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AI-assisted content generation and its impact on ESL learners' speaking skills: A Quasi-experimental study

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ABSTRACT

The study explores the potential of Artificial Intelligence (AI) as an additional tool to improve speaking proficiency among tertiary-level English as a Second Language (ESL) students. The study is based on a mixed, quasi-experimental design, including two stages: a preliminary survey (N = 149) to conduct research on the perceptions of learners toward AI-assisted learning, and an intervention phase with a purposive sample (n = 60). The intervention consisted of AI-assisted speaking tasks aimed at content generation and validation, conducted over eight weeks. The data were gathered using a Likert scale questionnaire and pre-test/ post-test of speaking performance. High internal consistency (Cronbach's α = 0.912) was established through reliability analysis. The survey results show that there is a largely favourable attitude towards AI, especially in terms of assisting with cognitive planning, increasing linguistic accuracy, facilitating learner autonomy and motivation. Two-way ANOVA in the inferential statistical analysis showed a significant increase in the post-test scores, which proved the effectiveness of AI-assisted interventions. Nonetheless, regression analysis showed that individual AI-based activities did not have strong predictive power on performance, which emphasised the multifactorial development of speaking skills. The study summarises that AI, as a pedagogical support tool, when applied wisely, can be used to promote cognitive and affective aspects of language acquisition.

KEYWORDS: Artificial Intelligence, ESL students, speaking, learner autonomy, formative feedback, AI-based learning, language pedagogy.

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1. Introduction

The field of English language education has long pursued a sustained effort to empower ESL learners with effective communication skills. Numerous studies have explored appropriate English Language Teaching (ELT) methods and approaches to enhance learners' communicative competence (Alshuraiaan & Almefleh, 2023; Ghajarieh & Safiyar, 2023; Yu & Wong, 2024). Over time, a range of pedagogical practices—such as the traditional chalk-and-talk method, Outcome-Based Education, English for Specific Purposes, and the Flipped Classroom model have been introduced into the curriculum with the aim of developing learners' proficiency in English communication (Rahmah, 2024).

Despite these advancements, a significant number of learners continue to struggle, particularly with speaking skills (Lee & Kim, 2025). While reading, writing, and listening are equally important, speaking remains a crucial skill, especially in contexts that require oral presentations (Rahmawati, E. et al., 2025). For learners with limited speaking competence, such situations often become highly stressful, functioning as an acid test, a severe conclusive or final examination. Learners may lose interest and motivation when they encounter difficulties, thereby creating a substantial barrier to effective language acquisition (Dislen, 2013; Hennebry Leung & Lamb, 2024). A lack of adequate input and sustained motivation further exacerbates this challenge.

To address this issue, the present study integrates a learner-preferred AI tool as a supportive mechanism and introduces the concept of "AI-assisted content creation" for ESL learners. The use of AI not only facilitates content generation but also serves as a motivational intervention (Limeri, 2020; Mohamed et al., 2025), positively influencing learners' attitudes toward language learning. Given learners' natural inclination toward technology, engagement with AI-driven tasks tends to be both voluntary and sustained, thereby enhancing motivation.

The study was structured in two phases: (i) The first phase involved a survey conducted among English as a Second Language (ESL) students to examine their perceptions of using AI in their English learning process, and (ii) The second phase focused on evaluating improvements in speaking skills through AI-assisted speech materials. As part of this phase, learners were administered four speaking tests, during which they were encouraged to utilise AI-curated scripts as preparatory material. The post-test results indicated a marked improvement in their speaking competence compared to the pre-test outcomes. These findings align with recent research suggesting that AI tools play a significant role in reducing speaking anxiety and enhancing motivation among EFL learners (Wang & Wen, 2025; Bhar, 2026).

In summary, the study advocates using AI as a supplementary pedagogical tool to support content creation, thereby fostering confidence and motivation among ESL learners, particularly in oral communication.

2. Literature Review

2.1 Speaking Skills Instructions

The English Teaching and Learning means and methods have been enhanced with many productive pedagogical inclusions. Further, the learners equate their communicative competence with enhancement of their speaking skills (Elmahdi et al., 2025). Studies specifically focusing on existing methods such as content and language integrated learning (CLIL), task-based language teaching (TBLT), communicative language teaching (CLT) and so on that are applied to teaching in various contexts have been adopted in speaking instruction. Le and Nguyen (2022) in their research, advocated CLIL, an ELT method that comprises the integration of non-language content, which played an essential role in helping the ESL learners' language acquisition. Carmelin (2023) supported CLT as the dominant approach in English language education because CLT prioritises learner-centred methods to attain communicative competence.

Moving on to the study of Irwandia et al., (2022), which undertook an 80-question survey among 50 English department students who chose metacognitive strategies as the suitable strategy to improve their language skills from the other three strategies viz., metacognitive strategies, deep cognitive strategies, and surface cognitive strategies. Metacognitive strategies involve self-direction, self-monitoring, self-evaluation, and self-correction as the focal point of Metacognitive strategies. Adrian et al. (2023), in their research, have identified a series of instructional ELT pedagogical items like Communication Strategies, Task-Based Approaches, Role-Play, and Technology-Enhanced Approaches and the most frequently used strategies are Role-Play and Technology-Enhanced Approaches towards teaching speaking skills. Shaikh et al. (2023) emphasise the necessity of

incorporating activity-based teaching, collaborative instruction, and the utilisation of group work or interactive approaches for public sector colleges in Punjab, India.

