ผลของการใช้โปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์ต่อทักษะการสื่อสารด้วยการเขียนและกลวิธีการกำกับตนเองในการเรียนรู้ของนักศึกษามหาวิทยาลัยชาวไทย

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บทคัดย่อ

ความก้าวหน้าของเทคโนโลยีปัญญาประดิษฐ์ (AI) ได้นำไปสู่การใช้โปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์ในการเรียนรู้ภาษาเพิ่มมากขึ้น การศึกษานี้มีวัตถุประสงค์เพื่อตรวจสอบผลกระทบของโปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์ต่อทักษะการเขียนเพื่อการสื่อสารของนักศึกษามหาวิทยาลัยไทย และตรวจสอบกลยุทธ์การเรียนรู้แบบควบคุมตนเองระหว่างเข้าร่วมในการศึกษานี้ โดยมีนักเรียนยี่สิบหกคนเข้าร่วมในการเรียนรู้ โดยใช้โปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์เป็นเวลาสี่สัปดาห์ ซึ่งเป็นกิจกรรมนอกหลักสูตรของรายวิชาการเขียนภาษาอังกฤษ ข้อมูลเชิงปริมาณได้รับจากการทดสอบก่อนและหลังทักษะการเขียนเพื่อการสื่อสาร ในขณะที่แบบสอบถามกลวิธีการกำกับตนเองในการเรียนรู้ถูกนำมาใช้เพื่อให้ได้ข้อมูลเชิงคุณภาพ ผลลัพธ์เชิงปริมาณแสดงให้เห็นความแตกต่างอย่างมีนัยสำคัญระหว่างคะแนนก่อนสอบและคะแนนหลังสอบ ผลการวิจัยเชิงคุณภาพเผยให้เห็นการใช้กลวิธีการกำกับตนเองในการเรียนรู้ของนักศึกษาในระดับปานกลาง นอกจากนี้ บทความวิจัยนี้ยังนำเสนอข้อมูลเกี่ยวกับการใช้โปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์ในการสอนภาษาและการวิจัยในอนาคตอีกด้วย

คำสำคัญ: โปรแกรมสนทนาอัตโนมัติโดยใช้ปัญญาประดิษฐ์ ทักษะการสื่อสารด้วยการเขียน กลวิธีการกำกับตนเองในการเรียนรู้ นักศึกษามหาวิทยาลัยชาวไทย

The Effects of The Use of AI Chatbot on Communicative Writing Skills and Self-Regulated Learning Strategies of Thai University Students

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Abstract

The progress in artificial intelligence (AI) technology has led to an increased use of automatic conversation programs in language learning. This study aimed to examine the effects of AI chatbots on the communication writing skills of Thai university students and investigate their self-regulated learning strategies while participating in this study. Twenty-six students participated in a four-week chatbot-based learning as an extracurricular activity of an English writing course. Quantitative data on communicative writing skills was obtained through a pretest and a posttest, while a Self-Regulated Learning Questionnaire was implemented to obtain qualitative data. Quantitative results showed a significant difference between pretest scores and posttest scores. Qualitative findings revealed the medium use of self-regulated learning strategies. Furthermore, this research article also presents insights into the use of AI chatbots in language teaching and future research.

Keywords: AI Chatbot, Communicative Writing Skill, Self-Regulated Learning Strategies, Thai University Students

Introduction

The progress in artificial intelligence (AI) has resulted in the development of various groundbreaking applications that are transforming various aspects of human life, including the field of education. Recent strides in AI technology have created new opportunities to enhance the learning experience by introducing artificial conversation entities or chatbots. These computer programs leverage natural language processing (NLP) and machine learning algorithms to emulate human conversation, conversationally engaging with users (Khanna et al., 2015). Through the provision of personalized feedback, addressing queries, and executing tasks based on user input, chatbots have the potential to positively impact educational outcomes and broaden access to education (Okonkwo & Ade-Ibijola, 2021).

