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Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Enhancing reflective practices in higher education with AI-supported anthropomorphic coaches

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This paper reports on a pilot study exploring the use of generative AI and anthropomorphic coaches to enhance students' reflective practices. Reflective practice is crucial for critical thinking and self-awareness. AI-driven feedback systems and lifelike avatars may create interactive, engaging environments for deeper student reflection. Drawing on observations from an ongoing project using Soul Machines Studio at the University of Auckland Business School, this inquiry considers anthropomorphic AI coaches' ability to provide timely feedback and support reflective work in postgraduate courses. As a work-in-progress, we describe two use cases: (a) Refining team collaboration through AI-guided reflection and (b) providing feedback on reflective journal writing. We also outline future work on scalability, longitudinal studies, learning management system integration, cross-cultural adaptation, and ethical frameworks. We highlight AI's potential to develop students' reflective practices and contribute to integrating advanced technologies in education.

Keywords: AI in education, reflective practice, avatars, coaching, AI-driven feedback, anthropomorphic AI, case study

Introduction and key literature

Reflective practice is crucial for effective learning and professional development, allowing individuals to gain insights from their experiences and improve future actions. At the University of Auckland Business School (UABS), we recognise the transformative potential of reflective practices. Our educational approach integrates structured exercises, which improve students' critical thinking and self-awareness, addressing the need for deep learning and personal development. Reflective coaching also helps educators develop these skills and enhance their teaching practices (Ghaye, 2011). At UABS we are, ourselves, reflective and continuously look for ways to advance learning in this area. In this article we consider how artificial intelligence (AI) may provide support.

Artificial intelligence (AI) in education can enhance learning and adaptive feedback, tailoring opportunities to individual student needs (Holmes et al., 2019; Luckin & Holmes, 2016). One promising avenue is the use of anthropomorphic AI, where systems are designed with human-like characteristics to foster engagement and relatability. Li and Suh (2022) have reviewed the role of anthropomorphism in AI, highlighting its potential to make interactions with AI more intuitive and emotionally resonant. Some research indicates that learners are more engaged when interacting with AI that exhibits human-like traits, as these characteristics can create a sense of connection and increase motivation (Go & Sundar, 2019). However, there are also concerns about the potential for such anthropomorphism to lead to misconceptions regarding AI's true capabilities. Placani (2024) emphasises that anthropomorphism may distort users' perceptions, leading them to attribute agency and moral reasoning to AI systems that lack such capacities. This underscores the need for a balanced approach when integrating anthropomorphic AI into educational settings, ensuring that the technology's benefits are harnessed without exacerbating misunderstanding or misdirection.

At UABS, our approach to AI integration has been characterised by a willingness to experiment with emerging technologies to enhance learning outcomes. We have seen that reflective practices, in particular, may benefit from AI tools that provide timely, direct feedback (Woolf, 2009) aligned with best practice frameworks (e.g., Daudelin, 1996; Schön, 1983). Such systems have the potential to analyse reflections, identify patterns, and

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suggest areas for further self-exploration, thereby deepening student engagement and improving learning outcomes.

Guided by the following two questions, this paper explores the use of AI-driven anthropomorphic reflective coaches during a pilot study at UABS. First, how can they enhance reflective practices among students? Second, how can they assist educators in providing more effective reflective coaching?

Context and methods

Context

The study was conducted in the context of final-year postgraduate courses that prepare students for a team capstone project. These courses are part of an online asynchronous program and were chosen for this pilot due to the challenges in providing human-driven reflective coaching in a remote learning environment. Also, the development of critical thinking, self-awareness, and reflexivity are key components of UABS's assurance of learning for the program and reflective journaling forms a substantive part of students' assessments.

Development and implementation of the AI anthropomorphic coach

Soul Machines Studio (Soul Machines Studio, n.d) is a University of Auckland pioneered platform that creates realistic, expressive AI-powered digital humans for natural user interactions. Using advanced AI and animation technologies, it develops lifelike avatars that engage in rich conversations. The Soul Machines supported AI coach was developed to embody the qualities of an expert reflective coach. The coach's personality was designed to be empathetic, supportive, and engaging (Duffy, 2003; Johnson & Lester, 2016).

