Transforming Linguistic Mastery: Leveraging Rosetta Stone's Artificial Intelligence to Augment ESL Learners' Oratory Proficiency and Self-Directed Learning

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Abstract:
This study article examines the influence of Artificial Intelligence (AI)-driven training on enhancing English language speaking skills and promoting self-directed learning in practical settings. In the current educational landscape, AI-based apps have demonstrated their capacity to be transformative tools, stimulating learners' enthusiasm for facilitating interactive language acquisition activities. The research involved 120 engineering students studying English as a Second Language (ESL), who were randomly allocated to either an experimental group getting AI-based education or a control group receiving conventional instruction. Pre- and post-assessments were conducted to assess the students' English-speaking proficiency and self-directed learning capabilities, employing the Rosetta Stone mobile application, which has diverse speaking tasks, targeted workouts, pronunciation feedback, and a voice recognition mechanism. The findings demonstrated that the experimental group had notable enhancements in the components of speaking skills—accuracy, vocabulary, fluency, and pronunciation—relative to the control group. The results indicate that AI-driven training significantly improves English speaking abilities in ESL students and strengthens their self-regulatory mechanisms. These findings illustrate the capability of AI technology to improve language learning experiences and foster learners' autonomy and cognitive processes in speaking. pronunciation feedback English-speaking Proficiency Second Language (ESL).

Keywords: Artificial Intelligence, engineering students, AI-driven training, English-speaking proficiency Second Language (ESL).

Introduction

In recent decades, the integration of electronic gadgets into education has revolutionised instructional methodologies, notably with the widespread use of personal computers in educational institutions (Ruiz-Mercader et al., 2006). This technology revolution has enabled educational institutions to enhance their curriculum by implementing online classrooms for instructional reasons (Hamuddin, 2018). Among other technological advancements, artificial intelligence (AI) has emerged as a potent instrument in education, especially in oral communication, which has shown remarkable growth (Pokulevska, 2018). The integration of AI is driven by the necessity to enhance language acquisition in virtual environments, liberating learners from temporal constraints and physical classroom settings, facilitating the utilisation of learning resources, and enabling interaction with peers and instructors (Hamuddin, 2018; Ahmad et al., 2021).

Furthermore, artificial intelligence serves as a potent tool for stimulating student enthusiasm and facilitating collaborative language learning activities, which are crucial in the contemporary educational landscape. In recent years, artificial intelligence (AI) has favourably influenced the domain of English as a Second Language (ESL). Artificial intelligence systems employ voice recognition technology to identify and understand kids' speech similarly to humans. This capability is especially advantageous in circumstances when native English speakers are few, hence augmenting learners' communicative proficiency. It is essential to acknowledge that, while the use of AI in these contexts is exhilarating, it remains in its nascent stages, with substantial progress in automated voice recognition emerging just in the early 2010s.

Numerous research have examined the influence of artificial intelligence on the enhancement of speaking skills in English language learners (Junaidi, 2020; Kang, 2022). In this context, Hill et al. (2015) investigated human-human interactions against AI-human

communications, revealing that learners exhibited more engagement while interacting with AI than with their peers. Kang (2022) compared learner-AI interactions with learner-native speaker interactions, demonstrating the significant influence of AI on enhancing learners' speaking skills. Junaidi (2020) corroborated these findings, demonstrating that AI-assisted education enhanced learners' overall speaking proficiency, including fluency, grammatical correctness, vocabulary, and pronunciation.

Self-regulation of learning is a crucial concept in education that has garnered significant attention, particularly in language acquisition. Zimmerman (1989) defines self-regulated learning (SRL) as a proactive approach wherein learners actively oversee and regulate their cognitive, metacognitive, motivational, and emotional dimensions to attain their educational objectives. This multifaceted concept encompasses several methods and procedures, such as goal planning, self-regulation, strategic thinking, self-awareness, and motivational control (Pintrich, 2000). SRL empowers students to assume responsibility for their educational journeys, adapt to changes, and enhance their academic performance.

It evolves as a cyclical process of vision, efficacy, and self-regulation, wherein individuals establish objectives, execute strategies, and evaluate their accomplishments, all of which profoundly influence their academic outcomes (Zimmerman, 2002).