2.2 Motivation and Speaking Skill Enhancement

"Motivation in English language learning" (Summer, 2018) is a key aspect in keeping learners engaged in English-language learning activities. Ali and Fatemeh (2017) state that motivation is a key learning strategy that could transform a low English proficient student's mindset towards embracing learning English in a self-motivated manner. Lack of motivation is found to be one of the primary causes for these aversions to learning English, wherein 'a paucity of English application contexts' (Kai Zhu, 2023) leads to a lack of motivation. A study on demotivation to learn English has shed light on 'difficult course content, non-interactive teaching styles, English as the medium of instruction, and teachers' attitudes' Naeem.W (2023) as the major sources of demotivation among the participants. Further to address this cause, Ajmal M (2021) draws focus to the crucial role of two motivations, namely extrinsic motivation and intrinsic motivation, that are essential for ESL learners in language skills acquisition. Shi Jiao et al. (2022) in their studies, highlight that intrinsic motivation can create a significantly positive impact on English skills acquisition.

2.3 Incorporation of AI as a supplementary tool to enhance speaking skills

Recent research has increasingly highlighted the pedagogical potential of AI-driven tools in second language acquisition, particularly in the development of speaking skills. Abdallah et al. (2025) highlight that AI chatbots, particularly ChatGPT, enhance academic performance and engagement and support second-language learners, while also raising concerns about academic integrity, overreliance, and technostress. Similarly, Zhai and Wibowo (2023) demonstrate that AI dialogue systems contribute to the development of interactional competence through technological integration and learner engagement. Grab (2025) presented a study on ESL undergraduates from diverse cultural backgrounds and examined AI chatbot use for improving speaking skills. Over twelve weeks, the experimental group showed significant gains in fluency, pronunciation, grammar, vocabulary, and confidence, with reduced anxiety, highlighting AI chatbots as effective tools for enhancing speaking competence. Lai (2025) conducted a quasi-experimental study on Taiwanese EFL learners integrating ChatGPT within the bridge-in, objective, pre-assessment, participatory learning, post-assessment summary (BOPPPS) framework to enhance speaking skills. Over 18 weeks, the structured AI-supported instruction significantly improved all speaking sub-skills compared to unstructured AI use. Findings highlight AI's effectiveness in reducing anxiety, fostering autonomy, and enhancing interactive communication through guided pedagogical integration.

Emerging research in language assessment underscores both the potential and the challenges associated with AI integration. Chuang and Yan (2025), through a systematic review of 77 studies, reveal that generative AI is increasingly embedded in assessment design and management, offering innovative possibilities while raising concerns related to reliability, validity, fairness, and practicality. Their study highlights the need for cautious, principled, and context-sensitive implementation. In a complementary vein, Costantino and Martin (2025) investigate sustainable assessment through language portfolios, emphasising autonomy, reflective learning, and reduced learner anxiety. Their findings provide valuable insights for AI-assisted assessment, particularly in facilitating personalised feedback and flexible learning. Collectively, these studies suggest that effective AI integration must align with sustainable, learner-centred pedagogical practices while addressing broader institutional and technological constraints.

3. Research Context, Participants, Data Collection, and Methodology

The present study was conducted within the context of English as a Second Language (ESL) instruction, with a focus on exploring the effectiveness of Artificial Intelligence (AI) as a supplementary tool for enhancing learners' speaking skills. In particular, the study examined how AI can support students in generating and validating content for oral presentations, thereby improving speaking competence.

