How Embodiment Changes AI Tutoring: Comparing Student Perceptions of Text and AI Human Avatar-Based Chatbot Systems

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Outline

Embodiment adds social cues, but not pedagogy by itself

- Text-based generative AI tutors are mainly valued for **explanations, clarification, and practice support**.
- Learner interaction is typically dominated by **information seeking**; goal setting and self-evaluation remain rare.
- A live human-like avatar adds **voice, facial expression, and gestures**.
- These cues may increase social presence, but also raise expectations about natural dialogue, empathy, and motivation.
- The open question is whether embodiment changes only the **experience** or also the **learning behaviour**.

Prior text-based deployments: (Brünner & Ebner, 2025; Brünner et al., 2025)

Research Questions

RQ1 – Perception

How do students perceive the communicative qualities and overall usefulness of an avatar-based RAG tutor compared with a text-based system?

RQ2 – Self-regulated learning

Does embodied, multimodal interaction foster different forms of self-regulated learning behaviour in chatbot usage data?

Outline

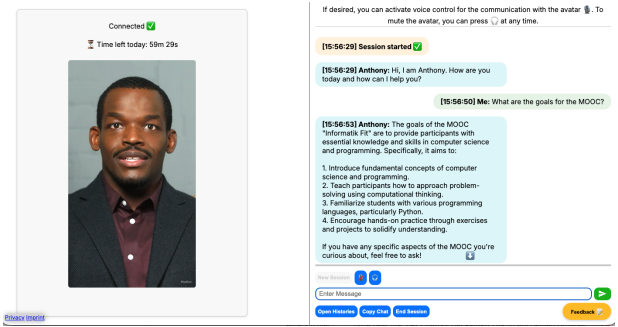
A field deployment connected perceptions with behaviour

- **Design-Based Research** deployment in two authentic higher-education contexts:
  - introductory computer science,
  - introductory Python programming.
- Voluntary use of an avatar-based RAG tutor.
- **Questionnaires:** users and non-users, with items comparable to the prior text-based deployment.
- **Interaction logs:** 341 anonymised user messages, coded with an adapted SRL process-action framework and manually reviewed.

SRL framework: (Lai, 2024)

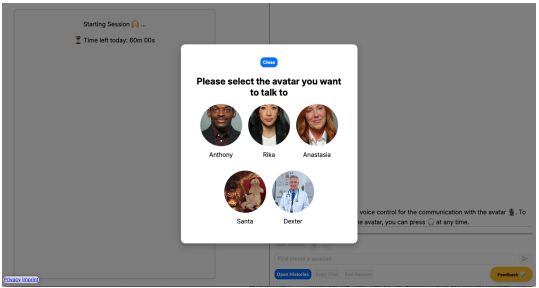
The tutor combined RAG with a live human avatar

- Course-specific knowledge base with Retrieval-Augmented Generation.
- Real-time avatar with synchronised speech, facial expression, and gestures.
- Text or voice input with visible voice transcripts.
- Answers remained available as text; the full chat history could be reviewed and copied.



Main tutoring interface: live avatar and parallel text chat.

Learners retained choice and transparency

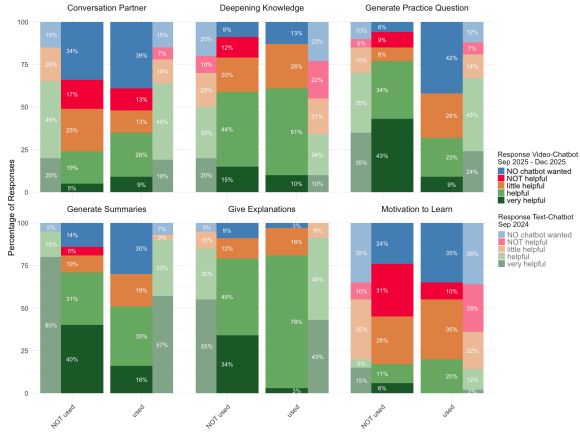


Optional character selection before the session.

- Learners selected among predefined appearances and voices.
- GDPR-compliant consent was collected; no audio recordings were stored.
- Source code, knowledge base, and data-processing scripts were released openly.
- A daily session limit controlled computational and API costs.

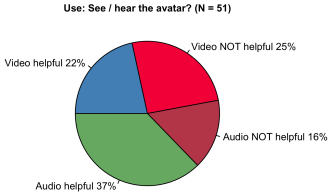
Outline

Learning-support ratings stayed close to text-only patterns

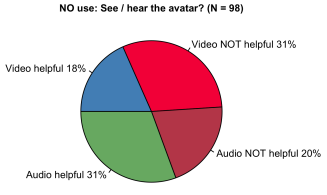


- Explanations and practice support remained the strongest perceived functions.
- Motivation support remained comparatively weak.
- The exception was the **communication-partner** dimension: active avatar users rated it more positively than non-users.

