

Inquiry in Action: Using AI to Reimagine Learning and Teaching: Case Studies from the Frontline of Higher Education Practice

INQUIRY IN ACTION: USING AI TO REIMAGINE LEARNING AND TEACHING: CASE STUDIES FROM THE FRONTLINE OF HIGHER EDUCATION PRACTICE

Case Studies from the Frontline of Higher Education
Practice

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Case Studies from the Frontline of Higher Education Practice



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DEDICATION

To all the contributing authors

*— for your courage to experiment, reflect, and share your practice so openly.
Your work embodies the spirit of inquiry in action and the belief that teaching transforms.*

And to John Raiti,

whose publishing expertise, patience, and good humour brought this collection to life.

ACKNOWLEDGMENT OF COUNTRY

We acknowledge the Traditional Owners and their custodianship of the lands on which this project originated. We pay our respects to their Ancestors and their descendants, who continue cultural and spiritual connections to Country. We recognise their valuable contributions to Australian and global society.



A Guidance
Through Time by
Casey Coolwell
and Kyra
Mancktelow ©
The University of
Queensland

About the artwork

Quandamooka artists Casey Coolwell and Kyra Mancktelow have produced an artwork that recognises the three major campuses, while also championing the creation of a strong sense of belonging and truth-telling about Aboriginal and Torres Strait Islander histories, and ongoing connections with Country, knowledges, culture and kin. Although created as a single artwork, the piece can be read in three sections, starting with the blue/greys of the Herston campus, the purple of St Lucia and the orange/golds of Gatton.

The graphic elements overlaying the coloured background symbolise the five UQ values:

- The Brisbane River and its patterns represent our Pursuit of excellence. Within the River are tools used by Aboriginal people to teach, gather, hunt, and protect.
- Creativity and independent thinking is depicted through the spirit guardian, Jarjum (Child in Yugambeh language), and the kangaroo

- The jacaranda tree, bora ring, animal prints, footprints and stars collectively represent honesty and accountability, mutual respect and diversity and supporting our people.

FOREWARD

Stan Karanasios

Over the last three years, AI has moved from the margins of educational technology to the centre of teaching practice. The question is no longer whether AI belongs in higher education, but how to integrate it with purpose and academic integrity.

I see two major tasks moving forward. First, we must design pedagogies that use AI to improve learning outcomes rather than automate for convenience. The opportunity is clear: with care and sound pedagogy, AI can personalise feedback, democratise access to information, and free educators to focus on mentoring and higher-order interaction and supervision.

Second, we must nurture students' use so they benefit from this technology. It can help students ask better questions, learn more deeply, and reason transparently. Here there are risks to manage. Emerging research suggests that overreliance on AI can erode recall, analytical ability, and critical thinking. We also know that models can hallucinate, encode bias, and obscure accountability. These are not reasons to avoid AI; rather, they are reasons to teach with it openly, make reasoning explicit, and design for verification, context, and challenge. This is especially important during the exploration and learning phase of implementation.

Despite these opportunities and risks, the mission of higher education is unchanged: to develop knowledgeable graduates with domain expertise, critical thinking, ethical awareness, and the confidence to lead in business, government, and society. In fact, tertiary education matters more than ever, with universities expected to show they produce knowledgeable, work-ready graduates.

This book brings together colleagues who have done the hard work of moving beyond the hyperbole around AI into practice. The work here contributes to our educational mission to cultivate future-ready graduates. Their classrooms are laboratories of curiosity and learning. Readers will find designs to adapt, pitfalls to avoid, and leadership guidance to create coherent courses and programmes. It will be helpful to educators currently implementing, or unsure how to implement, AI and to scholars of teaching and learning seeking evidence of best practice and advances in pedagogy.

About the author

Professor Stan Karanasios

THE UNIVERSITY OF QUEENSLAND

Stan Karanasios is a Professor of Business Information Systems at The University of Queensland Business School. His research examines how digital technologies transform work, organisations, and society, with a particular interest in how people engage with emerging technologies such as artificial intelligence. Drawing on activity theory and socio-technical perspectives, his work explores how technology shapes organisational practices, knowledge creation, and decision-making in complex and resource-constrained contexts. His current projects investigate the implications of AI for human work and learning, the ethics of digital transformation, and the ways in which AI can support responsible innovation in education and business.

INTRODUCTION

Rachel Fitzgerald

This collection began with a shared vision, to reimagine how educators and students could engage with artificial intelligence (AI) through inquiry, design and reflection to represent core values of higher education: curiosity, care, and critical inquiry. The project grew from a recognition that practice, not policy should lead the conversation about AI in learning. Across disciplines, staff and students came together to make teaching and learning visible, to surface, through the Scholarship of Teaching and Learning (SoTL), how they are experiencing and shaping this moment of technological change. Consistent with SoTL's commitment to students-as-partners, the project positioned learners as co-designers, co-authors, and co-evaluators throughout the work (Felten, 2013; Cook-Sather et al., 2014).

Emerging from a 2024 Teaching Innovation Grant at the University of Queensland (UQ), *Inquiry in Action* formed a community of practice, a network of educators and students experimenting, reflecting and writing together to navigate AI's uncertainties and explore its potential as a pedagogical partner. Throughout the project, educators approached AI as a catalyst for reflection, creativity and renewed attention to their teaching. Each contributor began with a practical question such as how might AI enhance feedback or inclusivity or engagement? Their classrooms became living laboratories where teachers and students co-designed, tested, and refined new learning experiences. Collectively, these chapters illustrate how SoTL and design-based inquiry can guide responsible innovation that is iterative, evidence-based, and grounded in authentic disciplinary practice (Felten, 2013; Fitzgerald et al., 2025).

The contributors to this volume represent a cross-section of disciplines, from dentistry and dietetics to economics, engineering, and information systems. Each case reflects a unique context, yet all share a common commitment to exploring how AI can enhance the human dimensions of learning. The project created space for educators and students to experiment safely, to document their insights rigorously, and to connect local innovations to broader questions of pedagogical design, ethics, and impact. By situating each case within a shared SoTL framework, this collection transforms individual acts of experimentation into a collective inquiry into how teaching and learning evolve in the age of AI. Together, these cases demonstrated that leadership in learning and teaching rests on fostering the curiosity, courage, and community that enable transformation to take root, a learner-centred leadership stance that aligns

institutional purpose with the lived experience of learners through trust, collaboration, and shared responsibility (Krause, 2023).

The chapters are organised to trace a progression, from early experiments that introduce AI as a practical teaching tool, to more mature designs that embed it as a partner in inquiry, reflection, and assessment. Each section builds on the last, moving from exploration to integration, from individual innovation to collective learning. Together, they showcase the range of ways educators are making sense of GenAI in context: redesigning learning tasks, scaffolding ethical reasoning, rethinking feedback, and strengthening inclusivity through co-creation with students. *Inquiry in Action* also honours the people who brought it to life. The educators and the students who contributed to this collection model leadership that is relational and grounded in curiosity, evidence and care. This is SoTL in Action, inquiry that values partnership, is grounded in context, and aims to improve learning. In curating this work, the project seeks to create a living record of what responsible, values-led AI engagement looks like across higher education.

Much of the literature on AI in higher education is theoretical, descriptive or tool-focused (Zawacki-Richter et al., 2019). *Inquiry in Action* seeks to fill that gap by showing how AI integration unfolds pedagogically through the relationships, choices, and the values that shape learning. Across the book, educators use frameworks such as Technological Pedagogical Content Knowledge (TPACK) and Universal Design for Learning (UDL) to ensure that design remains mindful of inclusion and understanding. Several authors embed self-regulated learning principles, reflective cycles, and participatory ethics, positioning students as partners in shaping learning. A commitment to partnership pedagogy underpins the entire collection. Students co-authored, co-tested, and co-evaluated many of these interventions, offering insight into the opportunities and tensions of AI-enhanced learning. This work reflects a philosophy of leadership through learning that recognises innovation as a collective, relational process. By bringing together educators and students across disciplines, *Inquiry in Action* demonstrates that curiosity, care, and collaboration remain the foundation of transformation in the age of AI. Across the collection, partnership is enacted in concrete ways, from co-writing and co-analysis to student-led evaluation reflecting the Students-as-Partners framework (Healey et al., 2016; Cook-Sather et al., 2014).

The early chapters explore the foundations of AI literacy and ethical confidence. Sowmya Shetty and Divya Anantharaman's *Starting Smart with AI* describes a large-scale, first-year health course that introduces students to AI through structured, reflective practice. Their design scaffolds prompting, critique, and attribution, showing that ethical confidence begins with transparency and consistency in assessment (see

Shetty & Anantharaman, this volume). They make a persuasive case for early, supported exposure to AI before students encounter it informally as essential for professional readiness. Building on this, Nantana Taptamat, Marnie Holt, Dominic McGrath and student partners Tiarna McElligott, Lauren Miller, and Hana Purwanto's *From Anxiety to Agency* charts how uncertainty about AI can be transformed into ethical capability. Co-creating the Science Generative AI Essential Guide with students, they model partnership pedagogy in action, treating students' lived experiences of confusion and curiosity as design data (see Taptamat et al., this volume). Their work reveals that agency develops when students are invited to shape, critique, and own the norms of responsible use.

Across disciplines, these cases reveal that curiosity about AI was often matched by caution. Many students approached the technology with a blend of fascination and fear, uncertain about its legitimacy, doubtful of its accuracy, and uneasy about authenticity. In *Starting Smart with AI* and *From Anxiety to Agency*, educators reframed this hesitancy as a space for learning rather than a limitation. By acknowledging students' reluctance, and designing for transparency, educators helped transform student scepticism into ethical awareness and reflective agency. Later in the book, Weerakoon's and Wright's health-focused case will also show how trust develops through dialogue and human presence. These moments of hesitation serve as a good reminder that learning begins when uncertainty is named, shared, and explored together.

Melinda Pratt and Iris Zhang's *Leading with Responsible AI* provides a philosophical counterpoint. Set within education and creative inquiry, their chapter examines how students distinguish between human and automated creativity. They show that ethical learning involves technical and cognitive judgement, and also attentiveness, imagination, and moral reflection (see Pratt & Zhang, this volume). Here they show how AI is a mirror for what it means to learn and create as a human being. Taken together, these chapters help us to move the conversation toward curiosity and awareness, and importantly, from tool-use to ethical engagement.

The middle of the book turns to design and how AI can make learning more inclusive, relevant, and connected, and reveals the pressures and paradoxes of doing so. Arosha Weerakoon's *Designing with AI* details a rapid, real-time digital uplift in two dentistry courses, where GenAI was used as a co-creative assistant to streamline design and enhance patient-centred learning. Her story captures both the possibilities and precariousness of GenAI. As a clinician-academic balancing teaching, research, and professional practice within tight workload constraints, Weerakoon demonstrates how technology can clarify expectations, reduce cognitive load, and support diverse learners when guided by universal design principles and supported by structured

success criteria, multimodal resources, and transparent AI use. Her findings also caution that “AI-ness” such as synthetic voices, perceived artificiality, and questions of authenticity can undermine trust in a student-staff relationship if not framed by a clear pedagogical purpose (see Weerakoon, this volume).

Olivia Wright and her student partner Shreyasi Baruah continue the theme in *Integrating Generative AI to Strengthen Counselling and Communication in Dietetic Education*, using AI-powered simulations and chatbots to help students practise empathy and motivational interviewing. Their study illustrates how AI can support clinical communication when introduced sequentially with scaffolds that balance practicality and reflection (see Wright & Baruah, this volume). This is followed by Reihaneh Bidar’s *Paving Paths of Enquiry-Led AI Integration for Future-Ready Learners* which further demonstrates how to bridge inclusion and inquiry. Bidar shows how information systems students progress deliberately from dependency to collaboration and then to integration as they learn to prompt, validate, and critique AI outputs. Her model reflects another focus of this collection, developing technical fluency through thoughtful, critically informed practice (see Bidar, this volume). Across these cases, we can see clearly that inclusion is not achieved by technology alone but from the educators’ capacity to translate feedback, even resistance, into design that re-centres human learning. It is also clear that when AI design is guided by pedagogy, it can augment the human strengths at the heart of this work.

The chapters that follow further the focus on inquiry, reflection, and disciplinary depth. In *Bicycles for the Mind*, Russell Manfield and students Alice Hawkesby, and Nicholas Nucifora test the idea that AI can enhance critical thinking. Their business and innovation class used AI tools transparently to prepare debates, moderate peer resources, and analyse case studies. For the authors, the results affirm Steve Jobs’s metaphor of the computer as “a bicycle for the mind”, so when students are asked to engage critically rather than passively, AI can accelerate learning while maintaining human judgement (see Manfield, Hawkesby, & Nucifora, this volume). John Raiti’s *GenAI in Economics Education* complements this by showing how AI supports inquiry-led learning in economics, helping students to use data to explore behavioural questions while sustaining reflective awareness of their own reasoning processes (see Raiti, this volume). Both cases position AI within disciplinary epistemologies as a tool for thinking rather than producing.

Aneesha Bakharia and student partner Jasmine Burt’s *Teaching with GenAI* offers a methodologically rigorous, TPACK-based approach to integrating AI into computing courses. By aligning technology, pedagogy, and content, they demonstrate how governance, structured prompting, and authentic assessment can coexist to build both employability and ethical awareness (see Bakharia & Burt, this volume). Sean

Mitchell's *Three Paths to AI Integration* brings the section to a close with three distinctive implementations: BBOP, NotABot, and The Lighthouse. Each iteration refines the role of AI, first as a verifier, then as a coach, and finally as a facilitator of reflection to support cognitive engagement and metacognitive growth. His findings reinforce a message echoed across this collection, that thoughtful design, rather than technological sophistication, ultimately determines educational value (see Mitchell, this volume).

What unites these contributions is a shared ethic of inquiry. Each author reminds us that responsible AI integration begins with questions, not answers. They show that design thinking, feedback, and iteration are practices that make learning visible, contextual and human. The diversity of disciplines represented here, from health and science to business, computing, and education, shows that meaningful innovation has little to do with technical prowess and everything to do with how educators make technology serve learning, not the other way around! Across this book, readers will see leadership in its most authentic form, less about positional authority, and more about action grounded in curiosity and reflection. The educators represented here embody what we need in higher education, collaborative leaders who build capability across roles, and innovate practice grounded in shared values of integrity, inclusion, and impact. This vision aligns closely with sentiments from the Australian Universities Accord (Department of Education, 2024), which calls for a sector that values people, partnerships, and purpose. These contributors already demonstrate that future by leading through influence, sharing practice, mentoring peers, and creating space for others to grow. Their stories show how inquiry-led teaching can drive systemic change, connecting micro-level classroom design to macro-level reform.

This approach to leadership finds philosophical resonance in Carmen Vallis's *Leading and Practising GenAI Care-fully* (see Vallis, this volume). Vallis reframes leadership through SoTL as relational rather than hierarchical, grounded in care, curiosity, and shared inquiry. Her call to "lead care-fully" invites educators to embrace uncertainty, to turn experimentation into scholarship, and to treat collective sense-making as a moral and pedagogical act. In this spirit, *Inquiry in Action* becomes more than a showcase of AI integration, it reflects a community of practice embodying the very principles Vallis articulates: curiosity over control, connection over compliance, and leadership through care.

AI has become a catalyst for re-examining the purposes of education, it makes us think about why we teach, what we value, and how we prepare students for a world where knowledge is co-created with machines. Each chapter shows that AI's potential depends on the integrity of pedagogy and the humanity of its teachers. This collection is also a testament to the education community. The Teaching Innovation Grant that

seeded this project was the beginning, the curiosity, collaboration, and care demonstrated by educators who voluntarily participated made it thrive. Despite heavy workloads, these educators found space to question, experiment, and share. They model leadership that is relational and reflective, the kind that changes culture from within. As higher education navigates AI's impact, the message here is clear – begin with learning, stay grounded in evidence, and design for inclusion and integrity – good teaching comes first (Crawford et al., 2023). When educators approach AI as inquiry rather than instruction, they build digital capability and resilience, empathy, and ethical judgement, the qualities that remain uniquely human. This is the mission of higher education, to develop knowledgeable, ethical, and confident graduates ready to lead in a world transformed by intelligence, both human and artificial.

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1.

STARTING SMART WITH AI: A PRACTICAL LITERACY TASK FOR FIRST-YEAR HEALTH STUDENTS

Sowmya Shetty and Divya Anantharaman

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Abstract

Generative Artificial Intelligence (GenAI) is rapidly reshaping healthcare education. This case study reports on the design and implementation of an AI literacy task embedded in HLTH1000, a large first-year cross-disciplinary course close to than 1,500 students. The task introduced tools such as ChatGPT, Copilot, and Claude to support academic writing and critical thinking while foregrounding ethical, professional, and practical considerations. Drawing on student reflections and course evaluation data, we identify perceived benefits, including efficiency, clarity, and a useful starting point for writing, alongside cautions about reliability, bias, overreliance, and the continuing need for human oversight. We outline the instructional design decisions, scaffolds, and workflow used, report challenges related to tutor alignment, digital literacy variance, and submission logistics, and present actionable refinements. We argue that early, structured, and ethically grounded engagement with AI can build digital confidence and professional judgement, provided it is supported by clear guidance, consistent assessment criteria, educator preparation, and robust governance.

Keywords

Generative AI, AI Literacy, Healthcare Education, Academic Writing, Ethics, Assessment Integrity, First-Year Curriculum, Student Reflections

Practitioner Notes

1. Introduce AI literacy in first year with staged practice in prompting, critique, and attribution, then revisit across the program.
2. Require tracked changes, annotated justifications, and a brief AI-use log to centre transparency, evidence, and accountability.
3. Pre-semester alignment and a living FAQ minimise mixed messages in large cohorts.
4. Let students either edit an AI draft or write first and then critique, to support different strengths and reduce overreliance.
5. Embed prompts and exemplars that mirror real healthcare contexts, so students see relevance to future practice.

Introduction

The integration of Generative Artificial Intelligence (GenAI) tools, particularly large language models (LLMs) such as ChatGPT, are important for healthcare education. These technologies offer valuable support in developing academic writing and critical thinking skills essential for clinical practice. GenAI assists students in drafting, editing, and refining healthcare report-style assessments, providing real-time feedback that improves clarity, structure, and coherence. It also helps interpret complex medical terminology and data, making learning more accessible and inclusive.

