The Impact of an AI-Based Extracurricular English Learning Program on Learners' English Speaking Self-Efficacy, Interest, and AI Literacy

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AI 기반 비교과 영어 학습프로그램이 학습자의 영어 말하기 자기효능감, 흥미, AI 리터러시에 미치는 영향

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Abstract This study investigates the impact of an AI-based extracurricular English learning program on learners' self-efficacy in English speaking, interest levels, and AI literacy. Utilizing a mixed-methods approach, the research statistically analyzed changes in participant at A University and delved into their learning experiences through the examination of reflection journals. Over a 12-week period, participants practiced English speaking using the AI-based app. *Plang*. The findings indicated statistically significant enhancements in English speaking self-efficacy, interest, and AI literacy. Key factors contributing to these improvements included immediate AI feedback, repetitive practice, and context-based learning, which greatly boosted learners' confidence and engagement. Additionally, participants developed a positive attitude towards the use of AI technology as a learning tool. This study provides empirical evidence that AI-based English learning effectively enhances college students' English speaking skills and AI literacy.

Key Words : Extracurricular English learning program, English speaking self-efficacy, Interest in speaking English, AI literacy

요 약 본 연구는 AI 기반 비교과 영어 학습 프로그램이 학습자의 영어 말하기 자기효능감, 흥미 및 AI 리터러시에 미치는 효과를 확인하는 데 그 목적이 있다. 이를 위해 A대학교에서 운영된 AI 기반 영어 학습 프로그램 참여자들의 영어 말하기 자기효능감, 흥미, AI 리터러시 변화를 통계적으로 검증하고, 성찰 저널 분석을 통해 학습 경험을 심층적으로 탐색하는 양적·질적 연구를 수행하였다. 프로그램에 참여한 학습자들은 12주간 AI 기반 영어 말하기 앱(*Plang*)으로 영어 말하기 학습을 진행하였다. 연구 결과, 영어 말하기 자기효능감, 흥미, AI 리터러시의 수행 영역에서 통계적으로 유의미한 향상을 보였다. 특히 즉각적 AI 피드백과 반복 연습, 맥락 기반 표현 학습이 학습자의 자신감과 흥미를 증진시키는 데 중요한 역할을 한 것으로 나타났다. 아울러 학습자들은 AI 기술의 학습 도구로서의 활용 가능성을 긍정적으로 인식하게 되었다. 본 연구는 AI 기반 영어 학습이 대학생의 영어 말하기 역량과 AI 리터러시 향상에 효과적임을 실증적으로 보여주었다는 데 그 의의가 있다.

Key Words : 비교과 영어학습 프로그램, 영어 말하기 자기효능감, 영어 말하기 흥미, AI 리터러시

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1. Introduction

In recent decades, AI technology has advanced significantly and become deeply embedded in various sectors of human life, including business, education, and healthcare. In the field of language learning, AI has been developed to enhance timeliness, usability, and personalized learning, thereby transforming language teaching and learning. AI technology provides interactive learning experiences, monitors learners' progress, and evaluates learning outcomes effectively.

Recent studies have revealed that the utilization of AI in educational settings can not only promote language proficiency, but also enhance motivation and confidence [1]. However, existing studies in language education have mainly focused on the impact of AI on learner perceptions in language class instruction. There is currently no known research examining how the use of AI influences the language experiences of students participating in extracurricular programs.

The purpose of this study is to analyze the impact of AI-based English learning in an extracurricular program on learners' self-efficacy, interest in speaking English, and AI literacy. Through this analysis, the study aims to provide practical strategies for enhancing effective English learning experiences. Accordingly, the following research questions are posed:

1. How does an AI-based extracurricular English learning program affect learners' self-efficacy in speaking English?
2. How does an AI-based extracurricular English learning program influence learners' interest in speaking English?
3. How does an AI-based extracurricular English learning program impact learners' AI literacy?

