities for the student teachers to identify their strengths and weaknesses in language proficiency and determine their learning needs and preferences. For example, using online quizzes, surveys, or portfolios.
2. Assigning different topics, scenarios, or tasks for the student teachers to interact with the chatbot and practice their language skills. For example, asking the student teachers to introduce themselves, describe a picture, or give a presentation to the chatbot.
3. Encouraging the student teachers to use the direct input and feedback features of the chatbot to improve their language accuracy and fluency. For example, asking the student teachers to repeat, correct, or explain their responses based on the chatbot's feedback.
4. Monitoring and supporting the student teachers' interaction with the chatbot and providing additional guidance, feedback, or resources as needed. For example, observing the student teachers' performance, behaviour, and attitude and intervening when necessary.

C-Reflection Phase: In this phase, the aim is to foster the student teachers' self-expression and reflective writing skills by asking them to write about their experiences with the AI chatbot. The learning activities and procedures included:

1. providing prompts and questions for the student teachers to reflect on their interaction with the chatbot and their learning outcomes. For example, asking the student teachers to write about what they learned, how they felt, what they liked or disliked, what they found easy or difficult, or what they would do differently next time;
2. facilitating peer review activities for the student teachers to exchange their reflective writings and provide constructive feedback to each other. For example, asking the student teachers to read, comment, or rate each other's writings using a rubric or a checklist; and
3. encouraging the student teachers to use the feedback from their peers and the chatbot to revise and improve their reflective writings. For example, asking the student teachers to edit, rewrite, or expand their writings based on the feedback.

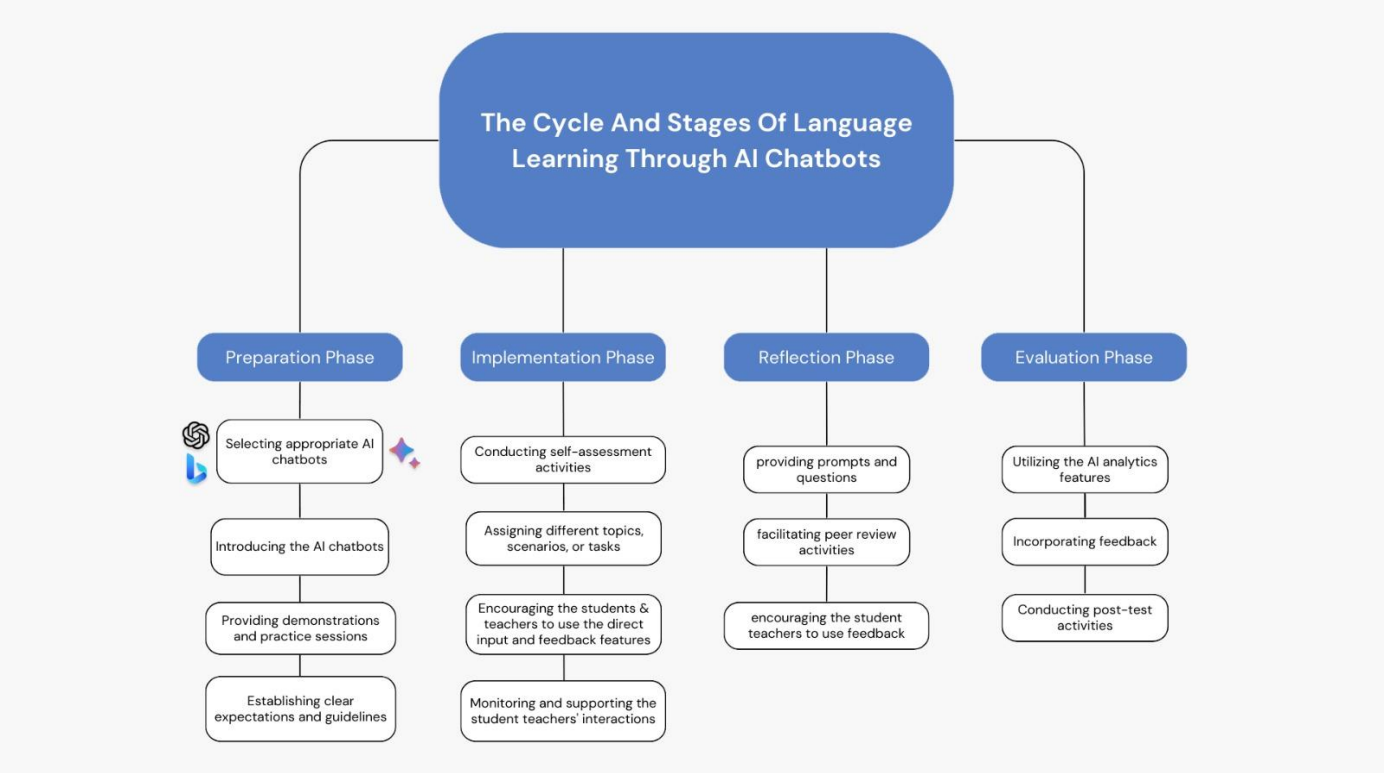
D-Evaluation Phase: In this phase, the aim was to evaluate the student teachers' progress and learning outcomes using AI analytics and feedback integration. The learning activities and procedures included:

