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Leveraging ICT tools to Enhance under Graduate students' Presentation Skills

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Abstract: In today's technology-driven academic environment, presentation skills have become an essential component of undergraduate education. Despite possessing subject knowledge, many undergraduate (UG) students struggle with organizing content, maintaining audience engagement, managing stage anxiety, and delivering presentations with clarity and confidence. This experimental study investigates the effectiveness of Information and Communication Technology (ICT) tools in enhancing the presentation skills of UG students. The study was conducted using a pre-test–post-test control group design, involving undergraduate learners from diverse academic disciplines. The experimental group received structured training through ICT-based tools such as presentation software, AI-supported speech analysis applications, virtual rehearsal platforms, and multimedia integration techniques, while the control group followed conventional presentation practices. The results suggest that ICT-integrated pedagogical strategies create an interactive and supportive learning environment that promotes self-evaluation, immediate feedback, and continuous improvement. The study highlights the importance of integrating digital tools into communication skills training at the undergraduate level to bridge the gap between academic learning and professional expectations. It concludes that systematic ICT-based intervention can substantially enhance presentation competence, preparing students for academic, professional, and real-world communication contexts

Keywords: Presentation skills, ICT tools, undergraduate students, experimental study, communication competence, digital pedagogy, AI-based feedback, speaking skills development.

1. Introduction

In contemporary higher education, oral presentation skills have emerged as a foundational academic and professional competency. Universities increasingly expect students not only to demonstrate subject knowledge but also to communicate ideas clearly, confidently, and persuasively. From seminar discussions and project defences to research presentations and placement interviews, oral performance plays a central role in academic success and employability. However, despite its importance, many undergraduate students continue to struggle with pronunciation clarity, vocal modulation, pacing, and audience engagement.

Traditional classroom instruction often emphasizes content preparation but provides limited structured guidance on delivery mechanics. Traditional classroom instruction often emphasizes content preparation but provides limited structured guidance on delivery mechanics (De Grez et al., 2009). Students frequently rely on memorized scripts, text-heavy slides, or monotonous speech patterns. Feedback, when provided, is typically subjective and instructor-dependent. As class sizes grow and instructional time becomes constrained, opportunities for individualized corrective feedback on oral performance become increasingly limited. This gap between the importance of communication skills and the availability of structured training calls for innovative pedagogical solutions.

1.1 Limitations of Conventional Feedback Mechanisms

Conventional feedback methods in presentation training primarily depend on instructor observation or peer review. While valuable, these approaches are often influenced by human variability, time constraints, and limited precision in analyzing vocal parameters. Instructors may identify general weaknesses—such as "speak louder" or "improve clarity"—but may not always provide detailed, measurable insights into aspects like speech rate, filler word frequency, articulation accuracy, or vocal pitch variation.

Moreover, students may experience anxiety when receiving feedback in front of peers, which can hinder reflective learning. Without objective data or repeated practice opportunities, improvement tends to be gradual and inconsistent. As a result, there is a growing recognition that technology-supported evaluation systems can complement human feedback by offering detailed, data-driven insights into speech performance.

1.2 Emergence of Artificial Intelligence in Educational Contexts

The rapid advancement of artificial intelligence (AI) has significantly transformed educational practices across disciplines. AI-powered systems are now capable of analyzing speech patterns, detecting pronunciation errors, measuring vocal pitch, identifying pauses, and evaluating fluency with remarkable precision. These developments have opened new possibilities for enhancing communication skill training through automated and adaptive feedback mechanisms.