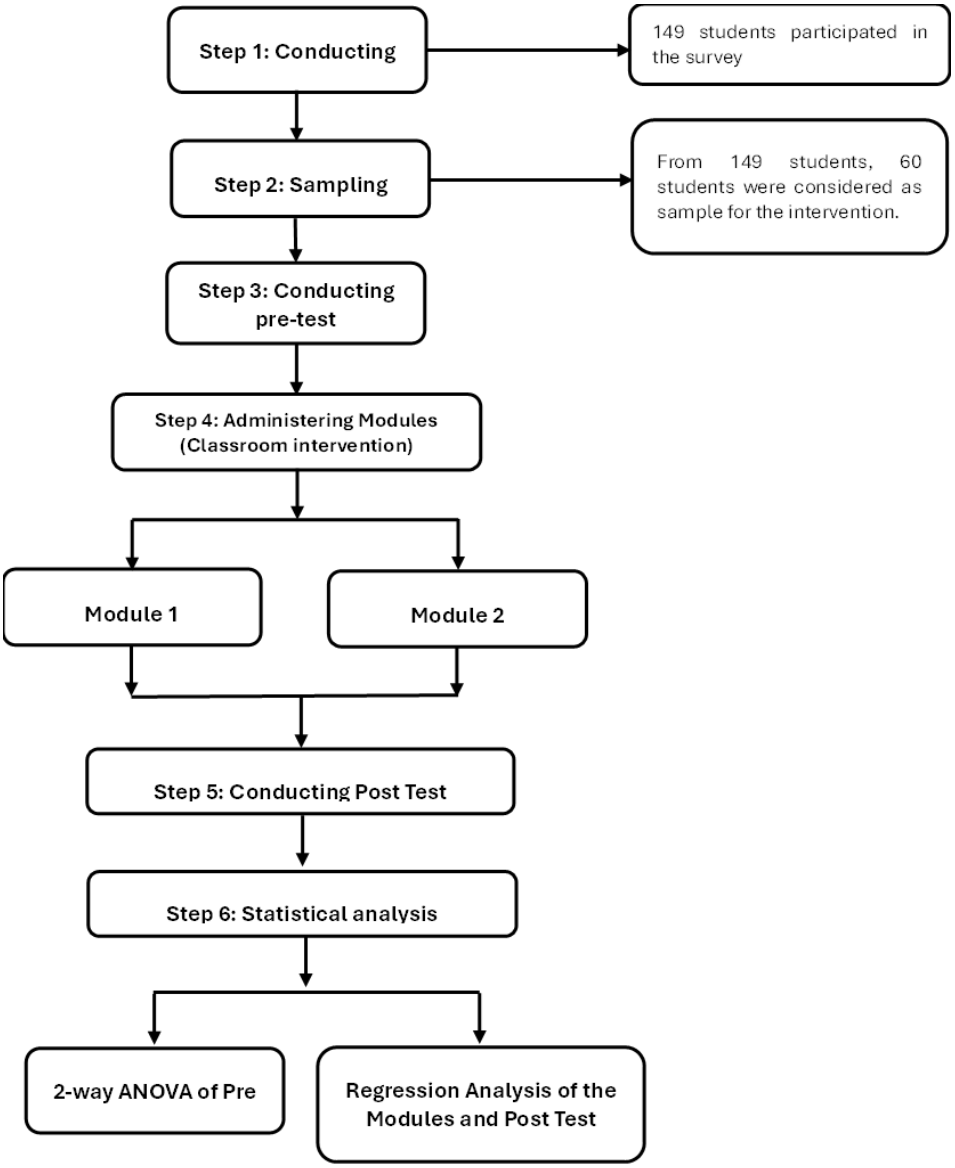

Figure1. Experimental Process

The research was carried out among tertiary-level ESL learners. Initially, a total of 149 participants were involved in the study, as assessed using a structured Likert-scale questionnaire. The questionnaire was designed to elicit students' perceptions, attitudes, and readiness towards the use of AI tools for content creation and validation in speaking tasks. This phase provided a broad quantitative understanding of learners' engagement with AI-assisted language learning.

Based on the analysis of the survey data, a subset of 60 participants was purposively selected to participate in the intervention phase, which lasted for eight weeks. The selection criteria were informed by relevant variables derived from the questionnaire responses, ensuring alignment with the objectives of the study. The study adopted a quasi-experimental quantitative research design (Toyon, 2021), where initial quantitative data from a Likert-scale questionnaire is followed by an intervention using AI-based speaking activities and subsequently analysed through post-test scores using ANOVA and regression techniques. A pre-test post-test structure was incorporated to measure the impact of the intervention. Prior to the intervention, the selected participants were administered a pre-test to assess their baseline speaking proficiency. Following this, participants engaged in two structured AI-assisted activities, which were specifically designed to facilitate the development of speaking skills through guided content generation and validation processes.

After the intervention, a post-test was conducted to evaluate improvements in participants' speaking performance. The data collected from the pre-test and post-test were subjected to statistical analysis to determine the effectiveness of the intervention. Analysis of Variance (ANOVA) was employed to identify any significant differences in performance, while regression analysis was used to examine the extent to which the AI-based activities influenced post-test outcomes. Thus, the study integrates survey-based data collection with

an intervention-driven experimental approach, combining perception analysis with performance measurement to provide a comprehensive understanding of the role of AI in ESL speaking skill development.
Overall, the study engaged participants at two levels: a larger survey group (N = 149) to establish contextual understanding, and a focused experimental sample (n = 60) to investigate the impact of AI-assisted instructional interventions on speaking skill development.

3.1 Research Instruments

3.1.1 Survey Questionnaire

The questionnaire designed for this study aimed to examine the role of AI in supporting content generation and enhancing speaking skills among ESL learners. The items were systematically grouped into six clusters based on their underlying constructs and focus. This clustering enabled a more nuanced interpretation of how AI contributes to different dimensions of speaking skills development.

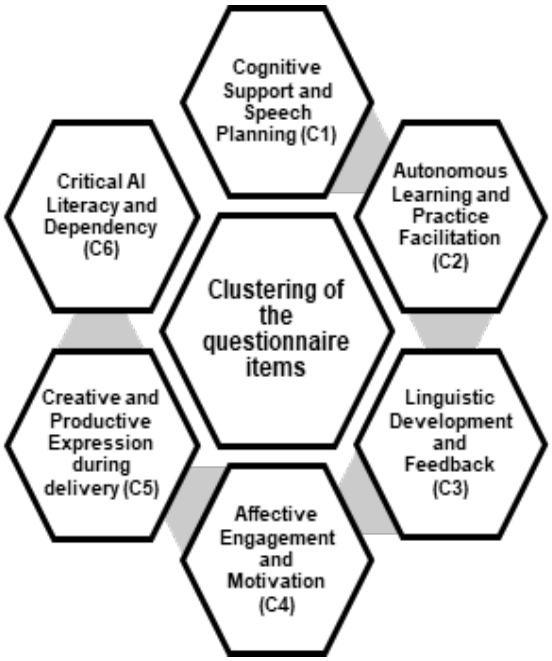

Figure 2. Clustering of the Questionnaire Items based on the Construct and Focus

3.1.1.1 Cognitive Support and Speech Planning (C1)

Items 1, 2, and 3 explored how AI facilitates idea generation, organisation of thoughts, and the use of scripts or outlines prior to speaking tasks. The responses indicate that a majority of learners rely on AI tools for pre-task planning, which significantly reduces cognitive load and enhances clarity of expression. This reflects the role of AI as a scaffolding mechanism, supporting learners in structuring their ideas effectively before oral production. Such findings align with speech production models and task-based language teaching, where planning is a crucial stage in improving fluency and coherence.

3.1.1.2 Autonomous Learning and Practice Facilitation (C2)

Items 4 and 9 focused on independent speaking practice and the frequency of practice enabled by AI tools. The responses suggest that AI encourages self-directed learning by providing learners with opportunities to practice speaking outside the classroom. Students reported increased frequency of engagement with speaking tasks, indicating that AI fosters learner autonomy. This aligns with principles of self-regulated learning, where learners take greater responsibility for their progress.

3.1.1.3 Linguistic Development and Feedback (C3)
Items 5 and 6 examined vocabulary development and error correction through AI-generated feedback. Learners reported that AI tools help them acquire context-specific vocabulary and provide immediate corrective feedback. This instant feedback loop enhances noticing and supports language acquisition. The findings highlight the importance of AI in facilitating input enhancement and reinforcing correct language use, which are central to Second Language Acquisition (SLA) theories.