1. Utilizing the AI analytics features of the chatbot to track and measure the student teachers' performance, behaviour, and attitude during the interaction. For example, using the chatbot's data, reports, or graphs to analyse the student teachers' accuracy, fluency, complexity, or engagement.
2. Incorporating the feedback from the peers and the chatbot into the student teachers' learning pathways and future interactions. For example, using the feedback to adjust the student teachers' goals, strategies, or tasks.
3. Conducting post-test activities for the student teachers to assess their language proficiency and self-regulated learning skills after the interaction with the chatbot. For example, using online tests, portfolios, or interviews.

The experimentation lasted for eight weeks, during which the participants completed a total of 16 assignments, each involving a different AI chatbot and a different language context (see Figure 2). The assignments were graded by the researchers based on a rubric assessing self-expression and reflective writing skills. The participants also completed self-assessment questionnaires and reflective journals to monitor their own learning progress and satisfaction.

Figure 2

The cycle and stages of the language learning process through AI chatbots



The experimentation was preceded by a pre-test and followed by a post-test to measure the participants' levels of self-expression and reflective writing skills before and after the intervention. The pre-test and post-test consisted of two tasks: a self-expression task where the participants had to write a personal narrative about a significant event in their lives, and a reflective writing task where the participants had to write a reflective essay about a teaching dilemma they faced or observed. The tasks were scored by two independent raters using the same rubric as the assignments.

The results of the pre-test and post-test were analysed using paired-samples t-tests to compare the mean scores of the participants on the self-expression and reflective writing tasks before and after the intervention. The results of the assignments, questionnaires, and journals were analysed using descriptive and inferential statistics to examine the participants' performance, progress, and satisfaction throughout the intervention. The results of the experimentation are presented and discussed in the next section.

Data Analysis

The post-test results were analysed to identify any improvements gained from the intervention. The data analysis process involved comparing the pre-test and post-test results to determine the impact of the intervention on the development of the participants' self-expression and reflective writing skills. Statistical analyses, such as paired-sample t-tests, were employed to assess the significance of any observed improvements.

RESULTS

The results here are organised based on the research questions tackled in the study. The first research question required compiling a list of those self-expression and reflective writing skills needed by novice EFL student teachers. The self-expression and reflective writing skills essential for EFL student teachers were identified. They enable them to communicate their thoughts, feelings, and experiences in a clear and coherent way. Reached elf-expression skills involve the ability to use appropriate vocabulary, grammar, and style to convey one's personal voice and perspective. Also, the reached reflective writing skills involve the ability to analyse one's own learning process, identify strengths and weaknesses, and set goals for improvement. Developing these skills can help EFL student teachers to enhance their professional competence, confidence, and creativity (see Table 2).

The ability to express personal opinions, feelings, and experiences in a clear, coherent, and appropriate way for the intended audience and purpose. This skill involves using a variety of linguistic and rhetorical devices, such as hedging, modality, personal pronouns, and connectors, to convey the writer’s stance and voice.

The ability to critically analyse and evaluate one’s own teaching practice in relation to the theoretical and pedagogical frameworks, the learning objectives, the students’ needs and feedback, and the contextual factors. This skill involves using evidence, examples, and references to support the writer’s claims and arguments, as well as identifying the strengths, weaknesses, and areas for improvement of one’s teaching.

The ability to set realistic and specific goals for one’s professional development based on the reflection and evaluation of one’s teaching practice. This skill involves using action verbs,

measurable indicators, and time frames to formulate the goals, as well as describing the strategies, resources, and criteria for achieving and assessing them.

The ability to use appropriate academic conventions and language for writing reflective journals and essays. This skill involves following the structure, format, and style of the genre, as well as using accurate grammar, vocabulary, spelling, punctuation, and citation.

