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Artificial Intelligence in Connectivism Learning: A Pathway to Communication Skill Development

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ABSTRACT: Communication skills have grown in importance across academic, professional, and social settings, but the current instruction of communication skills has often lacked personalization, adaptability, and an effective feedback system. Given these constraints, connectivism theory broadened the notion of learning into a networked and relational process with a strong focus on both human and technological relationships in relevant contexts, particularly in digital learning environments. Hence, this study concentrated on the utilization of Artificial Intelligence (AI) tools such as conversational chatbots, speech-recognition software, and automated writing evaluation systems to improve communication skills. The study was carried out using a mixed-methods research design composed of quantitative and qualitative analyses. Pre-test and post-test evaluations, along with learner feedback, were used to collect data, as well as AI- and peer-based assessments of learners who participated in communication training sessions supported by AI tools. This study compared the transformation of learners' fluency, vocabulary, pronunciation, coherence, and engagement within the AI-connectivism learning framework. The results showed significant improvements in students' communication skills as a result of regular interaction with AI-enhanced tools and collaborative learning groups. Reflection, critical thinking, and meaningful communication practice were crucial components of the learning process, highlighting the indispensable role of teachers and peers in the classroom. AI technologies provided immediate feedback, personalized practice, and adaptive learning opportunities. According to the study, the integration of AI within a connectivist educational context was found to be flexible and scalable for communication skills development in the modern educational environment.

KEYWORDS: Communication skills; artificial intelligence; connectivism; adaptive learning; communication training; educational technology; collaborative learning; digital pedagogy

1. Introduction

Communication skills have become an essential part of learning, work, and social interactions. Communication has occurred not only in face-to-face formats but also through online communication, multimedia communication, and intercultural communication. Emerging technologies have influenced the way people communicate, and digital literacy, adaptability, and the ability to interact through different platforms and networks have become highly valued skills that should be included in individual interaction competence [1]. Traditional tools such as language laboratories, which focused on listening and repetition exercises, were commonly used to assist in accent training, pronunciation, and listening skills development. However, these methods were often routine-based and highly dependent on the availability of resources and equipment.

For centuries, teachers used traditional methods of teaching communication skills, such as lectures, grammar exercises, reading, writing, and speech exercises, to help students develop language and interpersonal skills. These methods provided a structured approach to learning and established a basic level of knowledge; however, they also presented several drawbacks, including delayed feedback, lack of personalization, limited interaction opportunities, and unrealistic simulations [2]. As shown in Table 1, traditional communication training methods were increasingly compared with connectivism-based alternatives that emphasized adaptability, collaboration, and real-time feedback. This situation increased the demand for more adaptive, interactive, and learner-centered methods in communication training within digital learning environments. Artificial Intelligence (AI) emerged as a transformative tool in communication and language learning. AI applications such as Grammarly, Google Speech-to-Text, Duolingo, and conversational agents like ChatGPT provided instant feedback and personalized learning experiences.

Table 1. Traditional methods vs. connectivism-based alternatives.

Traditional Method	Description of Method	Limitation	Connectivism-Based Alternative	Advantage	Ref.
Advanced Reading Comprehension	Reading comprehension of vocabulary, phrases, and dialogues	Lacked contextual understanding and resulted in poor long-term retention	AI reading comprehension tools and spaced repetition applications (e.g., Duolingo and Anki with AI feedback)	Contextualized, adaptive learning with improved retention	[12]
Grammar Drills	Repetitive grammar exercises from textbooks	Monotonous learning with low engagement and limited real-life application	AI grammar checkers and interactive simulations	Real-time correction and improved interactive learning experience	[13]
Classroom Lectures	Teacher-centered delivery of communication theory	One-way communication and limited personalization	Online peer networks, AI tutors, and collaborative platforms	Learner-centered, multiple perspectives, and self-paced learning	[14]
Writing and Reading Practice	Essays, comprehension passages, and formal letter writing	Focus on accuracy rather than fluency and speed; delayed feedback	AI writing tools and digital assessment platforms	Immediate feedback, adaptive learning pathways, and enhanced communication practice	[15]