This work's practical explanation of self-regulated learning (SRL) is grounded in Seker's (2016) model, which is influenced by prominent SRL frameworks in second language acquisition, particularly emphasising Boekaerts' (1997) theory and Oxford's (1990) assessment of L2 instructional approaches. The examination of self-regulated learning is essential in this study as it serves as a pivotal element for comprehending the intricate interactions that arise when artificial intelligence (AI) instructions intersect with learners' engagement, motivation, and cognitive

strategies throughout their language acquisition process (Chang, 2005). This comprehensive investigation offers insights into the impact of AI on these fundamental traits and delivers a profound understanding of the underlying mechanisms that facilitate effective language acquisition. The study's findings are anticipated to furnish essential insights for enhancing pedagogical methods tailored to the specific needs and preferences of language learners in AI-integrated educational settings.

Literature of Review

The team-oriented communication strategies employed in this study align with the social constructivist principles advocated by Vygotsky (1984) across both responder groups. Vygotsky (1984) believed that contacts with persons with higher talents and intellect allow students to acquire knowledge and progressively attain larger degrees of self-awareness.

Vygotsky (1986) asserts that "every function in a child's cultural development manifests twice: first at the societal level and subsequently at the individual level; initially among individuals (inter-psychological), and later within the child." The zone of proximal development, pivotal to Vygotsky's social-constructionist theory, examines the gap between learners' current problem-solving abilities and their potential for improvement when participating in collaborative problem-solving activities with proficient peers.

Kim (2008) discovered that collaborative learning in the classroom facilitates students in supporting one another to attain their Zone of Proximal Development (ZPD) across various language acquisition roles. This is achieved by allocating duties to students of differing skill levels according to their language objectives and tasks. Through collaborative endeavours in language learning activities, such as group or pair work, students enhance their linguistic abilities and attain

their Zone of Proximal Development (ZPD). This study had both the control and experimental groups according to Vygotsky's social constructivist methodology, participating in interactive speaking activities with peers. The experimental group employed AI to reach their Zone of Proximal Development, whereas the comparison group accomplished this through collaborative speaking activities.

Numerous studies have been undertaken to examine the influence of AI on diverse approaches to language acquisition in English as a second and foreign language contexts, including writing (Fitria, 2023), reading (Liu, 2021), listening (Suryana et al., 2020), and speaking (Maknun, 2020; Divekar et al., 2022; Rustamova & Rakhmatullaeva, 2023). Suciati et al. (2022) performed a qualitative study examining the impact of the AI-based application, Cake, on language acquisition and speaking proficiency among learners. Data gathered from interviews, observations, and records revealed that AI-based training substantially impacted learners' total language learning, especially in improving their speaking abilities.

Maknun (2020) executed a quasi-experimental research examining the impact of an artificial intelligence application named Orai on the language performance of ESL students. The group conducting experiments employed Orai for interactive dialogue, whilst the other team refrained from using it for collaborative voice exchanges. The results indicated that the experimental participants surpassed the control group following the intervention, highlighting the efficacy of AI-based training in enhancing ESL language proficiency. The study by Ganesh Dandu and G. Mohanacharyulu (2023) indicated that the utilisation of Artificial Intelligence (AI) motivated learners to engage in speaking through diverse activities. The use of Artificial Intelligence (AI) presents significant opportunities for low and intermediate performers to engage with and learn from high achievers.

Likewise, Safadi et al. (2022) employed a quasi-experimental research design to evaluate the impact of AI-based training on the speaking abilities of female English language learners. In the present research, the experimental group engaged with Artificial Intelligence (AI) to boost their verbal communication presentation, whereas the control group's performance was enhanced by collaborative discourse with peers. Evaluations of speaking abilities were conducted to gather the necessary data, revealing that the experimental group outperformed the control group in speaking efficacy, thereby affirming the substantial influence of AI-based instruction on enhancing the communication skills of female English-speaking students.

Kang (2022) examined the differences between AI-assisted and native speaker-supported instruction on speaking proficiency and emotional factors among second language learners at a U.S. university. The findings indicated that AI-assisted training and local narrator guidance significantly enhanced the trainees' speaking skills. The findings indicate that AI-assisted and native speaker training significantly improved the trainees' communication skills. Nevertheless, learners utilising AI assistance outperformed those engaging with a local speaker for overall verbal competence and skills such as fluency, accuracy, and clarity. The findings indicated that pupils with lesser talents gained more from interactions with AI compared to their more competent counterparts. Conversely, pupils possessing exceptional skills derived the greatest advantage from engagement with a local speaker.

