

From Practice to Purposeful Improvement: Analysing Student–AI Reflective Dialogue in Psychomotor Skills Training

Research Overview

Psychomotor training is often framed as repeated practice and technical correction. Yet improvement also requires learners to interpret errors, regulate emotions, and translate experiences into revised action (Schön, 1983; Tanner, 2006). Conventional debriefing supports this reflective process but is difficult to sustain consistently in time-pressured health curricula.

Purpose of Study

This study examines Professor E, a purpose-built conversational AI reflection platform designed to support structured, educator-aligned dialogue. Unlike general-purpose chatbots, Professor E is configured around specific learning objectives, contextual prompts, and reflective goals, offering a bounded space for students to examine their practice rather than simply request answers from an open-ended AI tool.

Recent research has shown increasing interest in artificial intelligence across health professions education, including simulation, chatbot-supported learning, feedback, and debriefing (Chan et al., 2025; Feigerlova et al., 2025; Fernandes et al., 2026). However, much discussion remains focused on what AI can provide to students. Less is known about what students actually do within AI-mediated dialogue and how their reflective engagement develops across conversational turns.

This study addressed this gap by analysing student–AI transcripts generated during psychomotor skills training. It asked: What forms of learning activity are organised within student–AI reflective dialogue, and how might these interactions support student movement from procedural experience towards more deliberate, informed clinical skills performance?

Research Methods

This exploratory, cross-sectional, qualitatively led mixed-methods study analysed student–AI dialogue generated during psychomotor clinical skills training. The dataset comprised 15 student–AI sessions collected from three staged reflection activities embedded across clinical-skills modules involving core hands-on healthcare procedures, including patient assessment, emergency care procedures, and scenario-based clinical skills practice. Following each skills-training activity, students engaged with Professor E for structured post-practice reflection and AI-supported debriefing, using the dialogue to review performance, identify procedural or communication difficulties, and formulate improvement strategies. The final analytic sample consisted of 184 message turns.

A structured codebook was developed iteratively to translate theories of reflection and clinical judgement into a conversational analytic framework. The framework included message-level coding of student prompt type and AI response type, a five-point reflection depth scale, conversation-level interaction pattern coding, and structural indicators including turn count, follow-up density, and student word count. Reflection depth coding was informed by Hatton and Smith (1995), Tanner (2006), Mezirow (1990), and related work on reflective depth in professional education (Wong et al., 1995; Kember et al., 2008).

To strengthen trustworthiness, the full analytic sample was independently double-coded, and intercoder reliability was assessed using Cohen's kappa. While substantial agreement on reflection depth (linear weighted $\kappa = .62$) provides a confident basis for the core findings, lower agreement on AI response types ($\kappa = .33$) warrants a cautious interpretation of the AI's pedagogical role.

Results and Discussion

The analysis suggested that students used Professor E primarily as a reflective scaffold rather than as an answer engine. Reflective prompting was the dominant student move, indicating that learners were using the AI to examine procedural performance, identify learning gaps, and orient themselves towards improvement, rather than merely retrieve technical information.

A recurrent interactional pattern was observed across sessions. Students often began by describing what happened, expressing uncertainty, or naming emotional responses associated with skills performance. As the dialogue progressed, many moved towards more analytical reflection: explaining why an error occurred, identifying contributing factors, considering what they had overlooked, and planning what should change in their next attempt. In this sense, AI-mediated dialogue made visible a learning process often hidden in psychomotor skills training: the movement from doing, to noticing, to reasoning, to purposeful action.

The educational significance of these exchanges lies not in AI replacing educators or in proving immediate performance improvement. Rather, the findings suggest that purpose-built conversational AI can create a responsive interim space between practice attempts and educator-led debriefing. Students can surface uncertainty, rehearse interpretation of errors, and prepare more focused questions or action plans for subsequent learning.

This study shifts attention from AI as a feedback-delivery tool to AI as a medium through which learner thinking becomes visible, analysable, and developable. In psychomotor skills education, where competence depends on both repetition and interpretation, AI-supported reflective dialogue may help students transform practice experience into more deliberate clinical performance.

Keywords

AI-scaffolded reflection; student–AI dialogue; psychomotor skills; clinical skills education; health professions education

References

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