The intervention focused on improving key presentation components, including content organization, language fluency, pronunciation, non-verbal communication, visual design, and audience interaction. Quantitative data were collected using standardized assessment rubrics, and qualitative feedback was obtained through observation and learner reflections. The findings revealed a statistically significant improvement in the experimental group compared to the control group, particularly in confidence levels, clarity of expression, visual coherence, and overall delivery effectiveness. Recent studies highlight that AI-driven feedback systems enhance communication performance and learner confidence (Hwang & Tu, 2023; Younas et al., 2025). AI-based speech evaluation systems utilize machine learning algorithms and natural language processing to assess multiple dimensions of oral performance. Unlike traditional assessment methods, these systems provide immediate, consistent, and personalized feedback. Students can rehearse repeatedly, observe quantified performance metrics, and monitor their progress over time. This iterative learning cycle aligns closely with principles of self-regulated learning and formative assessment. Haseski (2019) briefly states the results of these studies as follows: the use of artificial intelligence in education will make learning more individual, provide effective learning experiences, enable students to discover their talents, improve their creativity and reduce teachers' workload.

In language education and communication training, AI tools have increasingly been integrated to support pronunciation training, fluency development, and public speaking improvement. However, the application of such technologies specifically to academic presentation skills requires further exploration and systematic investigation.

1.3 AI-Based Speech Evaluation Systems: Conceptual Foundations

AI-based speech evaluation systems operate on deep learning architectures that process audio input, extract acoustic features, and compare them against predefined linguistic or performance models. These systems analyze parameters such as speech rate (words per minute), articulation clarity, pause duration, pitch variation, and filler word usage. Some advanced platforms also assess coherence, lexical diversity, and structural organization.

From a pedagogical perspective, these systems support three key learning processes:

1. **Diagnostic Awareness** – Students gain objective insights into specific areas of weakness.
2. **Immediate Feedback** – Real-time corrections promote timely adjustments.
3. **Reflective Practice** – Repeated rehearsal fosters incremental improvement.

By combining automated analytics with structured instructional guidance, AI tools can serve as intelligent tutors rather than mere evaluators. The technology does not replace the instructor; instead, it augments human feedback with precision and consistency.

1.4 Addressing Presentation Anxiety through Technology

Public speaking anxiety remains one of the most common challenges among undergraduate students. Fear of judgment, lack of confidence, and limited rehearsal opportunities often result in nervous delivery, rapid speech, or monotone expression. AI-supported rehearsal platforms create a low-risk environment where students can practice privately and receive non-judgmental feedback. The ability to rehearse multiple times, review performance analytics, and observe improvement trends gradually reduces anxiety levels. Students begin to perceive presentations as skills that can be developed rather than innate talents possessed by a few. This psychological shift is crucial for long-term communication competence.

Technology, therefore, plays not only a technical role but also a motivational one. When students witness measurable improvement through data-driven insights, their confidence increases, reinforcing a positive learning cycle.

1.5 The Need for Empirical Investigation

Although AI-supported speech evaluation tools are gaining popularity, empirical research examining their effectiveness in academic presentation contexts remains limited. Many studies focus on language learning or pronunciation training rather than holistic presentation skills, which include delivery, structure, and audience engagement. There is a need for systematic investigation into whether AI-based systems can significantly enhance vocal competence compared to traditional instructor-led

feedback. Questions remain regarding:

- The extent of measurable improvement in vocal delivery
- The role of automated feedback in reducing anxiety
- The sustainability of skill development over time
- The integration of AI tools within structured classroom pedagogy

Addressing these questions is essential for validating the pedagogical value of AI-supported presentation training.

1.6 Research Context and Rationale

This study is situated within undergraduate communication training programs where students are required to deliver structured academic presentations. Despite regular practice sessions, noticeable variations in vocal clarity, articulation, and confidence persist. The introduction of AI-based speech evaluation systems provides an opportunity to examine whether structured digital feedback can bridge these gaps.

The rationale for the study stems from three core considerations:

1. The growing demand for strong communication skills in professional settings.
2. The limitations of conventional feedback mechanisms.
3. The emerging capabilities of AI-driven speech analytics.

By integrating AI-supported evaluation tools into presentation training, the study seeks to determine whether measurable improvement can be achieved in vocal delivery and overall presentation competence.