3.1.1.4 Affective Engagement and Motivation (C4)
Items 7, 8, and 9 addressed learners' confidence, engagement, and motivation when using AI compared to traditional methods. The responses reveal that AI-based activities significantly improve speaking confidence and increase learner engagement. Many students expressed greater willingness to participate in speaking tasks when supported by AI-generated content. This demonstrates that affective factors such as reduced anxiety and increased motivation play a critical role in enhancing speaking performance.

3.1.1.5 Creative and Productive Expression during delivery (C5)
Item 12 focused on whether AI supports creative expression in language use. The findings indicate that learners perceive AI as a tool that stimulates creativity by providing diverse ideas and language structures. This enables students to experiment with language and produce more varied and meaningful responses, contributing to the development of communicative competence.

3.1.1.6 Critical AI Literacy and Dependency (C6)
Items 10 and 11 examined learners' awareness of overdependence on AI and their ability to critically evaluate AI-generated content. While students acknowledged the usefulness of AI, some responses indicated a growing concern about excessive reliance on such tools. At the same time, learners demonstrated an emerging ability to critically assess AI outputs. This highlights the importance of fostering critical digital literacy and metacognitive awareness in AI-mediated learning environments.

To establish the internal consistency of the questionnaire used for the survey, Cronbach's alpha (α) was computed for the full set of 12 questionnaire items. The analysis yielded an alpha coefficient of **0.912**, indicating a high level of internal consistency among the items. Cronbach's alpha is widely used as a measure of scale reliability, reflecting the degree to which items within a construct are interrelated and collectively measure the same underlying dimension. In the present study, the obtained value exceeds the commonly accepted threshold of 0.70 (Nunnally & Bernstein, 1994), thereby confirming a satisfactory reliability of the questionnaire items for research purposes.

An alpha value approaching 0.90 suggests that the items are well aligned without indicating problematic redundancy. This balance is particularly important in educational research, where overly similar items may artificially inflate reliability without improving construct representation. The present coefficient, therefore, supports the suitability of the questionnaire for subsequent statistical analysis and interpretation.

Table 1: Reliability Statistics of the Questionnaire

Scale	Number of Items (N)	Cronbach's Alpha (α)	Interpretation
Questionnaire (Full Scale)	12	0.912	High Reliability

Note. N represents the total number of items included in the scale.

To conclude, the cluster-based analysis reveals that AI plays a multifaceted role in enhancing speaking skills among ESL learners. It supports cognitive processes, promotes autonomous learning, facilitates linguistic development, and enhances affective engagement. At the same time, it raises important considerations regarding dependency and the need for critical evaluation. Furthermore, the findings suggest that AI should be integrated as a supplementary tool rather than a replacement for traditional teaching. If AI incorporation is logical and research-based, it can significantly enrich the language learning experience by addressing both cognitive and affective dimensions of speaking skill development.

3.2 Pre-test and Post-test

The research design used in the present study consisted of a series of well-planned activities that were systematically designed to investigate the effectiveness of using AI-generated content to improve the speaking ability of ESL students. To assess the level of proficiency in speaking for tertiary -level ESL students (N = 149), a pre-test speaking activity was administered initially. The topic assigned for the pre-test was "My Friend." Students were not allowed to use any tool of artificial intelligence, like ChatGPT or Gemini, for preparing and delivering their presentations. The following four criteria - Content, Fluency, Vocabulary and Grammar, and Pronunciation were used to assess their performance, and pre-test scores were used to make comparisons with post-test scores.

A survey titled "AI and Speaking Skill Development among Tertiary-level ESL students" was carried out after the pre-test to explore the learners' perceptions of the application of AI in the English language learning. The survey results revealed a positive attitude toward using AI to create speaking content, as it was seen as useful for language learning and preparing presentations.

This was followed by a series of targeted speaking practice sessions with the help of AI-powered content generators. The activities were conceived to assist learners in generating ideas, structuring content and enhancing their oral presentation. A post-test on the topic "My Hero" was administered at the end of the intervention phase. Like the pre-test condition, students were asked to write the content of their presentation without the support of AI to be able to assess their acquired competence in speaking. The post-test performances were assessed with the same rubric that was used in the pre-test. The results indicated that the participants' overall speaking proficiency improved significantly after the pre-test, highlighting the effectiveness of AI-supported speaking practice in enhancing oral communication skills for ESL learners.

4. Analyses

4.1 Survey Analysis

The heat map below reveals an overall view of the perception of the ESL learners towards AI as an addition to the speaking skills improvement tool, with an overwhelmingly positive response pattern being observed across all twelve items. The data show a high concentration of answers in the Agree category, typically around 40-60%, with relatively low percentages in the Disagree and Strongly Disagree categories, indicating low resistance to the introduction of AI. The results, when analysed in terms of the