The Soul Machines supported AI coach was connected to the GPT-4o large language learning model via a project-specific OpenAI API key. The knowledge base was directed towards Daudelin's (1996) four-stage reflective framework (problem articulation, problem analysis, tentative theory, and action) as well as other foundational reflectivity conceptualisations and reference materials (e.g., Kolb, 1984; Moon, 2004; Schön, 1983). The AI coach was recently piloted with a small group of students to evaluate its initial effectiveness during a group capstone project. The AI coach was aligned with course objectives and integrated into assignments that involved ongoing reflections on project challenges supported by reflective journaling. Feedback from this pilot is being used to enhance the coach's functionality and responsiveness in preparation for broader implementation.

Further to our initial broad aim for the AI coaches, two interesting use cases emerged as we worked with the technology. These are presented next as illustrations of the utility of these coaches. Observational data was collected using an approach informed by action research (Mertler, 2019), emphasising our continuous learning and developing during educational design. The uses cases are presented below as short vignettes with the aim of "showing readers how things work" rather than telling them (Jarzabkowski et al., 2014, p. 280), and so reveal key elements of the use of these AI coaches in practice during the pilot study.

Note how both cases draw systematically on Daudelin's (1996) framework. Also note that student privacy is maintained in both use cases in accordance with the University's ethical AI guidance. Conversations with the AI coaches are controlled by the user and conversation history is not shared with others. In accordance with the methodology outlined above (Jarzabkowski et al., 2014), vignettes below are illustrative only.

Findings

Case 1: Refining team collaboration through AI-guided reflection

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Consider the scenario where a hypothetical student (let us call them Alex), is struggling with a recent group project. Alex's group project had not gone as planned, and he was feeling increasingly frustrated with the lack of progress and team dynamics. Seeking help, Alex decided to interact with the AI coach, which had been integrated into his course to facilitate reflective practice.

When Alex initiated the session, the coach used its empathetic design to create a welcoming atmosphere. 'Tell me about your group project, Alex,' the coach prompted, its lifelike avatar maintaining eye contact and offering a supportive demeanour. Alex began to describe the project, detailing the challenges his team faced. He mentioned issues with communication and a lack of clear roles, and the coach probed Alex' frustrations.

The coach guided Alex through Daudelin (1996)'s problem analysis stage, emphasising the importance of reflexivity and self-analysis. 'Why do you think you felt frustrated during the project?' the coach asked. Alex paused, reflecting on his emotions. He realised that his frustration stemmed not only from the team's disorganisation but also from his own expectations and communication style. 'How did your actions contribute to the team's challenges?' the coach continued. This question prompted Alex to consider how his reactions and behaviours might have exacerbated the situation.

Through a series of further guided questions, the coach helped Alex formulate a tentative theory. Alex hypothesised that if he communicated his concerns more constructively and sought feedback from his teammates, the team's dynamics might improve. 'What changes could you make to your approach to improve team dynamics?' the coach prompted. Alex decided to implement regular check-ins with his team and to practice active listening to better understand his teammates' perspectives.

Finally, in the action stage, the coach assisted Alex in deciding on concrete steps to improve future group projects. Alex outlined a plan to enhance team motivation and cohesion, including setting clear roles and responsibilities and fostering open communication. The coach's feedback and actionable insights empowered Alex to apply the lessons learned from the reflective process, fostering self-awareness, continuous improvement and personal growth.

Case 2: Providing feedback on reflective journal writing

In another application, a lecturer used the AI coach to help provide feedback on students' reflective journals. This process, conducted asynchronously in the online learning environment, provided lecturer-mediated support to the student to enhance the quality of their reflective practice, making future journal entries more structured and insightful.

To illustrate this, the journal entry of another student, Julia, described her team's lack of motivation after a break and the strategies implemented to address it. Julia had submitted her journal entry through the learning management system (LMS), Canvas. The lecturer read the submission and then inputted the student's journal into the Soul Machines system for evaluation.

The AI coach first assessed the problem articulation. 'Julia mentioned a general lack of motivation, but we need to help her clarify the specific problem,' the coach suggested. In their written feedback, the lecturer was then guided to suggest how the student might rephrase the problem statement: 'After the break, our team, including myself, lacked motivation, which hindered our productivity and enthusiasm for new tasks.' Next, the AI coach analysed the student's explanation of exhaustion from previous tasks but encouraged a deeper analysis of personal feelings and behaviours contributing to the issue, for example: 'Why does Julia think she felt exhausted after the break?' and 'How did this affect her work and interactions with the team?' The coach prompted the lecturer to encourage the student to reflect on their own role in the teams' motivation issues. The coach's questions supported the lecturer in helping the student consider how their feelings and behaviours influenced the team's dynamics.