Research on using chatbots in language education is still in its early stages. Still, growing evidence suggests that chatbots can effectively promote a range of language learning outcomes. Studies have investigated the effectiveness of chatbots in promoting speaking skills, with some finding that chatbots can provide effective speaking practice and feedback (e.g. Han, 2020; Shazly, 2021). Other studies have focused on using chatbots for grammar and punctuation practice, with some finding that chatbots can be an effective tool for promoting these skills (e.g. Kim, 2019; Vázquez-Cano et al., 2021). Additionally, research has explored users' perceptions of chatbots in language learning, with some finding that users perceive chatbots as useful and engaging tools for language learning (Chuah & Kabilan, 2021; Yang & Chen, 2023).

Replika is a chatbot that has gained popularity among English language learners due to its conversational capabilities and ability to provide personalized language learning support (Belda-Medina & Calvo-Ferrer, 2022; Brandtzaeg et al., 2022). Replika uses natural language processing and machine learning algorithms to generate human-like conversations with users, which can adapt to individual users' language learning needs and provide personalized feedback and support based on grammar, vocabulary, pronunciation, and cultural insights have made it a useful tool for language learners (Belda-Medina & Calvo-Ferrer, 2022).

In a research endeavor undertaken by Sumakul et al., (2022) concerning the implementation of AI technology in English as a Foreign Language (EFL) classes in Thailand, it was discovered that Thai students held favorable views regarding the incorporation of AI technology in the educational setting. The study indicated that participants were optimistic about the potential of AI technology to enhance teaching and learning experiences for both students and instructors. Notably, the utilization of chatbots was identified as particularly beneficial in fostering motivation and engagement among Thai students in the process of learning English. These findings imply that Thai students are open to the integration of AI technology in education and recognize the prospective advantages it may offer. With ongoing advancements in AI technology, its adoption in education is likely to become more prevalent across diverse cultures and contexts. While the literature review indicates a substantial body of research on the use of AI technology, including chatbots, in language education, there appears to be a notable gap in specifically addressing and exploring the application of these technologies to address the challenges faced by Thai students in developing their communicative writing skills. The existing research emphasizes the potential benefits, but a focused exploration of how AI, particularly chatbots, can specifically aid in enhancing writing skills among Thai students seems to be an area that has not been extensively investigated. Additionally, while previous studies have predominantly focused on teacher-organized and monitored learning environments, the current study seeks to highlight the development of learner autonomy, especially in the context of Thai students engaging with AI chatbots. This can provide insights into the students' motivation, self-efficacy, and autonomy, which are crucial factors in language learning success. The study can potentially contribute valuable insights into the use of AI chatbots in language learning, specifically in the Thai educational context. It is expected that the findings of this study can inform the development of effective language teaching and learning strategies that can benefit Thai students and enhance their communicative writing skills.

Research Question

1. To what extent does the AI chatbot 'Replika' help enhance the communicative writing skill of Thai EFL learners?

2. What are self-regulated learning strategies to help enhance communicative competence while engaging with chatbot-based learning?

Literature Review

The roles of AI chatbots in language learning

The impact of artificial intelligence (AI) is evident in our daily lives as it has revolutionized the way we interact with technology. The development of sophisticated applications and devices, commonly referred to as intelligent agents, has facilitated the execution of diverse tasks. A chatbot is a computer program that leverages artificial intelligence to facilitate interactions between humans and machines. It operates on Human-Computer Interaction (HCI) principles, which involve studying how people interact with technology (Bansal & Khan, 2018). Chatbots are also referred to by various names, such as artificial conversation entities, interactive agents, smart bots, and digital assistants. These terms are used interchangeably to describe the technology enabling human-like interaction between users and machines. To engage in human-like communication through written or oral language, chatbots rely on Natural Language Processing (NLP) and sentiment analysis, which enable chatbots to comprehend and generate human language (Khanna et al., 2015).

