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The Future is Connection:

Collaboration, Creativity and Compassion in a Digital Society

Designing AI-mediated interactive learning environments for communication skills: Insights from two implementations

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Developing communication skills remains a core challenge in higher education, particularly in providing scalable opportunities for practice and feedback. This study explores how artificial intelligence (AI)-mediated systems function as interactive learning environments for communication skills development. Two implementations are examined: a voice-only conversational AI-mediated system used across health disciplines and a digital human avatar used in a business unit. A mixed-methods design was employed, combining quantitative survey data and qualitative content. Findings highlighted three key affordances: repeated low-stakes practice, immediate feedback, and flexible engagement. Students reported increased confidence and perceived skill development. Limitations included conversational inaccuracies, realism, technical reliability, and feedback consistency. Importantly, findings indicate that the effectiveness of AI systems is strongly influenced by prompt design, scenario construction, and alignment with learner level. This paper reframes AI tools not as autonomous technologies, but as designed interactive learning environments requiring careful pedagogical integration. Implications are discussed for the design of AI-supported learning activities, particularly in contexts involving oral communication and authentic assessment.

Keywords: artificial intelligence, communication skills, interactive learning environments, feedback

Introduction

Effective communication is a foundational competency across disciplines, underpinning professional practice and graduate employability (Clokie & Fourie, 2016; Maguire & Pitceathly, 2002; Mainga et al., 2022). Communication skills are typically developed through experiential learning processes involving repeated practice, feedback, reflection, and refinement (Wijnen-Meijer et al., 2022). Providing these opportunities at scale remains a challenge in higher education (Blackmore et al., 2018; McCarrick et al., 2025). Simulation-based approaches such as role play or standardised patients provide valuable experiential learning but are resource intensive and difficult to sustain at scale (Ismail et al., 2024; Issenberg & Scalese, 2008).

Recent advances in conversational AI and digital humans have extended the capabilities of simulation-based learning environments by enabling dynamic, responsive interaction (Barker et al., 2024; Holderried et al., 2024; Jacobs et al., 2025; Yeung et al., 2025). These systems allow learners to engage in dialogue-based exchanges and receive automated feedback, shifting AI from a content generation tool to an interactive learning environment. As such, AI-mediated systems have the potential to support experiential learning processes at scale by providing opportunities for repeated practice and immediate feedback. However, there remains limited empirical research examining how such systems function pedagogically, particularly in relation to communication skills development. Existing research has tended to focus on feasibility, usability, and learner perceptions of AI tools (Jacobs et al., 2025; Platt et al., 2024), with less attention to the mechanisms through which these systems support learning and the design factors that influence their educational value.

Guided by an experiential learning perspective, this paper conceptualises conversational AI and digital humans as interactive learning environments rather than simply technological tools. Drawing on two AI implementations across health and business education, it examines how these environments support

communication skills learning and the factors that influence their effectiveness. Specifically, the study sought to address the following research questions:

RQ1: What affordances and limitations do students identify when using AI-mediated systems to support communication skills development?
RQ2: How do learners perceive the contribution of AI-mediated systems to communication skills learning, confidence, and practice?
RQ3: What design features influence the effectiveness of AI-mediated communication learning environments?