1.7 Objectives of the Study

The primary objectives of this study are:

- To examine the effectiveness of AI-based speech evaluation systems in improving vocal delivery components such as clarity, pacing, articulation, and modulation.
- To compare performance outcomes between students receiving AI-supported feedback and those receiving traditional instructor feedback.
- To explore students' perceptions of AI-assisted presentation training.
- Through experimental investigation, this study aims to contribute to the growing body of research on AI-enhanced educational technologies and communication skill development

2. Methodology

2.1 Research Design

This study employed a quasi-experimental research design using a pre-test–post-test control group model to examine the effectiveness of ICT tools in enhancing the presentation skills of undergraduate students. The design facilitated a comparison between students exposed to ICT-integrated instruction (experimental group) and those receiving traditional presentation training (control group). The primary objective was to determine whether ICT-based intervention produces statistically significant improvement in presentation competence.

2.2 Participants

The participants comprised undergraduate students enrolled in a communication skills course at a higher education institution.

A total of 60 students participated in the study and were divided equally into two groups:

- Experimental group (n = 30)
- Control group (n = 30)

Participants were selected through purposive sampling. All students had prior experience delivering classroom presentations but had not received structured ICT-based presentation training before the study.

2.3 Instruments

Data were collected using the following instruments:

1. Presentation Skills Assessment Rubric – A structured rubric designed to evaluate seven key dimensions:
   - Content organization
   - Language accuracy and fluency
   - Pronunciation and articulation
   - Voice modulation
   - Non-verbal communication
   - Visual design and multimedia integration
   - Audience engagement

2. Pre-test and Post-test Presentation Tasks – Academic presentations delivered before and after the intervention.
3. Self-Assessment Questionnaire – A Liker-scale instrument measuring confidence, anxiety levels, and perceived improvement.
4. Observation Checklist – Used by evaluators to document delivery patterns and behavioural changes.

The reliability of the rubric was established through inter-ratter reliability measures, and content validity was ensured through expert review.

2.4 Intervention Procedure

The intervention was conducted over an eight-week period.

2.4.1 Experimental Group

Students received structured ICT-integrated training, including:

- Multimedia presentation tools (e.g., PowerPoint, Canva)
- AI-supported speech analysis applications
- Video-recorded rehearsal sessions
- Automated feedback systems
- Virtual presentation simulations

Each training session targeted specific presentation components such as slide organization, vocal clarity, body language, timing, and audience interaction. Students practiced using digital tools and received immediate AI-generated and instructor feedback to refine their performance. The integration of AI-supported rehearsal and feedback systems is supported by contemporary research on adaptive learning technologies (Alam & Windiarti, 2025; Siemens & Long, 2024).

2.4.2 Control Group

The control group received conventional instruction, including:

- Classroom lectures on presentation techniques
- Traditional slide preparation Manual instructor feedback
- Standard in-class presentation practice without ICT-based enhancement

2.5 Data Collection Procedure

Both groups delivered a pre-test presentation at the beginning of the study, evaluated using the standardized rubric. After the eight-week intervention, students delivered a post-test presentation. Scores from both assessments were recorded for statistical comparison. Self-assessment responses and observational data were collected to complement quantitative findings.

2.6 Data Analysis

Quantitative data were analyzed using statistical software.

- Paired-sample t-tests were conducted to measure within-group improvement.
- Independent-sample t-tests were used to compare post-test scores between the experimental and control groups.

Qualitative data from self-assessment and observation were analyzed using thematic analysis to identify patterns related to confidence, engagement, and skill development.

2.7 Ethical Considerations

Participation was voluntary, and informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the research process. The study complied with institutional ethical guidelines for research involving human participants.

3. Results

3.1 Overview of Performance Changes

The analysis of pre-test and post-test scores shows a clear difference in improvement between the two groups. At the beginning of the study, both the experimental and control groups demonstrated almost similar levels of presentation ability, indicating that the groups were comparable before the intervention.

However, after the eight-week training period, the experimental group, which received ICT-integrated instruction, showed substantial progress in overall presentation performance compared to the control group.

3.2 Descriptive Statistics

Table 1 presents the mean scores and standard deviations for both groups.