The use of adaptive learning pathways, pronunciation analysis, and interactive communication practice further enhanced communication learning [3]. In addition, virtual reality (VR) and AI-driven simulations enabled learners to experience real-world communication situations, including interviews, presentations, negotiations, and collaborative discussions. These technologies increased learner engagement, promoted self-directed learning, and provided opportunities for students to practice communication skills beyond the classroom environment. However, the impact of AI in communication training depended largely on its compatibility with appropriate pedagogical frameworks. Many previous studies treated AI primarily as a technological tool rather than as an integrated component of the learning process. This highlighted the need for a theoretical framework that explained how learners interacted with AI systems, digital platforms, peers, and educators within a connected learning environment. Although many studies examined AI applications in language and communication training, only a limited number explored AI within a connectivist pedagogical framework [5]. Most previous research focused mainly on AI for correction and assessment rather than considering AI as an integral learning node within a communication network. To address this gap, the present study introduced an AI-Connectivist Model for Communication Skill Development, as illustrated in Figure 1, which visualized AI as a non-human learning node within the communication network. The study also sought to evaluate the effectiveness of this framework using a mixed-method research design consisting of pre- and post-assessments, AI analytics, and peer evaluations.

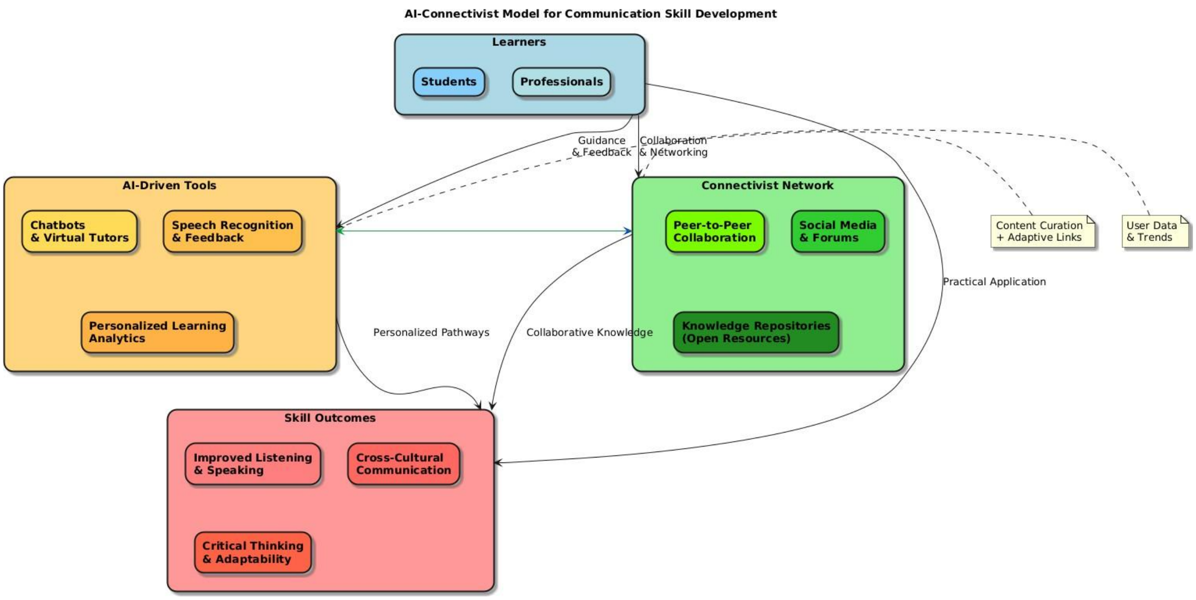

Figure 1. AI-Connectivist Model for Communication Skill Development

The objectives of this study were to explore how AI applications were integrated within connectivist pedagogy to improve communication skills, to propose a conceptual AI-Connectivist Framework for communication skill development, to evaluate the potential effectiveness of this framework through a mixed-method research design, and to identify the challenges, limitations, and ethical concerns associated with AI-assisted communication training.

2. Literature Review

2.1. Connectivism in digitally learning.

Connectivism posited that knowledge was distributed across networks of people and artifacts, and learning was understood as the capacity to form, traverse, and update those connections. Crucially, non-human nodes (e.g., AI tutors, databases, and analytic dashboards) co-participated in learning, which directly aligned with communication-skill training that unfolded across peers, platforms, and intelligent tools. In this framework, AI functioned as a node that provided timely feedback and practice contexts, while peers and instructors contributed social regulation and meaning-making [22].

