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Collaboration, Creativity and Compassion in a Digital Society

Ako AI Agents: Early experiences in the development of design principles

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Generative artificial intelligence (AI) is increasingly affecting tertiary education, creating both challenges and opportunities. This study explores the development of pedagogically designed AI agents to support nursing education across three Institutes of Technology and Polytechnics in Aotearoa New Zealand. Using a design-based research (DBR) approach, this paper reports on the first iteration of three agents intended to support key challenges facing nursing education. Initial design principles were developed after a review of relevant literature. The agents were developed in line with these principles, and learner feedback was collected through surveys (95 responses) and focus groups. Survey responses indicated generally positive learner perceptions of the agents as supplementary learning tools supporting understanding, confidence and independent learning. Focus group feedback informed refinements to the agents and the design principles, including personalised feedback, learner support and deeper integration of Te Tiriti o Waitangi. The study offers preliminary, practice-informed guidance for designing AI-supported nursing education; subsequent iterations will further refine the agents and design principles.

Keywords: generative artificial intelligence, AI agents, nursing education, learning design, design principles, design-based research

Introduction

Tertiary learners and educators operate within an increasingly complex environment. Our learners are facing increasing social and financial pressures, making it all the more challenging to provide adequate support. While recent developments in technology such as generative AI add to these pressures, they also offer opportunities to improve aspects of the tertiary learning experience. Since the public introduction of ChatGPT, the use of generative AI in education settings has grown dramatically (Parker et al., 2026). In many ways this growth has outpaced the ability of educators to adapt, as they are experiencing these technological changes at the same time as their students.

This study focuses on the educational challenges currently faced within nursing education across three Institutes of Technology and Polytechnics (ITPs) in Aotearoa New Zealand and the potential of generative AI to address those challenges. The project team worked with an educational leadership group including representatives from the three ITPs to identify the most pressing challenges they face in nursing education through a series of initial meetings. Together, they identified three priority areas across the three years of the degree programmes. These were drug calculations in the first year, communication in the second year and critical thinking in the third year of study. The project team then explored the use of generative AI agents with these challenges in mind, using a design-based-research (DBR) methodology.

Design principles

Before the commencement of development of AI agents, an exploration of the relevant literature was conducted to inform a set of design principles. It was critical to begin with a sense of which approaches the literature indicated could support learning and which should be avoided.

Empirical studies suggest that unstructured use of generative AI can lead to a reduction in the domains of critical and creative thinking, triggering cognitive offloading (Li et al., 2026). Not all cognitive offloading is

detrimental to learning, however. Beneficial offloading can be supported through intentional pedagogical design of generative AI tools that perform tasks such as providing scaffolding, structured practice and feedback to the learner. Further to this, metacognitive prompting that encourages the learner to reflect and assess their understanding can promote the productive struggle needed for learning to occur (Lodge & Loble, 2026). Concepts such as these formed the basis for the design principles used in the development of agents to support nursing education.

Table 1.
Initial design principles and supporting literature

Principle	Selected supporting literature
Prioritise the development of learners' skills, understanding, and critical thinking rather than delivering ready-made answers.	Chi & Wylie, 2014; Kapur et al., 2005; Li et al., 2026; Lodge & Loble, 2026
Ensure agents prompt learners with follow-up questions, guidance, or challenges that deepen engagement.	Chi & Wylie, 2014; Lodge & Loble, 2026; Wood et al., 1976

Method and design cycle

DBR was adopted as the methodology for this study as an approach that blends theory with practice through a rigorous process of iterative cycles (McKenney & Reeves, 2013). This paper reports on the first iteration of the study, conducted in the second half of 2025. A second iteration was conducted in the first half of 2026, and a third iteration is planned for the second half of 2026; these will be addressed in a future publication. The study began through initial meetings with practitioner experts from the nursing education schools. Through these meetings three areas of focus were determined. These areas of focus were considered alongside guiding literature to define a set of initial design principles and three AI agent concepts to be developed. These agents were built with iterative development and testing cycles, including broad subject matter expert testing and testing with past students. Once this process was complete, iteration one began, with the three agents made available to current students enrolled in appropriate classes across the three institutions. A survey was administered to those students and a subset of six students from each institution formed a focus group for each agent after having used the agent. Feedback from the survey and focus group data collection was then used to inform the next iteration where the design principles and the agent designs were refined.

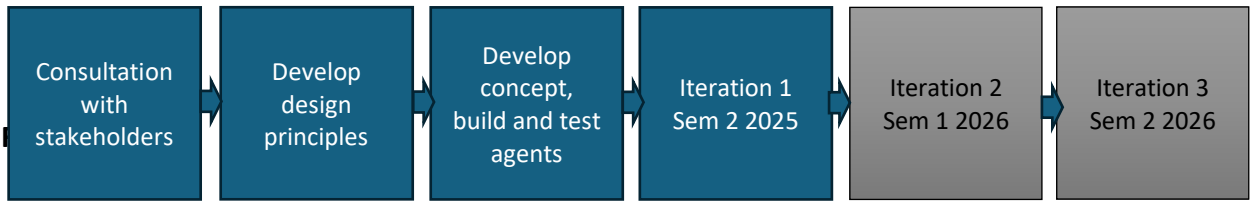


Figure 1. *DBR project iterations*

Findings

Survey

Users of the three agents across the three tertiary institutions were encouraged to take part in a survey to gauge their perceptions of their experience with the agent they worked with. A total of 95 survey responses were collected across the three nursing-focused AI Ako Agents (Drug calculation n = 59; De-escalation n = 24; Deteriorating patient n = 12).