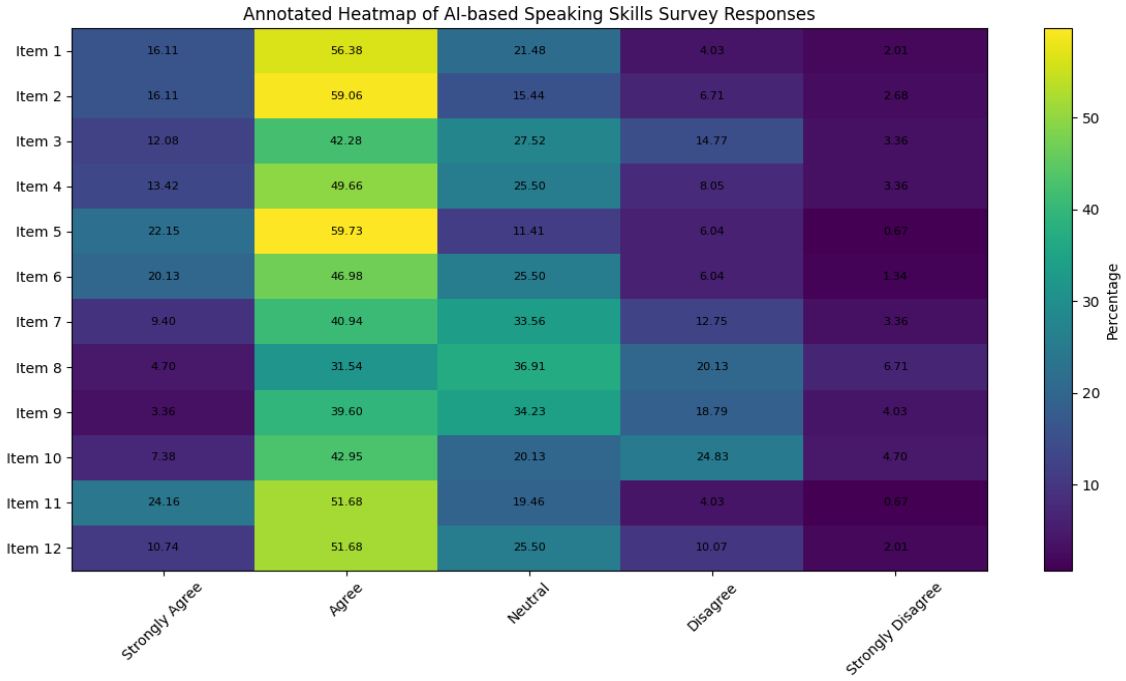

Figure 3. Heat Map based on the Percentage of Responses to the Items

identified clusters can shed more light on the dimensions of AI-assisted learning. The agreement in terms of cognitive support and speech planning (C1: Items 1–3) is high, which indicates that learners extensively use AI to generate ideas, arrange thoughts, and pre-plan tasks, thereby lessening cognitive load and improving the clarity of expression. In the same manner, the presence of autonomous learning and practice facilitation (C2: Items 4 and 9) also suggests that AI can provide more chances to use self-directed speaking practice, but looking at the neutral responses, all learners are not as used to independent activities.

One of the most pronounced positive trends can be observed in the linguistic development and feedback (C3: Items 5 and 6), where the large rates of agreement reveal how the learners value AI influence on vocabulary development and instantaneous feedback correction, which are the major processes during the second language learning. Conversely, responses involving affective engagement and motivation (C4: Items 7, 8, and 9) have a slightly less homogeneous pattern, with agreement being the dominant response, with more neutral and occasional disagreement responses, which suggests that the motivational effect of AI could be distributed dissimilarly among learners. However, the general trend is concerned with the fact that AI promotes greater levels of confidence and readiness to engage in speaking activities. It is also observed that the cluster devoted to the creative and productive expression (C5: Item 12) has a very high degree of agreement and emphasises that learners consider AI as a resource that promotes creativity and allows them to use language more varied and more meaningful in the process of speaking.

Meanwhile, the heat map indicates a more equal spread of answers within the group of finding essential AI literacy and dependency (C6: Items 10 and 11). Although the rate of agreement is still the highest, the rates of neutrality and disagreement are comparatively high, especially in Item 10, which evidences that learners are getting more conscious of the dangers of relying on AI too much. This implies that skills of critical evaluation and metacognitive awareness have been developed when learning is mediated using AI. Altogether, the heat map highlights the fact that ESL learners have a positive attitude toward AI as an added tool, specifically in the field of planning, feedback, and creativity, as well as showing the dynamically shifting recognition of the importance of responsible and critical AI tools use.

Overall, the heat map shows that the ESL learners have a positive trend, which is overwhelmingly positive in terms of accepting AI as an additional tool to improve speaking skills and relatively low resistance and uncertainty. This trend contributes to the notion that the integration of AI is not only possible but also pedagogically useful, as well as to the necessity of guided integration to minimise student reluctance to it and achieve the most useful results.

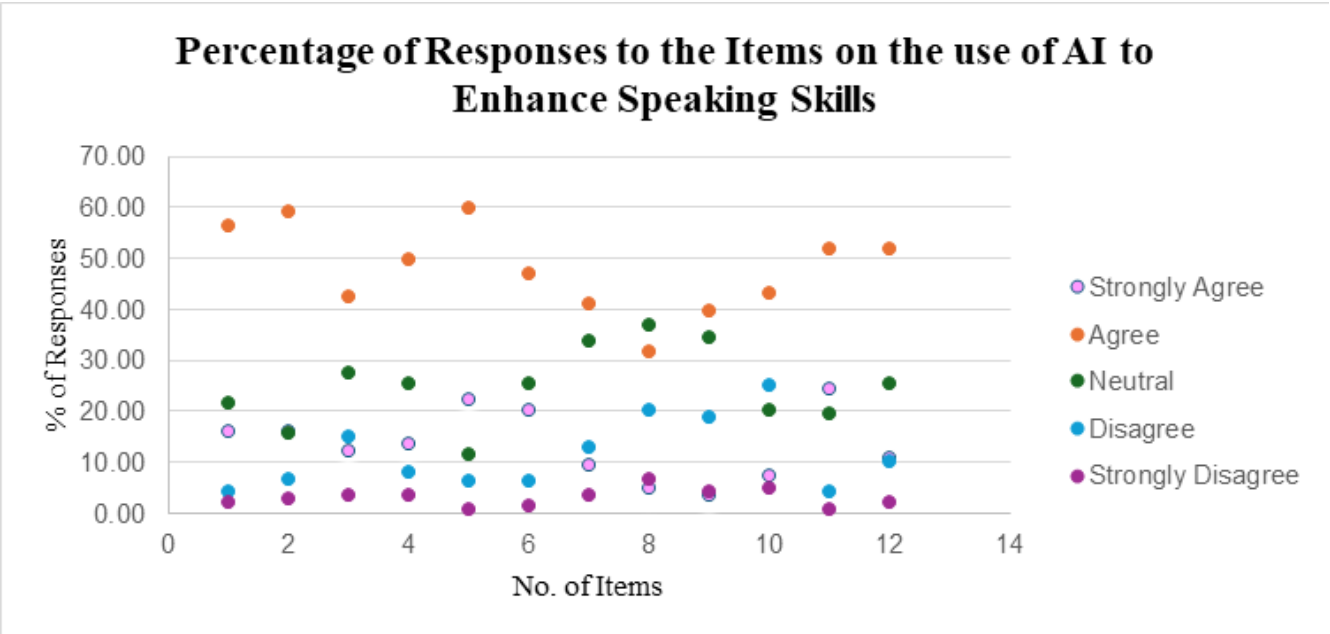

Figure 4. Percentage of Responses to the Items on the Use of AI to Enhance Speaking Skills