2. Literature Review

2.1 AI and English speaking

Empirical research has explored various strategies and learning outcomes in relation to AI and English language learning [2]. Utilizing AI can enhance engagement and improve speaking improvement. A study on college students' English language fluency of oral output in Hong Kong [3] revealed that participants perceived the advantages of AI and demonstrated improvements in their speaking fluency. Especially, long-term involvement on practicing English with AI has positive impact on promoting English speaking fluency.

Additionally, practicing English with AI can promote student interest and motivation. One study examined how an AI app supported learners in practicing English conversation during a 10-week period [4]. The results showed that the AI app effectively stimulated students' interest in speaking English. Another study investigated the impact of an AI voice chatbot on Vietnamese college students' English speaking skills [5]. Findings indicated that the AI voice chatbot engaged students in communication and increased their interest. The ability to practice conversations with the chatbot (self-practice) and its availability anytime and anywhere (self-access) contributed to heightened enthusiasm and motivation for speaking, encouraging students to speak more actively.

2.2 AI and English self-efficacy

The concept of self-efficacy refers to “a person’s belief in one’s capability to organize and execute the courses of action required to manage prospective situations”[6]. Self-efficacy beliefs are related to an individual’s confidence in their abilities to complete tasks through effort and skill. Four primary sources have been identified as influencing the development of these beliefs. The most influential is mastery experience, or firsthand experience. To promote student achievement, educational efforts should focus on fostering students’ beliefs in their

competence and confidence through successful performance of relevant tasks. The second source is vicarious experience, which is gained through observing the actions of others. The other sources include verbal judgments from others and psychological states such as anxiety, stress and other emotional states.

Self-efficacy beliefs influence the choices of tasks learners make and the actions they persue. People with strong self-efficacy beliefs have greater intrinsic interest, set challenging goals, and heighten their efforts, persistence, and resilience [7]. Recently, research on English self-efficacy utilizing AI has demonstrated positive effects on language learning [8]. A study revealed noteworthy enhancements in speaking self-efficacy among English learners [9]. Engaging with ChatGPT could help learners to develop confidence and courage in their capacity to communicate in English, manage their stress, and engage in pleasure learning.

2.3 AI Literacy

AI literacy means "having the essential abilities that people need to live, learn, and work in our digital world through AI-driven technologies."[10] Research areas related to AI literacy are diverse: understanding of AI concepts, retention of AI skills, perceived affective learning outcomes such as motivation, confidence, attitudes, and readiness toward AI learning, as well as ethical issues like bias in AI, legal responsibility, and intellectual property.

Pedagogical research on AI literacy education has been conducted across different educational levels [11]. For primary and secondary schools, the goals of AI literacy education include helping students understand the connection between AI applications and underlying concepts, as well as developing the ability to apply AI knowledge to analyze and solve problems. In contrast, adult learners, such as university students, are generally better prepared to undertake projects or research aimed at solving real-world problems using AI, given their foundational understanding of AI.

In the context of English language education, one study identified six key competencies for ChatGPT literacy: benefits, limitations, prompt design, evaluation, assessment, and ethics [12]. By analyzing the practices and challenges experienced by 492 language teachers in using ChatGPT, the study empirically validated a framework for ChatGPT literacy. It also revealed that teachers generally had a strong awareness of its benefits, limitations, ethical considerations, and evaluation methods, but faced difficulties in using ChatGPT for assessment and prompt engineering.

Another study examined the relationship between AI literacy and English language learning motivation among university students [13]. Data were collected through surveys focusing on four components of AI literacy—awareness, usage, evaluation, and ethics—as well as subscales of language learning motivation, including self-confidence, attitude, and personal usage. The results indicated a positive correlation between AI literacy and motivation in learning English, with students possessing higher AI literacy tending to demonstrate greater motivation to learn English.