Group	Test	Mean (M)	Standard Deviation (SD)
Experimental (n = 30)	Pre-test	58.43	6.12
Experimental (n = 30)	Post-test	78.56	5.48
Control (n = 30)	Pre-test	57.90	5.95
Control (n = 30)	Post-test	63.21	6.03

Table 1. Mean and Standard Deviation of Presentation Scores

While both groups began with nearly equal average scores (approximately 58), the experimental group improved by more than 20 points in the post-test. In contrast, the control group showed only a modest increase of about 5 points.

3.3 Within-Group Improvements

A paired-sample t-test was conducted to examine whether the improvement within each group was statistically meaningful.

The experimental group demonstrated a significant increase in scores from pre-test to post-test, $t(29) = 14.82$, $p < .001$. This indicates that the ICT-based intervention had a strong positive impact on students' presentation skills.

The control group also showed some improvement, $t(29) = 4.11$, $p < .01$, which may be attributed to regular practice and instructor feedback. However, the magnitude of improvement was considerably smaller compared to the experimental group.

3.4 Between-Group Comparisons

An independent-samples t-test was conducted to compare post-test scores between the two groups. The results revealed a statistically significant difference, $t(58) = 10.54$, $p < .001$, with the experimental group outperforming the control group.

The calculated effect size (Cohen's $d = 2.72$) indicates a very large effect, suggesting that the ICT-integrated training was not only statistically significant but also practically impactful.

3.5 Component-wise Skill Development

A closer examination of the assessment rubric revealed noticeable improvements in the experimental group across several key areas:

- Better organization and visual clarity of slides
- Improved pronunciation and voice modulation
- More confident body language and eye contact
- Enhanced audience engagement
- Reduced presentation anxiety

Students appeared more composed and structured in their delivery, likely due to repeated digital rehearsals and immediate feedback provided by AI-supported tools.

3.6 Student Reflections

Qualitative feedback provided additional insight into the learning experience. Many students reported feeling more confident after reviewing their recorded presentations and receiving automated feedback. They became more aware of filler words, pacing, and posture. Several students mentioned that practicing in a virtual environment reduced their fear of speaking in front of an audience. The findings suggest that ICT tools created a supportive learning space where students could practice, reflect, and improve at their own pace.

4. Discussion

4.1 Overview of Key Findings

The present study examined the effectiveness of integrating ICT tools into presentation skills training for undergraduate students. The findings clearly demonstrate that students who underwent ICT-supported instruction showed significantly greater improvement compared to those who received traditional training. Both quantitative results and qualitative reflections indicate that structured digital intervention positively influenced overall presentation competence. Since both groups began with nearly identical pre-test scores, the post-intervention differences strongly suggest that the ICT-based training was the key contributing factor to enhanced performance.

4.2 Impact of ICT Integration on Presentation Performance

The experimental group exhibited substantial improvement in overall presentation scores after eight weeks of ICT-integrated training. The structured use of multimedia tools, AI-based feedback systems, and recorded rehearsals created a more interactive and performance-oriented learning environment. The results confirm that technology, when purposefully integrated into pedagogy, can transform passive learning into active skill development.

4.3 Improvement in Delivery and Vocal Competence

One of the most noticeable improvements was observed in vocal delivery, including pronunciation clarity, pacing, articulation, and voice modulation. AI-supported speech analysis tools enabled students to identify issues such as monotone delivery, excessive filler words, or uneven pacing. Through repeated practice and feedback, students developed greater control over their voice and speech patterns. This improvement was significantly higher than in the control group, where feedback was limited to instructor observation. AI-supported speech analysis tools enabled students to identify issues such as monotone delivery, excessive filler words, or uneven pacing, supporting systematic refinement of oral performance (Chen & Huang, 2023; Li et al., 2024).

4.4 Enhancement of Visual Design and Content Organization

The integration of multimedia tools encouraged students to rethink how they structured and presented information. Rather than relying on text-heavy slides, students learned to apply principles of visual clarity, logical sequencing, and concise messaging. They demonstrated improved use of images, graphs, bullet structures, and transitions. This shift reflects not only

improved presentation skills but also enhanced digital literacy.