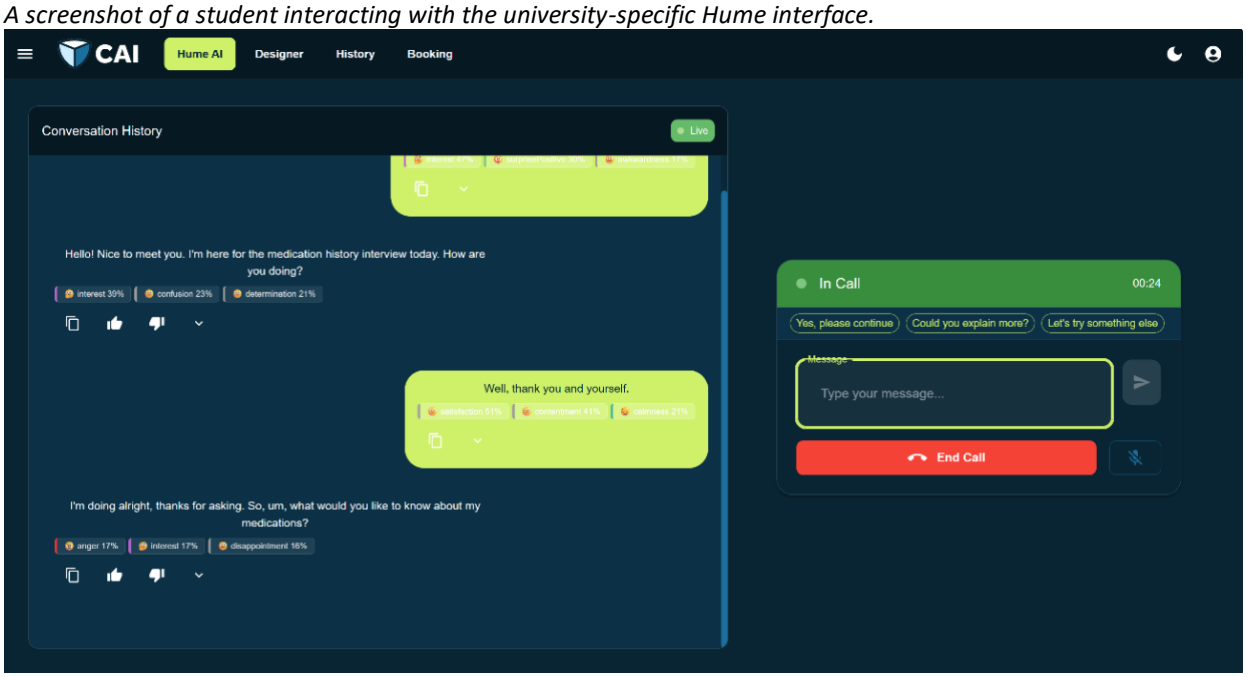
Context and approach

Ethics approval was obtained for both studies from Curtin University's Human Research Ethics Committee.

Study 1: Conversational AI (health disciplines)

The first implementation involved the use of a voice-based conversational AI system (Hume.ai) across multiple units within several health professional programs. The system enabled students to engage in simulated interactions with virtual clients, supporting activities such as case history taking, counselling, and rapport building. Feedback on communication was provided by the AI tool. Midway through the project, changes to platform subscription models required the development of a university-specific interface to enable student interaction with Hume. This shift foregrounded the importance of interface design in shaping learner engagement, as the structure of interactions, prompts, and feedback delivery became dependent on locally configured design decisions. Students who had the opportunity to use the AI tool within their unit were invited via Blackboard announcements and email invitations to complete a mixed-methods questionnaire exploring changes in perceived confidence, skills, and knowledge following engagement with the tool, together with qualitative feedback on its affordances and limitations. Sixty students completed the questionnaire. Most participants were aged 18-25 years (83%) and female (73%), reflecting the typical demographic profile of allied health programmes. The quantitative analysis used Wilcoxon signed-rank tests to examine pre–post changes, and qualitative data were analysed using descriptive content analysis. Academic staff also reflected on scenario and prompt design. Figure 1 provides an example of the interface through which students engaged with Hume, illustrating how interaction was structured within the university-developed system.

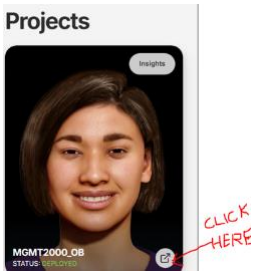
Figure 1.
A screenshot of a student interacting with the university-specific Hume interface.



Study 2: Digital human avatar (business context)

The second implementation involved an AI-powered digital human avatar ("Sophia") integrated into a second-year undergraduate organisational behaviour unit to support oral presentation skills. Students enrolled in the unit were recruited via Blackboard announcements and email invitations, with a $20 gift card provided for participation. Student experiences were explored through six face-to-face focus groups involving 36 students across Curtin's Bentley (*n* = 14), Malaysia (*n* = 18), and Mauritius (*n* = 4) campuses. Focus groups lasted 45-60 minutes, were audio-recorded and transcribed, and were analysed using thematic analysis (Braun & Clarke, 2006). Figure 2 presents the Sophia avatar, representing the conversational agent with which students engaged during the activity.

Figure 2.
A screenshot of a student interacting with Sophia



Findings

Findings are presented as cross-case themes to highlight common affordances and constraints of AI-mediated communication learning environments.

Repeated, low-stakes practice

Across both implementations, students valued the opportunity to engage in repeated practice without the pressure associated with real audiences. In the conversational AI study, students reported benefits from iterative interaction and the ability to practise communication skills in a flexible, low-risk environment. Similarly, in the digital avatar context, students highlighted the usefulness of rehearse-and-repeat opportunities when preparing for assessed presentations.

Immediate feedback and reflection

Feedback emerged as a central affordance in both studies. The conversational AI system supported feedback on communication performance, enabling learners to reflect on questioning style, structure, and clarity. The digital avatar similarly provided immediate feedback on delivery elements such as pacing and fluency, which students reported as supporting improvement in performance. These findings suggest that AI-mediated feedback can supplement traditional instructor-led approaches, particularly in large cohorts.