Li and Bonk (2023) conducted research on virtual language learners utilising the Rosetta Stone application outside conventional classroom settings. They found that students employed several tools and engaged in self-monitoring of their progress while learning, informed by the functions of Rosetta Stone. Students were motivated by intrinsic goals, such as a fervour for culture and travel, rather than accolades or grades. Kessler (2023) tackled issues in mobile-assisted

language learning (MALL) applications by integrating reflective e-journal activities into Rosetta Stone. The study, grounded on metacognition theory, revealed that journaling enhanced students' cognitive awareness across several domains, with participants deeming the activity both beneficial and enjoyable. Shortt et al. (2023) investigated the MALL program of Rosetta Stone, emphasising its efficacy and enhancement attributes.

Researchers found that studies focused on the use of statistical techniques and random sampling, prioritising gadget development rather than the learning experience and its implications. The literature review emphasised, based on performance studies, the English language and the United States as the primary research context, revealing research inadequacies that impact MALL, entertainment users, and academics.

Ultimately, the AI participants expressed positive evaluations on AI-mediated communication; but, interactions with native speakers did not substantially influence the students' perceptions of native speaker communication.

Methodology

The present study comprised 90 B. Tech level ESL students from VIIT (A). The study population comprises 52 male and 38 female students. The learners engage in one of five conversational assemblies organised by various entities that offer Artificial Intelligence (AI) speaking instruction. This study encompassed a selection of English-speaking institutions and college-level courses, all recognised for their commitment to providing high-quality language education. Given the absence of notable differences in student profiles or English language proficiency among the institutions, it is essential to acknowledge that each offered a range of supplementary resources and support services to facilitate language acquisition. Language laboratories, chat groups, and access to internet educational resources were other major factors.

A randomised controlled trial with numerous assessments was performed to evaluate the effectiveness of AI-based speaking instruction (Deaton & Cartwright, 2018). Prior to the study inquiry, all individuals provided informed written consent. The evaluation The pre-test was administered before to the commencement of the study program, during the first two sessions, and after the final course activity. One control group participated in a conventional speaking course at each company, whereas the experimental group received coaching in speaking using Artificial Intelligence (AI). Both sessions occurred concurrently, facilitated by the AI-assisted training delivered by the team of researchers and backed by three senior language teachers collaborating with the present investigator. The Artificial Intelligence (AI) voice training was uniform across all groups.

The choosing of the two courses was facilitated by concurrently presenting the Artificial Intelligence (AI) path and the conventional approach as the 'English Speaking Course.' This coursetandem model necessitated learners to engage in both AI-based and conventional classes concurrently, hence exposing them to diverse teaching methodologies.

The study assessed the effect of AI-based speaking instruction on learners' fluency after consistently practicing speaking abilities with the Rosetta Stone mobile application through diverse role-play discussions. The examiner administered a post-test to both the control group and the AI research group, encompassing four linguistic components of English-speaking proficiency: accuracy, fluency, vocabulary, pronunciation, and grammatical variety. The students' performance in each component was evaluated according to the topics addressed in the IELTS speaking exam, with scores ranging from 1 to 9. Each student in every speech proficiency group was assigned based on the IELTS language speaking band descriptions as the scoring criterion. The comprehensive speaking grade for each student was determined by summing these values and

dividing by four. To guarantee dependability, the language competencies of the learners were evaluated by two professional assessors: the investigator and an additional senior professor specialising in ESL speaking instruction. The inter-witness reliability was assessed using Cohen's kappa coefficient, yielding a value of 0.87, deemed good.

Variable Discussion

The study included controlling parameters to ensure the results were precise and dependable. Initially, participants' global English proficiency was assessed using the BEC (Business English Communication) test. The BEC is a widely recognised examination for English language competency, commonly accepted in India. The BEC is a distinguished higher education English component, meticulously crafted and overseen by the National Assessment Committee, a reputable authority in core curriculum and evaluation systems. It targets college students who have completed a three-year degree program. The thorough assessment meticulously examines linguistic competencies such as LSRW (Listening, Speaking, Reading, and Writing). It encompasses essential aspects of English-speaking skill, including vocabulary, grammar, and understanding. Test scores and certifications are essential for establishing eligibility for foreign admissions and diverse work options. The IELTS speaking component is assessed on a scale of 0 to 9, ranging from the lowest to the highest points. The researcher utilised the IELTS speaking band description to evaluate the participants' speaking abilities during the research process.