3. Research Method

3.1 Subjects of the study

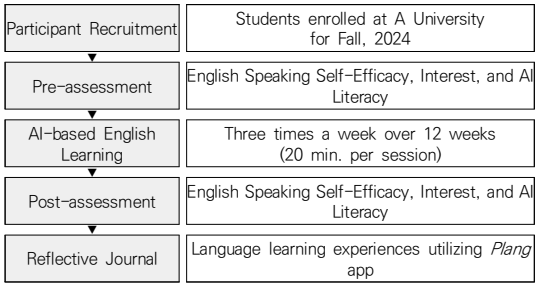
This study involved 50 participants who voluntarily enrolled in and completed a 12-week extracurricular program conducted at A University in Seoul. The following table shows the distribution of participants by department and academic year:

〈Table 1〉 Participants

Dept.		No. of participants	Proportion(%)
Depart-ment	ICT Convergence Business Department	10	20.0
	Department of IT Engineering	18	36.0
	Department of Global Tourism	8	16.0
	Department of Design	5	10.0
	Department of Food and Nutrition	4	8.0
	Department of Human Care	5	10.0
academic year	1	1	25
	2	2	18
	3	3	7
Total		50	100.0

3.2 Research Procedure

This study was conducted to examine the effects of an AI-based extracurricular English speaking program, following the research procedures illustrated in [Fig. 1].



[Fig. 1] Research procedure

The AI-based English speaking program in this study is an extracurricular program operated by the Teaching and Learning Support Center at A University. Participants voluntarily engaged in the program and utilized the AI-based English speaking app, *Plang*, to learn English. They spent time for more than 20 minutes per session, three times a week for the duration of 12 weeks. In total, each participant committed to more than 720 minutes for learning English throughout the program.

Participants began the learning process by taking an English proficiency assessment through the *Plang* app, which provided them with content tailored to their interests and language levels. They engaged in real-time conversations with the AI, experiencing a process of correction and feedback during their practice.

Moreover, assessments of English speaking self-efficacy, interest, and AI literacy were administered both before and after the program. At the end of the program, participants were also asked to complete a learning satisfaction survey and reflective journals.

3.3 Research Instruments

3.3.1 English Speaking Self-Efficacy Scale

The measurement tool for assessing English speaking self-efficacy was adapted from the instrument utilized in the study by Liu (2013) to better align with the objectives of this research [14]. The questionnaire comprised a total of 10 items, such as "I can effectively convey my ideas in English" and "I can speak English confidently even if others around me might laugh." Each item of the assessment tool was structured on a 5-point Likert scale (1 = 'Not at all' to 5 = 'Very much so'). Based on pretest(N=50) and posttest(N=50) data, reliability analysis in SPSS/PC+ 29.0 yielded Cronbach's α coefficients of 0.930 for the pretest and 0.935 for the posttest, indicating high internal consistency.

3.3.2 English Speaking Interest Scale

The assessment instrument utilized to evaluate interest in speaking English was adapted from the instrument used in the study by Jung and Lee (2023) to align with the goals of this research[15]. The questionnaire consisted of a total of 12 items designed to evaluate participants' interest in speaking English. Examples of items include statements such as "I look forward to my English learning sessions using *Plang*" and "I find activities

that involve speaking in English enjoyable." Based on pretest(N=50) and posttest(N=50) data, reliability analysis produced Cronbach's α values of 0.932 and 0.946 for the pretest and posttest, demonstrating strong internal consistency.

3.3.3 AI Literacy

The instrument used for assessing AI literacy was adapted from the AI literacy assessment tool developed by Yoon (2022) to suit the context of this research[16]. The questionnaire consisted of a total of 16 items addressing various aspects of AI recognition, understanding of principles, application, social value, and ethics. Examples of statements include "I am aware that AI technology is used in the English learning tool (*Plang*)" and "I believe that the ability to work with AI will be necessary in the future." Based on pretest(N=50) and posttest(N=50) data, reliability analysis produced Cronbach's α values of 0.935 and 0.923 for the pretest and posttest, respectively, reflecting satisfactory internal consistency.