Thoughtful integration into curricula is vital. GenAI must be used responsibly, guided by ethical principles and supported by institutional frameworks. In healthcare disciplines, where professional integrity is paramount, responsible use is non-negotiable. While GenAI can enhance learning and support clinical reasoning, its implementation requires caution. Issues such as data privacy, ethical implications, and the need for human oversight must be addressed. Transparency and trust are central to AI adoption in healthcare education. Patient confidentiality and strong data governance are critical. Ethical guidelines are needed to reduce bias and promote equitable outcomes. Explainability and accountability help uphold professional standards and ensure safe, effective use of GenAI in clinical settings.

To support these opportunities and challenges, an AI literacy task was introduced into the curriculum of a large cross-disciplinary course with more than seventeen health and behavioural science disciplines participating. The structured activity encouraged students to explore GenAI tools reflectively, considering their ethical, professional, and practical dimensions. This case study examines how such an intervention could promote informed decision-making, digital responsibility, and critical engagement

with AI. By fostering both technical competence and professional integrity, the task aimed to prepare students for the evolving realities of healthcare practice in a digital age.

Background, Evidence and Need

As healthcare prepares students for the digital realities of clinical practice, GenAI has emerged as a challenge and a catalyst for change. Tools such as ChatGPT are transforming how learners engage with information, build arguments and communicate evidence, while opening new pathways for inclusion and engagement. Within a Scholarship of Teaching and Learning (SoTL) lens, this case considers GenAI as a pedagogical development that reshapes how educators cultivate judgement, ethics and professional identity in future clinicians.

The Promise of GenAI in Learning and Writing

GenAI assists students in drafting, editing, and refining healthcare report-style assessments, improving clarity, structure, and coherence through iterative feedback loops (Peláez-Sánchez et al. 2024). These tools also help interpret complex medical terminology and data, making learning more inclusive. Research shows that GenAI can enhance engagement, enable personalised and adaptive learning, and improve academic productivity (Bakthavatchalam & Sivasankar, 2024; Kim et al., 2025).

A growing body of literature highlights the value of GenAI in transforming higher education by enabling autonomous, interactive and adaptive learning experiences (Bakthavatchalam & Sivasankar, 2024; Peláez-Sánchez et al. 2024). These technologies support students to enhance their academic writing, developing critical thinking skills, and engage more deeply with course content. Platforms such as ChatGPT have also been shown to provide personalised feedback, scaffold complex and facilitate virtual simulations, leading to improved learning outcomes and higher student satisfaction (Kim et al., 2025).

GenAI tools are also recognised for their role in promoting technological fluency among students. By equipping learners with the skills to navigate and critically engage with emerging digital environments, GenAI supports both academic and professional development (Krause et al., 2025).

Their integration into academic writing has demonstrated practical benefits, including improved efficiency, enhanced quality, and greater learner autonomy (Kim et al., 2025). This aligns with emerging pedagogies that prioritise student-centred learning,

continuous feedback and authentic assessment, the key pillars of contemporary learning design (Sankey et al. 2023). Recent systematic reviews further emphasise the pedagogical potential of GenAI in fostering creativity, learning independence, and prompt literacy. However, they also caution against overreliance, which may hinder the development of essential cognitive and metacognitive skills (Qian, 2025). Responsible and strategic implementation is therefore crucial to maximise educational benefits while maintaining academic integrity and inclusivity. To harness its full potential, educators must consider how GenAI transforms the very processes of writing, reflection, and ethical reasoning that underpin healthcare education.

Risks, Responsibilities and Ethical Imperatives

The emergence of Multimodal Large Language Models (MLLMs) marked a significant advancement in healthcare education. These models, which integrate text, image, and other data types, offer real-time feedback, clarify complex medical terminology, interpret large volumes of clinical data, and simulate realistic interactions for training and decision support. For instance, MLLMs can assist clinicians during consultations or procedures by providing instant, context-aware insights, thereby improving diagnostic accuracy and clinical efficiency (Topol, 2019). MLLMs also enhance communication between healthcare providers and patients by translating technical language into accessible terms, they support patient understanding and informed consent, contributing to safer and more transparent care (Rajpurkar et al., 2018).

In healthcare disciplines, where ethical standards and professional integrity are paramount, the responsible use of GenAI is essential. Ethical concerns such as algorithmic bias, data privacy, and the lack of transparency in AI decision-making must be addressed to ensure fair and accountable assessment practices. García-López and Trujillo-Liñán (2025) warn of risks including the loss of cognitive autonomy and potential misuse of student data by institutions. They call for inclusive regulatory frameworks and ethically grounded pedagogical models to safeguard student rights and academic integrity. Structured AI ethics education has shown promise. Abuadas et al. (2025) demonstrate that targeted instruction in AI ethics can significantly enhance students' moral sensitivity and ethical awareness. These findings reinforce the need for curriculum-level interventions, particularly in healthcare education where professional standards are paramount. Researchers further highlight the importance of human oversight in the use of GenAI to uphold academic standards and reduce risks such as overreliance (Peláez-Sánchez et al. 2024) as well as originality, bias, and data privacy (Bobula M, 2024). To support responsible integration, scholars advocate for updated assessment policies and the scaffolded development of AI literacy throughout the curriculum (Bobula M 2024; Almarzouqi et al. 2024).

Educator-led training is also considered essential. It ensures students receive guided support in navigating the complexities of AI use in academic writing while maintaining rigour and integrity (Lazar et al., 2024). Ethical frameworks play a critical role in this process, helping students understand the boundaries and responsibilities associated with AI-assisted learning (Castillo-Martínez et al., 2024, Lazar et al., 2024 and Cheng et al., 2025). Thoughtful integration of GenAI into health professional curricula must be guided by ethical principles and supported by robust institutional frameworks (Dempere et al., 2023; Dos, 2025; Li Y & Li J, 2024). As these tools become more embedded in higher education, the need for responsible use intensifies, especially in healthcare disciplines, where professional integrity cannot be compromised. These technologies hold immense promise, they can enhance learning, sharpen clinical reasoning, and support informed decision-making. Yet implementation demands caution. Issues such as data privacy, ethical implications, and the irreplaceable role of human oversight must be carefully considered. Without these safeguards, the risks may outweigh the benefits. Patient confidentiality also remains a major concern, and the need for strong data governance frameworks cannot be overstated (Reddy et al., 2020). Researchers have called for the development of ethical guidelines to support the responsible use of AI, aiming to reduce bias and promote fair, equitable outcomes across diverse populations (Morley et al., 2020). Explainability and accountability are essential to uphold professional standards and ensure AI is used safely and effectively in clinical education (Amann et al., 2020).

As discussed earlier, newer MLLMs are being used to simulate clinical scenarios, allowing students to engage in interactive learning environments that mirror real-world practice. These simulations help scaffold complex tasks and promote adaptive learning, particularly in disciplines such as radiology, dermatology, and critical care (Esteva et al., 2017; Johnson et al., 2016). By enabling learners and practitioners to interact with multimodal data in meaningful ways, MLLMs foster technological fluency and strengthen clinical reasoning skills, ultimately supporting more informed decision making and improved patient outcomes. Together these opportunities and challenges highlight the importance of scholarly inquiry into how ethical frameworks and curriculum design can prepare students to engage critically, reflectively, and responsibly with AI in professional healthcare contexts.

Design Implications for Teaching and Learning

Effective implementation within academic settings requires thoughtful instructional design and comprehensive teacher training to ensure that AI tools align with learning goals and pedagogical intent. Vorobyeva et al. (2025) emphasise that successful integration of AI in education depends not only on technological readiness but also on

educators' preparedness and the development of targeted professional learning programs. The increasing presence of artificial intelligence in healthcare education and practice highlights the importance of early and responsible engagement with its tools. Patient safety, enhanced learning outcomes, and trust in technology are foundational to effective teaching and professional practice. These considerations must be embedded from the very beginning of a student's academic journey.

As GenAI continues to evolve, its integration into healthcare education must be guided by ethical principles, transparent practices, and a strong commitment to equity. This approach ensures that students benefit from technological advancements while also developing the critical competencies needed to navigate AI-enhanced clinical environments responsibly. By fostering digital literacy, ethical awareness, and professional integrity, educators can prepare future health professionals to use AI thoughtfully and effectively in real-world practice.

Healthcare Education Context

Understanding the learning and teaching environment was essential to interpreting how the AI literacy task unfolded in practice. HLTH1000, a large cross disciplinary first-year course offered a distinctive opportunity to explore how students from multiple health fields encounter and interpret emerging technologies. Within this diverse cohort, learners ranged from recent school leavers to mature age professionals, bringing wide variations in digital literacy and confidence, disciplinary language and expectations of what academic writing looked like in health. Integrating GenAI into this space was both ambitious and necessary. It provided a rare opportunity to see how students from multiple health fields might engage with artificial intelligence as part of the professional toolkit they will soon rely on. The goal was to empower students to make purposeful, ethical, and informed use of these tools, understanding not only their technical functions but their implications for professional judgement and scholarly practice.

Challenges in First-Year Healthcare Education

Cognitive readiness and overreliance

First-year students are still developing foundational knowledge and critical thinking skills. Overreliance on GenAI tools may hinder the development of cognitive and metacognitive abilities that are essential for clinical reasoning (Qian, 2025). Without appropriate scaffolding, students may struggle to distinguish between AI-generated

content and their own academic contributions, which can undermine learning autonomy and originality (Peláez-Sánchez et al., 2024).

Ethical and professional integrity

Healthcare education requires a strong commitment to ethical standards and professional integrity. The use of GenAI raises concerns about algorithmic bias, data privacy, and the lack of transparency in AI decision-making processes (Bobula, 2024; Almarzouqi et al., 2024). These issues are especially critical when students engage with sensitive health data or simulate clinical scenarios. García-López and Trujillo-Liñán (2025) highlight risks such as cognitive autonomy loss and institutional misuse of student data, which could compromise ethical learning environments.

Instructional design and educator preparedness

Effective integration of GenAI tools depends on thoughtful instructional design and educator training. Vorobyeva et al. (2025) stress that technological readiness must be matched with educator preparedness and professional development. Without clear pedagogical frameworks, AI integration may result in inconsistent learning experiences and misalignment with curriculum goals.

Assessment integrity and transparency

The use of GenAI in academic tasks challenges traditional assessment models. Concerns about plagiarism, authorship, and transparency in AI-assisted writing require updated assessment policies and ethical guidelines (Castillo-Martínez et al., 2024; Cheng et al., 2025). Ensuring fair and transparent evaluation practices is essential to maintain academic standards and student trust.

Pedagogical Design Response

Having identified these opportunities and challenges, the HLTH1000 team sought to design a practical, scalable intervention that could introduce GenAI in a way that was both responsible and engaging. Several alternatives and complementary strategies were considered prior to, during and after the implementation of this AI literacy task:

Scaffolded AI Literacy Tasks

Introducing structured AI literacy tasks early in the curriculum helps students engage critically with GenAI tools while developing ethical awareness and academic integrity

(Abuadas et al., 2025). Early, low-stakes activities were key to helping students move from curiosity to confidence.

Multimodal Learning Models

The use of Multimodal Large Language Models (MLLMs) supports interactive simulations that mirror real-world clinical practice. These models enhance technological fluency and clinical reasoning (Topol, 2019; Esteva et al., 2017; Johnson et al., 2016). However, with a diverse and very large first-year cohort such as HLTH1000, this level of simulation was not feasible at scale. Instead, the teaching team incorporated AI inclusive and digitally supported tools into other learning activities and assessments, including:

RiPPLE: a UQ adaptive learning platform featuring an AI-powered chatbot that provides immediate feedback on student generated content before it is shared for peer moderation.

Padlet: a collaborative platform used to foster discussion and collective reflection. Its flexible visual design supports multimodal engagement and inclusive participation across large cohorts, while its embedded AI features assist in designing and organising shared spaces, generating ideas, and maintaining a safe, moderated environment.

Educator-Led Training and Ethical Frameworks

Professional development for educators and the integration of ethical frameworks into teaching practice are essential to guide responsible AI use (Lazar et al., 2024; Castillo-Martínez et al., 2024). This step was crucial in building a shared language of trust and transparency across the teaching team.

Hybrid Learning Models

Blending GenAI tools with traditional teaching methods helps strike a balance between technological support and cultivating independent thinking and professional judgment. In this spirit, an AI literacy task was introduced into the curriculum to provide students with a structured, reflective and academically grounded opportunity to explore GenAI tools in meaningful ways. The activity was designed to familiarise student with the functionality of AI tools and to deepen their understanding of the ethical, professional, and practical dimensions of their use. It invited students to think critically, pose questions, and consider the broader implications of technology in

clinical and academic settings. By promoting informed decision-making, digital responsibility, and an appreciation of how AI can complement rather than replace human judgement, the task aimed to strengthen technical competence and professional integrity.

Ultimately, it served as a foundation for preparing future health professionals to navigate the complexities of an increasingly digital practice landscape.

This case study therefore set out to:

- *Build technological confidence* by supporting students to develop the knowledge and skills required to use GenAI tools effectively in healthcare report writing, including understanding their benefits, recognising limitations, and reflecting on ethical implications.
- *Embed GenAI into authentic learning* by implementing AI use within a first-year report writing assignment as part of a large, multidisciplinary course with approximately 1,500 students, creating a scalable, inclusive approach to digital literacy.
- *Integrate academic tools* by introducing a *suite of platforms* that support writing and research. Students engaged with GenAI platforms alongside traditional word processors and citation managers, building practical digital scholarship skills.
- *Foster AI literacy and ethical awareness* by guiding students to make informed choices about appropriate and transparent use of AI, developing foundational writing, critical thinking, and professional responsibility.
- *Evaluate impact and engagement* by assessing how AI use influenced student performance, confidence and interaction with course materials to better understand its role in enhancing academic outcomes through active and reflective engagement.

By mirroring familiar academic structures, the task was designed to reduce cognitive load and foster a sense of authenticity and relevance. Students were invited to explore GenAI tools particularly large language models within the scope of their report writing at an introductory level. This allowed them to reflect on both the benefits and limitations of these technologies in a guided and supportive environment. Through structured activities and reflection, the task cultivated ethical awareness, digital responsibility, and critical thinking. It also provided a safe space for experimentation. Students were encouraged to engage with AI tools critically and transparently, considering their implications for academic integrity and professional standards. Ultimately, this approach aimed to build confidence in navigating AI-enhanced environments and to prepare students for the evolving realities of healthcare education and practice.

Implementation: From Design to Delivery

In HLTH1000, a large cross-disciplinary first-year course within the Faculty of Health and Behavioural Sciences to Faculty of Health, Medicine and Behavioural Sciences, the teaching team took a deliberate and research informed approach to introducing GenAI. The implementation in 2024 was conceived as a curriculum experiment and a professional learning opportunity for students and staff. Guided by the principles of safe exploration, critical reflection and transparent practice, the rollout modelled the kind of ethical, evidence-based engagement expected in future clinical contexts. GenAI tools such as Copilot, ChatGPT, and Claude were introduced to enhance learning while embedding foundational AI literacy. The focus was to develop technical proficiency and informed reflective and responsible users of emerging technologies.

During the semester, students were introduced to GenAI through scaffolded activities designed to encourage critical engagement and professional reflection. They were asked to:

- Summarise complex healthcare concepts.
- Generate and critique an AI-generated health report, assessing its use of evidence applying their own academic rationale to refine it.
- Explore the ethical implications of AI in healthcare, including issues of bias, data privacy and professional accountability.

The integration of GenAI into healthcare education for first-year students presents distinct pedagogical challenges. These include ensuring responsible use, maintaining academic integrity, and supporting students in developing the skills needed to evaluate and apply AI tools thoughtfully. Many students in HLTH1000, are still building foundational knowledge and clinical reasoning skills. Without careful scaffolding, early exposure to AI risks promoting overreliance, which may hinder the development of cognitive and meta-cognitive abilities (Qian, 2025). To address this, the teaching team implemented a structured AI literacy task that encouraged students to critically evaluate AI-generated content and distinguish it from their own academic contributions (Peláez-Sánchez et al., 2024). Ethical dimensions were explicitly woven into the reflection component, with students exploring issues such as hallucinations, algorithmic bias, data privacy, and transparency (Bobula, 2024; Almarzouqi et al., 2024). Each student critiqued AI-generated healthcare reports using tracked changes and annotated rationales grounded in scientific evidence, an exercise designed to reinforce ethical reasoning and professional judgement.

Effective integration of GenAI requires deliberate instructional design and educator readiness. To ensure alignment with curriculum goals, the HLTH1000 teaching team

embedded GenAI tasks within existing assessment frameworks and professional contexts. While Multimodal Large Language Models (MLLMs) can simulate clinical practice through immersive environments, they are not feasible at scale for this course. Instead, a hybrid learning model was adopted, combining GenAI tools with traditional discussion-based teaching to ensure balanced skill development and to uphold academic integrity.

The introduction of GenAI also prompted a re-examination of traditional assessment models, particularly around authorship, originality and plagiarism (Castillo-Martínez et al., 2024; Cheng et al., 2025). This invited students to consider the ethical and scholarly dimensions of AI use, the how, when and why to incorporate it responsibly. Clear, transparent marking criteria were also introduced to maintain academic standards and foster trust. Together these measures positioned AI as a catalyst for critical thinking and academic growth.

The TPACK framework (Technological, Pedagogical and Content Knowledge) guided the design and implementation of this task, integrating three key dimensions:

- **Content Knowledge:** understanding what AI is and how it applies to health and behavioural contexts.
- **Pedagogical Knowledge:** designing accessible and engaging learning experiences for a first-year cohort with a high proportion of recent school leavers.
- **Technological Knowledge:** meaningfully integrating AI and digital tools such as ChatGPT for critical thinking activities, Kahoot for in-class knowledge review, RiPPLE for adaptive peer learning with chatbot feedback, and Padlet for collaborative idea sharing.

This approach also supported culturally and linguistically diverse (CALD) students by offering multimodal learning opportunities and fostering inclusive, participatory learning around AI concepts.

Workflow

Tutorials became the engine of this experiment. Working in small groups of five to eight, within larger workshops of around 30 students assigned to each tutor, learners engaged in open discussions about the responsible use of AI and its promise, its pitfalls and its place in future professional practice. These smaller tutorial settings provided a more personal environment for exploring ethical dilemmas, sharing examples and reflecting on the importance of human oversight in healthcare contexts. The goal was

to help students understand how AI functions and build their confidence in using and critically evaluating it within authentic clinical and academic scenarios.