2.2. AI for communication training.

Research conducted after 2019 indicated that the use of chatbots could aid in improving speaking performance, engagement, and self-confidence in L2 settings, provided that feedback was transparent and tasks were well designed. Systematic reviews published in 2024–2025 reported generally positive but inconsistent findings and highlighted the need for more robust experimental designs and ethics-by-design approaches (including privacy and bias considerations) in large-scale chatbot deployment [23]. AI-based writing support tools (e.g., Grammarly-type systems) were increasingly used in academic environments. Studies and randomized controlled trials (RCTs) suggested improvements in grammar accuracy and text organization, as well as increased student engagement; however, findings were mixed when automated feedback replaced formative teacher input. Emerging work in 2025 suggested that hybrid feedback (teacher + AI feedback) better supported higher-order thinking skills [24].

Medium effect sizes were reported in meta-analytic and primary studies examining automatic speech recognition (ASR) systems for pronunciation practice, particularly when combined with explicit corrective feedback and/or peer correction. Learners valued the immediacy and objectivity of ASR feedback, and usage data suggested that learning gains were strengthened through sustained independent practice across sessions [25]. Virtual reality (VR) was also increasingly used for practicing presentations, clinical discussions, and client-facing communication. Recent reviews and trials (2024–2025) indicated improvements in learner confidence, empathy, and transfer to real-world role-play situations; however, cost, motion sickness, and facilitator expertise remained barriers. Scholars emphasized the need for more rigorously controlled and longitudinal studies [26].

In educational contexts, affective computing systems increasingly identified engagement, anxiety, and confusion and adapted communication tasks or feedback accordingly. Systematic reviews (2023–2025) showed growing use of multimodal data (video, audio, text, and sensor inputs) to process oral presentation performance; however, early findings indicated feasibility alongside concerns regarding accuracy, privacy, and fairness [27]. Recent studies also evaluated the accuracy of AI-based speaking evaluators and writing feedback systems. Results showed moderate to high agreement with human scoring in structured tasks, and adoption was strongly influenced by performance expectancy, effort expectancy, and facilitating conditions. Nonetheless, transparent rubrics, human oversight, and bias auditing were consistently recommended [28]. Since 2019, evidence indicated that AI contributed to communication learning networks through: (i) immediacy (instant grammar and ASR feedback), (ii) scalability (24/7 dialogue partners and VR-based cohorts), (iii) personalization (data-driven feedback), and (iv) multimodal interaction (affect-aware prompts). Within connectivism, these AI nodes were integrated with human peers and mentors, enabling teachers to act as task curators, interpreters of AI feedback, and facilitators of peer dialogue, while mitigating risks of over-automation, privacy leakage, and superficial learning.).

2.3. Challenges and research gaps.

Despite the rapid advancement of AI-supported communication training, several challenges and research gaps remained. First, methodological rigor was limited, as many existing studies relied on small samples or quasi-experimental designs; therefore, more multi-site randomized controlled trials and longitudinal studies were needed to establish stronger causal evidence [29]. Second, most studies focused on surface-level language gains, while higher-order communication outcomes—such as argumentation quality, audience adaptation, intercultural pragmatics, and discourse cohesion—remained underexplored [24]. Third, ethical and governance issues were insufficiently addressed, particularly in relation to bias detection, data protection protocols, and transparency of AI models in educational contexts [30]. Fourth, the evolving role of instructors remained unclear, especially regarding how teachers could effectively integrate AI-generated feedback with peer review processes and instructional mediation without increasing workload [31]. Finally, generalizability across disciplines and cultural contexts was still limited, even though VR- and ASR-based studies in health, business, and STEM communication showed promising results; broader validation across proficiency levels and cultural settings was still required [26]. As summarized in Table 2, key differences between traditional and AI-assisted communication training approaches were observed across multiple instructional dimensions, including feedback timing, personalization, practice intensity, authenticity, multimodality, assessment, and ethics.

Table 2. Traditional vs. AI-assisted communication training (2019–2025).