〈Table 2〉 Reliability Verification Results

	No. of items	Cronbach-α		Scale
		pre-	post-	
English speaking self-efficacy	10	.930	.935	5-point Likert scale
English speaking interest	12	.932	.946	
AI literacy	16	.928	.923	

3.4 Data Analysis

This study employs a mixed-method approach, integrating both quantitative and qualitative research methods. In the quantitative research, data analysis was conducted using SPSS/PC+ 29.0, employing descriptive statistics and paired sample t-tests.

This study also employed a qualitative research method to explore and articulate the significance of participants' learning experiences. The analysis focused on students' reflective journal responses, which were examined using Colaizzi (1978)'s phenomenological analysis framework[17]. By employing this method, the study aimed to uncover the themes and meanings that emerged from participants' perceptions in the context of learning English through the AI-based app.

4. Finding and Discussion

4.1 The impact on English speaking self-efficacy

This study aimed to investigate the effect of an extracurricular English speaking program that employs an AI-based app on the self-efficacy in speaking English. Changes in English speaking self-efficacy were analyzed before and after program, utilizing a paired sample t-test. As shown in 〈Table 3〉, the mean self-efficacy score prior to participation was 3.24, which increased to 3.86 after the program, indicating an enhancement of 0.44 points. The paired sample t-test results demonstrated that this difference was statistically significant. The findings indicate that the use of the AI-based app for language learning in the extracurricular program had a positive impact on the self-efficacy of participants in their English speaking abilities.

〈Table 3〉 The results of the paired samples t-test on pre- and post-test scores for self-efficacy in speaking English

	N	M	SD	t	p
Pre-	50	3.24	.8364	-6.852	.000*
Post-	50	3.86	.8069		

*p<.001

In learners' journal entry, they also revealed how the practices through the app influenced their self-efficacy in speaking English. The opportunities to correct grammatical and pronunciation errors and repetitive practices

provided by *Plang* promoted learners' confidence of speaking English. Rather than feeling anxiety and hesitating, their attitude has become more active and speaking practices through *Plang* were not the challenges any more, but the process of pleasure learning. Those positive experiences reinforced self-efficacy of learners. One student responded in her journal entry as follows.

"AI provided immediate feedback on grammatical errors and pronunciation, helping learners identify and improve their weaknesses. Repetitive practice fostered a sense of achievement and significantly boosted confidence. What was once a hesitant task has now become an enjoyable process of skill development. These experiences greatly contributed to the continuous enhancement of their self-efficacy in speaking English."(S3)

Another student shared how her attitude toward speaking English changed, especially in the context of her part-time job, where her use of the app helped her respond to foreign guests with more confidence. She mentioned that practicing with AI offered opportunities to have conversations in various contexts, which helped improve her speaking skills.

"I struggled with pronunciation due to a short tongue and weight, which caused frustration and often led me to avoid speaking English. I felt insecure when communicating with foreigners, often stuttering or making grammatical mistakes. However, through *Plang* learning, I was able to improve. I learned correct pronunciation, natural sentence formation, and practiced repeatedly to correct and develop my speaking skills. The AI conversation system also helped me practice in various situations, making conversations with foreigners feel more natural. As a result, I recently gained confidence while working part-time and interacting with foreign customers."(S8)

4.2 The impact on interest in speaking English

To investigate the impact of the extracurricular program that employs an AI-based app on participants' interest in speaking English, data collected before and after the program were analyzed, and a paired sample t-test was conducted. As presented in 〈Table 4〉, the mean interest score prior to participation was 4.14, which increased to 4.56 after participation, with an enhancement of 0.42 points. The results of the paired sample t-test indicated a statistically significant difference. These findings suggest that the extracurricular English speaking program utilizing the AI-based app positively influences the interest of learners in speakin English.

〈Table 4〉 The results of the paired samples t-test on pre- and post-test scores for interest in speaking English

	N	M	SD	t	p
Pre-	50	4.14	.604	-6.756	.000*
Post-	50	4.56	.520		

*p(.001

Learners expressed in their journal entries that they enjoyed the learning process provided by *Plang*. According to their reflections, the gamified features of the app, which included pronunciation practice and word matching activities, contributed to increased enjoyment and engaged them more actively in learning.