AI chatbots have a long history dating back to the 1960s when ELIZA, a natural language processing program, was created by Joseph Weizenbaum (Weizenbaum, 1966). ELIZA was designed to simulate human conversation using pre-programmed responses based on simple pattern-matching techniques. ELIZA's capabilities are restricted due to its limited knowledge, which confines its discussions to a specific domain of topics. Furthermore, ELIZA is unable to engage in prolonged conversations and cannot acquire context or learn from the discussion. These limitations are

noteworthy drawbacks of the technology. Over the years, chatbots have evolved and become more sophisticated. In the 1990s, chatbots such as A.L.I.C.E. (Artificial Linguistic Internet Computer Entity) and Jabberwacky were developed (Wallace, 2009). These chatbots used NLP techniques to generate responses to user inputs, and they learned from user interactions and improved their responses over time. In the early 2000s, chatbots began to be used for commercial purposes, such as customer service and sales support. One of the most famous chatbots in this context is IBM's Watson, which was initially developed to compete on the game show Jeopardy! in 2011 and has since been used in various industries, including healthcare and finance (Ferrucci et al., 2010).

Chatbots have gained significant popularity in recent times and are now being employed across various domains, encompassing customer service, healthcare, and education (Abbasi et al., 2019). In recent years, the use of artificial intelligence (AI) chatbots has gained attention in the field of English as a foreign language (EFL) education. Several studies have investigated the effectiveness of using AI chatbots to enhance EFL students' speaking ability, communication skills, and grammar learning outcomes (Han, 2020; Kim et al., 2021; Yang et al. , 2022; Ye et al., 2022; Chen and Lin, 2023). Han (2020) found that AI chatbots positively impacted students' emotional responses towards English learning. Similarly, Yang et al. (2022) reported high levels of student engagement and task success rates while using an AI chatbot as an English conversation partner. Kim et al. (2021) significantly improved EFL students' communication skills, including fluency, intonation, stress, and response-to-questions tasks. Ye et al. (2022) reported improved grammar, pronunciation accuracy, and oral performance considerably. Finally, Chen and Lin (2023) found that the AI chatbot-supported grammar tense learning approach enhanced grammar learning outcomes and reduced English learning anxiety among EFL students. In the Thai EFL context, integrating chatbots in language classrooms is in the initial stage. Only a few studies have been found in this area (e.g. Sumakul et al., 2022). Sumakul et al. (2020) conducted a study

to explore the perspectives of English as a Foreign Language (EFL) teachers regarding the incorporation of artificial intelligence (AI) in their classrooms. The researchers gathered data through interviews with four EFL teachers at a university in Indonesia, all of whom had experience integrating AI into their teaching practices. The findings revealed unanimously positive perceptions among the teachers regarding the use of AI in their classrooms. According to the teachers, AI was viewed as a valuable tool that could enhance both teaching and learning. Furthermore, the interview data underscored the importance of considering students' motivational levels and teachers' technological and pedagogical competence when implementing AI in EFL classrooms.

Methodology

Research Design

The methodology used in this study was a quasi-experimental design, which involved a pretest-posttest control group design. According to Creswell (2014), a quasi-experimental design is suitable when the researcher cannot manipulate the independent variable for ethical or practical reasons. The use of pretest-posttest control group design helped control extraneous variables that could have affected the results. The study involved three phases: pre-intervention, while-intervention, and post-intervention phases. The pre-intervention phase involved administering a pretest to measure participants' communicative writing skills. The while-intervention phase took four weeks as an extracurricular activity of the English Writing for Daily Life course, during which the participants engaged with the AI chatbot 'Replika' at least three times a week with ten questions. The post-intervention phase involved administering a posttest on communicative writing skills and measuring the participants' levels of self-regulated learning strategies using a self-regulated learning questionnaire (SRLQ).