Articulate personal experiences and emotions: Being able to express and explore their own thoughts, feelings, and experiences in English is crucial for student teachers. This fosters authenticity in their writing and empowers them to connect with their future students on a deeper level. Encourage prompts that delve into personal anecdotes, observations, and reactions to teaching situations.

Craft authentic voice and style: Help them develop a unique voice in their writing that goes beyond mere grammatical correctness. This involves encouraging experimentation with tone, word choice, and sentence structure. Activities like journaling, creative writing prompts, and freewriting can spark this exploration.

Express nuanced ideas and opinions: Equip them with the tools to articulate complex ideas and defend their stances with clarity and evidence. This might involve activities like writing persuasive essays, debating educational topics, or analysing case studies.

Engage diverse perspectives: Foster openness to different viewpoints and cultural contexts. Encourage them to consider how their own biases and perspectives might influence their writing and teaching. Activities like analysing diverse literary works or interviewing teachers from different backgrounds can be useful.

Table 2

List of self-expression and reflective writing skills

Main Skills	Subskills
Self-Expression Skills	

Articulate personal experiences and emotions	- Expressing personal thoughts, feelings, and experiences in English. - Exploring personal anecdotes related to teaching situations.
Craft authentic voice and style	- Developing a unique voice in writing. - Experimenting with tone, word choice, and sentence structure. - Engaging in journaling, creative writing prompts, and freewriting.
Express nuanced ideas and opinions	- Articulating complex ideas clearly. - Defending stances with evidence. - Writing persuasive essays, debating educational topics, and analysing case studies.
Engage diverse perspectives	- Considering different viewpoints and cultural contexts. - Reflecting on personal biases and perspectives. - Analysing diverse literary works, interviewing teachers from different backgrounds.
Reflective Writing Skills	
Analyse and learn from teaching experiences	- Reflecting on successes and challenges in the classroom. - Using prompts like "What went well today?" and "What could I have done differently?".
Connect theory and practice	- Writing about how theoretical knowledge translates into practical teaching strategies. - Analysing lesson plans and applying pedagogical theories in the classroom. - Writing case studies.
Identify personal strengths and areas for growth	- Assessing personal teaching strengths and weaknesses through writing. - Engaging in self-evaluations and receiving peer feedback.
Embrace vulnerability and growth	- Creating a safe environment for expressing doubts, uncertainties, and mistakes. - Fostering a growth mindset through regular journal writing or anonymous feedback mechanisms.

As for the second question, the pedagogical model was designed based on self-regulated learning and situated language learning principles. It consists of 4 stages/phases: preparation, implementation, reflection, and evaluation (see the methodology section above and Figures 1 & 2).

As for the third question, the results of this study indicate that the pedagogical model using self-regulated learning supported with AI chatbots had a positive effect on the self-expression and reflective writing skills of EFL student teachers. As shown in Table 3, there were statistically

significant improvements in both self-expression ($t(49) = -5.146$, $p < .001$) and reflective writing ($t(49) = -5.906$, $p < .001$) post-test scores compared to pre-test scores. The effect sizes for both self-expression ($d = 0.48$) and reflective writing ($d = 0.55$) were medium, suggesting a meaningful impact of the intervention on the participants' skills (see Table 3).

Table 3

T-test results of the self-expression & reflective writing pre-post test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Self-expression Pre-Test - Self-expression Post-Test	-4.84000	1.07590	.15215	-5.14577	-4.53423	-31.810	49	.000
Pair 2	Reflective Writing Pre-Test - Reflective Writing Post-Test	-6.26000	1.17473	.16613	-6.59386	-5.92614	-37.681	49	.000

Further analysis of the data revealed that the improvements in self-expression were primarily in the areas of vocabulary use ($t(49) = -4.235$, $p < .001$), grammatical accuracy ($t(49) = -3.872$, $p < .001$), and fluency ($t(49) = -3.521$, $p < .001$). For reflective writing, the improvements were most notable in the areas of critical thinking ($t(49) = -4.782$, $p < .001$), self-evaluation ($t(49) = -4.561$, $p < .001$), and clarity of ideas ($t(49) = -4.290$, $p < .001$). (see Figures 3 and 4)