Survey responses for the Drug calculation AI Ako Agent suggested that students generally perceived it as a useful supplementary learning tool. They found it particularly useful for revision, practice questions and independent study. The strongest responses related to the students' intention to continue using the agent, its perceived support for effective learning, and their understanding of course content. Preference between the agent and face-to-face learning was mixed, suggesting the tool is a useful augmentation rather than a replacement.

The De-escalation AI Ako Agent survey produced a generally positive pattern of student perceptions. Students were most positive about the agent helping their learning, supporting effective learning, improving confidence and encouraging responsibility for learning. Mixed responses were provided related to the agent's usefulness compared with face-to-face instruction and cultural inclusivity, suggesting that further refinement may be needed to more consistently support a culturally responsive and Te Tiriti o Waitangi-aligned learning experience which is critical in the field of nursing in Aotearoa.

The Deteriorating patient AI Ako Agent survey produced highly positive student perceptions, although these must be interpreted cautiously given the low number of responses. All respondents indicated that they would recommend the agent to others and would like to see agents like this in more of their courses. This agent received very positive responses related to learner perceptions of cultural inclusivity and alignment with Te Tiriti o Waitangi health principles, suggesting this approach may be beneficial for future development of the other agents.

Focus groups

The focus groups allowed for a deeper dive into the experience of a subset of users of each of the agents. Focus groups were conducted at each of the institutions for each of the agents with six student users. This concise paper will focus on the focus group findings that have shaped changes to the design principles and agents that moved forward to the second iteration. Comments from users of the agents were synthesised into nine categories of suggested changes to the agents. The table below outlines the different suggestions, including which agents they were suggested for and which agents each change was adopted in.

Table 2.
Focus group suggestions and adoptions

	Drug calculation		**De-escalation**		**Deteriorating patient**	
Suggested	Suggested	Adopted	Suggested	Adopted	Suggested	Adopted
Personalisation and adaptivity	Y	Y			Y	N
Engagement/gaming features	Y	Y			Y	N
Voice integration	Y	N	Y	N	Y	N
Onboarding and support	Y	Y				
Conversation starters	Y	Y	Y	Y	Y	Y
Deeper integration of Te Tiriti o Waitangi			Y	Y	Y	Y
Adaptive scaffolding of learning			Y	N		
Links to the LMS content	Y	N	Y	N	Y	N
More personalised feedback			Y	Y	Y	Y

Discussion

Data from iteration one indicated that students broadly perceived the agents as useful, while the focus groups identified priorities for further development.

Feedback inspired agent improvements

It became clear through the focus groups that a stronger introduction to the agents would benefit all three groups, particularly as these types of agents are relatively new for our learners. As a result, a rollout plan was

developed for each agent, including how it is introduced to classes. Conversation starters were requested across all agents and seen to be a straightforward addition that would help learners to have an idea of what they can do when interacting with the agents. A range of different requests were made related to personalisation or adaptivity in the agents. Adaptivity of the activity was only adopted in the Drug calculation agent for iteration two. Given the mathematical nature of that agent, it was easier to implement and feedback from its use in the second iteration could inform future changes in the other two agents. This adaptivity was also connected with a new gamification element, providing users with scoring feedback as they progressed. However, more personalised feedback was developed for the De-escalation and Deteriorating patient agents. The two simulation-style agents were ideal candidates for deeper integration of Te Tiriti o Waitangi material, which was added through some of the dialogue, options with the patients and an understanding of *tikanga* (protocols) for engaging with the virtual patients.

Two items that were not addressed in any of the agents were the inclusion of voice interaction and direct links to LMS content. Voice was evaluated and at this stage not included for the iteration two updates. At this stage the voice integration was at times slow and unnatural because it required multiple steps: transcribing speech, passing the transcription to the model, and converting the response back to speech. The model was also not effective when working with te reo Māori which is a critical requirement for these agents. This will be revisited in future as the technology improves.

Revised design principles

Table 3.
Revised design principles and supporting literature

Principle	**Selected supporting literature**
Prioritise the development of learners' skills, understanding, and critical thinking rather than delivering ready-made answers.	Chi & Wylie, 2014; Kapur et al., 2005; Li et al., 2026; Lodge & Loble, 2026
Ensure agents prompt learners with follow-up questions, guidance, or challenges that deepen engagement.	Chi & Wylie, 2014; Lodge & Loble, 2026; Wood et al., 1976
Personalise feedback to learners	Hattie & Timperley, 2007; Martin et al., 2025; Wang et al., 2025
Provide support to learners beforehand and during agent use	Practical observation

Conclusion

This first DBR iteration contributes an initial, practice-informed set of design principles for educational AI agents and demonstrates how student feedback can translate into concrete design changes across three nursing programmes. The findings indicate that these agents are best positioned as supplements to, rather than replacements for, face-to-face learning. They also highlight the importance of purposeful onboarding, clear conversation starters, personalised feedback, and culturally responsive design aligned with Te Tiriti o Waitangi. Although the findings are based primarily on learner perceptions and one agent had a small survey sample, they offer actionable guidance for educators developing similar tools. Subsequent iterations will test and refine these principles and examine their relationship with learning outcomes.

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