Confidence and perceived skill development

Across both implementations, learners reported increased confidence and perceived communication skill development. These perceptions were reflected in qualitative and quantitative feedback, with students describing greater confidence and reduced anxiety when communicating in simulated environments.

Design constraints: realism, accuracy and usability

Despite these benefits, both implementations revealed important limitations. In the conversational AI system, challenges included conversational inaccuracies, irrelevant responses, and interruptions, which affected

interaction quality. The digital avatar study identified issues related to technical reliability, repetitive feedback, and lack of emotional nuance, as well as interruptions during speech delivery. These findings highlight that AI-mediated environments are not inherently effective; rather, their educational value depends on the quality of system behaviour and user experience.

Importance of prompt and scenario design

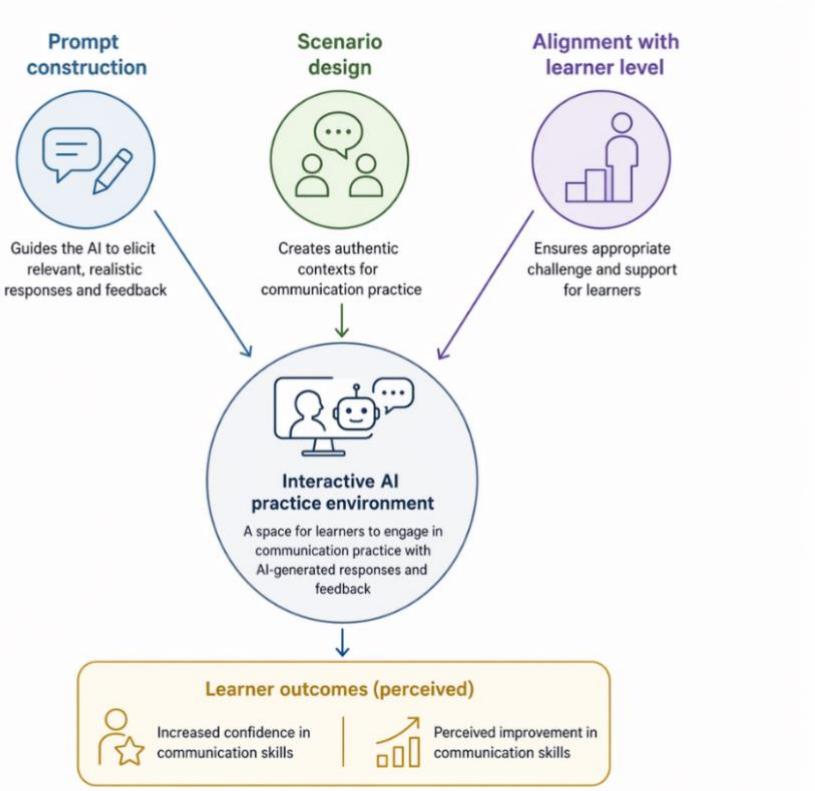
A consistent finding across both contexts was the importance of design. In the conversational AI study, poorly specified prompts resulted in interactions that did not align with learner level, requiring iterative refinement of scenarios. Similarly, the avatar required careful configuration and instructional guidance to ensure meaningful engagement.

Discussion

Consistent with an experiential learning perspective, the findings support the conceptualisation of AI-mediated systems as interactive learning environments shaped by interaction, feedback, and design. Notably, similar affordances emerged across two distinct contexts, namely client communication in health disciplines and presentation skills in business education. Despite differences in discipline, communication task, and modality, both implementations highlighted the value of repeated practice, immediate feedback, learner confidence, and pedagogical design.

These affordances were not inherent to the technology. Rather, their educational value depended on system behaviour, realism, and the quality of pedagogical design. Prompt construction, scenario design, and alignment with learner level emerged as particularly important factors shaping learner experiences and perceived outcomes. Figure 3 summarises the proposed relationship between design features, interaction quality, and learning outcomes.

Figure 3.
A conceptual model of how design elements shape the interactive AI environment and influence learning outcomes



The findings extend existing research by moving beyond questions of feasibility and usefulness to examine how AI-mediated environments support communication learning across disciplines. They suggest that AI tools should be integrated deliberately within curricula, with attention to usability, prompt design, and alignment with learning objectives. Importantly, the study identified perceived rather than objectively demonstrated improvements in communication skills. Future research should therefore examine behavioural change, performance outcomes, and transfer to authentic communication contexts.

Conclusion

This study demonstrates that AI-mediated systems can function as interactive learning environments that support communication skills development through repeated, flexible practice and feedback. However, their effectiveness is not determined by technology alone. Instead, it depends on the quality of interaction, system behaviour, and, critically, pedagogical design. AI tools are therefore best understood as complements to existing approaches, extending opportunities for practice while requiring careful integration into teaching and learning contexts.

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