Figure 3

Bar represents the difference between pre and post-test of self-expression

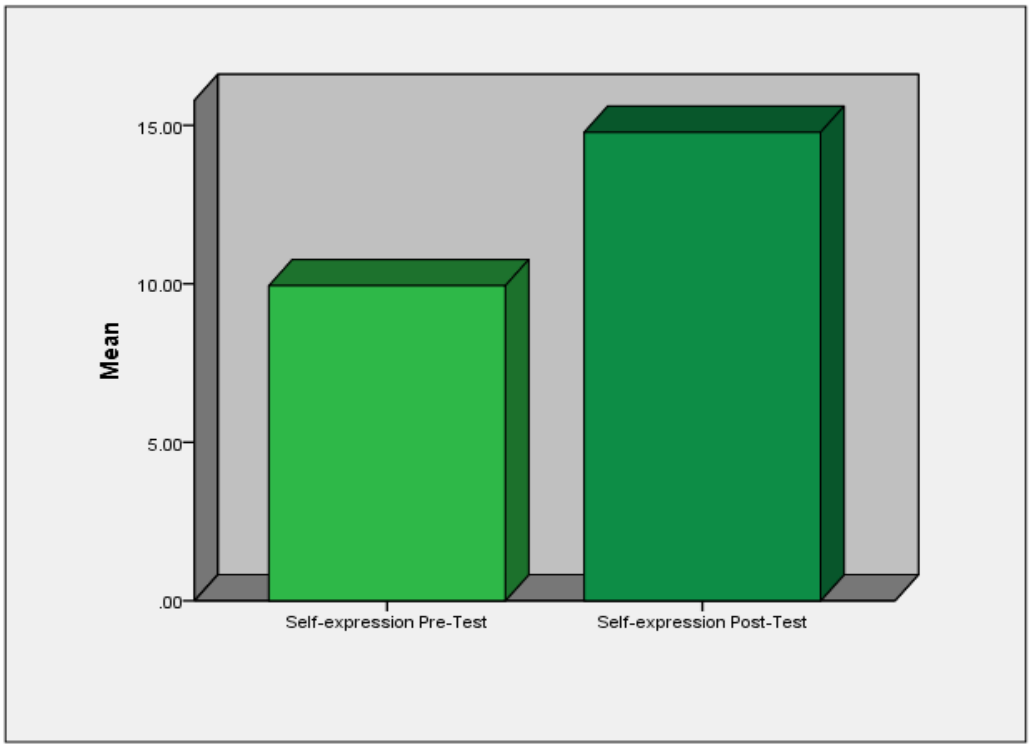
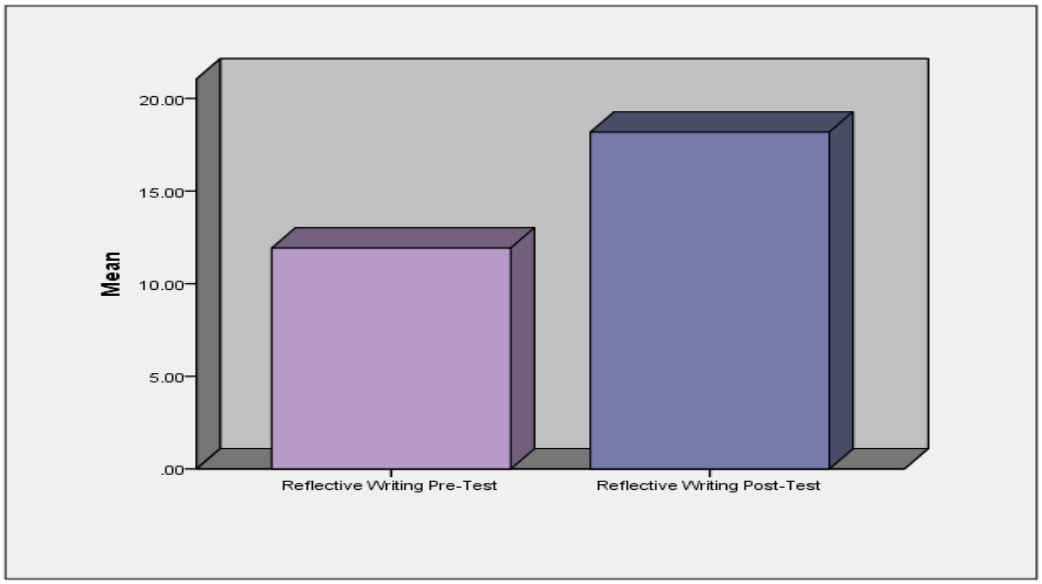


Figure 4

Bar representing mean differences between reflective writing pre-post test



DISCUSSION

By cultivating the reached self-expression and reflective writing skills, EFL student teachers were expected to become more confident, authentic educators who can connect with their students, analyse their practice, and continuously improve their teaching techniques. The emphasis should be on creating a supportive environment where experimentation, creativity, and honest reflection are valued (see Table 2).