In conclusion, the pre-test findings have identified some variances in the individuals' baseline communication abilities before to the commencement of the preparation program. The structured variables enhanced the accuracy of the regression findings and eradicated any potential errors attributed to variances between the two groups early in the trial. The accessibility of the

regulatory elements indicated that alterations in learners' communication skills and self-regulation may be attributed to Artificial Intelligence (AI)-assisted verbal communication directives rather than to other components of overall English proficiency.

The conditional variables were assessed based on four criteria of speaking skills as a post-test. To assess the outcomes of various pre-test circumstances and the disparities in results between people with low and high pre-test scores on the dependent variables, pre-test performance and the interaction between the course and pre-test results were included as predictors.

AI-enhanced English language learning application - Rosetta Stone

Rosetta Stone is an AI application for English language learning, renowned for its revolutionary methodology in language acquisition. Since its inception in 2011, Rosetta Stone has emerged as a globally recognised and favoured language acquisition system, positioning itself as the premier AI-driven language learning resource. The realistic speaking exercises are an essential element of Rosetta Stone's language acquisition curriculum. These assignments engage students in verbal interactions with the software, compelling them to respond to prompts and enquiries in the target language. These interactions are essential for enhancing speaking competence as they necessitate pupils to articulate their viewpoints and ideas verbally.

The speech component of Rosetta Stone is distinguished by its prompt assessment methodology. As students respond to instructions, an AI-enabled chatbot meticulously assesses many facets of their language proficiency, including accuracy, pronunciation, fluency, and vocabulary. This quick feedback system utilises machine learning techniques that meticulously evaluate pupil performance. Consequently, students receive personalised feedback tailored to their own language requirements, enabling immediate changes and improvements in their speaking

proficiency (Kessler, 2023). Rosetta Stone prominently prioritises motivation through the seamless integration of games on their website. Students participate in a course where they earn points, complete assignments, and gain eligibility for further tasks as they advance, fostering a sense of achievement and encouraging ongoing practice.

The Rosetta Stone application enables students to monitor their language acquisition progress, offering insights on their overall growth and areas that may need more focus (Li & Bonk, 2023). Engaging in discussions enhances their verbal skills. The integration of AI technology into Rosetta Stone represents a major advancement in language acquisition.

It provides learners with ongoing, collaborative, and personalised opportunities for practice. Rosetta Stone's speaking exercises and immediate feedback motivate students to express their views in their selected language while enhancing their pronunciation and writing abilities.

In our study, we utilised the formidable capabilities of the Rosetta Stone software, which is grounded in artificial intelligence language elements, to assess its unique impact on language proficiency, especially fluency, within the setting of ESL learners. The researchers utilised Rosetta Stone's comprehensive functionalities to investigate the role of Artificial Intelligence (AI) language acquisition in enhancing speaking proficiency and promoting self-regulation among ESL learners.

Methodology

This study employed a comparative method to examine the impact of Rosetta Stone, an Artificial Intelligence (AI)-driven language acquisition application, on language competency and self-regulation in the ESL context. Students were randomly assigned to either the treatment group or the control group. The treatment group utilised the Rosetta Stone application, which employs

technology that analyses natural languages to enhance performance across many areas, including LSRW (Listening, Speaking, Reading, and Writing). The study examined speaking skills with this application. The initiative depended significantly on the Rosetta Stone AI chatbot, which offered learners English instructions and problems. Participants were thereafter requested to respond to all questions, and the chatbot provided instantaneous feedback on several aspects of their English language proficiency, including fluency, vocabulary, pronunciation, and accuracy.

The result was generated by machine learning methods that evaluated learners' achievements, enabling the chatbot to offer tailored guidance based on each student's individual needs. The intervention comprised group activities and discussions, enabling students to refine their speaking skills in a more relaxed environment. Furthermore, students could monitor their accomplishments with the Rosetta Stone app, which provided prizes and feedback on their comprehensive language acquisition experience. Consequently, the control group was instructed using a conventional speaking curriculum. The exercise concentrated on enhancing speaking skills via group discussions, games, role plays, and presentations. This training program provided students the chance to improve their speaking skills in a structured environment, free from apprehension, and did not use any AI applications.