In classroom practice, this transformation became clearly visible. For instance, during the pre-test phase, many students used slides filled with lengthy paragraphs copied directly from textbooks. In contrast, after ICT-based training, students began summarizing key ideas into short bullet points supported by relevant visuals. A student presenting on environmental sustainability replaced dense textual explanations with a comparative info graphic showing carbon emission data, followed by a simple bar graph to illustrate yearly trends. This visual restructuring helped the audience grasp complex information more quickly and effectively.

Similarly, students presenting research topics learned to organize their slides using a clear introduction–body–conclusion format. Instead of presenting disconnected information, they applied logical transitions such as "problem–solution," "cause–effect," or "comparison–contrast." For example, in a business communication class, one student structured a marketing presentation using a step-by-step visual flow diagram that guided the audience through market analysis, strategy, implementation, and expected outcomes. The use of icons and consistent colour themes improved coherence and audience engagement.

Multimedia integration also enhanced students' ability to emphasize key points. In science-based presentations, students used labelled diagrams and short animation clips to explain processes rather than reading descriptions aloud. This not only reduced cognitive overload but also improved audience retention. In addition, students became more conscious of design balance—avoiding overcrowded slides, maintaining font consistency, and selecting appropriate colour contrasts for readability.

These classroom examples illustrate that ICT integration did more than improve aesthetics; it strengthened students' ability to think critically about information design. By aligning content with visual strategy, students developed stronger organizational skills and a deeper understanding of how effective communication depends on both structure and presentation.

4.5 Role of AI-Based Feedback and Digital Rehearsal

Effective feedback plays a pivotal role in education, serving as a critical tool through which students assimilate various sources of information to enhance their learning and performance (Carless and Boud 2018; Henderson et al. 2019). AI-based feedback became one of the most meaningful elements of the training process. What made it effective was not merely the technology itself, but the way it allowed students to see and hear themselves more clearly. Instead of waiting for general comments after a presentation, students received immediate, specific feedback about their speech patterns, pacing, and delivery. This helped them understand exactly where improvement was needed and encouraged them to make small but steady adjustments.

In the classroom, this shift was quite noticeable. For example, several students were surprised to discover how often they relied on filler words. Many had never realized how frequently they said "um," "so," or "like" while thinking. When the AI report displayed the count of these fillers, students became more conscious of their speech habits. In later rehearsals, they intentionally slowed down and paused instead of filling silence with unnecessary words. Gradually, their delivery became smoother and more composed.

The pacing feedback was equally helpful. Some students tended to rush through their slides, especially when they felt nervous. Watching their recorded rehearsals helped them recognize this pattern. One student commented that she had never noticed how quickly she spoke until she heard her own recording. With guided practice, she learned to pause briefly after important points, making her presentation clearer and easier to follow. Video recording also improved non-verbal awareness. Students began noticing simple habits—such as shifting weight repeatedly, avoiding eye contact, or keeping hands rigid. After observing themselves, they practiced standing more steadily, using purposeful gestures, and maintaining better eye contact. These changes, though subtle, significantly improved their overall presence.

Perhaps most importantly, digital rehearsal created a comfortable environment for practice. Students could rehearse multiple times without fear of embarrassment. This reduced anxiety and encouraged experimentation with tone, emphasis, and expression. Over time, presentation preparation became less stressful and more reflective. Instead of preparing just to "finish" a task, students began preparing to improve.

4.6 Development of Confidence and Reduction of Presentation Anxiety

Presentation anxiety is a common experience among undergraduate students, particularly when they are required to speak in front of peers and faculty members. At the beginning of the study, several students displayed visible signs of nervousness—shaking hands, lowered voice, rapid speech, and avoidance of eye contact. As (Yim, 2014) pointed out in his recent study, a factor that leads students of a foreign language to anxiety is the lack of exposure to a context where the target language is spoken. The findings indicate that ICT-supported rehearsal environments helped reduce these symptoms by creating a gradual and supportive pathway toward confident performance.