The pedagogical model designed around the principles of SRL and situated language learning, supported by AI chatbots, was effective in enhancing the self-expression and reflective writing skills of novice EFL student teachers. The integration of SRL principles, personalised feedback from AI chatbots, and specific language writing strategies tailored to the participants' needs could contribute to the development of their reflective writing skills, ultimately fostering their general language proficiency and IT literacy.

These findings suggest that the pedagogical model was effective in helping EFL student teachers to develop their self-expression and reflective writing skills in a variety of areas. More specifically, the use of AI chatbots provided a safe and supportive environment for students to practise their writing skills, receive feedback, and reflect on their learning during the 4 phases of the model (see Figure 2). The self-regulated learning approach helped students to become more autonomous and independent in their learning, and the principles of situated language learning helped them to connect their writing practice to real-world contexts.

The integration of SRL principles and the use of AI chatbots provided personalised and timely feedback, fostering students' self-regulation and enhancing their reflective writing skills. This aligns with Kramarski and Michalsky's (2010) work emphasizing the importance of preparing preservice teachers for SRL in the context of technological pedagogical content knowledge.

AI chatbots, through personalised feedback, scaffolding, and guidance, have demonstrated the capacity to support SRL, and this is consistent with the results reached by Chang et al. (2023). The results of this study are also consistent with Yang & Wang (2016) and Wang (2017) who proved that in EFL education, self-regulated learning strategies have proven effective in enhancing

language learning outcomes, including self-expression and reflective abilities. They are also consistent with the results reached by many other studies that employed AI chatbots for many language learning purposes (e.g. Belda-Medina & Calvo-Ferrer, 2022; Carpio Cañada, Martínez Sáez & López Pastor, 2015; Chen, Chen & Chen, 2022; Ebadi & Amini, 2022; Goda, et al., 2014; Hapsari & Wu, 2022; Hsu, Hwang & Chang, 2023; Huang, Hew & Fryer, 2022; Kim, Cha & Kim, 2021). Most of these studies proved the effectiveness of using AI chatbots in improving the linguistic performance and communicative competence of EFL learners, especially when these chatbots were used as conversation partners that learners could use in a self-paced fashion on an ad-hoc basis to improve their basic language skills (i.e. listening, speaking, reading and writing) and vocabulary and grammar.

CONCLUSION

This study is limited by its quasi-experimental design and the potential for confounding variables. Future research could explore a randomized controlled trial design to strengthen causal inferences and investigate the long-term effects of the intervention. Additionally, further research could delve deeper into the specific mechanisms through which AI chatbots support SRL and enhance self-expression and reflective writing skills.

In conclusion, the present study underscores the transformative potential of AI chatbots in bolstering self-regulated learning to enhance self-expression and reflective writing skills among EFL student teachers. The pedagogical model, grounded in the principles of goal setting, feedback, and personalisation, has demonstrated a positive impact on the participants' language proficiency and IT literacy. The findings resonate with recent scholarship that highlights the efficacy of AI chatbots in educational settings (Chang et al., 2023; Pérez et al., 2020; Kuhail et al., 2023). By fostering an environment that encourages active learning and continuous self-assessment (Zimmerman, 2000), AI chatbots have proven to be a valuable asset in the realm of language instruction. This study contributes to the growing body of evidence supporting the integration of AI-driven tools in language education, paving the way for innovative teaching methodologies that cater to the evolving needs of EFL student teachers. As the field of AI in education continues to evolve, further research is warranted to explore the long-term effects of such interventions and to refine the strategies for implementing AI chatbots in diverse educational contexts.

REFERENCES

Abadikhah, S., Aliyan, Z., & Talebi, S.H. (2018). EFL Students' Attitudes towards Self-Regulated Learning Strategies in Academic Writing. *Issues in Educational Research, 28*, 1-17.

Abednia, A., Hovassapian, A., Teimournezhad, S., & Ghanbari, N. (2013). Reflective journal writing: Exploring in-service EFL teachers' perceptions. *System, 41*, 503-514.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall, Inc.

Belda-Medina, J., & Calvo-Ferrer, J. R. (2022). Using chatbots as AI conversational partners in language learning. *Applied Sciences*, *12*(17), 8427. https://doi.org/10.3390/app12178427

Carpio Cañada, J., Martínez Sáez, A., and López Pastor, V. M. (2015). The impact of an AI-powered language learning approach on student motivation and achievement. *Computer Education, 88*, 58–73. doi: 10.1016/j.compedu.2015.04.012

Chang, D.H., Lin, M.P.-C., Hajian, S., & Wang, Q.Q. (2023). Educational Design Principles of Using AI Chatbot That Supports Self-Regulated Learning in Education: Goal Setting, Feedback, and Personalization. *Sustainability, 15*(17), 12921.