Participants

The participants of this study were 26 students from a public university in the Northeastern region of Thailand. Participants were selected from an intact class enrolled in the course "English Writing for Daily Life." This course aims to improve students' practical writing skills for everyday communication. The student's English language proficiency was assessed to be at the A1 level, according to the Common European Framework of Reference for Languages (CEFR). This level indicates that the participants are beginners in English, capable of basic interactions and understanding. Before participating in this study, the participants did not have experience using the AI chatbot Replika. This ensures that all participants start with a similar baseline. The age range of the participants was between 20 and 22 years. All participants were informed about the purpose and procedures of the study.

Research Instruments

AI chatbot Replika

The AI chatbot Replika was created by the startup Luka in San Francisco (USA) in 2017. Replika has a unique design that allows users to customize their avatar when they first create their Replika account, including options such as gender, hairstyle, and outfit. Replika uses feedback from conversations with users and access to social networks if permission is granted to learn from them and become more human-like. The bot also has memory and diary-keeping capabilities, and users can gain more experience to reach different levels. Additionally, Replika includes an augmented-reality-based option, which enables participants to launch an AR-based avatar to chat with the Replika. In the first week of the treatment phase, participants were instructed to download the Replika app on their mobile phones and create an account. They were guided through the customization process and given a brief tutorial on how to interact with the chatbot effectively. To control for variables, all participants were asked to grant the same level of permissions to Replika, including whether or not to allow access to social networks.

A pretest and posttest on communicative writing skills

A pretest and posttest were administered to assess the impact of using the AI chatbot Replika on students' communicative competence and writing performance. The researchers developed 40 questions across eight topics, including daily life, friends, hobbies, pets, holidays, celebrities, sports, and language. Each topic contained five questions designed to gauge various aspects of language proficiency, including vocabulary, sentence structure, and conversational skills. The questions were open-ended questions, which encouraged students to form complete sentences. The questions were carefully crafted to align with the learning objectives of the "English Writing for Daily Life" course and to provide a comprehensive assessment of students' communicative writing skills. Students were asked to write a sentence to respond to each question. A binary scoring system is employed to evaluate participants' responses. Given the A1 proficiency level of the participants, this system aims to prioritize clarity and relevance of the responses over minor grammatical errors. Three levels are used to assess the participants' responses in the scoring system for evaluating communicative competence. A score of "0" is marked when the response is either incorrect, irrelevant, or unintelligible, indicating a complete lack of understanding or relevance to the question posed. A score of "0.5" is marked for partially correct responses but may contain significant errors that affect the overall understanding of the answer. These responses may also be intelligible but not entirely relevant to the question, reflecting a partial grasp of the topic. Finally, a score of "1" is marked for correct and intelligible responses, even if they are not formulated in complete sentences.

Self-Regulated Learning Questionnaire

The Self-Regulated Learning Questionnaire used in this study was adapted from the comprehensive Self-Regulated Online Learning Questionnaire developed by Jansen et al., (2017) The questionnaire consists of 36 items that are categorized into five scales: Metacognitive Skills (18 items), Time Management (5 items), Environmental Structuring (5 items), Persistence

(5 items) and Help-Seeking (5 items). To cater to the linguistic needs of the participants, the questionnaire was made available in both English and Thai. The reliability of the questionnaire was confirmed through a Cronbach's alpha coefficient of 0.945, indicating high internal consistency. Participants will respond to the items using a 5-point Likert scale, ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (5) The questionnaire is divided into two main sections: Background Information, which collects demographic and other relevant data, and Self-Regulated Learning Strategies, which contains 36 items designed to measure various aspects of self-regulated learning.

Research Procedure

The research procedure consisted of three phases: pre-intervention, while-intervention, and post-intervention. The pre-intervention phase was conducted one week before the intervention and involved administering a pretest to measure participants' communicative writing skills. The while-intervention phase lasted four weeks and involved participants engaging with a conversational AI chatbot named Replika at least three times per week, answering ten questions each time and submitting a weekly journal writing reflecting on their language learning from the interaction. Regular interactions and journaling allow students to set goals, reflect on their progress, and adjust their language learning strategies based on their experiences with the AI chatbot. The post-intervention phase included a posttest to assess the students' communicative writing skills and investigate the participants' levels of self-regulated learning strategies using a self-regulated learning questionnaire.