The graph reflects the percentage of responses of ESL students to different items in terms of the degree to use AI as a supplementary tool to develop speaking skills. It is also evident that there is an overall tendency in the high percentage of the answers of the people who agree with different questions, since it goes between 40 and 60 percent, which is a good indication of positive perception towards AI integration. The implication is that learners consider AI especially handy in the organisation of their written works when delivering speeches and gathering ideas when conducting oral assessments. The neutral responses take a moderate position, as this contains a certain portion of inconsistency in the experience of the learners. However, in contrast, those responses are relatively low throughout the whole work, demonstrating low opposition to the use of AI. It is also to be believed that most learners utilise both the cognitive and practical forms of assistance presented by AI, although a small percentage of them are reserved. Comprehensively, the graph shows that there is a positive tendency towards AI-aided speaking, highlighting how it can be used to improve the preparation, organisation, and involvement in ESL settings.

4.2 Statistical Analysis: ANOVA and Regression

To systematically examine the effectiveness of AI-assisted interventions on learners' speaking performance, the study employed both Analysis of Variance (ANOVA) and multiple regression analysis as complementary statistical techniques. The primary purpose of conducting ANOVA was to determine whether there was a statistically significant difference between students' pre-test and post-test scores, thereby assessing the overall impact of the intervention on speaking skill development while accounting for individual variability among participants. This analysis enabled the study to establish whether the observed improvements were attributable to the instructional approach rather than random variation.

In addition, multiple regression analysis was performed to investigate the predictive relationship between intermediate performance indicators (DATA 3 and DATA 4) and the post-test outcomes. The purpose of this analysis was to identify the extent to which these variables contributed to learners' final performance and to evaluate their relative influence within the learning process. By integrating ANOVA and regression techniques, the study provides both a comparative and predictive perspective, offering a more comprehensive understanding of how AI-mediated learning supports the development of speaking skills among ESL learners.

4.2.1 Two-way ANOVA

The two-way ANOVA was conducted to examine the effect of test condition (pre-test vs post-test) and participant variability on students' speaking performance.

Table 2. Two-way ANOVA Results

Source	Sum of Squares	df	F	p-value
Participants	1701.97	59	0.969	0.548
Test (Pre vs Post)	7873.20	1	264.41	1.82×10^{-23}
Residual	1756.80	59	—	—

The results indicate a highly significant main effect of the test condition, $F(1, 59) = 264.41$, $p < 0.001$. This suggests a statistically significant improvement in students' performance from pre-test to post-test. The large F-value clearly demonstrates the strong impact of the intervention (AI-assisted learning). In contrast, the effect of participant differences was not statistically significant, $F(59, 59) = 0.969$, $p = 0.548$. This indicates that individual differences among students did not significantly influence the variation in overall performance compared with the effect of the intervention. The findings strongly support that AI-assisted content generation and speaking practice had a significant positive effect on students' speaking performance. The improvement observed is consistent across participants, reinforcing the effectiveness of AI as a pedagogical tool for enhancing speaking skills.

4.2.2 Regression Analysis

The regression plot illustrates the relationship between activity 2 – AI-based content creation, validation and presentation, which is referred to as Data 4. Data 4 scores (independent variable) and post-test performance

(dependent variable), with the regression line representing the predicted trend when controlling for activity 1 – Self introduction (own content and AI curation content) which is referred to as Data 3 (held constant at its mean value).