Assessment instructions and marking rubrics were distributed early in the semester (July 2024), with final submissions due in October. Throughout the semester, students were guided through each stage of the task both in class and via group discussion board on the learning management system. This reinforced academic integrity, ethical reasoning, and digital fluency, while aligning with the broader learning outcomes of HLTH1000. As part of the AI literacy assessment, students were asked to generate a short paragraph using a GenAI tool such as ChatGPT, CoPilot or Claude responding to prompts related to healthcare topics. They then iteratively refined this output by creating new prompts to adjust tone, clarity and use of evidence, ensuring the text met word limits and included appropriate references. The process then required students to critique the AI-generated material for clarity, accuracy, bias and ethical soundness, identifying any factual errors, weak arguments, or unprofessional language.

Using a word processing software, students annotated their edited documents with tracked changes and provided concise rationales for each revision, grounded in evidence-based reasoning. In addition, they were encouraged to maintain a brief reflective log documenting when and how GenAI tools were used, what challenges were encountered and what insights were gained. This scaffolded workflow encouraged students to engage critically, think ethically and treat AI as a partner in inquiry rather than an answer engine.

Implementation Challenges

Rolling out a GenAI-integrated task in a course of this scale presented several practical and pedagogical challenges. Key issues included:

Digital Literacy Variance

Students entered the course with widely differing levels of comfort and experience with GenAI tools and word processing software. Some students required additional support with prompt engineering, critical evaluation, and the use of tracked changes. These challenges extended to tutors, several of whom were also adapting to new tools and needed guidance in troubleshooting and modelling effective AI use.

Tutor preparedness and workload

Tutors needed to quickly familiarise themselves with GenAI technologies and ethical frameworks adding complexity to lesson planning and delivery. Consistent communication and shared resources became essential to maintain alignment.

Inconsistencies in AI-generated output

Variability in AI responses made it difficult for students to judge reliability and accuracy. This, however, became a valuable teaching moment reinforcing the need for human oversight and critical review.

Academic integrity concerns

Students were sometimes uncertain about the boundaries of acceptable AI use. Clear guidance, exemplars and transparent marking criteria were essential in establishing trust and accountability.

Technical limitations

Issues such as platform access, formatting inconsistencies and compatibility with institutional systems occasionally disrupted workflow and required contingency planning. Submitting assessments with track changes enabled through the learning management system presented further complications with some students encountering formatting errors or uncertainty around submission requirements. These logistical hurdles highlighted the importance of clear instructions, early testing of systems, and accessible technical support when introducing innovative digital assessment at scale.

Student reflections

Student reflections on their experiences with GenAI provided rich insight into how first-year learners conceptualised AI's role in healthcare education. Through an exploratory thematic analysis of a small, randomised sample (n=28), five themes emerged, revealing how students made sense of efficiency, reliability, collaboration, ethics and context when engaging with AI. These reflections illuminate students' developing literacy and inform broader pedagogical questions about responsible innovation in curriculum design.

Theme 1: Perceived Utility and Strengths

Students widely acknowledged the efficiency and speed of AI tools, particularly their ability to organise large volumes of data and produce well-structured, grammatically sound outputs.

Many used AI for summarisation, synthesis and as a starting point for writing tasks, valuing its clarity and accessibility. Overall students reported that AI reduced cognitive load, improving the organisation of information and provided a reliable foundation for academic writing. For educators, these findings highlight AI's potential to support novice writers through structured modelling and feedback, particularly in large first-year cohorts transitioning to academic communication in professional disciplines.

Theme 2: Limitations and Reliability Issues

While students appreciated the practical benefits of GenAI, they voiced significant concerns about reliability and accuracy. Many noted inconsistent ability to follow the specific task parameters such as word count, referencing, lack of credible sources and factual errors. Some described AI as being in an “infant” stage, lacking creativity and depth. These reflections reinforce the importance of embedding critical evaluation and verification skills into AI literacy tasks, positioning AI as a starting point for inquiry rather than a substitute for scholarly judgement.

Theme 3: Human-AI Collaboration and Boundaries

Students consistently recognised the need for human oversight and professional judgement when working with AI. They viewed ethical reasoning, contextual understanding and critical thinking as inherently human capabilities that AI cannot replicate. For many students, this recognition was shaped through direct interaction with AI-generated content where they observed fluency but also a lack of nuance and insight. Several reflections highlighted how effective use of AI depends not only on what is asked but how it is asked. Prompt design emerged as a form of dialogic practice, one that requires intention, curiosity, and critical awareness. This developing sense of prompt literacy revealed students beginning to see AI as a partner in inquiry and not a source of truth. It was recognised that outputs must be interpreted, verified, and contextualised by human judgment. This theme shows how early exposure to AI can cultivate meta-awareness of the human role in technology use. By positioning students as both users and evaluators, the activity prompted them to consider not only what AI can do, but what it should do, laying the groundwork for ethical, reflective, and profession-ready engagement with emerging technologies.

Theme 4: Ethical and Future Implications

The AI literacy task in HLTH1000 represented an innovative, practice-based exploration of how first-year students engage with emerging technologies in healthcare. It served as a teaching innovation and a research-informed intervention, generating valuable insights into student learning, ethics, and curriculum design. Many students questioned whether it was appropriate to rely on AI for academic tasks, especially assessments, where concerns around plagiarism, authorship and academic integrity were frequently raised. There was a shared view that overuse of AI could undermine critical thinking and reduce opportunities for genuine learning.

Students also reflected on the broader applications of AI and the potential consequences of its use. In general contexts, they saw value in AI's ability to support efficiency and productivity particularly for managing information and supporting routine administrative tasks. However, in the context of healthcare, student reflections expressed concern about the risks of using AI-generated content without proper human oversight. They emphasised the continued importance of ethical decision-making and human judgement particularly when decisions affect patient care or professional integrity. Bias in AI-generated reporting was another key concern. Students recognised that AI outputs can reflect skewed or incomplete perspectives, depending on the data used to train the system. This prompted deeper questioning about fairness, accuracy and the potential for harm if AI is used uncritically.

Students also looked ahead, reflecting on the future of AI, with curiosity and caution. Some expressed optimism about its capacity to transform education and professional practice while others warned of possible misuse and unintended consequences, if ethical safeguards are neglected. Many reflected on the role of prompts and how they influence AI outputs. In doing so, they began to see AI as a collaborator and not an authoritative source.

Theme 5: Context, Caution and Conditions for Meaningful Use

Student reflections strongly emphasised that the effectiveness of GenAI depends heavily on the context in which it is used. While many recognised clear benefits in tasks such as summarising information, drafting reports and supporting learning, others stressed that meaningful use requires more than just access to the technology. They called for clear guidelines, structured training and strong ethical frameworks to ensure AI is used responsibly effectively and with purpose. In healthcare settings, students were especially cautious. They acknowledged the potential of AI to assist with managing data and streamlining documentation but also voiced concerns about the risks when technological errors have real world impact on patient care. Accuracy,

ethical reasoning and human judgement were seen as non-negotiable, and that AI must be carefully integrated to support professional expertise rather than replace it.

Across all contexts, participants agreed that the value of AI is maximised when it is applied thoughtfully and with a clear awareness of its limitations. They recognised that effective integration depends as much on the culture of use not just the technology itself. Student reflections point to a future where the success of AI in Healthcare Education will depend on how well it aligns with human values and the ethical commitment to do no harm.

Reflection on AI inclusive task in HLTH1000 (2024)

The integration of the AI task into HLTH1000 was a bold and timely pedagogical move, designed to immerse first-year health students in the realities of emerging technologies in professional practice. By embedding GenAI directly into the curriculum, the task gave students a hands-on opportunity to explore how these tools are reshaping health professions. The purpose was to introduce AI tools and encourage students to think critically about responsible and ethical use. This innovation took place at a moment of uncertainty in higher education, when the use of AI was being cautiously considered and when Turnitin still gave a “AI-use warning label”! In fact, a big chunk of the cohort’s tasks was labelled as “check AI use”. Through this activity, students were challenged to engage with AI-generated content, evaluate its accuracy, reflect on its ethical limitations and professional implications. The activity aimed to build essential skills in digital literacy, ethical awareness and reflective thinking, capabilities increasingly vital in healthcare contexts. It also encouraged students to consider how AI might influence clinical decision-making, patient communication and professional accountability, particularly as report topics often required comparing healthcare systems across countries.

Formal student feedback collected through course evaluations revealed a mix of enthusiasm and challenge. Many students described the task as “fun,” “eye opening,” and “innovative,” appreciating the relevance of working with technology that was transforming their field. One participant praised the “very creative,” design of the AI and tasks, while another reflected on how the task helped them understand both the “liability” and “unreliability” of AI in professional settings, an insight that aligns with the task’s intended learning outcomes. These comments also revealed a growing awareness of the need for critically evaluation, especially in contexts where accuracy and accountability matter. For many, the task became more than an introduction to AI, it was a formative experience that deepened their understanding of ethics, reliability and human oversight in technology use.

However, the rollout also surfaced challenges that shaped student experiences. A recurring theme in feedback was confusion around task instructions. Students were unsure about formatting requirements, whether to include screenshots or AI transcripts, how to manage word counts, and how to annotate revisions effectively. This confusion was compounded by inconsistent advice from tutors and course coordinator, leading students to describe the task as “tedious”. Others felt it was time consuming and overly technical, detracting from core disciplinary learning. Some students questioned the practical relevance of editing AI-generated reports. They suggested that a focus on critique rather than revision might be better aligned with authentic professional tasks, allowing them to apply ethical reasoning without getting lost in technical formatting requirements. These reflections highlight a lesson in curriculum innovation, that novel tasks require clear communication, consistent guidance and a strong pedagogical alignment to maximise learning impact.

Students offered thoughtful suggestions for future refinement, many of which have been incorporated into planning for future teaching practice.

Key recommendations

- Providing step-by-step exemplars and video walkthroughs to clarify expectations (students valued a video made by the teaching team which was reactive to feedback through the semester).
- Offering alternative formats for students to engage with AI (e.g., critique vs. edit).
- Strengthen alignment and communication between tutors to ensure consistent messaging.
- Embedding the AI activity more explicitly within course content to enhance perceived relevance and authenticity.

Overall, the AI task in HLTH1000 represented a valuable experiment in integrating emerging technologies into healthcare education. It successfully introduced students to both the promise and pitfalls of GenAI, encouraging them to reflect on its ethical and professional implications. While issues of clarity and consistency limit its impact for some, the experience offered rich insights into how innovation unfolds in practice and how thoughtful design, communication and reflection can turn experimental tasks into transformative learning experiences.

Future Directions

Reflecting on the implementation of the HLTH1000 AI task, the next phase focuses on refinement, relevance and co-creation. While the initial design successfully

encouraged curiosity and ethical reflection, it also revealed the need for clearer guidance, stronger tutor alignment and closer links between task design and professional practice.

Planned improvements include providing detailed exemplars and clearer formatting instructions, offering students the choice to either edit or critique AI-generated content, and conducting tutor calibration sessions supported by shared marking guides and FAQs. Strengthening communication across the teaching team will help ensure consistent guidance and enhance student confidence. Future iterations should also embed discipline-specific examples to make AI use more authentic and meaningful for instance, exploring AI in medication safety for Pharmacy, mental health triage for Psychology, or clinical documentation for Nursing and Dentistry. Embedding these contexts will help students connect ethical reflection with real-world professional practice. Ethical and critical AI literacy should be scaffolded throughout the semester, with discussions around bias, misinformation, and the boundaries of human–AI collaboration. This approach aims to cultivate both technical fluency and professional integrity.

Post-project, the teaching team is engaging in a student–staff partnership to analyse outcomes, share findings at teaching and learning forums, and develop a case study for dissemination. Plans include piloting a revised version of the AI task in a smaller discipline specific cohort within Dentistry and establishing a student–staff advisory group to guide ongoing AI integration across the curriculum. Ultimately, the next stage builds on lessons learned to create a model for responsible, inclusive, and contextually relevant AI education. This needs to be a model that prepares students to think critically and act ethically in an increasingly digital healthcare landscape.

AI Use Declaration

This chapter was prepared with assistance from Co-Pilot, which supported aspects of writing and editing, including clarity, structure, and citation formatting. All ideas, findings, and interpretations are the authors' own, and the AI did not generate or analyse primary data or replace academic judgement.

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FROM ANXIETY TO AGENCY: A CASE STUDY IN CO-DESIGNING AN ETHICAL AI GUIDE FOR SCIENCE STUDENTS

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Abstract

As generative AI (GenAI) becomes embedded in academia, students often face a mixture of curiosity and anxiety, caught between the potential of new tools and the fear of academic misconduct. This chapter addresses the critical challenge of how students' uncertainty about AI use creates barriers to deep learning, authentic assessment, and the development of scientific reasoning skills in higher education. In this chapter, we also detail the development of the *Science Generative AI Essential Guide*, an open educational resource at the University of Queensland designed to address this challenge. Grounded in principles of self-regulated learning and Multimedia Learning theory, we share the story of our iterative, evidence-based process, moving from identifying student needs to co-designing a practical, multimodal module with student partners. Student partners played a central role in shaping module content, evaluating accessibility, and co-creating ethical AI scenarios. The case study highlights how grounding our intervention in the real-world tensions of students' experience, particularly around assessment integrity, was key to building their confidence and sense of agency. We present our key takeaways and design principles, offering a practical model for educators seeking to move beyond policy and proactively support students in the ethical use of AI. The chapter includes a teaching team reflection, insights from our student partners, and an example of an ethical scenario that can be adapted for classroom use.

Keywords

Generative artificial intelligence, academic integrity, science learning, student centred design, staff-student partnerships, AI literacy, self-regulated learning, cognitive load

Practitioner Notes

1. Treat students as partners from scoping to review. Their lived experience surfaces real risks and makes resources credible among peers.
2. Do not leave the guide as optional reading. Reference it in class, tutorials, and assessment briefings, and assess its use with short, applied tasks.
3. Prompt forethought, monitoring, and reflection around AI use. Ask students to justify when and how AI supported learning and where it might have bypassed it.
4. Prefer short videos, interactive checks, and concise tables over dense text. Sequence content from simple to complex with scenario practice throughout.
5. Track shifts in student confidence, quality of evaluations of AI outputs, and correct disclosure and referencing of AI use, then iterate.

Background

This case study is situated within The University of Queensland (UQ), a large research-intensive institution in Australia committed to fostering “accomplished scholars and courageous thinkers.” The arrival of ChatGPT in late 2022 sent shockwaves through higher education globally, and UQ was no exception. In 2023–2025, one of the most urgent challenges facing both students and educators at UQ has been the integration of generative artificial intelligence (GenAI) tools, such as ChatGPT, into teaching, learning, and assessment.

Beyond the surface-level concerns about academic integrity, we identified a deeper pedagogical problem: students’ uncertainty about appropriate AI use was creating significant barriers to learning. Specifically, this uncertainty:

- Being unresolved and associated with fear impeding learning (Lodge et al., 2018) and the development of trust between teachers and students.
- Inhibited the development of critical evaluation skills essential for scientific practice.
- Created inequitable learning conditions where confident students experimented with AI while anxious students avoided potentially beneficial tools.
- Prevented students from developing AI literacy as a core 21st-century competency.

While these tools offer potential benefits in terms of personalisation and efficiency, they also raise significant ethical and pedagogical questions. Students often express uncertainty about how to use GenAI responsibly without violating academic integrity, a tension that reflects broader concerns about the challenges GenAI poses to assessment and student learning across the sector (McDonald et al., 2025). Educators, meanwhile, face growing pressure to adapt their teaching to ensure fairness and transparency. The underlying pedagogical challenge was that this uncertainty undermined students' confidence and risked encouraging shallow engagement strategies (e.g. avoiding AI altogether, hiding AI use or using it without reflection). Our co-design process therefore aimed to close this gap by scaffolding ethical, contextualised, and confidence-building approaches to AI use. This mirrors national guidelines in Australia, which now challenge institutions and educators to take shared responsibility for building AI literacy directly into the curriculum (TEQSA, 2024).

In response, the Faculty of Science at UQ developed the Generative AI Essential Guide, an open, multimodal educational resource aimed at supporting students in understanding how to use GenAI ethically in their studies. This project was grounded in a Scholarship of Teaching and Learning (SoTL) approach: it drew directly on student voice, institutional policy, and theoretical frameworks to inform iterative module design. Through surveys, student-staff partnerships, and classroom piloting, the development of this guide highlights a teaching-as-inquiry model that responds to authentic student concerns. The case illustrates how SoTL can address pressing pedagogical challenges by translating abstract policy into inclusive, practical learning experiences.

Exposure and Student Understanding of Generative AI

Data from internal 2023 – 2024 science student surveys indicate that understandings of GenAI are varied and complex. Students predominantly associate GenAI with tools such as ChatGPT that generate textual responses to prompts. Many responses highlight the capability of GenAI to produce not only text but also images, music, and various forms of media. The overarching theme is the recognition of GenAI as a powerful tool that leverages vast datasets to create original outputs derived from existing patterns in the training data. The Leximancer concept map suggests that the understanding of Generative AI among students is multi-dimensional but centres around a few core concepts. “AI” and “generate” are at the heart of the conversation, with “use” being the most commonly associated action. The term “ChatGPT” has emerged as a significant node, indicative of students' familiarity with specific AI tools.



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Figure 1 Leximancer analysis of Semester 2, 2023 student definition of GenAI.

Similarly, in semester 2, 2024, students described diverse use of generative AI tools in their academic work. Common uses are summarised in Table 1.

Table 1 Student Perceptions of Generative AI Tools: Uses, Benefits, and Challenges

 Getting started with assignments "I tend to find myself using ChatGPT and Bard [now Gemini], not for direct information, but just to get me started on where to start looking and what to start looking for. Like a guiding path for assignments that I have due for university or something like that." (FG1, Student 1)	 Understanding content "Based on the course contents, I usually use it as a dictionary. Like I can just type in specific terms from the work content and ask them to explain the details for me. It saves me a lot of time, and I don't have to chase back after the lecturers or the discussion group." (FG1, Student 2)	 Grammar correction "I usually use ChatGPT to check grammar for my reports. It helps me make my reports clearer and more concise." (FG4, Student 2)	 Programming assistance "I use ChatGPT a lot to debug my codes." (FG1, Student 3)
+ Positive experiences	- Negative experiences	! Challenges and limitations	
Generative AI tools such as ChatGPT and Grammarly were used extensively for tasks such as summarising materials, drafting essays, and grammar checking. A student explained, " <i>I copy-paste readings into ChatGPT to condense them, which saves a lot of time</i> " (FG3, Student 3). Another added, " <i>I've been using ChatGPT to help me develop my essay introductions and conclusions after I've written the body</i> " (FG3, Student 2).	Institutional restrictions deterred some students. "All of my courses have said you can't use AI. The one course that allowed it was too hard to use it for" (FG3, Student 1). Some students expressed hesitation due to unclear guidelines, " <i>From UQ I have only gotten warnings to not use AI for certain assignment.</i> " (FG5, Student 1).	Some students struggled to effectively interact with AI tools, including crafting prompts. " <i>You need to know how to ask AI, but I don't know exactly how to ask</i> " (FG1, Student 3). Technical limitations also arose: " <i>It doesn't understand high-level maths; it gets things wrong</i> " (FG2, Student 2). Some students expressed hesitation to use AI tools due to a lack of clarity around their ethical use: " <i>I'm scared of getting academic penalties from Turnitin where they could detect AI</i> " (FG2, Student 2).	