Data Analysis

The normal distribution of the sample group was checked using the Shapiro-Wilk test since the number of participants was less than fifty. To assess the impact of the intervention on communicative writing skills, a Paired-samples T-test was utilized to compare the means of the pretest

and post-test scores using the SPSS program. To examine self-regulated learning strategies and perceptions towards the use of the AI chatbot Replika, descriptive statistics were used, and the mean score of each item was interpreted into three levels: high, moderate, and low.

Results

Communicative writing skill

The Shapiro-Wilk statistic for the pretest was 0.94 with 26 degrees of freedom, resulting in a p-value of 0.11. Similarly, for the posttest, the Shapiro-Wilk statistic was 0.94 with 26 degrees of freedom, and the p-value was 0.13. The normality test results indicated that the assumption of normality was not violated for both pretest and posttest scores on communicative writing skill. Therefore, a paired-samples T-test was conducted to compare the mean scores between the pretest and posttest. The analysis showed a significant difference in the mean scores between the pretest and posttest, $t(26) = -6.388$, $p < .001$, indicating that implementing the AI chatbot Replika significantly enhanced Thai EFL students' communicative competence.

Table 1

Paired Samples Test of the Pretest and Posttest Scores on the Communicative Writing Skill

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest-Posttest	10.03846	8.01239	1.57136	6.80219	13.27474	6.388	25	.000*

*Significant at ($\alpha \leq 0.05$).

Self-regulated Learning Strategies

With regards to students' self-regulated learning strategies while using the AI chatbot Replika to enhance communicative skills, the results showed that the overall self-regulated learning strategies were at a medium level ($\bar{x}$ = 2.75), and the results of the five sub-scale were also at a medium level. Considering the mean frequency scores of the five categories, we found that the most frequent use of students' self-regulated learning strategies was in the persistence category, followed by environmental Structuring, metacognitive skills, time management, and help-seeking, respectively.

Table 2

Self-regulated Learning Strategies Sorted by Sub-scale

No.	Sub-scale	Mean	S.D.	Level of strategies used
1.	Persistence (PE)	2.86	0.59	Medium
2.	Environmental Structuring (ES)	2.81	0.74	Medium
3.	Metacognitive Skills (MT)	2.80	0.76	Medium
4.	Time Management (TM)	2.70	0.51	Medium
5.	Help-Seeking (HS)	2.63	0.73	Medium
Overall Strategies Use		**2.75**	**0.74**	**Medium**

Discussion

Paired-Samples T-test was applied to find out if there was any significant difference between the pretest and posttest scores regarding the participants' communicative writing competence. It was found that there is a significant difference between the means of the students' pretest and posttest scores (p-value = 0.00). It was lower than .05. In other words, implementing the AI chatbot Replika significantly improved students' communication. The result of this study was in line with Han (2020), who stated that chatbot-based instruction could enhance communicative competence. Additionally,

the findings indicated that using chatbots to interact with activities supported by deliberate learning objectives can help students learn language (Huang et al., 2022). Mayer (2017) also asserted that individuals learn better from multimedia lessons when words are presented in spoken form and small user-paced segments. However, it is important to note that technology should not replace traditional classroom instruction entirely. Teachers still play an essential role in providing learners with guidance, support, and feedback. The use of technology should be seen as a complement to traditional classroom instruction, providing learners with additional opportunities to practice and develop their language skills.