The consistent and accurate execution of AI-based speech training was crucial in the current study. To ensure treatment adherence and assess the quality of therapy across all collaborating organisations and groups, stringent protocols were implemented (Moncher and Prinz, 1991). Initially, rigorous seminars were conducted for both investigators and the English instructors responsible for delivering AI-based speaking instruction. This workshop encompassed comprehensive guidance on the effective utilisation of the Rosetta Stone program, the organisation of speaking exercises, and the provision of constructive feedback to participants. The initial

evaluation was conducted to measure instructor readiness, comprehension of the subject content, and proficiency with the AI-based software.

Multiple unanticipated evaluations were performed during the intervention phase to guarantee continuous assessment of treatment fidelity. These findings were obtained at various intervals throughout the inquiry at each participating organisation. The primary objective was to guarantee that discussions adhered to the designated topic. A checklist was created to ensure consistency in presentation by monitoring the execution of speaking training across the two groups. It examined critical matters, including the scope of the speaking exercises, the specific sorts of assignments employed, and the nature of the assessments provided to students. The English language teachers responsible for delivering speaking instruction accurately completed this list of prerequisites for each lesson.

The researchers instructed the language educators on the evaluation of both control and intervention courses on a consistent basis. The evaluation assessed educators' comprehension of teaching content, ability to facilitate group interactions, and proficiency in providing constructive feedback to students. Assessments were conducted routinely to maintain a constant educational standard. Throughout the experiment, full adherence to the designated intervention schedule was noted. The deviations from the prescribed action were meticulously recorded and rectified. The meticulous monitoring of program reliability was essential for preserving the validity and reliability of the research findings, enabling any observed differences in outcomes between the intervention and control groups to be confidently attributed to the assistance rather than variations in instructional methods.

Data Analysis

The data analysis stage involved administering a post-test using role-play discussions to assess the strategy's impact and ensure the participant populations were comparable at the outset of the study. The researchers conducted many studies to determine the efficacy of the operation and to ensure both groups were equivalent at the beginning of the experiment. A two-tailed test was conducted on all control and dependent variables to evaluate baseline equivalence. The objective was to confirm the discrepancies identified between the two groups at the conclusion of the assessment, which were linked to interference rather than pre-existing variances. A variety of linear regression analyses were employed to evaluate the effect of the intervention. The analyses utilised Mplus Version 7, which maximised the chance of robust prediction. The proportion of misplaced data ranged from 1.8% to 5.7% due to a higher rate resulting from a deficiency of students during the post-test. The analysis revealed no significant disparity in dropout rates between the control and experimental groups ($X2$ (1, 95) = 1.09, P= 0.273), indicating that the missing data was random. The full-information value prediction was employed to address missing data. To assess the efficacy of the training, direct hypotheses and a one-tailed test of significance were conducted. The significance level (α) was set at 0.05 to assess the numerical relevance of the outcome. The current methodology was utilised to evaluate the extent to which the training program enhanced IELTS speaking skills, encompassing vocabulary, accuracy, fluency, and pronunciation. Additionally, the outcome of an Artificial Intelligence (AI) software on self-discipline was analysed.

To assess the training's efficacy, hypotheses were formulated, and a one-tailed analysis was employed for reliability. A significance level of 0.05 is established to evaluate the statistical value

of the results. The technique was executed to assess if the approach enhanced language components including Fluency, Accuracy, Vocabulary, and Pronunciation.

Moreover, the results of the AI methodology for learning or control have been analysed. The control variables were used to enhance the quality of the regression results and mitigate any bias arising from initial group differences. The variables were overall English competence, anxiety when speaking, and pretest outcomes. The dependent variables were assessed by post-tests for each of the four speaking ability measures.

To analyse the influence of pretest variables and diverse outcomes for individuals with high and low initial test scores on the dependent variable, the pre-test score and the interaction terms of course pre-test scores were incorporated as predictor factors. If evidence of a significant link phrase existed, the outcome of the course varied based on students' beginning scores on the dependent variable. Additional predictive factors were used to evaluate the impact of initial score discrepancies and diverse outcomes across people with varying pre-test scores.The parameters encompassed the pretest score and the course-pretest score contact category.

Results and Discussion

This comprehensive analysis indicates that both groups were comparable at the outset of the experiment, ensuring that any subsequent enhancements in speech and self-regulation were attributable to the practice rather than pre-existing differences in proficiency.