Getting started with assignments

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Grammar correction

"I usually use ChatGPT to check grammar for my reports. It helps me make my reports clearer and more concise." (FG4, Student 2)

Programming assistance

"I use ChatGPT a lot to debug my codes." (FG1, Student 3)

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Generative AI tools such as ChatGPT and Grammarly were used extensively for tasks such as summarising materials, drafting essays, and grammar checking. A student explained, "*I copy-paste readings into ChatGPT to condense them, which saves a lot of time*" (FG3, Student 3). Another added, "*I've been using ChatGPT to help me develop my essay introductions and conclusions after I've written the body*" (FG3, Student 2).

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In summary, students predominantly use generative AI tools for text-based tasks like summarising and grammar correction. However, institutional barriers, prompt-crafting difficulties, and unclear ethical guidelines hinder their ability to fully leverage these tools. Clearer policies and training are needed to address these challenges effectively.

Theoretical Framework

Our approach to addressing this challenge was informed by two key learning theories, Self-Regulated Learning (SRL) and Multimedia Learning Theory (Mayer, 2020).

Self-Regulated Learning (SRL)

Zimmerman's (2002) model of self-regulated learning emphasised cyclical processes of forethought, performance, and self-reflection. Broadbent, Panadero, Lodge, and de Barba (2019) extend this perspective, noting that in higher education, SRL also requires the regulation of cognition, motivation, behaviour, and emotion, and that digital environments both enable and complicate this process.

In the context of generative AI, students must adapt traditional SRL strategies to new challenges. Effective use of AI requires:

- Making metacognitive judgments about when AI assistance supports rather than undermines learning.
- Setting clear goals for each AI interaction (e.g., deepening understanding versus accelerating task completion).
- Monitoring reliance on AI tools and critically evaluating outputs to prevent overdependence.

While AI can scaffold learning processes, Broadbent et al. (2019) emphasise that the responsibility for regulation ultimately lies with students. For educators, the implication is to design activities that explicitly prompt forethought, monitoring, and reflection, ensuring that GenAI use becomes a catalyst for deeper learning rather than a substitute for it.

Multimedia Learning Theory

Following Mayer's (2020) principles, we designed our intervention to segment content, personalise pathways, and integrate interactive elements to reduce cognitive load and sustain engagement. Central to this design were scenario-based activities that encouraged students to practise ethical reasoning and transfer judgment skills into their studies.

The Challenge: "Am I Allowed to Use This?"

Since 2023, a growing sense of uncertainty has spread across university campuses. GenAI had rapidly entered the academic world, and while students were curious and increasingly engaged with these emerging tools, many were also deeply anxious. Our finding is consistent with studies highlighting widespread student concerns around academic integrity and over-reliance on these new tools (Wang et al., 2024).

Throughout this period, one question consistently surfaced in our conversations with students, both implicitly and explicitly, *am I allowed to use this?* What appeared to be a simple question revealed a multifaceted set of concerns, including fears of unintentionally committing academic misconduct, confusion over inconsistent course guidelines, and uncertainty about where the boundary lay between legitimate assistance and academic dishonesty. More critically, this uncertainty was actively impeding learning. Students reported:

- Avoiding potentially beneficial AI tools entirely, missing opportunities for enhanced learning.
- Spending excessive mental energy worrying about compliance rather than focusing on learning.
- Developing surface-level approaches to assignments to avoid any risk of misconduct.
- Experiencing increased stress that negatively impacted their overall academic performance.

Our initial research confirmed these findings. A survey conducted in Semester 2, 2023 revealed that although nearly 74.5% of 322 science students had experience using GenAI, a significant majority expressed discomfort or uncertainty about its appropriate use (SLOCI, 2023). This concern was further supported by research from Turnitin, which found that 64% of students reported worry about AI use, exceeding the 50% of educators who expressed similar concerns. This feeling of uncertainty persisted into Semester 2, 2024, as students continued to raise it during focus group discussions. As one student shared,

"I'm quite worried about academic integrity. It would be good to have guidelines on how I can use it for assignments without getting in trouble."

(FG4, Student 1)

Similar expressions were echoed widely across both the St Lucia and Gatton campuses. Our data revealed that students were navigating an unclear and evolving space on their own, often turning to peers, online forums, or social media for advice in the absence of consistent and accessible institutional guidance.

It became clear that policy alone would not be enough. What was needed was a shift

from rule enforcement to student empowerment. Our goal emerged with clarity: to design an educational resource that would:

- Provide clear, actionable guidance.
- Support the development of metacognitive skills for ethical AI use.
- Foster critical evaluation capabilities essential for scientific practice.
- Build student confidence in making informed judgments about AI integration.
- Develop AI literacy as a transferable professional competency.

This goal aligns with the progression levels of UNESCO's AI Competency Frameworks, including enabling students to transition from foundational understanding to practical application (Cukurova & Miao, 2024; Miao & Shiohira, 2024).

Our Approach: Listening First, Building Second

From the outset, our design philosophy was guided by three core principles: to be student-centred, evidence-based, and genuinely collaborative. We recognised that while educators bring pedagogical expertise, students possess invaluable knowledge about their lived experiences, digital practices, and the emotional dimensions of learning with AI. This complementary expertise made genuine partnership essential.

To achieve this, we used a methodology known in educational research as Design-Based Research (DBR). In simple terms, this meant we worked in an iterative cycle of design, feedback, and refinement. We would create the resource, test it with students and staff, gather their feedback, and then use that input to make it better (Wang & Hannafin, 2005). This process ensured that our project remained grounded in the authentic needs of our community rather than our own assumptions about what they needed.

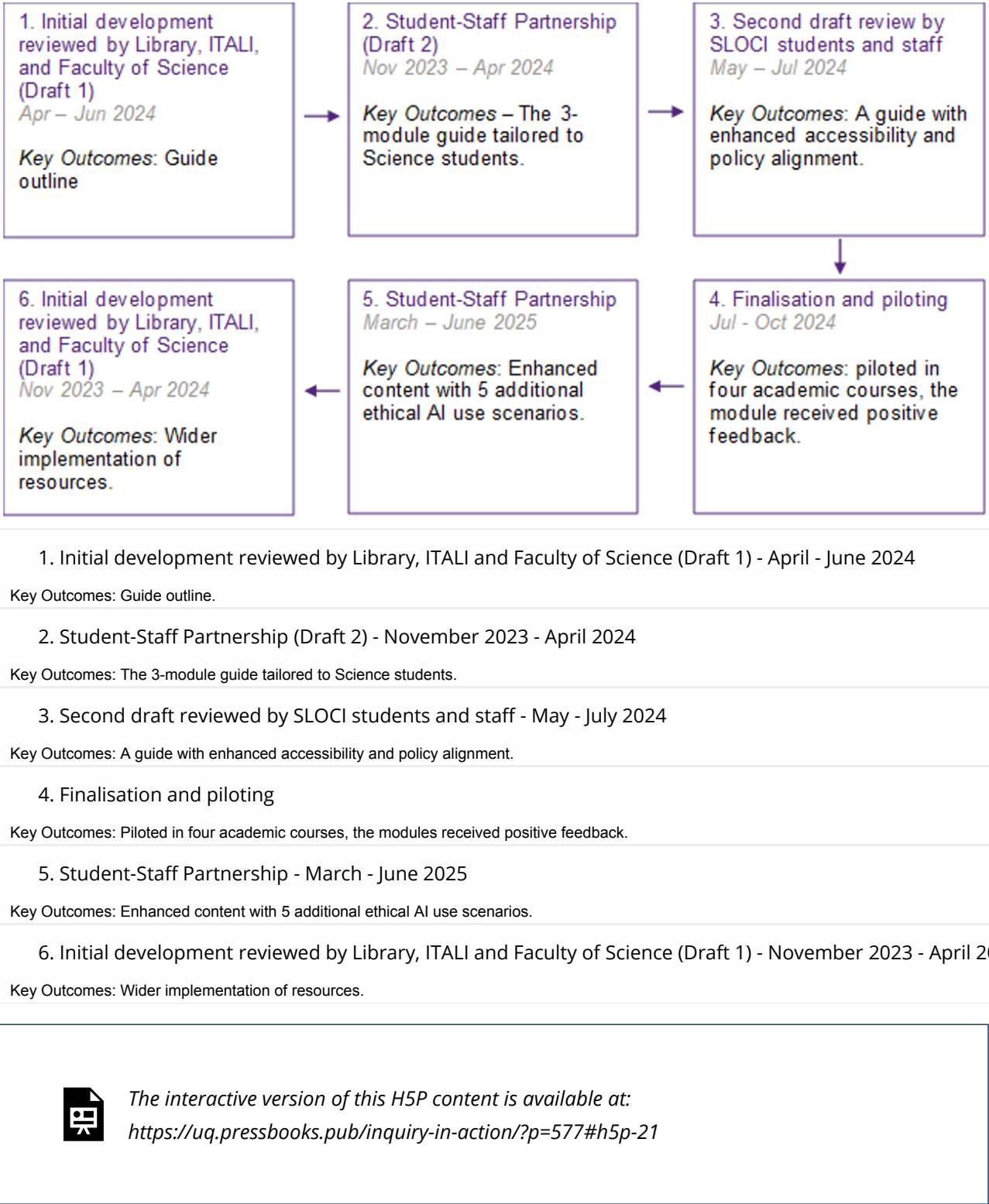


Figure 2 Key steps of our guide development process

The Power of Student Partnership

A critical part of our collaborative approach was our Student–Staff Partnership (SSP). In Semester 1, 2024, we partnered with four students who acted as co-designers,

reviewers, and our most valuable critics of the Guide. In Semester 1, 2025, we continued this collaboration with a new SSP team, including three returning students, who specifically worked on development of five ethical AI use scenarios. Additionally, Science Student Led Observation for Course Improvements (SLOCI) students collected diverse students' perspectives on GenAI use as well as on our Guide throughout 2023-2025. These student partners brought essential expertise about:

- The lived experience of navigating AI uncertainty in their courses.
- Their digital literacy practices and preferences.
- Emotional and social dimensions of AI use among peers.
- Practical insights into what makes educational resources engaging and accessible in their studies.

Ethical and inclusive principles were central to this process. We drew on principles for effective partnership (Matthews 2017) as we interpreted guidance about ethical AI use together. Ethical practice was enacted through scenarios that modelled transparency, fairness, and academic integrity. Inclusion was built into the design by involving undergraduate and postgraduate students from multiple science disciplines, ensuring diverse perspectives. Multimodal design choices (e.g., combining video, text, and interactive elements) also supported accessibility and engagement for students with varied learning needs.

The diversity of the student team enriched our design process significantly. As one student partner reflected:

"This co-design partnership integrated diverse perspectives from students and staff across different learning and professional backgrounds within the Faculty of Science. The student team included both undergraduate students from biomedical sciences and biology, as well as postgraduate students from occupational health and safety and physics. This diversity created opportunities to learn from each other's experiences across different disciplines."

(Student Partner Reflection, 2025)

Their influence was crucial. For example, our early drafts of the module were text-heavy and theoretical. Student partners were candid in their feedback, noting that students would likely lose interest. This aligns with research showing that overly long or unfocused computer-based training modules can reduce learner motivation and limit learning outcomes (Peterson & McCleery, 2014). Their input prompted a shift

away from dense paragraphs towards interactive scenarios, short videos, and practical examples, elements that became the most highly rated features of the module.

The student partners' approach was both systematic and creative. As one partner described:

"The development followed an iterative approach, beginning with an initial design plan that was refined through feedback incorporating student experiences and course requirements. Throughout the process, we consulted with teaching and learning design staff and fellow students to gather user feedback and ensure the resource met its intended purpose."

(Student Partner Reflection, 2025)

This iterative process led to a more effective guide, such as developing

"a concise, readable table format for levels of GenAI use that presented guidelines targeted for specific use cases",

(Student Partner Reflection, 2025)

a direct response to student needs through to co-design for clarity and accessibility.

The collaboration was also beneficial for the student partners themselves. One partner emphasised that

"the most meaningful aspect of this involvement was the valuable networking opportunities it provided, which opened doors to working with staff in other capacities, including research assistant positions."

(Student Partner Reflection, 2025)

Another student partner noted:

“This project provided a meaningful opportunity to express my needs and expectations regarding GenAI-related resources and guidance, which directly informed the production of a tool that could specifically met those needs. Moreover, being embedded in the development process offered me valuable insight into the complexities and challenges involved in designing educational resources, including ethical guidelines, which deepened my appreciation for the nuances of the process and taught me valuable lessons in content creation, information design and data collection.”

(Student Partner Reflection, 2025)

The importance of genuine student partnership cannot be overstated. As one partner articulated:

“Student involvement as partners in creating educational resources ensures that materials developed for students actually meet student needs.”

(Student Partner Reflection, 2025)

This insight captures why our collaborative approach was essential, not just for creating a better resource, but for modelling the very principles of ethical engagement and shared agency that we sought to teach.

The Intervention: The Generative AI Essential Guide

Defining Our Ethical Framework

Before describing the guide’s structure, it was important to articulate what we meant by “ethical” and “inclusive” AI use in the context of science education. Our framework was informed by national and international guidelines, including the Australian Government AI Ethics Principles (2020), the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021), and UQ’s institutional policies on academic integrity and accessibility. These provided a foundation which we then adapted through student–staff partnership to the specific needs of science students.

Ethical AI use in science education includes:

- **Academic Integrity:** Ensuring AI is used in ways that preserve the authenticity of students' own learning and assessment processes (aligned with UQ Academic Integrity policy).
- **Transparency:** Encouraging students to openly disclose when and how they use AI tools, consistent with principles of explainability in national framework.
- **Critical Evaluation:** Cultivating skepticism about AI outputs and fostering habits of verification and cross-checking, consistent with established approaches to metacognition and self-regulated learning (Zimmerman, 2002; Broadbent et al., 2019).
- **Learning Enhancement:** Positioning AI as a support for deeper understanding rather than a shortcut that bypasses key disciplinary processes.
- **Equity:** Ensuring AI use does not exacerbate existing inequities, reflecting UNESCO's emphasis on inclusive and human-centred AI.

The Inclusive design principles we followed included:

- **Multimodal Delivery:** Offering text, video, and interactive activities to support varied learning preferences (Mayer, 2020).
- **Cultural Sensitivity:** Recognising that students' digital practices and attitudes toward technology are shaped by diverse cultural contexts.
- **Accessibility:** Ensuring all resources met WCAG 2.1 AA standards, aligned with UQ accessibility guidelines.
- **Reduced Barriers:** Avoiding unnecessary jargon, scaffolding complex ideas, and making AI concepts approachable for all students.

The result of our collaborative process was the Generative AI Essential Guide: Unlocking Learning Sciences, an open-access, multimodal online module. The module includes scenarios, videos, and interactive elements designed to make ethical practice clear and practical. In line with principles of scaffolding, the scenarios progressed from basic applications (e.g., grammar correction) to more complex tasks (e.g., using AI to critique arguments). The design also drew on cognitive load theory, presenting content in short videos and concise tables to reduce overwhelm, and on metacognitive approaches that prompted students to reflect on when AI supported or hindered their understanding. We structured the guide to take students on a journey from basic understanding to confident application:

- **Module 1:** Introduction to GenAI, covering the fundamentals: what these tools are, their capabilities, and their limitations based on technical and ethics.
- **Module 2:** Responsible Use of GenAI: Addressed ethics head-on, providing checklists and clear guidance on how to use AI in line with university academic

integrity policies.

- **Module 3:** Practical Application of GenAI: Offered concrete, discipline-specific examples of how to use AI to support learning, including exemplified use in some assessment tasks and career development.

To make the ethical considerations tangible, we developed a series of interactive scenarios based on the very tensions our research had uncovered in Semester 2, 2024.

Example: The Study & Exam Preparation Scenario

Alex, a science student, is preparing for the final CHEM1200 exam, a 40% centrally scheduled, paper-based hurdle exam. The course explicitly prohibits AI use during the exam but does not specify whether AI tools can be used to support study beforehand. Like many students, Alex wonders, “Can I use AI to study without crossing a line?”

To navigate this, Alex experiments with several GenAI tools. For instance, they use Claude to generate multiple-choice questions for self-testing:

Prompt: “Give me five multiple-choice questions to test my understanding of transition metals as taught in CHEM1200 at UQ.”

After answering, Alex checks responses critically and notes areas needing review. Rather than accepting feedback passively, Alex re-visits lecture notes to confirm explanations. This active engagement illustrates responsible use; AI supports study but does not replace effort.

Alex also uses ChatGPT to explain difficult chemistry concepts, asking:

Prompt: “Explain the concept of NMR Spectroscopy in simple terms, with an example.”

This prompt scaffolds understanding without offering a shortcut.

In another case, Alex prompts ChatGPT to act as a tutor:

Prompt: *"Act as a Socratic tutor to help me understand acids and bases as taught in UQ's CHEM1200."*

This helps Alex refine conceptual understanding through critical dialogue, mirroring traditional tutoring in an ethical way.

The scenario prompts students to consider the risks and opportunities in each use case:

- **Risks:** Over-reliance, potential copyright breaches, AI hallucinations, and lack of critical engagement.
- **Opportunities:** Personalised learning, formative feedback, spaced repetition (e.g., Anki flashcards), and time-efficient revision through summaries or podcasts.

A critical decision point is included:

Is it ethical to use AI to generate answers to past exam papers from the UQ library?

The scenario guides students to realise that uploading copyrighted material is inappropriate. However, using AI to practise responses (without uploading content) can be ethical, if answers are verified and AI is treated as a study partner, not a solution machine. This scenario explicitly addresses the tension between efficiency and deep learning. Through guided reflection, students consider:

- When AI summarisation supports learning (e.g., initial orientation to complex topics) versus when it might bypass important cognitive processes.
- How to use AI as a dialogue partner for deeper understanding rather than a shortcut.
- The importance of verifying AI outputs against authoritative sources.
- Strategies for maintaining active engagement when using AI tools.