Dimension	Traditional Approaches	AI-Assisted Approaches	Evidence Highlights
Feedback latency	Delayed feedback dependent on teacher schedules	Immediate feedback through AWE, ASR, and chatbots	Faster feedback cycles associated with learning gains; medium effect sizes reported for ASR in pronunciation development
Personalization	Limited, cohort-based instruction	Learner-level analytics and adaptive prompts	Personalization improved learner engagement and intention to use AI tools
Practice volume	Restricted to classroom time	Continuous 24/7 scalable practice opportunities	Autonomous ASR-based practice contributed to measurable improvement
Authenticity	Role-play and classroom presentations	VR simulations and conversational agents	VR improved learner confidence and empathy; longer trials still required
Modalities	Primarily text and speech	Multimodal input (text, speech, and affective signals)	Affective computing showed promise but required ethical safeguards
Assessment	Human-based scoring only	AI scoring combined with human moderation	Moderate to high agreement with human scoring in structured tasks; human oversight remained necessary
Ethics	Established pedagogical norms	Data privacy, bias, and explainability concerns	Reviews emphasized the need for governance frameworks and transparency

Taken together, recent evidence suggested a clear instructional pattern in AI-enhanced communication learning: AI nodes provided rapid and individualized feedback through tools such as AWE, ASR, and immersive VR systems; human nodes, including peers and instructors, interpreted and contextualized feedback while modeling discourse strategies; analytic nodes identified patterns in learner performance such as accuracy, fluency, prosody, and emotional states to support reflection; and governance nodes ensured ethical compliance, fairness, and data protection. A connectivist learning design that integrated and balanced these interconnected nodes—rather than replacing human feedback—most effectively reflected the consistent findings across the 2019–2025 literature.

3. Materials and Methods

3.1. Research design and participants.

The study employed a mixed-methods research design focusing on the effectiveness of AI platforms in enhancing communication skills within a connectivist theoretical framework. A mixed-methods approach was considered appropriate because communication skill development involves both measurable outcomes and subjective learner experiences. The quantitative methods allowed for the assessment of improvements in fluency, grammar, comprehension, and presentation skills, while the qualitative methods provided insights into learners' perceptions, engagement, and interaction within AI-assisted learning environments.

Mixed-methods research, as described by Creswell, integrates numerical data with human experiences to address educational problems comprehensively [8]. This approach has been widely applied in AI-supported learning contexts to evaluate both learning outcomes and learner participation in digital environments [9]. In line with this design and the principles of networked learning emphasized by Siemens, connectivist theory was applied to understand learning in digitally connected environments [22].

The study consisted of three phases: diagnostic, intervention, and evaluation. In the diagnostic phase, participants' communication skills were assessed. During the intervention phase, learners used AI tools within a connectivist environment, interacting with learning systems, peers, instructors, and digital resources [19], [21]. In the evaluation phase, improvements in communication skills were measured, along with learners' perceptions collected through assessments, surveys, and interviews. Data triangulation enhanced the credibility and validity of the findings [29].

The study participants were undergraduate and postgraduate students aged 18–25 years enrolled in English communication and English development courses. A total of 100 students were selected and divided into two groups: a control group receiving traditional communication training and an experimental group engaging in AI-assisted connectivist learning activities. The diversity of participants provided a range of academic backgrounds, language proficiency levels, and communication experiences [6, 7].

Stratified random sampling was used to ensure balanced representation across academic disciplines and educational levels. This method minimized sampling bias and improved representativeness by dividing participants into relevant strata before random selection. Stratified sampling is widely recognized in educational research for ensuring proportional representation of participant groups [8]. Participants were then randomly assigned to control and experimental groups based on pre-test performance. Both groups were tested under identical conditions to ensure consistency and reduce external influences.

The control group received traditional communication training, while the experimental group was exposed to AI-supported learning tools integrated within a connectivist teaching model. This comparative design enabled evaluation of AI-assisted learning effectiveness against traditional instructional methods [32]. Ethical considerations were strictly followed throughout the study. All participants provided informed consent and were fully informed of the research purpose and procedures. Confidentiality and anonymity were ensured through secure data handling, and participants were allowed to withdraw at any time without penalty. These procedures aligned with established ethical guidelines for educational research involving human participants [32].