This result underscores the importance of addressing and alleviating speaking anxiety in language learning contexts to enhance learners' speaking proficiency. Nevertheless, the study did not identify a significant effect of speaking anxiety on vocabulary memory, grammatical correctness, or self-regulation. This indicates that although speaking anxiety can impact some

facets of speaking competency, its effect may not universally extend to other language skills or the student's self-regulation strategies. The results suggest that students' ability to select and utilise vocabulary, maintain grammatical accuracy, and implement self-regulated learning strategies may not be significantly influenced by their degree of communication anxiety.

This result underscores the importance of regulating and alleviating speaking anxiety in language learning contexts to enhance learners' speaking proficiency. The study, however, did not identify a significant effect of speaking anxiety on vocabulary memory, grammatical correctness, or self-control. This indicates that although speaking anxiety can impact some facets of speaking competency, its effect may not consistently apply to other language skills or the student's self-regulation strategies. The results suggest that a learner's ability to select and utilise vocabulary, maintain grammatical accuracy, and implement self-regulated learning strategies may not be significantly influenced by the student's degree of communication anxiety.

This research utilised a mix of methodologies to examine the impact of AI-supported training on ESL learners' speaking skills and speech self-regulation. The initial research indicated that students' language proficiency significantly enhanced with AI-based instruction compared to non-AI methods. These studies also revealed the advantageous effects of AI on pupils' speaking skills. Engagement with AI in novel and stimulating manners may have improved learners' verbal communication skills. Essentially, engaging with artificial intelligence (AI) in a virtual environment would have prompted students to actively participate in exchanges, resulting in significant enhancements in their speaking skills.

AI-driven training offers customised and flexible learning experiences, evaluating learners' competencies to pinpoint areas for improvement. Personalised feedback and training tools are provided, enabling learners to meet specific language needs and progress at their own speed,

enhancing their speaking proficiency. Furthermore, AI-driven instruction immerses students in substantial language input through collaborative activities, virtual environments, and AI-enhanced instructors. Engaging in authentic speaking activities on these platforms fosters precise language usage, essential for attaining fluency, vocabulary, and the functional skills necessary for efficient oral communication.

Participants' speaking skills and self-regulation have enhanced owing to the opportunity to engage in collaborative speaking activities with AI at any time and place. Despite conventional learning contexts, students were not constrained by location or time, allowing them to engage in collaborative speaking exercises at their convenience. These results demonstrated AI's efficacy in facilitating student interaction in diverse, conveniently accessible locations and at configurable times. Furthermore, students were able to engage in dialogue with AI, since it fostered a conducive environment for interactive speaking activities. Nervousness often inhibits students from participating in collaborative discussions with professors and peers.

Conclusion and Recommendations

The primary objective of this research was to examine how AI may enhance the verbal communication abilities and self-regulation of ESL learners. The post-test findings indicated that the students utilising AI (Research group) exhibited superior improvements in both speaking competency and self-regulation compared to the control group lacking AI help. The advantages were ascribed to the engaging and participatory atmosphere cultivated by AI during speaking exercises. The use of Rosetta Stone, with its AI characteristics such as vocabulary distribution, interactive discussions, speech recognition, and comprehensive feedback, significantly enhanced second language speaking proficiency compared to conventional techniques. This underscores AI's

capacity to enhance language acquisition via tailored and interactive experiences aimed at certain aspects of linguistic development. Furthermore, participants in the Artificial Intelligence (AI) application instruction group exhibited a higher level of self-regulation compared to the control group, underscoring the efficacy of AI applications in facilitating goal-setting, progress tracking, and adaptive learning modifications for students. Through the provision of customised insights and various exercises, AI empowers proficient pupils to autonomously oversee their training and cultivates a communicative strategy that enhances their verbal communication abilities. By using a computer-supported classroom, English as a Foreign Language instructors may develop engaging interactive speaking activities and assignments that incorporate artificial intelligence and peers. This technique would enable ESL learners to engage in significant speaking interactions, enhancing their speaking skills and self-regulation.

Given that the inquiry included pre-and post-tests to assess second language competence and self-regulation skills, it is crucial to acknowledge that the results do not fully encapsulate the diversity and complexity of these abilities. Employing a multitude of quantitative and qualitative analyses in forthcoming research may provide a broader perspective on the impacts of artificial intelligence (AI) training. Ultimately, further research is required to examine the long-term effects and the clear methodology underlying these significant improvements.

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