This scenario, co-developed with student partners, models how ethical engagement with GenAI can support deeper learning. It reinforces our principle, Use AI to learn, not to shortcut learning. Through scenario-based reflection, students learn to evaluate AI's role in their study practice critically, reducing anxiety and promoting academic integrity.

Did It Work? Shifts in Student Confidence and Understanding

We piloted the module with 235 students across four science courses, and the evaluation results were highly encouraging. Overall, 80% of students surveyed agreed or strongly agreed that the module was valuable for understanding how to integrate GenAI into their studies ethically.

Module 3, which explored practical applications of generative AI, was also well-received, with respondents valuing the hands-on activities and real-world scenarios. One student noted,

"The hands-on examples helped clarify how AI could be used effectively and ethically in academic work."

(Student Feedback, Sem 1, 2025)

This comment is supported by one SLOCI's student module review:

"Students say that they don't use GenAI because they do not know about it, what it is, or how it can be used. This course informs students and advises them of how GenAI can be used and integrated into university (both study and assessment). This content is beneficial and suitable for Students."

(SLOCI student module review)

Most importantly, we saw a clear shift from anxiety to confidence. After completing the module, 60% of students reported feeling "confident" or "strongly confident" in applying GenAI tools to their studies—a significant increase. Students' qualitative feedback highlighted the value of the clear, practical guidance. As one student noted,

"[The module] helps to clear the procedure for new GenAI technology and use of it in a study space and shows how it can be used to help learning in an ethical manner."

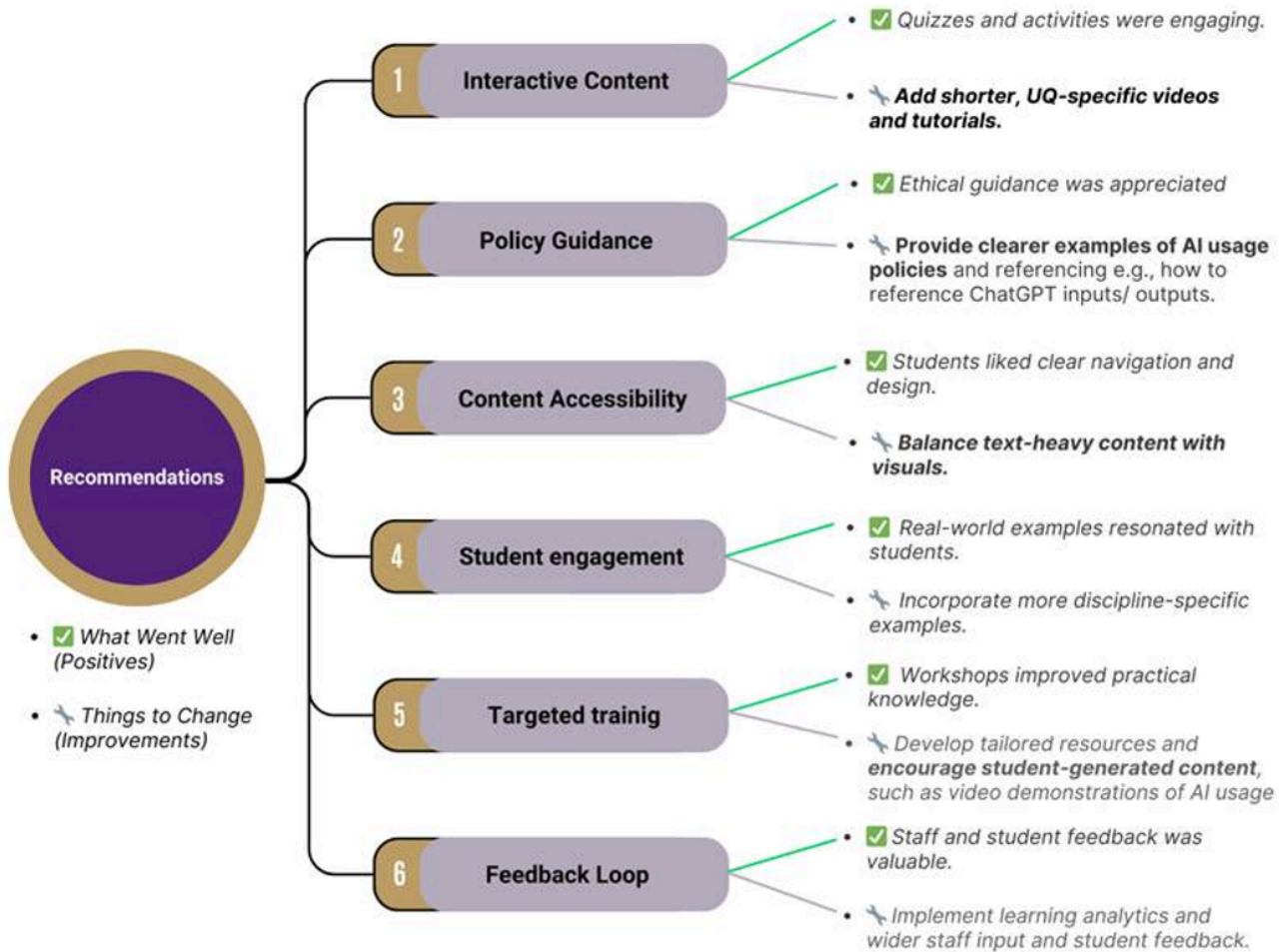
Another praised the multimodal approach:

"The content was given in different ways...and therefore I was entertained, and it kept me interested."

Despite these successes, several areas for improvement were identified. While most students found the course easy to navigate, some felt that the structure could be simplified. One respondent commented,

"For me, it was too much text content and long videos for it to be fully engaging."

Students also requested shorter, more dynamic videos to enhance engagement, and feedback indicated that text-heavy sections, particularly in Module 1, could be condensed to improve accessibility. Additionally, some participants highlighted the need for clearer guidance on referencing AI-generated content and understanding academic integrity policies. The following figure summarises the key recommendations for future iterations of the module based on module implementation in Semester 2, 2024, highlighting both what worked well and what could be improved based on student and staff feedback.



1. Interactive Content What Went Well (Positives) Quizzes and activities were engaging. Things to Change (Improvements) Add shorter UQ-specific videos and tutorials.
2. Policy Guidance What Went Well (Positives) Ethical guidance was appreciated. Things to Change (Improvements) Provide clearer examples of AI usage policies and referencing (e.g. how to reference ChatGPT input/outputs).
3. Content Accessibility What Went Well (Positives) Students liked clear navigation and design. Things to Change (Improvements) Balance text-heavy content with visuals.
4. Student Engagement What Went Well (Positives) Real-world examples resonated with students. Things to Change (Improvements) Incorporate more discipline-specific examples.
5. Targeted Training What Went Well (Positives) Workshops improved practical knowledge. Things to Change (Improvements) Develop tailored resources and encourage student-generated content, such as video demonstrations of AI usage.
6. Feedback Loop What Went Well (Positives) Staff and student feedback was valuable. Things to Change (Improvements) Implement learning analytics and wider staff input and student feedback.



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Figure 3 Recommendations for future iterations of the Generative AI guide, highlighting strengths (What Went Well) and areas for improvement (Things to Change).

In response to these findings, in Semester 1, 2025, we had created shorter videos, reduced text-based content, and incorporated more interactive elements such as quizzes and scenario-based activities. We also provided clearer, step-by-step examples for referencing AI-generated work that aimed to address a key concern raised by students. The pilot testing demonstrated the module's potential to build students' confidence and skills in using generative AI responsibly, and with these

adjustments, it can become a useful learning resource. We have implemented our revised guide in Semester 2, 2025.

Our Reflections: What We Learned Along the Way

As a project team, our biggest realisation was that the GenAI challenge was not simply technological; it was deeply human. We initially approached the project focused on tools, features, and functionality. But what surfaced most clearly was the emotional weight students carried in the absence of clear guidance. Many expressed a genuine fear of doing the wrong thing by accident, which led to:

- Risk-averse learning behaviours that limited exploration and creativity.
- Surface approaches to assignments designed to avoid any AI-related risks.
- Missed opportunities for developing critical AI literacy skills.

This reframed our purpose: from merely delivering information to cultivating psychological safety. We learned that when integrating disruptive technologies, our first responsibility as educators is to listen to students' concerns and build a bridge of trust and clarity that supports ethical learning while maintaining academic rigor. A critical insight emerged around the balance between AI assistance and cognitive engagement. We observed that students needed explicit guidance on:

- Distinguishing between AI use that scaffolds learning versus use that bypasses it.
- Developing personal criteria for appropriate AI assistance.
- Building habits of critical evaluation and verification.
- Maintaining ownership of their learning process.

We recognised that guidance at the institutional level needed to work for all disciplines; however, this also meant that the guidance had to be abstracted from practice. Initially, we hoped that focusing within science would provide sufficient context to ground guidance on using AI. Yet even across science disciplines, practices varied significantly, and it became clear that offering consistent, specific guidance was not feasible. In many situations, this level of abstraction may be appropriate, but with the rapid evolution of GenAI and the potential for misconduct if guidance is misinterpreted, such abstraction carries risk. Through our partnership, we found ways to offer concrete, contextualised guidance across a range of courses, balancing specific examples with the diversity of practice across the faculty.

There were, of course, challenges. Student feedback indicated that the module took longer to complete than intended, highlighting the need to condense some of the

content. Another reflection concerned the cognitive trade-offs of AI use. While students valued AI for efficiency (e.g., summarising content), we recognised the risk of bypassing deeper disciplinary thinking. To address this, the Guide emphasised strategies for verifying AI outputs, prompting reflection, and re-engaging with original materials, ensuring AI supported rather than replaced critical learning processes. Several students said they only discovered the guide by chance, highlighting a gap in its promotion and integration. To be impactful, the guide must be embedded meaningfully into courses, something we aim to improve in future iterations.

One concern raised during the SSP project was the fear that we might invest significant time creating a resource that would ultimately go unused. As one of our team expressed,

"In order for the guide to work, academics might need to use it."

When the guide is treated as an optional extra, or a "tick-the-box" resource, its impact is limited. Blended learning approaches where the guide is referenced in class discussions, assessment briefings, or tutorials were seen as more effective as reflected in Park & Doo (2024)'s work. Behind the scenes, the work of co-designing such a resource also revealed emotional labour. Our team sometimes faced frustration when encountering conflicting views or dismissive attitudes about GenAI. As one team member reflected,

"Dealing with extremely different opinions among teaching staff can be frustrating. Sometimes, negative comments are hurtful."

These moments reminded us that innovation requires not only good design but resilience, collaboration, and shared purpose. Looking ahead, we carry forward these lessons with renewed commitment: to centre student voices, foster educator dialogue, and continue building an ethically grounded, pedagogically sound approach to GenAI integration in higher education.

Conclusion: Key Principles for Your Own Practice

This project reinforced our belief that proactive, empathetic pedagogy is an effective response to disruptive technological change. For fellow educators navigating this new landscape, our experience suggests the following key principles:

- **Co-design with Students:** Students may not be experts in pedagogy, but they are experts in their lived experience, digital habits, and emotional responses to learning. This form of expertise was critical for shaping resources that addressed authentic needs, while being complemented by staff pedagogical and disciplinary knowledge.
- **Bridge the Gap Between Policy and Practice:** Don't just tell students the rules. Use concrete examples and interactive scenarios to show them how to apply those rules in the messy, real-world contexts of their coursework.
- **Use Multimodality:** To keep students engaged with complex topics, use a variety of media formats. Videos, interactive elements, and clear visuals can make abstract ethical concepts more accessible and memorable.
- **Address the Anxiety, Not Just the Technology:** Recognise that student uncertainty is an emotional issue, not just a cognitive one. Frame your guidance with empathy to build trust and create a safe environment for learning and experimentation.
- **Embrace the Change and Model Lifelong Learning:** As GenAI continues to evolve, educators must also deepen their own understanding. Firsthand engagement with AI tools helps build practical knowledge, but technical familiarity alone is not enough. AI can be used meaningfully in teaching, if we reflect on the ethical implications of its integration (Mishra et al., 2023). Emerging research suggests that teachers require a combination of technological, pedagogical, and ethical knowledge to effectively guide students in AI-supported learning environments. This aligns with expanded frameworks such as Intelligent-TPACK, which reconceptualises the teacher's role not just as a user of technology, but as an orchestrator of ethically informed, pedagogically grounded AI-based instruction (Celik, 2023).

Key Lessons and Unexpected Insights

Through this journey, three key lessons emerged that we believe are transferable to other contexts:

- **The Paradox of Support:** We discovered that students often need the most

guidance precisely when they're least likely to seek it. The anxiety about "doing the wrong thing" created a paralysis that prevented students from engaging with available resources. This taught us the importance of proactive, embedded support rather than optional add-on resources.

- **The Power of Peer Legitimacy:** An unexpected insight was how student partners became informal ambassadors for the guide. Their involvement gave the resource credibility among peers that no amount of institutional endorsement could achieve. Consider how peer champions might amplify your own initiatives.
- **The Evolution of Ethics:** We learned that ethical AI use isn't a fixed set of rules but an evolving practice requiring ongoing judgment. Our most successful components were those that developed students' decision-making frameworks rather than prescriptive dos and don'ts.

Advice for Educators

For those engaging on similar work, we offer this advice:

- **Start with Empathy, not Technology.** Understand the emotional and cognitive dimensions of student experience before designing solutions.
- **Embrace Productive Discomfort.** The tensions between efficiency and deep learning, between support and self-reliance, cannot be resolved, only navigated thoughtfully.
- **Build for Adaptation, not Adoption.** Create resources that educators can customise for their contexts rather than one-size-fits-all solutions.
- **Measure What Matters.** Look beyond usage statistics to assess impact on student confidence, metacognitive development, and learning quality.

Ultimately, generative AI is not a temporary disruption, it is becoming a defining feature of academic and professional life. Our role as educators is not to restrict its use, but to guide it. By listening to our students and collaborating with them, we can move them from a place of anxiety to a position of agency, empowering them to become confident, critical, and ethical users of the tools that will shape their futures.

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Ethical approval

This project received ethical approval from The University of Queensland's Human Research Ethics Committee (2024/HE001346).

AI Use Declaration

This chapter was prepared with assistance from ChatGPT and Claude, which supported aspects of writing and editing for clarity. All ideas, findings, and interpretations are the authors' own, and the AI did not generate or analyse primary data or replace academic judgement.

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3.

LEADING WITH RESPONSIBLE AI – THE CASE FOR ETHICAL HUMAN LEARNING

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Abstract

This case study examines the ethical and pedagogical dimensions of leading with responsible AI in undergraduate learning, focusing on how students' creative and interpretive processes unfold when artificial intelligence is introduced as a co-participant in learning. Situated within a first-year education and creative inquiry context at The University of Queensland, the study compares two learning environments: the Visual Thinking Strategies (VTS) program at the UQ Art Museum and an integrative AI-assisted collaborative project. Drawing on Graham Wallas's illumination phase of the creative process, the research highlights how pedagogical attention, the deliberate focus on students' internal and external processes of meaning-making supports ethical, reflective, and socially aware learning. Through iterative, co-led experiences, students learned to distinguish between human and automated creativity, demonstrating the importance of inner attentiveness, aesthetic sensitivity, and embodied ethical reasoning. The study concludes that responsible AI pedagogy requires careful orchestration of both technological and human capacities, emphasising experiential, ethical, and creative engagement as the foundation for leadership and civic readiness in the intelligence era.

Keywords

Responsible AI, Creative Process, Ethical Learning, Visual Thinking Strategies, Co-led Learning, Generative AI, Human-Centred Pedagogy

Practitioner Notes

1. Frame AI tools as prompts for reflection and dialogue, pairing them with explicitly human acts (silence, observation, peer sense-making).
2. Build in moments of deliberate pause and verification (e.g., VTS-style prompts: *What's going on? What makes you say that? What more can you find?*) to surface ethical reasoning and depth.
3. Sequence activities to move from pre-personal reflection (private notes) to extra-personal articulation (public critique), then require evidence-informed revision.
4. Scaffold prompting alongside source-checking, bias scans, and short rationale statements that explain what was accepted, altered, or rejected.
5. Evaluate the chain of attention (reflection logs, peer responses, revisions) and make ethical judgement, not AI output quality, the centre of criteria.

Introduction

This case study is about co-led pedagogical processes, and communicable realities, in an undergraduate learning context that also includes artificial intelligence (AI). With the transition into the 'Intelligence Era' (Webb & Jordan, 2024) in a global society, there has been little attention given to how AI intersects with student creativity and processes. Being a merger of human realities and assistive algorithmic intelligence, this invention is hard to fathom beyond the self-corrective and generative functions it performs. Automated intelligence platforms are among the many information efficiencies introduced to assist humans in pursuit of progressing societal development. Since the release in early 2025 of the open-source AI platform "Deep Seek" in China, it has been striking how frequently global media highlight leaders and educators grappling with what AI asks of us as responsible humans (Fitzgerald & Curtis, 2025). The growing interest in AI assistive technology centres on the impact of automated information, raising questions about how developers can ensure its responsible human application. In Amazon's CEO Andy Jassy's leadership on AI, reinvention, and corporate culture, he offers clues on the stakes about the real work of humans in conjunction with AI, through his responsible focus in tracking effects from human development, and to experience, for societal good (Jassy, 2025). Yet in current AI scholarship, studies attend to tracking the generative platform experience as a productive prioritisation tool and profit-driven techniques (Black & van Esch, 2020; Chubb et al., 2022; Chui et al., 2018; Huang et al., 2022). For decades, it has been tangible to see focus shifting from human development in learning, to 'tech' – plus skills, plus jobs, and plus data. When a first-year higher education student cohort (n = 93) began to articulate their developing stance towards learning, what emerged were

the communicable realities, co-led pedagogically, and created in modulative configurations, that surfaced creative attainments in learning, and as ethical to fundamental internal processes required to process information in novel ways.