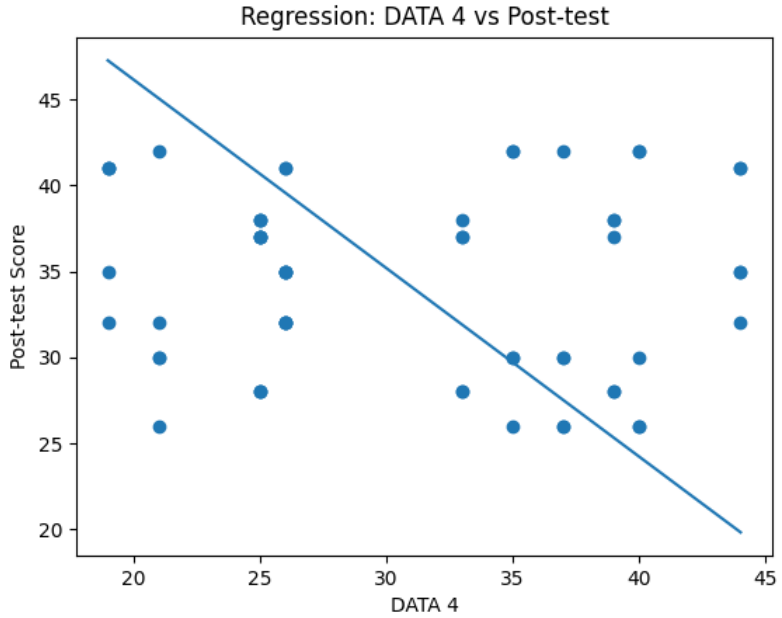

Figure 5. Regression Analysis between Data 4 and Post-test

A close examination of the scatter distribution reveals that the data points are widely dispersed across the plot, with no clear linear pattern emerging. Although a regression line is fitted to the data, it does not closely align with the majority of points, indicating a weak linear association between DATA 4 and post-test scores. This visual observation is consistent with the low coefficient of determination ($R^2 = 0.038$), which suggests that the model explains only a minimal proportion of the variance in post-test performance. Interestingly, the regression line exhibits a slight negative slope, implying that higher values of DATA 4 are not associated with improved post-test scores when the influence of DATA 3 is statistically controlled. In fact, the trend suggests a marginal inverse relationship, although this relationship is weak and lacks substantial predictive power. Furthermore, the scatterplot shows considerable variability in post-test scores across similar DATA 4 values, indicating that students with comparable DATA 4 scores achieved markedly different outcomes. This dispersion highlights the presence of unaccounted variables influencing performance, such as individual learner differences, motivation, prior proficiency, or the quality of AI-assisted engagement.

Another important observation is the absence of clustering along the regression line, which reinforces the conclusion that DATA 4 alone is not a strong predictor of post-test achievement. Instead, the distribution suggests a multifactorial influence on speaking performance, where DATA 4 contributes only marginally within a broader learning context. From a pedagogical and research perspective, the plot indicates that while DATA 4 may have some role in the learning process, it does not significantly determine post-test outcomes in isolation. The weak relationship underscores the need to consider additional variables such as instructional design, AI tool usage patterns, and affective factors in explaining improvements in speaking skills.

Thus, the regression plot provides visual and statistical evidence that post-test performance is influenced by a complex interplay of factors, rather than being strongly dependent on DATA 4 alone.

5. Findings

The results of the current research are the result of a multi-faceted synthesis of survey data, the results of experimental interventions, and the use of inferential statistics, which helps to provide a multi-dimensional picture of the importance of the use of Artificial Intelligence (AI) in improving speaking skills among learners at the tertiary level, studying English as a Second Language. The findings are explained according to the study goals, specifically focusing on the perceptions of the learners, their performance gains and the predictive quality

of the AI-mediated activities.

Initially, the survey results unambiguously confirm the presence of a rather positive attitude of learners towards the implementation of AI as an auxiliary device during the development of speaking skills. The cluster analysis of the responses to the questions shows that AI is greatly helpful in providing cognitive support, including idea generation, content organisation, and pre-task planning. This implies that AI can be used as a powerful scaffold device, which can alleviate the cognitive burden and help learners to go about the process of speaking with more clarity and readiness. In addition to this, these findings have been empirically reinforced by the high internal consistency of the tool (Cronbach's alpha = 0.912), which suggests these observations are highly reliable and that the constructs to be measured by the tool are related to the perceptions of AI-assisted learning that learners have in a coherent manner. Along with cognitive assistance, the results indicate that AI plays an important role in autonomous learning practices. Learners noted that they had more chances to practice speaking independently through the support of AI tools, which means that their behaviours are now oriented toward self-directed learning. This is important in pedagogy because it is evidence of the development of learner autonomy, which is a vital element of the second language acquisition process. At the same time, AI was also identified to be a key factor in linguistic development, especially in the improvement of vocabulary and in correcting errors. The immediacy of AI-generated feedback seems to support language acquisition processes as it allows learners to identify and correct their mistakes in a real-time manner.

The emotional aspect of education also becomes a crucial area inspired by the integration of AI. The results indicate that with the assistance of AI, learners feel more confident, less anxious, and more engaged in speaking activities. Even though some differences in responses are insignificant and show that motivational benefits are not distributed evenly, the trend shows that, in general, a more conducive and less frightening learning environment is created by AI. Further, students see AI as a stimulus to creative and productive expression, which allows them to experiment with language and produce a wider range of responses that are contextually relevant when performing speaking activities. Nonetheless, the results also demonstrate a significant area of concern attached to critical AI literacy and dependency. Although students appreciate the advantages of AI, a significant percentage state that they are aware of the risks of overreliance. This duality implies that there can be a development of metacognitive awareness, in which learners do not only use AI tools but also critically analyse their results. These results highlight the importance of incorporating the ethical and critical aspects in AI-assisted pedagogy.

The experimental stage of the research can be considered very powerful in terms of the empirical data of the study concerning the effectiveness of AI-assisted intentions. The two-way ANOVA results show that the difference in speaking performance between the pre-test and post-test is highly significant, and the main effect of the intervention is significant ($F(1, 59) = 264.41$, $p < 0.001$). This proves that the mentioned improvements in speaking competence are not mere coincidences but can be credited to the systematic AI-supported instructional process. Interestingly, the lack of variability among the participants and their values indicates that the intervention was effective across all learners, regardless of individual differences. It strengthens the validity and applicability of AI as a learning aid in ESL. Conversely, the regression analysis suggests a more subtle view of the influence of particular AI-based activities. The shallow interdependence of DATA 4 (AI-based content creation, validation, and presentation) and post-test performance ($R2 = 0.038$) suggests that this variable is not a good predictor of learning outcomes. The minor negative correlation is yet another indicator that more activity in this particular activity does not always lead to better performance, holding other factors constant. The result of this observation is that the development of speaking skills is a multifactorial phenomenon whereby the results depend on a complex of cognitive, affective, and instructional factors, and not one of the elements of an intervention.

The combined results imply that AI promotes speaking performance on a holistic level to a significant degree; however, the interaction of various convergent variables modulates its effectiveness, including the engagement of the learners, instructional design, prior proficiency, and motivation. This analysis thus confirms that AI cannot be regarded as a separate solution but as one that can be combined with the current teaching methods under pedagogical tools.

To sum up, the results support a strong argument that AI-assisted learning has a beneficial effect on ESL speaking skills by promoting cognitive planning, developing autonomy, training linguistic competence,

and promoting affective engagement. Concurrently, the research emphasises the need for AI-guided and critical utilisation in order to prevent overdependence and to achieve the utmost pedagogical impact. These lessons add to the accumulating body of literature that promotes a balanced, systematic, and student-centred approach to AI integration into language pedagogy.