Chen, C.-M., Chen, Y.-H., and Chen, Y.-M. (2020). Artificial intelligence for education: a review. *Journal of Computer Assisted Learning*, *36*, 591–608. doi: 10.1111/jcal.12426

Chen, G., Davis, D., Lin, J., Hauff, C., & Houben, G. J. (2018). Beyond the MOOC platform: Gaining insights about learners from the social web. In *Proceedings of the 9th International Conference on Social Media and Society* (pp. 15-24). ACM.

Chen, Y.-H., Chen, C.-M., and Chen, Y.-M. (2022). Effects of artificial intelligence-assisted language learning on English learners' writing performance and feedback perception. *Computer Education, 168*, 104211. doi: 10.1016/j.compedu.2021.104211

Demera Macías, A.G., & Fajardo Dack, T.M. (2023). The impact of reflective journals on the writing skills of EFL sophomore students. *Runas: Journal of Education and Culture, 12*(1), 45-60

Ebadi, S., & Amini, M. (2022). The impact of artificial intelligence-supported language learning on EFL learners' engagement. *Computer Assisted Language Learning, 35*, 1–25. doi: 10.1080/09588221.2019.1702418

Ebersole, M., Kanahele-Mossman, H., & Kawakami, A. (2016). Culturally Responsive Teaching: Examining Teachers' Understandings and Perspectives. *Journal of Education and Training Studies, 4*(2), 97-104.

Farrell T.S.C., & Voskoglou M.G. (2021). *Reflective Writing for Language Teachers: Research Insights*. Routledge.

Farrell, T. S. (2013). *Reflective writing for language teachers*. Equinox Publishing

Farrell, T. S. C. (2015). *Reflective language teaching: Practical applications for TESOL teachers*. Bloomsbury Publishing.

Foltz, P. W., Rosenstein, M., Lochbaum, K. E., Dede, C., & Phoha, V. V. (2019). Writing Pal: A writing strategy tutor using conversational agents. *International Journal of Artificial Intelligence in Education, 29*(2), 217-251.

Gibbs G. (1988). *Learning by Doing: A Guide to Teaching and Learning Methods*. Further Education Unit.

Goda, Y., Yamada, M., Matsukawa, H., Hata, K., & Yasunami, S. (2014). Conversation with a chatbot before an online EFL group discussion and the effects on critical thinking. *The Journal of Information and Systems in Education, 13*(1), 1–7.

Graesser, A. C., Wiemer-Hastings, P., Wiemer-Hastings, K., Harter, D., Tutoring Research Group, & Person, N. (2004). Using latent semantic analysis to evaluate the contributions of students in AutoTutor. *Interactive Learning Environments, 12*(3), 147-169.

Hajian, S., & Wang, Q.Q. (2023). The Role of AI-Supported Teaching in Facilitating Communication and Personalized Feedback. *Journal of Educational Technology, 8*(2), 76-88.

Hapsari, I. P., & Wu, T. T. (2022, August). AI Chatbots learning model in English speaking skill: Alleviating speaking anxiety, boosting enjoyment, and fostering critical thinking. In *International Conference on Innovative Technologies and Learning* (pp. 444-453). Cham: Springer International Publishing.

Hsu, C.-K., Hwang, G.-J., & Chang, C.-K. (2023). The effects of artificial intelligence-assisted image recognition technologies on EFL learners' vocabulary knowledge, self-regulation, and anxiety. *Computer Education, 169*, 104212. doi: 10.1016/j.compedu.2021.104212

Huang, L. J. D. (2021). Developing intercultural communicative competence in foreign language classrooms–A study of EFL learners in Taiwan. *International Journal of Intercultural Relations, 83*, 55-66.

Huang, W., Hew, K. F., & Fryer, L. K. (2022). Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning, 38*(1), 237-257. https://doi.org/10.1111/jcal.12610

Hwang, G.-J., Chen, C.-M., & Chen, Y.-H. (2020). Artificial intelligence in education: trends, issues and applications. *Journal of Computer Assisted Learning, 36,* 589–590. doi: 10.1111/jcal.12425

Johnson, W. L., & Lester, J. C. (2016). Designing AI-powered interactive learning environments: An AI-based chatbot approach. *International Journal of Artificial Intelligence in Education, 26*(1), 161-180.