3.2. AI tools and connectivist framework.

The intervention incorporated various AI tools designed to support communication skills development within a connectivist learning environment. These tools were selected not only for language learning purposes but also for their ability to facilitate interaction, collaboration, feedback, and continuous learning within digital networks. AI chatbots and large language models such as ChatGPT and Google Gemini provided contextual language support and conversational practice [19]. Through repeated interactions, learners developed fluency, coherence, vocabulary usage, and sentence structure while receiving immediate feedback to improve grammatical accuracy [33, 34].

Digital interaction and continuous access to information networks played a central role in knowledge construction and learner autonomy, as emphasized in Siemens' connectivist theory [22]. Speech recognition and pronunciation tools such as Elsa Speak and Duolingo AI supported pronunciation, speech clarity, listening, and fluency development. These tools provided feedback on stress, intonation, pronunciation, and speaking rate, enabling iterative self-correction and continuous improvement [25]. Distributed knowledge and collaborative learning were further supported through MOOCs, online discussion forums, and peer–AI collaborative environments. Learners engaged in discussions, shared ideas, responded to peers, and accessed diverse digital resources, enhancing communication skills, critical thinking, and problem-solving abilities [16]. Downes' connectivist theory emphasizes that knowledge emerges through networked interactions among people, technologies, and information sources [22].

In addition, analytics dashboards monitored learner engagement and performance throughout the intervention. These dashboards tracked participation frequency, speech clarity, vocabulary development, grammatical accuracy, and interaction patterns [28]. This data enabled learners to identify strengths and weaknesses, while instructors used analytics to provide targeted feedback and personalized support [31]. Overall, the connectivist learning approach was represented through interactions among learners, AI systems, peers, instructors, and digital resources. Learning was understood as a dynamic process of building and sustaining relationships within technological and social networks [21].

3.3. Data collection instruments.

The study used multiple research instruments to comprehensively analyze communication skill development in AI-assisted learning environments. The use of multiple instruments enabled methodological triangulation, increased validity, and enhanced research credibility [8]. Pre-tests and post-tests assessed grammar, fluency, comprehension, vocabulary, and presentation skills based on established communication indicators [8, 15]. The pre-test established baseline performance, while the post-test measured learning outcomes after intervention. Similar methods have been widely used in communication research [8, 9]. AI analytics data were also collected to provide objective insights into learner performance. These data included speech clarity, pronunciation accuracy, interaction frequency, vocabulary development, and error correction trends [25, 28]. AI-based assessment systems have been shown to provide reliable monitoring and consistent feedback in educational contexts [30].

Surveys and questionnaires using a five-point Likert scale measured learners' perceptions, motivation, engagement, and satisfaction with AI-assisted learning. These instruments were adapted from validated educational technology studies to ensure content validity [18]. Likert-scale instruments are widely used in educational research for structured measurement of attitudes and perceptions [8]. Reliability was confirmed through pilot testing and Cronbach's alpha analysis. Semi-structured interviews were used to collect qualitative data on learner experiences, challenges, and perceptions of AI tools. This method allowed in-depth responses while maintaining consistency through guided questions [29]. Thematic analysis was used to identify patterns and themes in learner experiences and is widely applied in educational research [8]. Assessment of the intervention included communication skill indicators such as fluency, accuracy, vocabulary usage, and coherence, as well as engagement metrics such as participation frequency, time spent on platforms, and interaction levels. Network effectiveness was evaluated through collaboration patterns among peers, instructors, and AI systems. Learner satisfaction was also assessed to understand perceptions of AI-supported feedback systems [22, 31].

3.4. Data analysis.

For quantitative analysis, paired t-tests and ANOVA were used. The paired t-test compared pre-test and post-test scores within groups to assess changes in communication skills. ANOVA examined differences between control and experimental groups to determine statistical significance [8, 9]. These methods are widely used in educational research to evaluate intervention effectiveness. Assumptions of statistical tests were examined prior to analysis. Normality was tested using descriptive statistics, and homogeneity of variance was assessed to ensure comparability. Independence of observations and consistency of measurement procedures were also ensured. These steps strengthened the reliability of statistical findings [8]. Qualitative data from semi-structured interviews were analyzed using thematic analysis to identify recurring themes related to learner experiences and perceptions. This method allows systematic coding and interpretation of qualitative data and is widely used in educational research [8]. Network analysis was also conducted to examine interactions among learners, AI systems, peers, instructors, and digital resources. This analysis visualized communication patterns, collaboration structures, and knowledge exchange within connectivist learning environments [22]. The integration of quantitative, qualitative, and network analyses provided a comprehensive interpretation of findings. Quantitative results measured performance improvement, qualitative findings captured learner experiences, and network analysis illustrated interaction patterns. Together, these approaches strengthened validity through triangulation and enriched understanding of AI-supported connectivist learning in communication skill development [21]. The research workflow is presented in Figure 2. The detailed evaluation framework of communication skills across student groups is presented in Table 3, which summarizes the performance indicators, formulas, and expected outcomes used in the study.