6. Pedagogical Implications and Conclusion

6.1 Pedagogical Implications

The results of the current research provide some critical pedagogical implications that can be applied to ESL teaching, especially when it comes to integrating Artificial Intelligence (AI) as an auxiliary method to refer to in the process of improving speaking. To begin with, the paper highlights the importance of situating AI as a scaffolding process and not a substitute for the conventional pedagogical activities. The high-quality evidence of the positive change in post-test performance indicates that the AI-assisted content creation can be an effective tool in assisting a learner with the planning stage of a speaking task. Consequently, teachers must be careful to employ AI tools in their pre-speaking tasks, such as brainstorming, outlining, and script writing to help boost cognitive load and improve the expression clarity.

Subsequently, the fact that the increase in learner autonomy is an indication of the possibilities of AI to facilitate learning outside of the classroom. Teachers need to create activities that promote self-directed practice, including AI-mediated rehearsal, simulated dialogue, and content refining. These practices are appropriate and consistent with principles of self-regulated learning and can greatly broaden learners' exposure to the target language, which in ESL situations is usually limited. Nonetheless, this autonomy should be directed with well-organised systems to make sure that learners get involved instead of idly depending on AI results.

Another urgent implication relates to the formative feedback and linguistic development. This paper shows the impact of the immediacy of feedback generated by AI on the learners, which helps them in their use of vocabulary and in correcting their errors. One of the ways teachers can use this feature is by applying AI to the continuous assessment routines and providing learners with immediate feedback, but at the same time, complemented by teacher-based assessment to make it more accurate and contextually appropriate, as well as help learners develop a more profound understanding of the language. This mixed feedback model will be able to promote fluency and accuracy in speech. The identified affective advantages of the research (especially enhanced confidence and minimised fear of speaking) indicate that AI may have a groundbreaking impact on the design of the supportive learning environment.

In the context of the incorporation of AI in the speaking classes, teachers must use AI resources to create low-stakes speaking tasks in which the students have no reason to fear being judged. This becomes particularly important when dealing with learners who are shy in engaging in the conventional classroom dynamics. Teachers may support the development of communicative competence more easily by a gradual shift of AI-aided practice to real-time communication. Meanwhile, the results regarding important AI literacy and dependence demand careful and responsible pedagogical combination. Although AI has significant advantages, it is evident that learners must be trained to assess, adapt, and critically respond to AI-generated materials. The activities that involve altering the artificial intelligence outputs, detecting the inaccuracies and considering the suitability of the generated answers should be considered by teachers. This will create metacognitive awareness and avoid over dependence on technology.

Furthermore, the regression analysis establishes that no single AI-based activity is an independent predictor of learning outcomes and instructional design is important. The successful integration of AI should thus be comprehensive, involving a variety of activities, including self-introduction tasks, AI-validated content creation, and guided presentations, in a consistent pedagogical structure. An attitude that takes a balanced approach and incorporates cognitive components of learning with linguistic and affective components of learning should be embraced by teachers instead of individual interventions.

Lastly, from an institutional perspective, the study proposes the necessity of establishing clear rules and training on effective and ethical application of AI in language learning to teachers and learners. This involves dealing with concerns regarding academic honesty, data integrity and proper levels of AI reliance.

6.2 Conclusion

The current research was aimed at exploring the practicality of AI as a supplementary tool of improving speaking among ESL students at the tertiary level, specifically AI-enabled content generation and verification. Combining the use of surveys to analyse perception and an experimental intervention and statistical analysis, the research will offer a detailed insight into both subjective and objective effects of AI in language learning.

The results show a great positive attitude towards AI integration among learners, who are aware of its usefulness in idea generation, language accuracy, and increasing engagement. More to the point, the statistical findings confirm that the AI-assisted instruction is significantly effective in enhancing the speaking performance and thus justifies its pedagogical relevance. The fact that the participants improved consistently also offers more arguments in favour of the inclusion of AI in regular ESL education. Nevertheless, the paper also mentions that AI is not always and everywhere as effective. Weak predictive correlation in regression analysis implies that the development of speaking skills is affected by a complex combination of variables, such as the motivation of learners, their level of proficiency beforehand and the quality of the instruction design. This supports the notion that AI ought to be considered as an empowering device within a more comprehensive pedagogical ecosystem and not a panacea.

Primarily, the research is part of the discourse concerning AI in education that is changing and growing by showing that AI can be valuable when it facilitates, adds to, and expands conventional teaching methods. Combined with a well-considered, critical approach, AI can help to turn ESL classrooms into more interactive, learner-centred, adaptive ones. Simultaneously, it should integrate under the direction of the pedagogical principles fostering independence, critical thinking and responsible use.

To sum up, the research suggests the adoption of a middle ground and evidence-based approach toward AI integration into language education, i.e. one that builds on its strengths and pays closer attention to its drawbacks. This strategy will not merely improve speaking proficiency among ESL learners but also equip them to better communicate and interact more critically in the increasingly AI-mediated world.

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Conflict of Interest
The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Authorship and level of contribution
Praveen Sam D.[1] conceived the study, designed the research framework, developed the survey instrument and intervention activities, coordinated data collection, performed data analysis and interpretation, and prepared the original manuscript draft.

Suresh G. S.[2] contributed to the research design, assisted in data analysis and interpretation, reviewed the statistical findings, and critically revised the manuscript for intellectual content.

Vijaya Baskar C.[3] contributed to the implementation of the intervention, assisted in data collection and validation, participated in the interpretation of results, and reviewed the manuscript.

Saravanan V.[4] provided methodological guidance, supervised the research process, contributed to the review and editing of the manuscript, and approved the final version for publication.

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