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For the tentative theory, the coach acknowledged the student's written suggestion that the team celebrate milestones and setting SMART goals but encouraged more explicit testing. Julia could 'formulate and test a hypothesis based on her analysis,' the coach advised, 'such as "I hypothesise that by regularly celebrating small achievements, the team's motivation will improve"'. The lecturer drew on this in their written feedback to encourage the student to describe actions that could be taken to test this hypothesis and note the impact on the team's morale and productivity. In the action stage, the coach reviewed the student's current practices and suggested reflecting on their effectiveness. 'What results might Julia observe from implementing her strategies to boost motivation?' the coach asked. The lecturer used this guidance to help the student refine their approach based on these reflections, fostering continuous improvement.

The AI coach also provided feedback to the lecturer on how to guide students in improving their future journals. It emphasised clear problem articulation and deeper self-analysis. For example, 'In the next journal entry, Julia might define the problem clearly and reflect on her emotions and actions in detail,' the coach suggested. 'She should set specific, measurable goals for testing her hypotheses.' The lecturer incorporated this targeted feedback into their written comments, which were then read by the student.

Discussion

Implications: Leveraging the capabilities of Soul Machines supported AI coaches

Based upon these case illustrations, the integration of Soul Machines supported AI coaches in educational settings has potential to enhance traditional methods of reflective practice. The lifelike avatars create emotionally supportive environments, which may foster a sense of connection, making students feel more comfortable and open while reflecting on their teamwork.

This system of real-time AI-driven feedback can provide more timely, specific, and actionable insights into problems and challenges as they arise. It also supports students in writing their reflective journal entries. By analysing reflections and identifying patterns, the coach can suggest areas for further exploration, helping students to engage more deeply with their situated learning experiences. Prompts and feedback help students develop critical thinking and self-awareness, improving the overall quality of reflective practices. Overall, we hope this might support students' self-directed learning and encourage them to take charge of their reflective practice.

The AI coaches can also assist educators by facilitating reflective discussions and providing constructive journal feedback. In online asynchronous learning environments, where human-driven reflective coaching is challenging, Soul Machines supported AI coaches offer a scalable and effective solution, where staff and students can engage with them at any time. This capability aligns with UABS' principles of equity, and we hope that it may offer students in remote or asynchronous settings the same level of reflective guidance and support as their counterparts in our more traditional, in-person courses.

Future work at UABS

As part of our broader plan at UABS to align AI-enhanced learning with the University of Auckland's strategic goals (Taumata Teitei, n.d.), we are planning several key steps for the integration of Soul Machines supported AI coaches in educational settings. First, scalability testing will expand the implementation of AI coaches to larger groups of students and educators across different disciplines, providing insights into the technology's scalability and generalisability. This aligns with our priority to embed AI literacy and skills across all disciplines. Second, longitudinal studies will assess the long-term impact of AI-driven reflective coaching on student learning outcomes and personal development, identifying sustained benefits and areas for improvement. Further integration of AI coaches with our LMS will streamline feedback and tracking of student progress, enhancing the usability and accessibility of these AI tools.

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Third, cross-cultural adaptation is crucial to ensure the technology is inclusive and effective for our diverse student population. This involves tailoring the coach's personality and responses to reflect cultural nuances, particularly to align with our commitment to Te Tiriti o Waitangi ((The Waitangi Tribunal and the Treaty, n.d.). Finally, developing a comprehensive ethical framework for AI in reflective practice is essential. This framework will address issues such as data privacy, consent, and algorithmic bias, guiding the responsible implementation of AI technologies (e.g., Floridi & Cowls, 2022).

Conclusion

The integration of generative AI and anthropomorphic reflective coaches in higher education holds promise for enhancing reflective practices. This paper has given early insights into how Soul Machines supported AI coaches can provide interactive, emotionally engaging, and adaptive feedback, fostering deeper student reflection and improving learning outcomes. By supporting both students and educators, these tools may streamline the reflective process, promote self-directed learning, and enhance critical thinking and self-awareness.

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