Practicing in a low-pressure digital setting allowed students to become familiar with their content before facing a live audience. For instance, during early sessions, some students admitted that their primary fear was "forgetting what to say." When they began rehearsing through recorded sessions, they realized that reviewing their own recordings helped reinforce memory and structure. This repetition reduced uncertainty and increased their sense of control over the material.

In classroom observations, a noticeable change occurred between the pre-test and post-test presentations. One student who initially avoided eye contact and spoke in a very soft voice gradually became more composed after several digital rehearsals. By the final presentation, he stood upright, maintained steady pacing, and interacted more naturally with the audience. He later shared that being able to practice multiple times without immediate peer judgment helped him overcome his fear step by step.

Another example involved students who experienced stage fright when presenting in English. The AI-supported

feedback helped them focus on specific areas such as pronunciation and pacing rather than worrying about overall performance. As they saw measurable improvement in these areas, their confidence increased. Instead of feeling anxious about "how they sounded," they began concentrating on effectively communicating their ideas.

Importantly, the digital environment shifted students' perception of presentations from a high-stakes event to a skill that could be practiced and improved. The opportunity to rehearse privately, reflect on performance, and correct mistakes reduced the fear of failure. Over time, nervous energy was replaced by preparedness and self-assurance. Overall, the integration of ICT tools did not simply enhance technical performance; it positively influenced emotional readiness. Students approached their final presentations with greater calmness and confidence, demonstrating that structured technological support can play a meaningful role in addressing affective barriers to communication.

4.7 Growth in Audience Engagement and Non-Verbal Communication

Students in the experimental group demonstrated noticeable improvement in maintaining eye contact, using purposeful gestures, and interacting more naturally with their audience. By reviewing recorded presentations, they became more aware of distracting habits such as repeatedly looking at the screen, swaying unnecessarily, or keeping their hands folded throughout the presentation. This growing self-awareness gradually translated into more dynamic and confident delivery during the post-test presentations.

In the early stages of the study, many students tended to read directly from their slides. Their focus remained on the projected text rather than on the audience. However, after watching their recorded rehearsals, they realized how disconnected this appeared. During later sessions, students consciously practiced scanning the room, making brief eye contact with different sections of the audience. In one classroom example, a student presenting on digital marketing shifted from reading bullet points to explaining them conversationally while engaging classmates with occasional questions such as, "Have you noticed this trend in your own social media use?" This simple shift made the presentation feel more interactive and lively.

Gestures also became more meaningful. Initially, some students either used very limited hand movement or exaggerated gestures due to nervousness. Through video playback, they observed these patterns and began refining their body language. For example, one student who frequently kept his hands in his pockets learned to use open-hand gestures to emphasize key ideas. Another student who tended to pace continuously practiced standing firmly and moving only when transitioning between points. These small adjustments improved overall stage presence.

Classroom observations also showed improved audience responsiveness. In later presentations, students paused briefly to allow the audience to absorb important information, nodded in acknowledgment of reactions, and adjusted their tone based on audience engagement. This responsiveness indicated not just improved technique but greater confidence and situational awareness.

Over time, students began to understand that effective communication extends beyond spoken words. Facial expressions, posture, and movement all contributed to clarity and impact. The combination of AI-supported feedback and recorded rehearsal enabled students to see themselves from the audience's perspective, making improvements more intentional and authentic. Research indicates that non-verbal behaviours such as eye contact, posture, and gestures significantly influence audience perception, credibility, and engagement (Mehrabian, 1972; Burgoon, Guerrero, & Floyd, 2016). As a result, their final presentations felt less mechanical and more engaging, reflecting genuine growth in non-verbal communication skills.

4.8 Promotion of Self-Regulated and Reflective Learning

ICT tools encouraged students to take ownership of their learning. Rather than depending solely on instructor comments, they engaged in self-assessment and iterative refinement. The ability to review performance recordings and analyze AI-generated feedback promoted independent learning habits. This development of self-regulation is particularly valuable in higher education contexts. Digital rehearsal and automated feedback foster reflective and self-regulated learning behaviours (Hwang & Tu, 2023; Redecker & Punie, 2023).