Audio mattered more than the visual avatar



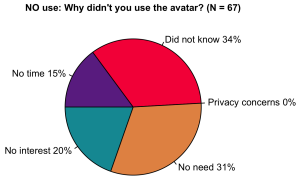
Users: perceived value of video and audio ($N = 51$).



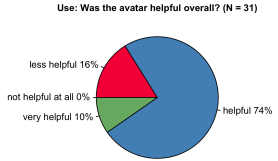
Non-users: perceived value of video and audio ($N = 98$).

- Users rated audio more positively than video: **37% versus 22%**.
- Non-users showed the same pattern: **31% versus 18%**.
- Visual embodiment was evaluated more critically than speech.

Adoption was positive; non-use was mostly situational



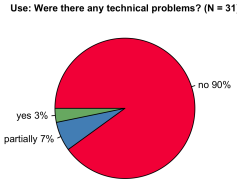
Main reasons for non-use ($N = 67$, multiple selections).



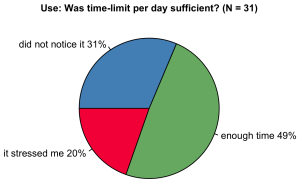
Overall helpfulness among active users ($N = 31$).

- Non-use reflected **lack of awareness** and **no perceived need**, not privacy concerns.
- **74%** of users rated the tutor helpful and **10%** very helpful.
- No user selected “not helpful at all”.

The prototype was stable, but the time cap added pressure



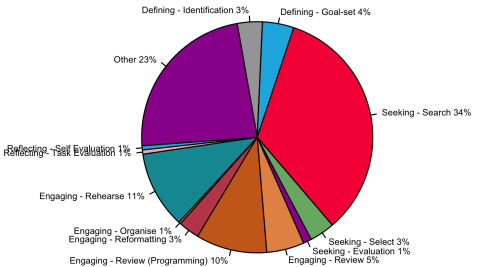
Reported technical problems among users ($N = 31$).



Perception of the daily time limit ($N = 31$).

- **90%** reported no technical problems.
- **49%** considered the daily limit sufficient and **31%** did not notice it.
- **20%** experienced the limit as stressful; **88%** supported offering the tutor again.

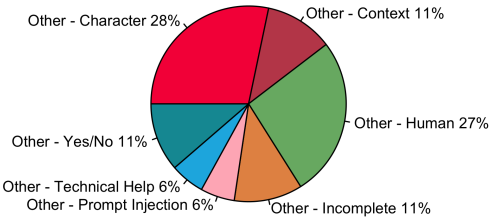
Embodiment did not shift learners toward deeper SRL



SRL action-process distribution in 341 user messages.

- **Seeking–Search: 34%** – still the dominant action.
- **Engaging–Rehearse: 11%**.
- **Programming review: 10%** – a distinct course-specific mode.
- Task evaluation and self-evaluation: only **1% each**.
- Embodiment alone did not trigger more goal setting or reflection.

Embodiment also attracted peripheral dialogue



Breakdown of the “Other” category ($N = 80$).

- “Other” interactions increased to **23%**, compared with **11%** in the text-only deployment.
- Character prompts (**28%**) and human-likeness checks (**27%**) made up most of this category.
- The remainder included incomplete input, prompt injection, and technical help: social presence created motives beyond learning.

Outline

The two research questions point to different effects

- **RQ1 – Perception:**
  - Embodiment improved the tutor's perceived role as a communication partner.
  - Core instructional usefulness stayed broadly comparable to the text-only deployment.
  - Audio contributed more perceived value than the visual avatar.
- **RQ2 – SRL behaviour:**
  - Information seeking continued to dominate interaction.
  - Metacognitive actions remained rare.
  - Embodiment added peripheral dialogue rather than deeper regulation.

Future tutors need scaffolding, control, and role clarity

- **Prompt forethought:** ask learners to define a goal before requesting help.
- **Support monitoring:** use self-check questions and ask learners to explain or test their reasoning.
- **Trigger reflection:** end sessions with summaries, confidence checks, and next-step planning.
- **Separate programming support:** frame code review as iterative learning rather than answer generation.
- **Offer modality control:** let learners select text, audio, or avatar presentation.
- **Manage expectations:** communicate capabilities, limitations, privacy, and the tutor's pedagogical role during onboarding.

Limitations shape the next comparison

Limitations

- Voluntary participation and self-selection.
- Short deployment period.
- No direct learning-outcome measure.
- Contextual differences from the prior text-based study.
- Dependence on one avatar technology provider.

Next research steps

- Controlled text versus audio-only comparisons.
- Adaptive motivational and SRL scaffolds.
- Longitudinal studies across courses.
- Learning outcomes alongside perception and logs.
- Effects of modality control on trust, agency, and AI literacy.

Take-away: social presence is not self-regulation

- A live avatar can make an AI tutor feel more like a **communication partner**.
- It does not automatically change the tutor's dominant role as an **information source**.
- Visual embodiment can also redirect attention toward the character and away from learning.
- The next design step is therefore not "more human-like", but **more pedagogically explicit**.

References I

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Questions & Discussion

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