"Through *Plang*, I found learning easy and enjoyable by using various methods. Practices like pronunciation, word arrangement, and speaking aloud felt like games, which kept me engaged and motivated to continue learning consistently."(S5)

Authentic English is another key factor invoking learner interest. Through the practice of authentic English in context, learners realized that they would be able to use what they learn in the real-life situations, which increases their motivation and confidence in using the language.

"I was able to learn expressions used by native speakers in real-life situations, rather than just grammar. This helped me understand local

expressions and their sense of language. As a result, I learned practical, everyday expressions that I can actually use in conversation, which gave me the joy of knowing I can speak functional English."(S7)

4.3 The impact on AI literacy

To examine the impact of the program utilizing an AI-based app on participants' AI literacy, changes in scores before and after program were analyzed. A paired sample t-test was conducted to evaluate these changes. As shown in 〈Table 5〉, the mean AI literacy score increased from 4.23 before participation to 4.52 after participation, indicating an improvement of 0.29 points. The paired sample t-test results revealed a statistically significant difference. Therefore, these findings suggest that the program positively impacts the AI literacy of learners.

〈Table 5〉 The results of the paired samples t-test on pre- and post-test scores for AI literacy

	N	M	SD	t	p
Pre-	50	4.23	.550	-5.112	.000*
Post-	50	4.52	.454		

*p<.001

Students expressed that they became aware of AI's capabilities in language analysis and processing, such as identifying areas for improvement, providing feedback, and adapting to learners' levels. These experiences allowed them to gain a deeper understanding of how AI functions and how AI technology is applied to the learning process.

"*Plang* used AI to analyze my weaknesses, provide feedback, and set suitable difficulty levels, helping me learn through repeated practice. Conversations with the AI simulated natural daily dialogue, boosting my confidence in real interactions. The real-time corrections of pronunciation and grammar also showed me how AI analyzes language, deepening my understanding of its role in learning."(S2)

In particular, some students admitted that their initial perceptions of rejection and difficulty in using AI shifted to a more positive attitude, leading them to recognize the value of AI for learning. The positive experiences with *Plang* influenced them to develop more favorable attitudes toward learning and to view AI as an essential tool for enhancing their educational experience.

"After using *Plang*, my initial reluctance and prejudices about AI disappeared. I now actively use AI for learning and completing tasks, and my view has shifted from negative to positive regarding AI utilization."(S9)

"This experience improved my ability to use AI effectively and shifted my attitude from negative to positive. *Plang* made learning fun and efficient, and I plan to continue using AI tools. I now see AI as an essential part of effective language learning."(S6)

5. Conclusion

This study investigated the impact of AI-based English learning in an extracurricular program on learners' English speaking self-efficacy, interest, and AI literacy. The results of this study showed that the use of the AI-based app positively influenced the self-efficacy of participants in their English speaking abilities. Engaging with AI technology contributed to increasing learners' confidence and their belief in their ability to communicate effectively in English.

In addition, the study found a significant increase in learners' interest in speaking English. The positive change indicates that the extracurricular program not only facilitated language learning but also motivated students to engage more actively in their learning process. The interactive nature of the AI app likely played a crucial role in fostering this heightened interest. The results

also demonstrated that the program had a beneficial impact on participants' AI literacy. As students interacted with the AI-based app, they developed a better understanding of AI technologies and applications, which is increasingly important in today's digital world.

These results suggest that educational institutions should consider further integrating AI technologies into their extracurricular programs. This could lead to the development of more engaging and impactful extracurricular activities that not only support language learning but also enhance students' AI literacy. However, the external validity of this study is limited by its exclusive reliance on the *Plang* app. Future research should examine multiple AI-based English learning applications to enhance the generalizability of the findings.

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