4.9 Comparison with Traditional Instructional Approaches

Although the control group showed some improvement due to regular practice, the magnitude of growth was considerably smaller. Research on instructional effectiveness suggests that technology-enhanced learning environments often produce stronger skill development outcomes when compared to traditional lecture-based approaches, particularly when they provide immediate and individualized feedback (Hattie & Timperley, 2007; Schindler et al., 2017). Traditional lecture-based guidance, while helpful, did not provide the same level of individualized and immediate feedback. This comparison highlights the added value of ICT integration in enhancing communication skills training.

In the control classroom, feedback typically followed a familiar pattern. After each presentation, the instructor offered general comments such as "improve your eye contact" or "work on your confidence." While these suggestions were meaningful, students often struggled to translate them into specific corrective actions. Without measurable indicators or recorded playback, many were unsure what exactly needed refinement. As a result, improvements were gradual and sometimes inconsistent.

For example, one student in the control group repeatedly received feedback about speaking too fast. However, without access to timing analytics or recorded rehearsal, the student could not clearly identify when the pace became excessive. In contrast, students in the experimental group could see their speaking rate in measurable terms and adjust accordingly. This difference made the learning process more concrete and actionable.

Another noticeable contrast was in preparation habits. Control group students often prepared primarily for the final presentation day, practicing a few times at home without structured feedback. Meanwhile, students using ICT tools engaged in

repeated, guided rehearsal sessions. Research on deliberate practice highlights that structured repetition combined with targeted feedback significantly strengthens skill acquisition (Ericsson, Krampe, & Tesch-Römer, 1993).The digital system encouraged a cycle of practice, review, and improvement, which gradually strengthened performance. This structured repetition appeared to build both skill and confidence.

Classroom engagement also differed. In traditional sessions, some students relied heavily on memorization, leading to stiff or mechanical delivery. Without video playback, they were unaware of how this appeared to others. On the other hand, experimental group students became more reflective about their delivery style because they had observed themselves on screen. They began adjusting tone, gestures, and transitions more intentionally.

Importantly, the comparison does not suggest that traditional instruction lacks value. Instructor expertise, classroom discussion, and peer feedback remain essential components of communication training. However, the findings indicate that when technology is thoughtfully integrated, it enhances and extends the effectiveness of conventional methods. The combination of human guidance and technological support creates a more comprehensive learning experience, allowing students to progress beyond surface-level improvements toward deeper communicative competence. ICT enhances the effectiveness of conventional pedagogical methods, enabling deeper communicative competence beyond surface-level improvement (Schindler et al., 2017).

4.10 Alignment with Contemporary ICT and AI-Based Educational Research

The findings are consistent with recent educational research emphasizing the transformative role of artificial intelligence and adaptive technologies in skill development. Studies conducted between 2023 and 2025 indicate that AI-driven systems enhance personalization, engagement, and performance outcomes. The present study adds empirical support to this growing body of literature, particularly within the domain of presentation skills. According to Lopez et al. (2025), immersive virtual learning spaces simulate real-world presentation contexts, thereby strengthening communicative competence.

4.11 Pedagogical Implications for Higher Education

The results suggest that presentation skills courses should incorporate ICT tools as an integral component rather than as supplementary resources. Curriculum designers may consider embedding digital rehearsal platforms, AI-based feedback mechanisms, and multimedia design training into communication modules. Such integration prepares students for both academic presentations and professional communication environments.

In addition, institutions may provide structured orientation sessions to familiarize students with these tools early in their academic journey. Faculty training is equally important to ensure that technology is used purposefully rather than mechanically. Teacher preparedness and pedagogical competence are widely recognized as key factors influencing successful ICT implementation (Ertmer & Ottenbreit-Leftwich, 2010).When ICT integration is aligned with clear learning outcomes and assessment strategies, it strengthens both teaching effectiveness and student engagement. Ultimately, a balanced combination of pedagogical guidance and technological support can foster confident, adaptable, and digitally competent communicators.