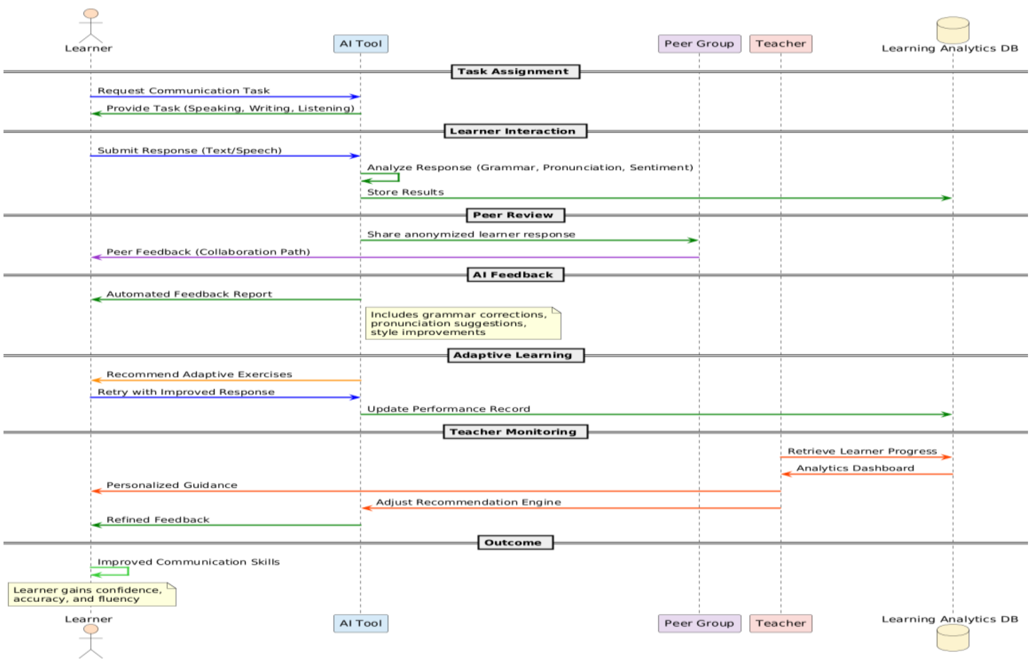

Figure 2. Detailed workflow of the proposed system.

Table 3. Evaluation of communication skills across student groups.

Subject Identified	Target Class & Level	No. of Students	Evaluation Method	Formula Used	Expected Outcome
Communication Skills	I-Year B.Tech (CSE) (S1)	60	Pre- vs. Post-Test	Improvement (%) = (Post – Pre) / Pre × 100	70–80% of students show measurable improvement
Professional English	II-Year B.Tech (ECE) (S2)	55	Average Gain Analysis	Avg. Gain = Σ(Post – Pre) / No. of Students	+2–3 point gain in language proficiency
Soft Skills Workshop	II-Year B.Tech (ECE) (S2)	40	Success Ratio	Success Ratio = (Students Improved / Total Students) × 100	≥ 85% students improve in confidence and presentation
Technical Presentation	Final Year B.Tech (EEE) (S3)	30	Skill Index	Skill Index = (Fluency + Vocabulary + Pronunciation) / 3	Average score ≥ 7.5 / 10
Group Discussion & Peer Review	III-Year B.Tech (IT) (S4)	45	Peer Collaboration Score	Peer Score = Σ Peer Ratings / No. of Peers	Increase in collaboration and critical thinking
AI-Supported Practice	I & II-Year Mixed Batch (CSE/ECE) (S5)	50	Adaptive Feedback Accuracy	Feedback Accuracy = (Correct AI Suggestions / Total Suggestions) × 100	≥ 90% accuracy in AI guidance