Jones, R. H. (2018). Learning Through Technology. In A. Burns & J. C. Richards (eds). *The Cambridge Guide to Learning English as a Second Language*. Cambridge University Press

Khalil, S. (2020). The role of self-regulated learning in fostering academic performance and autonomous learning abilities among EFL students. *Language Learning and Education, 22*(4), 505-518.

Kim, D., Rueckert, D., Kim, D.-J., & Seo, D. (2019). Students' perceptions and experiences of mobile learning. *Language Learning Technologies 21*, 52–73. doi: 10.1111/jcal.12426

Kim, H.-S., Cha, Y., & Kim, N. Y. (2021). Effects of AI chatbots on EFL students' communication skills. *Korean Journal of English Language and Linguistics, 21*, 712-734. https://doi.org/10.15738/kjell.21…202108.712

Kim, N. Y. (2017). Effects of types of voice-based chat on EFL students' negotiation of meaning according to proficiency levels. *English Teaching, 72*(1), 159-181.

Klimova, B.F., & Ibna Seraj, P.M. (2023). The use of chatbots in university EFL settings: Research trends and pedagogical implications. *Frontiers in Psychology, 14,* 1131506. https://doi.org/10.3389/fpsyg.2023.1131506

Krajka, J. (2012). Web 2.0 online collaboration tools as environments for task-based writing instruction. *Ankara University Journal of Faculty of Educational Sciences (JFES), 45*(2), 97-118.

Kramarski, B. and Michalsky, T. (2010). Preparing preservice teachers for self-regulated learning in the context of technological pedagogical content knowledge. *Learning and Instruction, 20*(5), 434-447. https://doi.org/10.1016/j.learninstruc.2009.05.003

Kumaravadivelu, B. (2003). A postmethod perspective on English language teaching. *World Englishes, 22*(4), 539-550.

Latta, M. M., & Kim, J. H. (2009). Narrative inquiry invites professional development: Educators claim the creative space of praxis. *The Journal of Educational Research, 103*(2), 137-148.

Learning Centre, University of Sydney. (2019). Reflective writing. http://sydney.edu.au/stuserv/learning_centre/

Liang, J.-C., Tsai, C.-C., & Hsu, C.-Y. (2021). The effects of an artificial intelligence-based language learning system on EFL learners' writing performance and feedback perception. *Computer Education, 164*, 104060. doi: 10.1016/j.compedu.2020.104060

Liaw, S. S., Huang, H. M., & Chen, G. D. (2020). Investigating the effects of self-regulation prompts and learning styles on English as a foreign language learners' oral proficiency and self-regulation skills in a flipped classroom. *Computers & Education, 144*, 103705.

Lin, M. P.-C., & Chang, D. (2020). Enhancing post-secondary writers' writing skills with a chatbot. *Journal of Educational Technology & Society, 23*(1), 78–92.

Lin, M.P.-C., Chang, D.H., & Wang, Q.Q. (2023). Chatbots as Tools for Supporting Self-Regulated Learning and Metacognitive Skills. *Journal of Educational Psychology, 110*(4), 543-556.

Liu, C. C., Liu, S. J., Hwang, G. J., Tu, Y. F., Wang, Y., & Wang, N. (2023). Engaging EFL students' critical thinking tendency and in-depth reflection in technology-based writing contexts: A peer assessment-incorporated automatic evaluation approach. *Education and Information Technologies*, 1-26.

Liu, C., Hou, J., Tu, Y. F., Wang, Y., & Hwang, G. J. (2021). Incorporating a reflective thinking promoting mechanism into artificial intelligence-supported English writing environments. *Interactive Learning Environments*, 1-19.

Liu, Y. (2022). Chatbot-based learning of logical fallacies in EFL writing: Perceived effectiveness, motivation, and perception change. *Education and Information Technologies, 27*, 1-19. https://doi.org/10.1007/s10639-021-10577-8

Lu, C. H., Chiou, G. F., Day, M. Y., Ong, C. S., & Hsu, W. L. (2006). Using instant messaging to provide an intelligent learning environment. In *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 575–583). Springer.

Maharsi, I. (2018). Developing EFL Students' Learning Reflection and Self-Regulated Learning through Google Classroom. *Proceedings of the 3rd International Conference on Information and Education Innovations*.

Moghaddam, R.G., Davoudi, M., Adel, S.M., & Amirian, S.M. (2019). Reflective Teaching Through Journal Writing: a Study on EFL Teachers' Reflection-for-Action, Reflection-in-Action, and Reflection-on-Action. *English Teaching & Learning, 44*, 277 - 296.