4.12 Ethical and Accessibility Considerations

While ICT integration offers clear benefits, institutions must ensure equitable access to digital tools and infrastructure. Adequate training, technical support, and reliable connectivity are essential for successful implementation. Additionally, ethical considerations related to AI-based evaluation, data privacy, and transparency must be addressed to protect student information and maintain trust.

4.13 Contribution to Communication Skills Pedagogy

This study contributes to communication skills pedagogy by demonstrating that structured ICT intervention enhances not only technical presentation elements but also affective and reflective dimensions of learning. The large effect size observed underscores the practical significance of technology-enhanced instruction in higher education. Technology-supported communication training is increasingly recognized as essential for 21st-century skill development (Mishra & Koehler, 2024; Kumar et al., 2023).

4.14 Summary of Discussion

In summary, the integration of ICT tools significantly improved undergraduate students' presentation skills across cognitive, behavioural, and emotional dimensions. The combination of multimedia support, AI-based feedback, and structured practice created a comprehensive learning environment that fostered confidence, clarity, and competence. These findings reinforce the importance of aligning technological innovation with pedagogical strategy to cultivate effective communicators in the digital age.

5. Conclusion

This study set out to explore whether integrating ICT tools into presentation skills training could make a meaningful difference in the performance of undergraduate students. The findings clearly suggest that it does. Students who engaged with multimedia tools, AI-supported feedback systems, and digital rehearsal platforms showed noticeable growth not only in measurable presentation scores but also in confidence, clarity, and overall delivery.

One of the most encouraging outcomes of the study was the transformation observed in students' approach to presenting. Initially, many participants relied heavily on memorized scripts or text-heavy slides. Over time, however, students began to demonstrate greater control over their voice, improved organization of ideas, purposeful use of visuals, and more natural

audience interaction. The opportunity to rehearse in a supportive digital environment, review recorded performances, and receive immediate feedback allowed them to identify weaknesses and refine their skills progressively.

Importantly, the integration of ICT tools did more than improve technical aspects of presentation. It also addressed emotional barriers, particularly presentation anxiety. Several students reported that practicing through recorded sessions and AI-guided feedback reduced their fear of public speaking. This gradual exposure and self-reflection appeared to build genuine confidence, which was evident in their final presentations.

The findings reinforce an important idea: technology itself is not transformative unless it is guided by thoughtful pedagogy. The success of this intervention was rooted in the structured integration of digital tools within a clearly defined instructional framework. When technology and teaching strategies work together, they create an environment where students can practice, reflect, and improve continuously.

Overall, this study highlights the potential of ICT-enhanced learning to strengthen communication competence in higher education. By embedding digital tools meaningfully into presentation training, institutions can better prepare students for academic, professional, and digital communication demands in the modern world.

6. Limitations and Future Research

While the results of this study are promising, certain limitations should be considered. The study involved 60 undergraduate students from a single institution, which may limit the generalizability of the findings. Future research involving larger and more diverse samples across multiple institutions would help confirm and extend this results.The intervention lasted eight weeks, which was sufficient to observe measurable improvement. However, presentation skills are developed over time through sustained practice. Long-term studies could explore whether the improvements gained through ICT integration are maintained months or even years later.

Another limitation relates to the scope of technology used. Although AI-based feedback and multimedia tools were incorporated, the study did not compare different AI systems or advanced technologies in depth. Future research could examine how specific deep learning models, speech recognition systems, or immersive technologies such as virtual reality influence communication training outcomes. In addition, qualitative investigations could further explore students' emotional experiences, motivation levels, and perceptions of technology-supported learning. Understanding how learners feel about digital feedback and self-recorded rehearsal may provide deeper insights into the psychological dimensions of skill development.

Future research may also investigate discipline-specific presentation contexts, such as technical presentations in engineering, research seminars in sciences, or persuasive communication in business studies. Exploring how ICT tools adapt to different academic domains would strengthen the applicability of such interventions.

In conclusion, this study opens pathways for continued exploration of technology-enhanced communication pedagogy. As higher education continues to evolve within a digitally connected world, thoughtful integration of ICT tools will remain essential in nurturing confident, competent, and adaptable communicators.

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