4. Results and Discussion

4.1. Quantitative results.

The intervention group (AI + Connectivism) showed measurable improvements in communication performance compared to the control group (traditional training). The quantitative results indicate that the AI-assisted connectivist learning model significantly enhanced communication skills compared to traditional instructional approaches. Students using AI-enabled technologies and digital collaborative platforms demonstrated notable improvement in fluency, vocabulary, pronunciation, coherence, and presentation skills. These findings align with Zhao [9], who reported that AI-powered educational tools enhance learner engagement and provide adaptive feedback systems that improve language performance. Similarly, connectivist theory proposed by Siemens [22] emphasizes learning networks, interaction, and digital connectivity, all of which were reflected in the learning environment of this study. As summarized in Table 4, the intervention was implemented across multiple engineering disciplines and communication-based courses, allowing communication development to be assessed in diverse academic contexts. The use of evaluation methods such as improvement percentage, average gain analysis, success ratio, skill index, and peer collaboration score provided a multidimensional assessment of learner performance.

Table 4. Comparison of communication skill scores (pre- vs. post-intervention).

Communication Dimension (0–10 scale)	Control Group (Pre-Test)	Control Group (Post-Test)	Experimental Group (Pre-Test)	Experimental Group (Post-Test)	% Improvement (Experimental)
Fluency	4.2	5.1	4.3	7.8	81%
Vocabulary Range	4.5	5.3	4.6	7.5	63%
Pronunciation Accuracy	5.0	5.4	4.9	8.1	65%
Coherence & Structure	4.7	5.6	4.8	7.9	64%
Overall Communication	4.6	5.4	4.5	7.8	73%

Unlike traditional classroom assessments that focus mainly on exam scores, the present study also emphasized collaboration, interaction, and communication confidence as key indicators of learning. Moore et al. [16] argued that connectivist learning environments extend beyond subject knowledge acquisition to include participation and digital interaction. This is further supported by Mukhlis et al. [11], who emphasized that connectivist environments generate broader educational outcomes beyond content mastery. The expected outcomes demonstrate improvement not only in linguistic competence but also in confidence, presentation ability, teamwork, and critical thinking. For example, Soft Skills Workshop activities for II-Year B.Tech students emphasized presentation confidence, while Group Discussion and Peer Review focused on collaboration and critical thinking. These findings align with Haruyama [17], who highlighted the importance of interaction-based learning activities such as role play and collaborative discussion in developing communication competence. In contrast to the traditional didactic approach described by Reid [14], the AI-supported environment enabled active learning and continuous engagement, resulting in improved communication outcomes. The findings also highlight the importance of adaptive AI feedback in communication learning. AI-supported practice provided immediate corrective feedback, improving learner performance continuously. This is consistent with Xu, Wang, and Zou [28], who found that AI-assisted speaking evaluation systems significantly enhance learner performance through instant feedback and peer-supported learning. Similarly, Du and Daniel [29] reported that AI chatbots increase learner confidence and engagement through interactive communication practice.

However, unlike earlier classroom-based approaches that rely on delayed teacher feedback, the present study demonstrates that continuous AI feedback enhances learner autonomy and confidence. Furthermore, the experimental group achieved significantly higher communication scores than the control group, confirming the effectiveness of AI-assisted connectivist learning. Both groups improved from pre-test to post-test, but the experimental group showed significantly greater gains across all communication dimensions. This supports Zawacki-Richter et al. [32], who found that AI integration in higher education improves learning performance and engagement. It also aligns with Liang and Bai [21], who emphasized that generative AI creates more interactive and learner-centered learning environments. The greatest improvement was observed in fluency, where scores increased from 4.3 to 7.8 in the experimental group (81% increase). This improvement reflects increased confidence and spontaneity resulting from continuous interaction with AI chatbots and collaborative communication activities. These findings are consistent with Cislowska and Peña-Acuna [23], who reported that chatbots reduce anxiety and promote communication practice in language learning. Unlike traditional classroom settings with limited speaking opportunities, the AI-driven environment enabled repeated practice with immediate feedback.