Part of the attention had to do with two central questions of creative matters: what supports undergraduate students' creative processes, where AI platforms are introduced? Why is ethical responsiveness in co-led creative processes pedagogical, in leading one another, and initiating learning process? Inquiring about responsible co-leading requires addressing what bio-semiotician, Joseph Hoffmeyer, scientifically introduced on the grounds of natural process – the counterintuitive claim that intelligent machines fail at the point where they “converse with us” (p.176). In his research, Hoffmeyer argued that the confusion arises from human experience itself, which guides how the interpretation process combines in relation to the body's needs and purposes (Hoffmeyer, 1998). For example, receptive sensing, which manifests an internal awareness, and indicates association trains, that brings a flash of success of interpretation (Sadler-Smith, 2015). Yet in current societal approaches to student learning, the human ‘inner stages and creative lenses’ are often overlooked in learning, even though essentially neurobiological. That is to say, the internal process and organising effects students are individuating (Marais et al., 2024). For human intelligence exists not just proxy for mental recognition. It is the human nature of bodily sensory activities in matters of creativity itself. As AI function infiltrates every known aspect in daily life, the physical human ‘mental success out of sense recognition’ remains distinct from AI capability. The agenda of technological development, when juxtaposed with human experience, forces us to confront this ecological imbalance through a focus on the ethics, of sensory human means, of which underpin the students experience explored in this case study.

We understand the experiences students engaged in this project were social in nature between private creativity processes and public sharing of one's own subjective human experience. To honour student dignity in this process invited us to consider the sources of attention and realities communicated in various modalities by students. We also considered our own attention to student responses towards an examination of what sources of aesthetic function and selective forces that arose and students responded to throughout. In doing so, student responses revealed ways to recognise the distinctive constructed social reality and emerging learning stance being formed, as part of student attention in the creative learning process (Ashcraft, 2021). With the objective of student learning of co-leading creative processes that prepare students as responsible educators, sensory aspects in pedagogical attention provided fertile insights for ‘the selective force’ in interpretations and differing sources that illuminate human learning.

At the start of the course roll-out and AI project, discussions in the staff-student partnership were focussed on the course objectives of relevance as it secured the purposeful opportunity in content topics and student experiential contexts. Two relevant project experiences were headlined as comparable platforms for focusing on student interpretation processes. These projects featured the three-staged course-embedded exhibition of Visual Thinking Strategies at The University of Queensland Art Museum and afterwards a mid-course integrative AI and peer collaborative 'exhibition'. Both experiences allowed students self-corrective and generative verbalised activation within visual platforms. To co-lead the student experiences of interpretation, of creativity, considered the naturally internal processes of the human inner-stage processes itself. We clarified the purpose of the research based on the course construct of pedagogical attention and communicable realities. This case study approach sets the scene that deliberately targets Graham Wallas' illumination phase of a mid-creative process, accompanied by the experiential means in platforms, raising trains of associations, and motility of deep effectual learning engaged by students.

Here, Hoffmeyer sees experience as essential "we do not get anywhere if we do not understand each other" (p. XVII). This highlights the importance of recognising students as active subjects positioned in pursuit of self-leadership for a global society (Pless et al., 2011). He further argues that in a learning context, an aesthetic staging of information risks neglecting the deeper value of experiential engagement, where in a natural real sense learners shape their own creative existence in constructing new perspectives on self and the world (Hoffmeyer, 2018). Perhaps the enduring didactic staged transmissions to information delivered and in respect to traditional higher education are not staged information at all but the attentional activations, yet when the learning starts in topic content, it moves students to other realities, including the potentials of human needs, to erase internal creative process. To lead responsibly for deep experiential engagement in pedagogical missions, this matters. Paying attention to what students engage particularly in relation to AI-generated information vis-à-vis other pedagogical trajectories in order to ask why the formulate-response relationships affirm internal awareness in processes of creativity in the act of learning itself.

To recap, the basis of pedagogical attention exists through experiential contexts and creative process in co-leading realities, and which posits the student into interpretative 'reasons' for learning. Through this juxtaposition of thought, as associative creations, in the Visual Thinking Art Museum session and a physical AI exhibition project, students attended to observe, evaluate, synthesise, justify and speculate. The physical AI project signals how students orientated modulations so to reach towards visual thinking – as creative accumulations – which provides

comparable, but also different internal experiential sequences. These parallel student considerations show the depth of attention varies between the illumination of visual thinking. These first-year students were engaged in visual thinking through attention on societal issues and challenges in course content but were asked to draw upon non-obvious scenarios outside their experience to engage sensorial wrought-learning. Students are entering a society where frequently ethical dilemmas warrant their attention as they encounter ambiguity. Learning through constructive means that initiate strong emotion and configuring responses becomes an individuated bodily response, which embeds such attention throughout the pedagogical experiences. This purpose offers a clear foundation to compare student leading that coheres in the content, context, and information generated by both the UQ Art Museum and Integrative AI Project platforms. Each platform assists students who are in a constant state of engaging creative processes to contend with suitable responses for improved awareness, and for enhanced self-leading of more responsible leaders in society.

Pedagogical Attention as a Creative Process

What could be considered pedagogical attention is one question in the literature, but student communicable realities open the dimension more broadly: of kinds of developmental activities in the learning experience (Shotter, 2009). It is conducive to begin a discussion about learning in the recent increased focus on pedagogical attention (that builds intellectual awareness) and illumination (interlinking existing knowledge with prescient observations). In the 'Art of Thought' written by Graham Wallas (1926), the economist and schoolmaster identified a creative process model, which Sadler (2015) extended recently, that surface five scientific explanations for interpretative steps, of which holds relevance still today. The living body fundamentally self-creates in 'striving to survive' and naturally sustains biological forces and active movement, but also utmost central to human development (Hoffmeyer, 2008). Of all the human form, attention comes in creative processes to forcefully 'spread' the modulated body to draw from external registrations and internal feelings to overcome environmental obstacles. This activation of thought is made in Wallas' creative phases, who questions artificial outsourcing of this intelligence (Sadler-Smith, 2007).

Phases of creative processes have been considered as a pedagogical matter to invoke a student response, and amenable when novel associations are combined. In this chapter, creativity is treated as a pedagogical practice that invites thoughtful student response. The analysis centres on the illumination and verification phases of the creative cycle, where students move from initial insight to tested understanding and how external engagement enables them to co-lead their learning and articulate

personal positions. Rather than equating learning with attention alone, students are framed as receptive, living systems that communicate meaning through interaction with people, materials, and place. In AI-rich courses this stance matters, because an exclusive reliance on synthetic information can crowd out attention to the human and internal processes that give learning consequence. We argue that creative processes cultivate self-organisation and shared sense-making, laying foundations for leadership and civic participation.

The key distinguishing feature of the first-year students becomes this: Can individuals co-lead the attentive illumination without reasons, without natural verification of being creative in realities with the experience of the real. To whom are students responsible, to course an effective human response in AI influences. The structure of the creative process follows the selective forces in the body which allows students the mental-sensory attention in responses. This responsible effect, forcing a natural need in the realities of humanness, also allows us to consider the knock-on effects in ethical subjects for leadership and civic society itself. Figure 1 and 2 considers the students attending in meaningful attempts to surface responses that attains creative means and shared understandings.



Figure 1 UQ Art Museum, Week 2, Session 2 – students engaging meaningful attainments of understanding

There are in illuminate attention phases two forms in the creative art of thought: the internal mental work, and the external verification. One means association trains, the other shared templates; one means awareness manifestation, the other means response, observations, and speculations (Wallas, 1926). The illuminative work students displayed via fringe attention; dynamic process, and personal experience nearer feeling unexpected, strange, disconcerting impression. The degree of illumination present in the student experience above is participatory, in a constant state of reconfiguring. Around the artwork image are evident markers to these attentions, each student taking place in folded protective arms. The learning phase displays the students mental work that any response about associations requires 'separation' from the personal and participation. The figured arms signal a temporal suspension for private moment for students in that process. Internal work also required a voluntary pedagogical silence, which the students experienced direct action of mind through an internal process of 'personal wording' – rising a train of associations for a response amongst shared words and visual representations (Sadler-Smith, 2015). Of note is one student with arms stretched forwards in the process of sharing speculative observations while the others remain 'silent'. The course convenors moved in attentive respect to the silence letting the associative trains arise, in the fleshed-out moments of silence. The students were comfortable and remained in attention to the artwork. Illumination is a manifest sign of long unconscious prior work (Poincaré, 2000, pp. 22-31). After the silences, there were long periods between responses at first. It was elongated creative bouts of conscious work, that notably as each session unfolded, the means for student attention configured into closer associative patterns of greater speculations in the observations and illuminated thought:

- Session and Artwork 1: Max Dupain Passengers in Train – students stood; there were several periods of silence.
- Session and Artwork 2: Petrina Hicks the Hand that Feeds – periods of silence: two brief periods.
- Session and Artwork 3: Noel Mckenna Tricycle Shadow with Cat – nil periods of silence.

This transit through the inner state, of creative bouts and the student interpretations, created a gap between an inner tension and outward verbal verification, the being a subject in creative illumination. The challenge of internal personal contests, and the continued internal force students experienced came to display novel responses and

attention that materialised in richer words and associative trains. The nonobvious content in the artwork bird image challenged and surfaced student tensions in the word choices and understanding contributions from other students. Although a shared visual template in the session, the artwork image extends an invitation for students to speculate and observe each other's responses that required no complete example or accurate answers. This allowed the students to individuating one's own responsible sense and a civic building toward co-led discussion in the difficult thought process. Verbal responses between the active student observations had an ethically-sound means to build a renewed template of awareness, as students kept sensitive to each response with very few being unresponsive. This experiential attention of co-leading, in support for other illuminations enriched the response gap students displayed between depth of information staged in the artwork and deference to others that forms a physicality that bodies forth a civic encounter, breaching student tensions of the fact that 'reasons to respond' did not appear at all automatically. Throughout, the student's internal verification processes were revealed externally, which the circularity of standing around the artwork together, created an experience where students could engage the connective force of each other's response. In essence, the students had made a use of fringe associations together to make co-led expression, the human tracking of deeper associations, and greater internal and creative experience, in gradual verification of each other's civic responses. Because the responses were non-automotive and students articulated on internal processes, the illumination phase engaged physical changes in word choice and tighter associative trains. The ambiguity of the artwork ended up as no obstacle as the students naturally engaged attention on the activation of thought, although a tension initially, it cohered in deeper information that materialised the natural steps Wallace identified in creative processes.

- Session and Artwork 1: Max Dupain Passengers in Train – students drew on multiple threads of evidence to support each other of interpreting a historical era of where people were looking (gaze) and what is not seen (mobile phones)
- Session and Artwork 2: Petrina Hicks The Hand that Feeds – the relationship between the outstretched hand and the other turning away makes it seem real with the bird looking at the viewer– inviting the viewer to respond.
- Session and Artwork 3: Noel Mckenna Tricycle Shadow with Cat –. where is this set? Is it a prison with the lines of vertical bars in the background? What is the pole outside? Is it a large umbrella that can be wound up by a handle?

Creative Processes as Communicable Realities

In co-leading, a creative process stands to engage the illuminate moments done in the

student recursive responses. Indeed, the students remarked increasingly upon fringe awareness, selecting more discernibly for which put the 'shape' in the personal experience – and the felt realisation the solution is coming. We noticed as the student descriptions portrayed a 'fill-in' for the non-obvious parts of the artwork, speculations turned into interesting conjectures. A supportive example of this development from biological fields is Dietrich and Kanso's (2010) review that summarises the fact that insight in learning requires verbal trains of associations, which then activate real experience verified in surrounding cultural bonded social structures. These preliminary 'shapeless' moments were starting points for students to await sparks of attention and affective awareness; in other words, the selective force comes through allotting an attentional place by sieving interesting combinations (Wallas, 1926). In human generated sign action, any attention about engagement requires sensory material process, that is 'information sources' that allows communication to occur (Kuhn et al., 2017). When students call out attention in their engagement to figure out non-obvious situations, this art of creative thought is in keeping with responsible leadership for civic preparation (Pless et al., 2011).

During the integrative AI mid-course exhibition, clusters of students arranged themselves in groups around laptops and an Adobe AI platform. The circularity mode of sitting around the laptop that engaged students provided an inverse attention process to that of the UQ Art Museum platform. Students attended each with clicks, prompts, inputs – which represented external creativity processes for internal illuminate reception. The creative processing occurred external to the natural inner functions required. Student observations during the process contained an attention of receivership for the obvious outcomes arising from the personal input in the platform. Suffice to say, there were minimal depths of difference in civic encounters formed in the students. The student responses during the AI experienced revealed the AI Adobe platform provided a stand-in for the work of making an illumination

Each response students flashed onto the projected screen in the lecture room, could be described as a set template of AI hints or on-the-fly attempts to model articulated responses. The students could show the AI image but could tell little purposeful explanations. This revealed students encountered difficulty in arising trains of associations to offer responses to build a chance to observe and speculate a contribution in the learning experience. As the students projected the AI images the responses were complete, accurate, yet first level responses. The responses could be described as superficial and disengaged from the internal creative process. For secondary responses or greater, the body requires the engagement of the internal affective process in the wrought work of attention (Stewart, 2020). One could say, the illuminative response students used that day in the AI project is the result of an already marked out template gained through AI creativity. Each student response

experience, and listed below, have an element of still rather than communicable realities – also a minimum of activation of internal creative processes. The ‘pre-shaped’ creative AI sequence students engaged is an incomplete experiential, for which self-selected AI images from known student pre-existent understandings and features formed proxy templates in place of the wrought inner-work needed. Students attended to obvious realities and staged information. The didactic, external process between the AI tool and responses, lead to shallow experiential experience with the necessary internalisation of the illumination phase. What responses were contained in the AI image makes it plain: the awareness marked out by external automatic information removed the need for activating bodily verbal trains of associations.

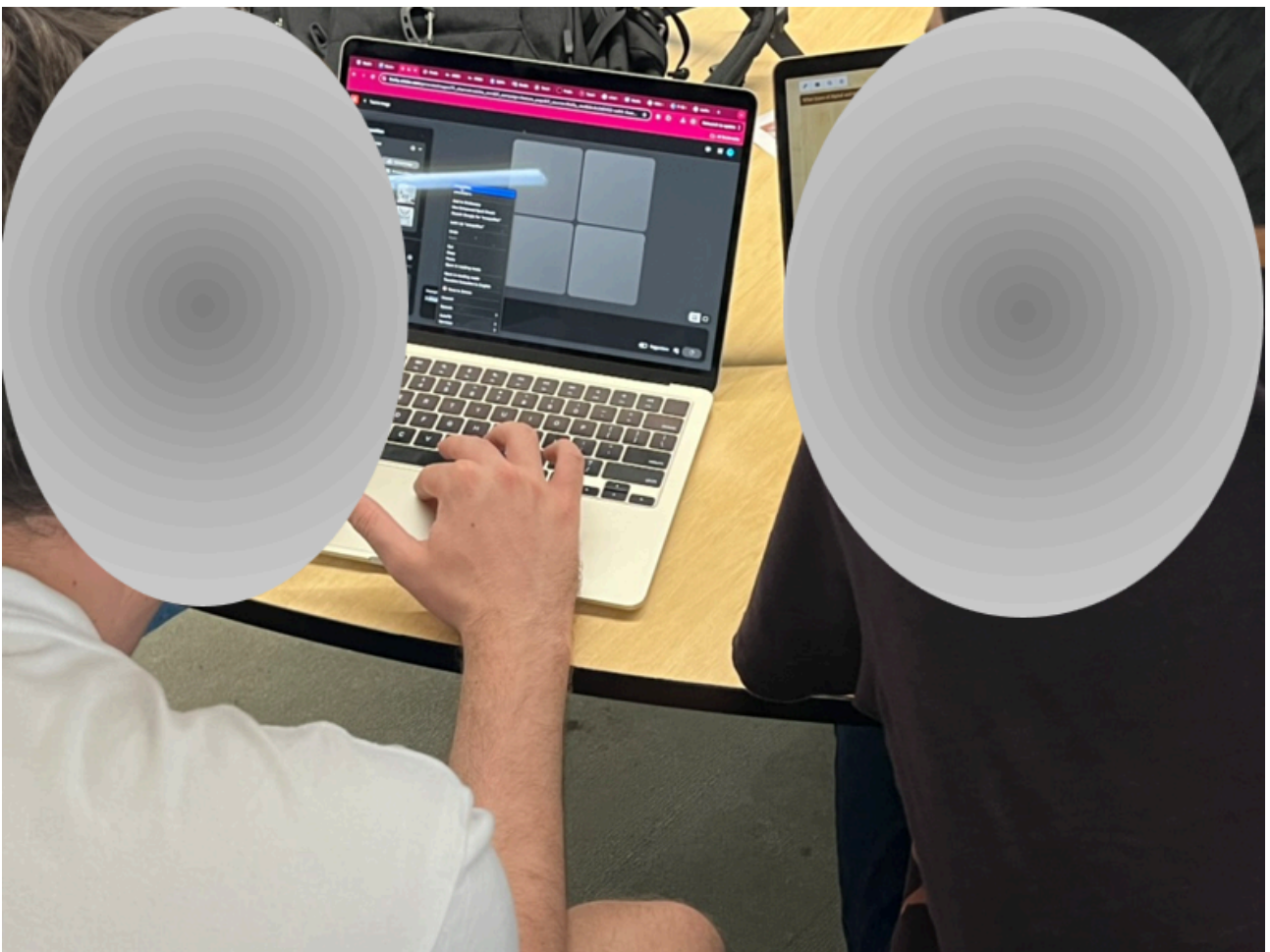


Figure 2 Mid-Course Integrative AI Project – students engaging meaningful attainment of AI understandings

There are in AI illumination attention phases two forms in the art of thought, the external templates, and the automatic template verification. One means inputted trains of known student associations, the other means a stand-in for individual thought. The hint and model of illuminative AI work is the automatic instance of information; which in this student example comes to unengaged internal experience.

Students were far from feeling unexpected, the learning prompted a still life, and small tokens of internal-external tensions. The false pretense of illumination present in the student experience above removes the inner impression and pedagogical silence. Around the student cluster in the image above are evident markers to these attentions, each student taking focus in generating opportune impressions of existent realities. This illumination phase displays the student outsourcing mental work that any response about associations requires a further contestation of internal tensions with reality. The internal and personal participation creates a gap between bystander realities and public attention the students had produced without co-led trains of associations. This gap contrasts with the Art Museum experience of international attention and co-led realities. Instead of a creative tracking of deeper associations, the evidence of the AI information remained uncontested. Students did not respond to other displays by students and AI images on the lecture display screen. Instead of a co-led building of intellectual awareness, it became an instructional public contribution in the attention context, as the running record displays:

10:56 am – one group shared with the lecturer that they had one idea for a Venn Diagram, but it did not work.