In terms of self-regulated online learning strategies, the medium use of self-regulated learning strategies was reported. It might indicate that online learning strategies were needed before starting the task. Zhou and Wei (2018) suggested that learners might not be self-regulating or autonomous unless they have been explicitly taught to use learning strategies. Aberle-Grasse (2020) also suggested that genuine connection and effective language learning online can be enhanced by selecting a few key learning strategies and teaching them well. This finding highlights the importance of incorporating explicit instruction and training on self-regulated learning strategies into language learning programs, particularly in online settings. In addition, language instructors can provide learners with various resources, such as video tutorials, online workshops, or interactive modules, to teach them how to effectively use self-regulated learning strategies. This can help learners to better manage their learning process, increase their motivation and engagement, and ultimately enhance their language proficiency.

Although the results of this study yielded a positive effect for the use of AI chatbots in language learning, these are valid concerns regarding the use of chatbots in the classroom. While they can provide some benefits, it is important to consider how they may impact the overall learning environment and the teacher's workload. Distractions can be a major issue, particularly if students become too focused on interacting with the chatbot rather

than completing their assignments or participating in classroom discussions. Additionally, teachers will need to ensure that they can effectively manage both online and offline learning activities to ensure students engage with both modes of instruction effectively. Preparing learning guidance and additional materials for online learning can also be time-consuming, and teachers may need to undergo training to learn how to effectively use chatbots in the classroom. Providing consistent feedback to students is also essential, mainly if the chatbot is used as a form of assessment.

Conclusion

The use of AI chatbot technology in EFL teaching is a promising direction for future research and practice. Chatbots can provide students with opportunities for consistent writing practice and feedback, helping them to develop their writing skills and build their confidence over time. Additionally, chatbots can be programmed to provide personalized feedback tailored to each student's needs and learning goals, which can be particularly helpful for students struggling with traditional classroom instruction. Mobile technologies offer a novel approach to improving communication and education (Gharehblagh & Nasri, 2020), dramatically facilitating language acquisition by providing communication exercises everywhere and helping reduce anxiety (Chien et al., 2022).

The findings of this study suggest that the implementation of the AI chatbot Replika has the potential to enhance students' communicative writing skills. It aligns with previous studies showing the effectiveness of chatbot-based instruction in improving language learning outcomes. Nonetheless, this study highlights the potential of using AI chatbots in language learning and calls for further research to explore the ways in which this technology can be optimized to enhance language learning outcomes. Additionally, instructors must carefully design assignments and activities that balance teaching methods to ensure that students' writing skills are developed holistically. It is, therefore, recommended that EFL teachers make use of

AI chatbot technology in their classroom, as teachers should be creative in making and giving material conducting the teaching and learning process and apply various teaching media in order for the students not to feel bored in learning (Nur et al., 2019). In addition, using AI chatbots can provide learners with more opportunities for autonomous learning, which is an important aspect of language learning in the 21st century.

To successfully integrate AI into language classes, teachers should actively facilitate interactions between students and AI tools, guiding them in optimal usage. Continuous monitoring of student progress allows for tailored support where needed, positioning teachers as mentors in the AI-enhanced learning environment. Students, in turn, are encouraged to adopt proactive roles, setting clear learning goals and utilizing AI-generated feedback to refine language proficiency, fostering a sense of autonomy. Identifying language areas well-matched with AI, such as vocabulary acquisition and pronunciation practice, ensures targeted integration. Strategic planning is crucial for seamlessly incorporating AI into existing curricula, emphasizing complementarity with traditional methods. Finally, effective assessment design, capturing AI-facilitated and traditional learning outcomes, and optimizing feedback mechanisms are recommended for continuous improvement and holistic evaluation of students' linguistic development.

However, it should be noted that the effectiveness of AI chatbot technology depends on various factors, such as the quality of the chatbot, the design of the learning tasks, and the learners' motivation and self-regulation skills. Therefore, further research is needed to explore these factors and to develop more effective ways to integrate AI chatbots into EFL teaching. Furthermore, it is essential to consider the limitations of this study. The sample size was relatively small, and the study was conducted in a specific context (Thai university students learning English as a foreign language). Therefore, the results may not be generalizable to other populations or contexts. Longitudinal studies can provide more information about the long-term impact of using chatbots in the classroom.

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