Pronunciation accuracy also improved significantly, increasing from 4.9 to 8.1. Speech recognition tools provided immediate feedback on stress, intonation, and articulation. These results align with Ngo, Chen, and Lai [25], who found that automatic speech recognition significantly improves pronunciation in ESL/EFL learners. Similarly, Liu and Guo [20] reported that AI-based vocal tools enhance oral performance through repeated feedback cycles. Compared to conventional drills described by Lamsal [13], AI-based systems offered more personalized and continuous feedback. Vocabulary range and coherence also showed marked improvement. Learners using AI tools demonstrated better idea organization, logical structuring, and lexical variation. These findings align with Tsang [15], who emphasized that interactive language practice improves writing and communication quality. Additionally, connectivist learning environments exposed learners to diverse linguistic inputs, enhancing vocabulary acquisition and coherence development, consistent with Yang and Dai [12].

Although the control group showed moderate improvement through traditional instruction, its performance remained lower than the experimental group. This suggests that traditional instruction lacks personalization, interaction, and adaptive feedback. These findings support Alam [10], who argued that technology-enhanced connectivist environments better meet the needs of digital-age learners. The study further emphasizes that AI should complement, not replace, teachers, as human guidance remains essential for communication development. Overall communication performance in the experimental group increased from 4.5 to 7.8 (73% improvement). This demonstrates that AI-based connectivist learning creates a supportive environment for communication development through interaction, feedback, and collaboration. These findings are consistent with Luo et al. [31], who reported that AI-supported learning systems enhance engagement, communication, and academic performance when integrated with structured pedagogy.

4.2. Qualitative findings.

Three main themes emerged from the interviews and open-ended responses. The first theme, personalized feedback, showed that students valued the immediate correction and guidance provided by AI chatbots, which was not typically available in traditional classroom settings and allowed them to improve their language use more efficiently. The second theme, distributed learning environment, highlighted that learners constructed knowledge through continuous interaction with AI systems, peers, instructors, and online platforms, reflecting the principles of connectivist learning, where knowledge is distributed across networks rather than confined to a single source [22]. The third theme, increased engagement, indicated that learners experienced higher motivation and sustained participation due to gamification features, interactive dialogue, and instant feedback mechanisms embedded in AI tools. Sample participant responses further supported these themes, such as "The AI chatbot is never tired of my mistakes; it keeps correcting me until I improve," and "Learning with AI and peers together made the process more collaborative and engaging."

4.3. Discussion and interpretation.

The comparison between the control and experimental groups demonstrates that AI-supported connectivist learning significantly enhances communication skills. While AI does not replace instructors, it operates as a distributed node within the learning network, enabling continuous feedback, repeated practice, and extended interaction opportunities. Within the connectivist framework, AI functions both as a learning coach and a knowledge source, reinforcing the importance of networked and distributed learning environments [22]. The findings further indicate that continuous AI-driven feedback systems are more effective than traditional delayed feedback approaches in accelerating communication skill development and improving learner performance.

5. Conclusions

The present study mainly focused on the application of connectivism theory in the context of using Artificial Intelligence (AI) to enhance students' communication competence. Students not only developed fluency and accuracy in speaking but also improved their ability to present ideas through digital media with increased confidence, supported by distributed learning networks such as AI chatbots, peer learning platforms, and intelligent feedback systems. AI-driven interventions, grounded in connectivist pedagogy, continue to demonstrate their ability to engage students, promote self-directed learning, and facilitate collaborative knowledge construction. A key takeaway is that AI functions as a learning facilitator and amplifier of learning connections, continuously engaging learners in accessing, practicing, and refining communication skills across various contexts. This aligns with the connectivist model of learning, where knowledge networks evolve dynamically with the integration of new tools and technologies.

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Author Contributions

Newbegin Sugandhamani contributed to conceptualization, methodology, data collection, data analysis, and writing of the original draft. Ramkumar Emaraj Vairamuthu contributed to writing—review and editing, supervision, and validation of the study. Lincy Kiruba Selvaraj contributed to writing—review and editing, technical review, proofreading, and final manuscript approval. No external funding was received for this research.

Competing Interests

The authors declare that there are no competing financial, personal, or professional interests that could have influenced the work reported in this paper.

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