10:57 am – another group were celebrating as they got the AI result desired and resonated with what students self-selected from existent awareness to show other students publicly at the table. The focus being on showing rather than guidance on explanations. Everyone continuously focused on chatter and without co-leading a respond and engage a mind-set needed to attend to the non-obvious and integrate challenges in a global society.

11:01 am – one student projected the AI image on the lecture room display, recounting the features of the image; colour choices, naming object, noting details – only stating the obvious ‘seen’ propositions

11:10 am – students were asked to translate what the AI image contributes to collective thought on the week topic of taking a stance on ways to engage the importance of educational contexts inclusive of all stakeholders. Instead of responding, students returned automatically to the group clusters, sat and wrote in privatised times to finally engage the inner process, before students nominated on the lecture room whiteboard an alternative second-order perspective and new reality.

11:15 am – along a continuum line drawn on the lecture room whiteboard, students lead ethical responses of reinterpreted expressions of the AI image, after enhanced self-awareness and deeper peer-to-peer engagement and

dealing in open sources of fringe data and self-nominated exposure to different perspectives.

Here, we make no judgement of the relative designated or scaffolded images created via the AI platform, versus the intrinsic integrative of attention of responsible human centred contributions on the focal course topic that week. The integrative responsible learning is perhaps an intentional marker of the use of context in activities post AI use in the interpretative processes. The student sources of AI attention created an aesthetic staging of information in the Adobe platform, which closes the pedagogical need for internalised human verification. One of the key features of artificial generated gems of thought is that the easy access, effectively averts students from mindful attention. We will reflect on this tracking of attention pathways in both the AI project and UQ Museum exhibition in depth in a later section.

The Illumination Phase: student co-led attention

The illumination phase of Wallas' creativity process provides a zoomed in explanation as to the necessity to understand ourselves and each other in a co-led learning context. In fact, it is the bodily illumination attention that sets the self-led understanding and creative process apart from AI functions. Central to this phase are the associated degrees of consciousness with visual and verbal imagery that provide clarity so one can 'word' or 'project oneself' in following creativity stages (Wallas, 1926). To make opportunity of this phase, the researchers in this case study asked the question of: 'Where would students be during the illuminated intersect stage, in higher education learning contexts, with the use of AI?' The learning context revealed the student focal points during attentional and creative process. The use of an AI source meant students had to contend with a form of self-denial of focus in their internal bodily workings. In the inner tensions to self-lead, and to experience attending to the non-obvious in being active citizens in society, scholars agree that an ill-preparedness exists for many in this regard (Pless et al., 2011). Who can be considered to be learning as Dewey (1958) suggests, are those who experience their own inner reality directly. To exhibit reckoning of emotions and direct inner work **involves, reaching the limits of AI platform**, and scholars caution in agreement (Selwyn, 2022). That is to say, images are incontrovertible to the student internal processes, so feature as an **extra-personal focus**, unless arising selective **tension** integral to the inner student meaning making creates an **internal response**. Table 1 below expands on the pedagogical means for better direct student attention which balances the ethics of Wallace's identified creative process, and by extension, responsible co-leading experiences.

Table 1 Understanding student attention for ethical and responsible co-leading

Illumination Creativity Stage	Visual Thinking Strategy	Adobe AI Platform
Provides Private Insight	Pedagogical silences, the non-obvious, and contradicting past experience, allows the adjustment of mental frames and mindsets to determine fresh explanations	Learning effects are engaged when AI tools increase student awareness in topics far from expected experience. The private insight comes from the challenge of the AI generated 'external template.'
Verbal Trains of Associations	Associations offered randomly by students and adjudicated naturally by sequential responses that shaped or challenged the collective interpretations	Associations engaged additionally from AI platforms and adjudicated by artificially imposed responses that recursively challenge the student to initial internal interpretations
Produce individual insights	Dependent on domain-specific knowledge and responsiveness to peer responses that forms the internal substrate for creativity in shared visual and verbal imagery	Dependent on translation of external domain-specific and narrowed information that limits fringe associations for depth and deference essential to broader societal systems and thus respective responses with use of both visual (AI) and verbal (spoken projection) imagery
Leading for tethered insights	Dependent on orientation of individual mindset and listening to build other responses by open attention and responses to seemingly unrelated source domains	Dissonant and serendipitous to human experience and subjective expression – validations only through subsequent verbal and active reasoning to explain information
Aesthetic Opportunities	Selective verbal and visual imagery forces a delicate sieve of that manifests in a human internalised and individuated combination, order, and sequence. (Weick 2002, 2007, 2020)	Pre-contained responses of information that present a coherent arrangement
Information Presentation (student)	Verbal, Visual, and Bodily Affect	Visual External Information Flows

Illumination Creativity Stage	Visual Thinking Strategy	Adobe AI Platform
Composition of Images	Information bound in a combinatorial living bodily system of producing and determining, that is, interpretive readings where students reconfigure responses that sediment internal differences	Information in a self-referenced system that exists for itself in where students privately select and respond to differences that does not consist in any direct corrections of what is produced that surfaces short-term responses and denial of internal difference
Level of Focus and Balance	Private expressions of rich awareness where students ascertain what they are in a position to point out, and with bodily informed responses and effective in the context offered	Public formulations of fluid responses then expressed by verbal recounts where students are unaware of what they are in a position to point out and reduced effectiveness in the context offered

The creative stages identified by Wallas, specifically, the mid illumination stage, creates an opportunity to understand the combinatorial effects of attention in human terms for improved thought (Wallas, 1926). In the student creative process, it means an illumination (increased occurrence and composition of visual images) requires much conscious effort to put in shape new wordings for extending effective means to lead and share in a social context. Yet, without this significant process of internal ‘engaged realities’, the dealing with the pre-personal learning (the internal criss-crossing of tension obstacles) inhibits students to deal with future challenges, and in consequence, meaningful digestion of attention in contributions outside their existent experiential spheres. The creative learning needed to select, sieve and recombine information to convert into what the human body needs and purposes, if not external validated, manifests unawareness.

The Ethical Creativity Process: responsible lessons learned

While there is not room to provide the entire details of each creative process, we focus on two key aspects related to the illumination stage: visual and verbal imagery. Figure 3 and 4 below shows the creative process – the Visual Thinking session and Integrative AI and Collaborative session respectively. One distinguishing experience, the creative process and images presented, were the ethical dilemmas students experienced. The students were forced to contend with nonjudgemental worldviews and commit to different ways to detect and communicate best understandings. This

of course, is what makes the creative learning process a unique concept – a person's natural possibility rooted in the interior makings.

The UQ Art Museum curator selected images of everyday experiences such as train passengers, a backyard clothesline, and child playing with a bird. The students faced ethical contradictions in these images that tended to contravene common sense or their experience. When conducting the sessions, the image displayed in the centre of the gallery room allowed students to examine the world from different angles. Responsible leadership scholars emphasise this enhanced cultural empathy and sensitivity in society today (Pless et al., 2011). The questions asked of students moved through three prompts to enhance sensitivity: What's going on here, what do you see that makes you say that, and what more can you find? The students shared their understandings which proliferated opportunities to listen to one another yet remain suspended in their own final judgement when viewing the image. More so, the student emphasis on suspending judgement in the illumination phase captures subsequent learning effects with alternative outcomes. That is, this process enabled the co-leading to pedagogically occur in the students' personal ethics of attention and forming responsible self-awareness.

During the AI session, students responded to basic instructions as a starting point for using the Adobe AI platform. They could construct images that fit their expectations yet admittedly belonged to the personal and past experience region in understanding. The researcher running records noted what surfaced in student attention throughout the process and the social constructions that were initiated (Shotter, 2014). The details reflect how students moved into brief private times to respond to a publicly offered question prompt when using the AI tool. The movements shapes attention as a site of examination. The subsequent sharing of AI images in a public showing resulted in first order responses where students merely recounted the obvious elements in the AI image. Interesting responses to the public showings revealed other students were spurred on to experiment with more elaborate functions on the platform. Through this process, ultimately the public showing of responses were saying back what the AI tool had generated without any depth or individuating taking place. What was evidently missing were the expected contradictory moments of strong emotional responses, like the folding of arms, in determining a deeper awareness of self in the locus of attention. The internal body speaks sensations. The student receptive sensing has manifest responses to show inner human work in mental success.

The illumination phase of visual and verbal imagery in the AI use, only translated when students moved beyond the platform and expressed an evaluation for external validation with peers in a subsequent task assigned. The conscious effort of evaluative expression occurred when students had to conceive an individuated explanation,

written on a continuum displayed on the whiteboard, which publicly built on responses with other points of view. Among the different alternative perspectives were the learning effects. When alternative student perspectives-built awareness of associated trains of thought, the indicated labour revealed the moral attention effects. It is creativity. Attention awareness. Inner attention combined in novel ways (Dane & Pratt, 2007).

Ultimately the individual students displayed new realities for both the art museum and AI integrative experience. The students directed inner work to reinterpret co-led different associations with different effects on the learning trajectory. In the move from resorting to automatically presented AI information, students could establish personal and individual qualitative explanations. The AI image failed to contradict the student realities and instead provided an edited template of pre-conceived thoughts on individual needs. The learning effects that occurred in the non-AI pedagogical acts in brokering tensions through external student validation in a social context. The creativity arising in sole human generated attention were a co-led pedagogical process itself that opened the potential to ensure tensions were brokered and resolved.

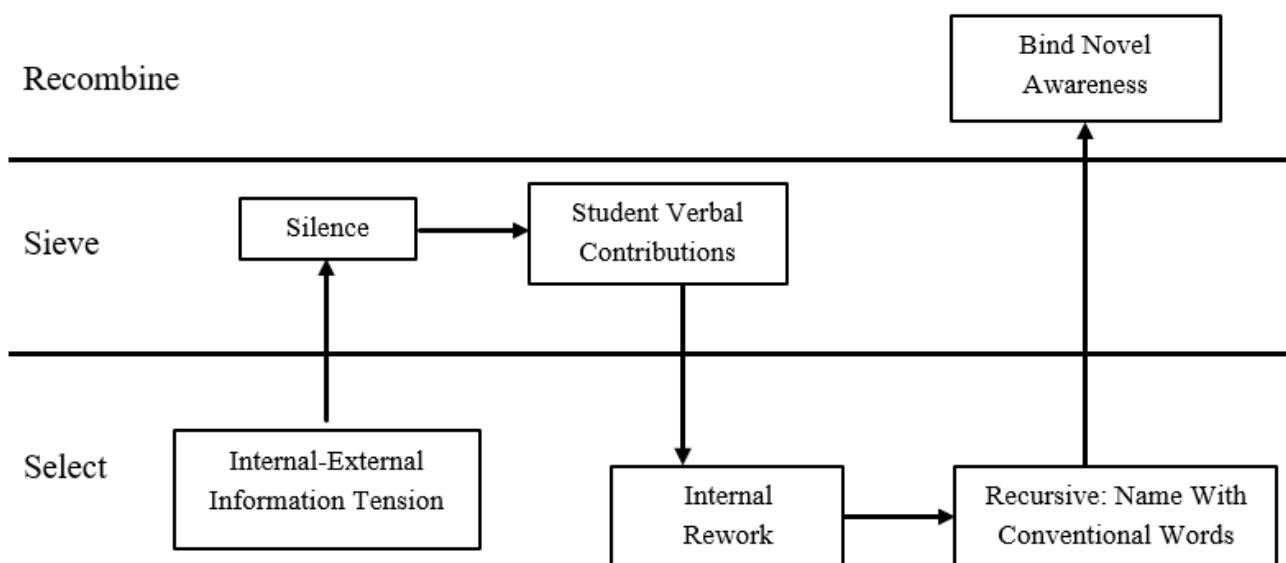


Figure 3 UQ Art Museum creative processes in terms of “attention tensions” (proximal to acquire understanding)

Student engagement in visual thinking responses, and evaluative responses in the mid-course integrative inquiry that included an AI platform, both were met with silence. Noticeably, pedagogical silence allowed visual thinking and followed by interrogatory discussions that were integral. Neurobiological scholars frame such silent sequences as natural moments of abstractions, where student power is suspended (Dietrich & Kanso, 2010). Co-led responses served as communal and

individual pedagogical attention foundations that shed impression on evidence to support student communicable realities.

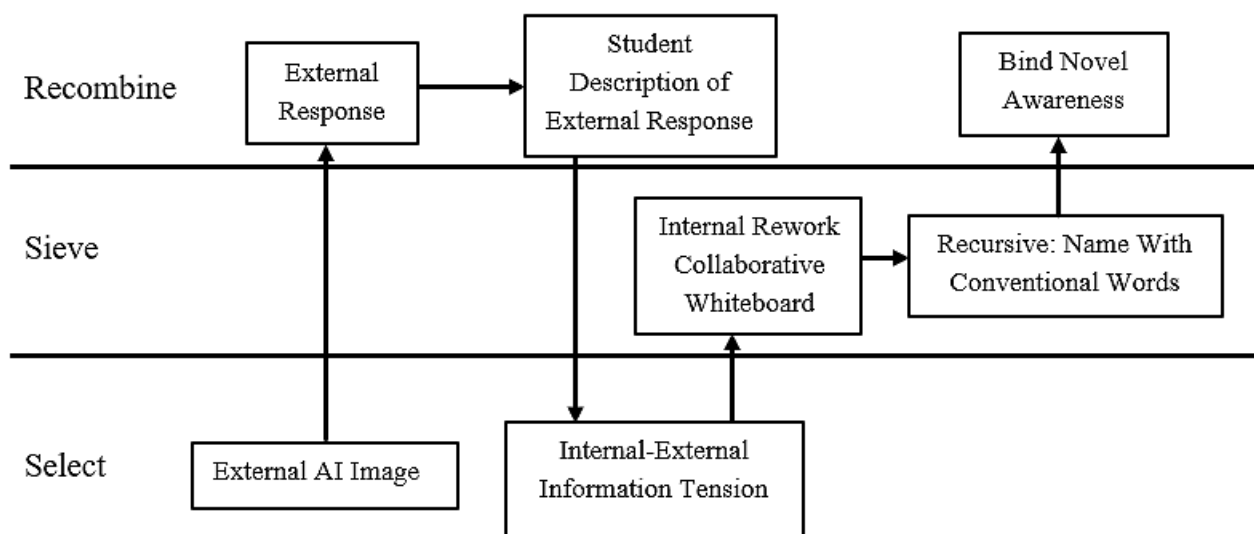


Figure 4 AI Collaborative creative processes in terms of “attention tensions” (proximity to acquire understanding)

Visual Thinking Project: Modulated Stages: inner pre-personal, public extra-personal, and creativity

The visual thinking sessions highlight three key learning outcomes of an illumination phase.

1. Firstly, when feelings arise in a creative process of learning it signals novel combinations of attention sources have combined into knowledge (Gore & Sadler-Smith, 2011).
2. The second outcome worth mentioning is the suspension of ‘right and wrong’ answers. Several instances of increasing trains of associations and broader more abstract ‘fringe’ attention to sources of information formed a layered repertoire of responses amongst the students (Sadler-Smith, 2015).
3. The third learning outcome identified the nature of civic responses in professing oneself in public engagement.

In this body of student attentional work, co-led realities materialised where students engaged the details of pre-personal attention sources in private, where responses are contingent upon detail verification through an internal process. The outward body responses indicated “feelings that arise when knowledge is combined in novel ways”

(Dane & Pratt, 2009, p.5). And yet these displayed feelings of interior movements formed the collective attention on the intersubjective student experiences. It enabled the combined responses to acquire solidarity among the discussion. The students responded in new ways when challenged by the tension of others' insight. This means the students described concepts in the artwork. It is in this context we examine the different creativity stages to suggest attentional considerations for leading, and with responsible human applications. In this view, the fact that we are bodies is consequential for the pre-personal work that must happen in learning. This provides access to the forms of attention that engage students in noticing the experiential depth, inner tensions, and outward verifications for marking novel responses as part of being responsive in citizenship and as a social representation.

Attention Phase One Findings:

- Attend to visible image conveyed; does it bend paths in focus to new ends
- Attend to self-same impulses; redefine or accept concepts in distinctive or common terms
- Attend to sublime difference in qualities of student responses; take note to use this focus in later tasks
- Wait for students to challenge, tip, turn, tackle the raw gist in the observed naturally; let students take the stage so purely student responses

Attention Phase Two Findings:

- Present students with non-obvious information sources
- Preface situations which can interrogate existent concepts in course topics

Attention Phase Three Findings:

- Ask yourself what do you see and why?
- Attribute source codes in student responses – what is not on the student transcript?



Figure 5 Visual Thinking Project, Session 2, UQ Art Museum – students reckoning with sharper reinterpretations and renew understandings

Inner pre-personal and public extra-personal creative responses

Students illuminated some functional aspects of the image at first, which connected a pre-personal sense to explicit and obvious attachment to own spheres of life-world experience; such as the era in which the photo was captured – type of transport, and where the gaze of people were directed. Associations were drawn from current student realms, such as noticing the lack of mobile phones, and interpreting the dress styles. Gradually the interval gaps in student contributions decreased while the line of talk to support mutual understanding increased. As the students sunk into the moment to bend attention toward details other students provided, the onflow of responses tended to be in reply and substantiated a more concrete grasp of the non-obvious elements. On numerous occasions, the students linked the subject topic of emotions in their own response to those sourced from observing the artwork. For instance, one participant formulated a hypothesis as an alternative to the

contemplative description others had recalled. Visual cues in the background of the artwork of smoke and haze against the photo subjects who did not lock eyes with one another revealed moral reflections emerged in the session. The student who provided a reconciliatory response to fringe aspects in the artwork, had remained standing in the circle and paused in consideration before turning to gesture to other students for a response to build thoughts. The student triggered deeper reflection processes and engaged others purposefully to respond with support of the awareness garnered in the observation. Student responses in the external public domain were of a distinct social nature that produced conditions for respect, trust, and nature unscripted responses.

AI Integrative Project: Modulated Stages: inner pre-personal, public extra-personal, and creativity

The narratives students surfaced in the use of the AI interface contained ethical aspects. Before the AI images were talked about and projected onto the lecture screens, the inner student process remained nonactive, and before then the AI platform had sewn and stitched information together for the student. The sequence of relational orders had flipped and made possibilities of innate body processes undone in what students could articulate. The student wrought inner focus needed for depth in understanding requires a good deal of responses to responses (Bateson, 1972). Once the AI image had been created by students it had been long past the quickening of responses needed to respond and produce it – an innate integral part to the human creative learning process of presenting communicable realities.