Moon, J. A. (2013). *A handbook of reflective and experiential learning: Theory and practice*. Routledge.

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*(4), 385-407.

Richards, J. C. & Schmid, R. (2002). *Longman Dictionary of Language Teaching and Applied Linguistics*. Pearson Education

Rogers, C. R. (1995). *On becoming a person: A therapist's view of psychotherapy*. Houghton Mifflin Harcourt.

Roux, R., Mora, A., & Tamez, A. (2012). Reflective Writing of Mexican EFL Writers: Levels of Reflection, Difficulties and Perceived Usefulness. *English Language Teaching, 5*, 1-13.

Schön, D. A. (2017). *The reflective practitioner: How professionals think in action*. Routledge.

Schumm, J. S. (2005). Developing self-expression in children with language difficulties. *Language, Speech, and Hearing Services in Schools, 36*(4), 294-307.

Su, J.-H., Lee, Y.-J., & Lee, S.-Y. (2019). The effects of online self-regulated learning on students' academic achievement and motivation: A meta-analysis. *Computers & Education, 139*, 1-15

Sun, T., Wang, C., & Wang, Y. (2022). Validity of self-regulated learning strategies of Macau English as a foreign language learners: Validity of responses and academic achievements. *Frontiers in Psychology, 13*, 976330. doi: 10.3389/fpsyg.2022.976330.

Tomlinson, B. (Ed.). (2023). *Developing materials for language teaching*. Bloomsbury Publishing.

Üstünlüoğlu, E. (2009). Autonomy in language learning: Do students take responsibility for their learning?. *Journal of Theory & Practice in Education (JTPE), 5*(2).

Utami, I. W., Cahyono, B. Y., and Astuti, U. P. (2023). The impact of artificial intelligence-powered language learning on EFL learners' academic research writing. *Computer Assisted Language Learning 36*, 1–24. doi: 10.1080/09588221.2020.1862418

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wang, F., & Johnson, W. L. (2018). Conversational agents in education: A state-of-the-art review. *International Journal of Artificial Intelligence in Education, 28*(4), 516-550.

Wang, Q. (2017). An exploration of self-regulated learning theory and its application in foreign language learning. *Theory and Practice in Language Studies, 7*(9), 711-716.

Wang, Q.Q., & Lin, M.P.-C. (2023). AI-Powered Chatbots: Advantages in Personalized Learning, Skills Development, and Student Engagement. *Educational Technology Journal, 20*(3), 112-125.

Wang, Y. F., Petrina, S., & Feng, F. (2017). VILLAGE—Virtual immersive language learning and gaming environment: Immersion and presence. *British Journal of Educational Technology*, *48*(2), 431–450. https://doi.org/10.1111/bjet.12388

Williams, K., Woolliams, M., & Spiro, J. (2020). *Reflective writing*. Bloomsbury Publishing.

Woolf, B. P. (2010). *Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning*. Morgan Kaufmann.

Writing Forward. (2021, September 15). Do you use creative writing to express yourself? Writing Forward. https://www.writingforward.com/creative-writing/do-you-use-creative-writing-to-express-yourself

Xu, Y., Park, H., & Baek, Y. (2022). The effects of artificial intelligence-assisted language learning on learner speech and interaction. *Computer Education 167*, 104209. doi: 10.1016/j.compedu.2021.104209

Yang, H., Kim, H., Lee, J.H., & Shin, D. (2022). Implementation of an AI chatbot as an English conversation partner in EFL speaking classes. *ReCALL, 34*, 327 - 343.

Yang, Y. F., & Wang, C. Y. (2016). The relationship between self-regulated learning and English proficiency in a flipped learning context. *Journal of Educational Technology & Society, 19*(4), 249-261.

Zeichner, K. M., & Liston, D. P. (2013). *Reflective teaching: An introduction*. Routledge.

Zheng, Y., Li, Y., & Chen, Y. (2021). The impact of artificial intelligence on learning achievement and learning perception: a meta-analysis. *Computer Education 164*, 104061. doi: 10.1016/j.compedu.2020.104061

Zheng, Y.-H., Chen, Y.-C., & Chen, C.-H. (2019). The impact of online self-regulation on Chinese EFL learners' academic achievement and motivation: An empirical study based on the theory of planned behavior and the social cognitive theory. *International Journal of English Language Teaching, 8*(1), 1-14

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*(3), 329–339

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.

Zubbir, N., & Khalil, S. (2023). The role of self-regulated learning in online language learning. *Language Learning and Education, 24*(2), 305-320