Students were assigned a task script that described a concept which they had to modify and challenge what it could mean in their professional practice. As the AI responses took shape, new groups of students formed to share tips and tools. The shielded access to the Adobe site provided a privatisation moment and separate incubation space in the creative process. The students shared images in pre-conditioned formats or first order responses that regurgitated existent personal and obvious content. This poses ethical dilemmas that contradicts and produces high cross-loadings important for social responsibility and enhancing relational abilities (Pless et al., 2011).

Images sequences as shown below, model the process in which student responses increased in detail and creative attention through co-led prompts so students could iterate further articulations that formed better translations in the public context. The top image shows descriptives of words, the middle picture is meant to be a manipulated self-photo, and the final details a remix and combination of disparate

concepts. When the students responded to these events to then share information on the whiteboard chart, several students returned to their chairs. You could say they were attending to their inner ecology of ideas and making contact with the subsequent meanings in their AI image so to sensitise and articulate a combined sequence of coherent meaning. The students slowed down to consider an inner work to re-evaluate and consider the multiple pathways in their possible responses. Illumination stages could be described as the *inner pre-personal vis-à-vis public extra-personal*, unending chains of responses in material creativity processes, where students select different sensory and mental dynamics in the human body (Wallas, 1926). As evident below, the attention findings below require careful considerations for projects based on AI and limits on natural human development.



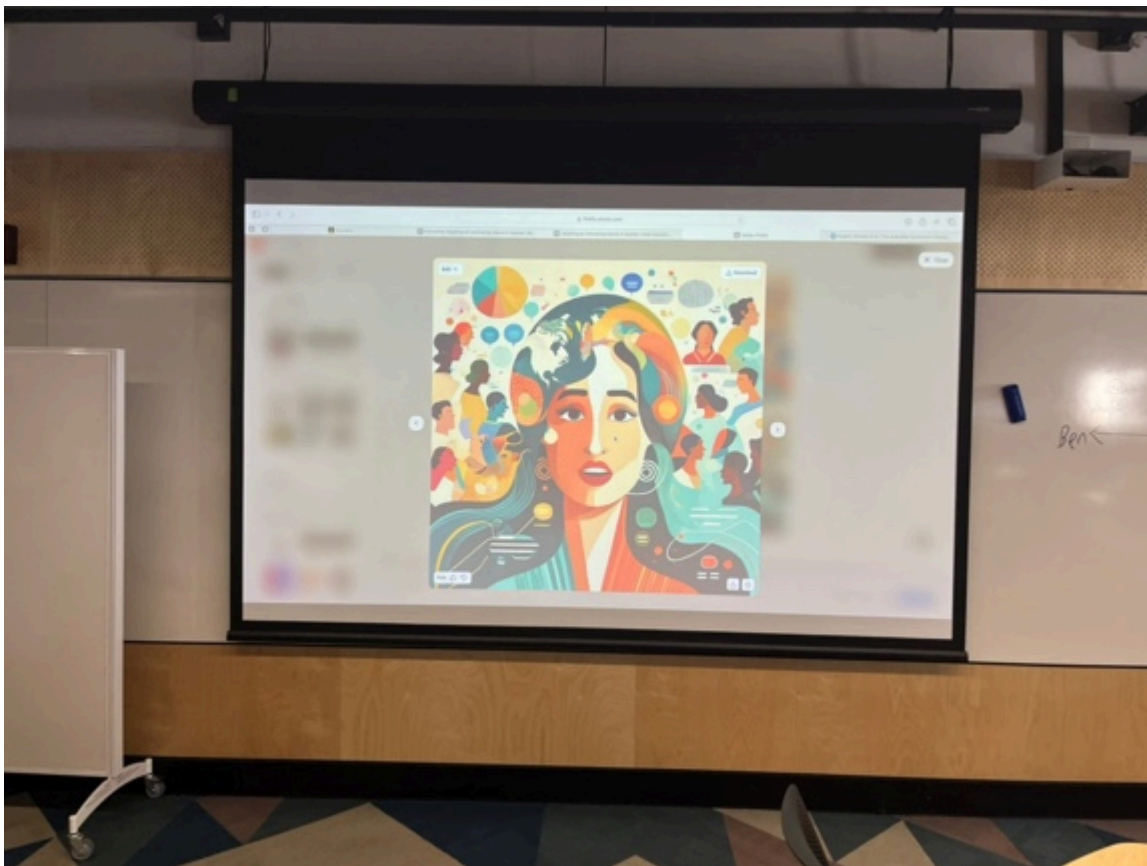
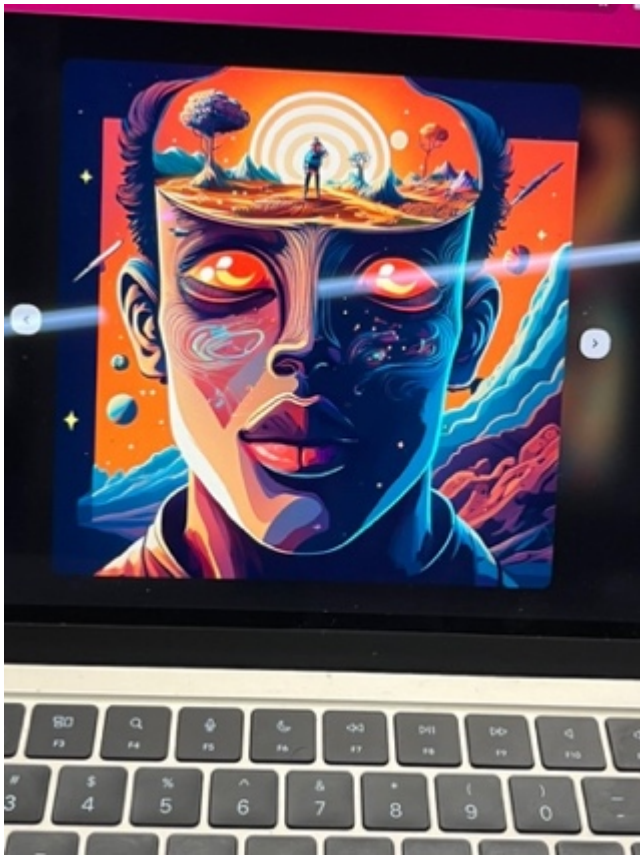


Figure 6, 7 and 8 Mid-course session, Collaborative Inquiry, UQ, Semester 1, 2024

Attention Phase One Findings:

- Ask yourself what do you see and why?
- Expand attention on whether the AI experience activates internal creative processes – what further attention and pre-personal work is required?

Attention Phase Two Findings:

- Focus students on foundational representations of AI information sources
- Focus situations openly figuring to re-examine AI illusions in correspondence to course topics

Attention Phase Three Findings:

- Attend to verbal images conveyed; do students rise trains of associations
- Attend to external-solutions; do students capture individuated, internal expression
- Attend to self-affirming qualities of AI responses
- Work with students to active attention on AI responses

Iterative Case Study Research: Theoretical and Evidential Implications

A close reading during the entire research project offers lines of responsible attention theoretical constructs and the clear ethical propositions of illumination in creative processes of experience. We call this co-leading or ethical responsiveness; through continual scopes of meeting, reflecting, iterations and emphasising the real-world contextual expressions between the researchers and student cohort (Graebner et al., 2012). Wallas' model of the creative process guided how we let natural responses expand; and it included focus on the constant composing in students sharing individuated associations and verbal imagery that formed in discussions, and captured in projections from devices onto class screens, to marking a responsible human site of engagement. One running record traces the student UQ Museum discussion:

"Is the crow digitally manipulated? How was it positioned there? Why did the artist make this image? The setting looks constructed not natural. All the figures have been confined to the lower right of the picture. Is the concrete playing area a block of flats?"

Attention on the two-fold aspects of the creative learning sequences at UQ; communicable realities both mental and sensorial, we began as researchers to reflect on distinguishing features in the data evidence but also writing co-led notes on running records collected and observing student responses. The combination of real-time and retrospective qualitative data removed potential bias and focused us on the extant theory that became revealed (Eisenhardt & Graebner, 2007). The cases chosen provided revelatory field observations to the justified scoping of creativity and responsible co-leading in communicable realities as to the associated ‘ethical tensions.’ This provides a multi-faceted illumination from both the informant and researcher perspectives (Gioia, 2021). To recap, illumination is defined as ‘degrees of conscious attention involved in the creative process with visual and verbal imagery (Wallas, 1926, pp. pp. 70-73). This moral imagination conducive to responsible leading (Pless et al., 2021) is exemplified in an extract from the researcher observations:

“While students built on each other’s perspectives they also acknowledged their peer’s ideas. Sometimes they observed something in a different way and felt comfortable to express this difference. Together students drew on a number of different clues to support their ideas such as in the Noel McKenna painting, to support the idea of memory, students observed that the sepia tone was like old photos, the boy is looking back to his past, the shadows like memories are constructed representations of his reality.”

The researchers read and reread the running records, student images, and observational notes to ascertain an adequate level of meaning of participants to generate a grounded theory using the Gioia method (Gioia et al., 2013). It is through staying close to the experiences that we inducted themes of student responses – from the illumination phase of the creative processes, and as displayed in Table 2 below. We shared the decisioning during the coding process to check agreement on constructs. A zooming in and out between the different data served as the theory building process focused on the two focal constructs of communicable realities and pedagogical attention (Nicolini, 2009). The communicable realities in the student responses indicate attention of visual and verbal imagery merges in creative processes. Upon these findings, the co-leading suggests the amenable motility in tensions when students engage the ethical human side with already well-established learning. We suggest the AI platform exists better as an editing tool, and further concur the vicarious learning offered by AI platforms stands as the link between pedagogy and creativity – an artificial impact that is outside the inner student attentive work, to bridge the stratum of being, with that staged intelligence.

Table 2 Student response themes in the illumination phases of creativity processes

Student Responses		
Materialising Performance	Affective Charged Judgements	Pre-personal
Depths of Response		
Recognise Transferability		
Talk of Progress in the Idea		
Approve Otherness	Creative Intuitions	
Expressing Mutuality		
Elaborate Combinations		
Detectable Ideas		

Student Responses		
Orientating to Connection	Anticipatory Perception	Extra-personal
Navigate Difference		
Identify Connection	Feelings Arise When Knowledge Combined	
Recognise Mutuality to Translate		

In this case study, AI becomes a temporal analogy for automated creativity. The significance of creativity and responsible human learning convenes in how students continue to create, attend, and communicate their realities across both platforms. From the outset, the rationale for this case study rested on the tension between AI efficiencies and the self-corrective kinds of learning these platforms promote, compared to the far more natural human work of creativity. What does AI take away or add to the physical process through which students learn to create and to respond with independent qualitative expression? Our approach accounts for a level of focus, of balancing the interests and needs of the student, treating each learning experience as uniquely individual. To this end, the co-led pedagogical experiences, the integrative AI project, and UQ Museum exhibition, but also the qualitative research method,

expanded development of students who lead others in dealing with civic and societal systems, by engaging creativity (Csikszentmihalyi, 2006). The student civic attention in this case study is a learning moment to consider receptive human systems for our intelligence age. For, it is the student 'bodies' that perceive in meaningful attentive ways that development is gained in a 'vectored sense' of responses to others' expressions (Shotter, 2017). For educators this suggests that a deliberate focus on internal and external processes of meaning-making is required if to support the ethics of internal processes integral to human development and creative learners.

Continuing Responsible AI Practice in Teaching and Learning

What does AI take away or add to the physical process that leads to student learning to create and to respond using independent expressions? This question asks about the signs of life in human, and creative attention processes that this case study begins to answer. In evaluation, some greater insight may be offered now that poses responsible principles for considering activating co-led reflective and socially aware attention and the body in creative processes and the adoption of AI platforms. It is not a formulaic method, but a way to see a standard of thinking with AI platforms in pedagogical terms and responsible human development. In pre-personal and extra-personal creative processes, responsible leading of AI pedagogically could include:

1. Attention in the demonstrative creativity students require in being civic and responsible in society.
2. Attention on the difference between pre-personal and extra-personal and what these two themes offer in service of one another in human development.
3. Attention to careful orchestration of artificial intelligence, verbal responses, and visual imagery to engage student bodies that perceive in meaningful attentive ways.

Case Study Limitations

As our case study has illustrated, the integrative approach to student attention and creativity provides responsible forms of human development, that includes AI platforms. Integrative means the experiences used a variety of sources and methods, including local and abstract artwork phenomenon, and brokerage of student responses in different physical configurations (group circle, white boarding, public displays of AI images) and co-leading in contributions to data and descriptive displays. Students faced bringing different forms of expression (visual, verbal and digital) as co-

led associations for creative attention. Further projects of this kind would need to consider the entire creative process that supports the illumination and verification phases. We offer the initial phase of ‘preparation’ as a key for significant and prominent attention in future studies. We therefore propose a research agenda for extending the ‘Art of Thought’ and explore how this phase could enrich student attention for this intelligence age. Suggestive aspects of preparatory activities that we present in Table 3, offer sub-themes that enrich the pre-personal and extra-personal findings we empirically and theoretically identified.

Table 3 Preparatory attention to support engagement in responsible human development

Undergraduate UQ Course	Preparation Activities	Attention
Pedagogy and Creativity Focused	Conscious voluntary modes of thought, and experimental observations	Conscious links made with real-life applications before students enter the on-site student experience.
Possible Pre-Domain Knowledge	Regulated modes of thought, and conscious control of observations	Regulated links made with pre-domain ‘logical rules’ application of pre-site knowledge exposure.

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4.

DESIGNING WITH AI: EXPLORING INCLUSIVE AND PATIENT-CENTRED LEARNING IN DENTISTRY

Arosha Weerakoon

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Abstract

This chapter documents a rapid, real-time digital uplift of two dentistry courses that are delivered at the University of Queensland, Brisbane, Australia. Both courses involved the use of generative AI as a co-creative assistant to reduce workload, clarify expectations, and make public-health and professionalism content feel clinically relevant. Guided by course evaluation and focus-group feedback, I rebuilt the learning management system, introduced structured success criteria, and embedded patient-centred case studies connected directly to learning objectives and assessment. To support diverse learners, I offered multiple representations of core content (interactive modules, podcasts with associated course readings, slide PDFs, and recorded tutorials with AI transcription). AI was used judiciously to scaffold slide structures, generate draft case assets (images, short videos, voices), produce assessment FAQs, and help edit descriptive feedback always with human review for accuracy, currency, and context. Student responses highlight both benefits (clarity, flexibility, perceived relevance) and cautions (perceived “AI-ness,” synthetic voices, and concerns about authenticity). Practical takeaways include – make the pedagogical “why” explicit; blend AI scaffolds with teacher expertise; provide multimodal equivalents and adopt transparent AI-use declarations in assessment. Future work will consolidate assets into a course handbook, evaluate relationships between declared AI use and outcomes, and deepen responsible-AI teaching aligned with professional standards.

Keywords

Generative AI, course design, dentistry education, patient-centred learning, Universal Design for Learning (UDL); assessment design

Practitioner Notes

1. Patient-centred case studies, scaffolded with AI support, helped students see connections between professionalism, ethics and their future clinical practice.
2. AI tools streamline course redesign, particularly in structuring LMS content, developing assessment FAQs, and editing personalised feedback.
3. Offering multimodal formats (interactive modules, podcasts with associated course readings, slides, recorded tutorials) aligned with UDL (universal design for learning) and improved accessibility for students with varied needs.
4. Embedding an AI use declaration on assessment coversheets normalised disclosure, raised awareness of responsible practice, and encouraged reflection on integrity.
5. AI-generated images, voices, and slides required careful validation; integrating these AI scaffolds with educator expertise was essential to ensure accuracy, authenticity, and trust in learning materials

Background

What are My Courses About?

I coordinate and teach courses on dental public health and professional practice. These courses incorporate topics and concepts that reside outside the realm of traditional clinical training but remain essential ‘soft’ skills to help students maintain professionalism and cultivate ethically sound practice (Kodali et al., 2024). Professionalism and ethical practice is essential to all health professionals. Dental professionals, along with eleven other health practitioner groups are governed by the Australian Health Practitioner’s Agency (AHPRA) through a shared Code of Conduct. This Code of Conduct sets out the standards of professional conduct the National Boards expect and is used by Boards to oversee health practitioners. All health practitioners have a professional responsibility to be familiar with and to apply the Code of Conduct (AHPRA, 2024; Weerakoon et al., 2025). My courses provide the grounding to help students understand what it means to be a professional, while learning about broader public health concepts and how they relate to everyday clinical practice.

How Do Dental Students Engage with My Course Content?

Students typically experience this course in varying formats that include workshops, short lectures, self-directed reading and online interactive modules on a learning management system known as UQ Extend. In 2024, students experienced a simplified version of this course, as I was still new to teaching it. I largely retained the 2023 structure, though at the request of the now previous Chair of Teaching and Learning, I redesigned assessments to be more resistant to AI use. On reflection, however the 2024 cohort had been challenged to demonstrate greater creativity and engage less with rigid marking rubrics, a useful reminder of how assessment design shapes learning. As the semester and 2024 iteration of the course progressed, it became apparent that many students perceived the broad range of topics as disjointed and disconnected from clinical practice. Another key issue was engagement, workshop attendance was low, with many students reliant on readings alone. Some chose to covertly recorded informal post-workshop conversations, particularly when assessment details were discussed, suggesting clarity around assessment held more value for them than participation in broader learning activities.

In 2023, students accessed course materials through the learning management system, UQ Extend. However, when I assumed responsibility in 2024, I was unable to continue using this platform. The previous coordinator had created the content on an external platform, Genially, a commercial platform for creating interactive and animated visual content such as presentations, infographics and quizzes. While I could share these resources with students, I was unable to adapt the 2023 content or formatting to meet the evolving needs of the course in 2024 and beyond.

GenAI Tools I Engaged with

In the 2025 iteration of my courses, I predominantly used ChatGPT. Although I remain open to experimenting with other platforms to explore what they can offer and how they might support my teaching. I enjoy testing tools, pushing their capabilities, and often use them in unconventional and divergent ways. This exploratory approach led me, somewhat unexpectedly, to create a podcast series for the course, an outcome that illustrates how playful engagement with technology can generate multimodal resources that appeal to different learners. Alongside ChatGPT, I also experimented with Google Notebook LM, Adobe Firefly, OpenAI's Sora and the AI features built into applications such as Prezi. Each tool opened distinct possibilities. Firefly, for instance, enabled the creation of ethically sourced illustrative visual content that could support patient case studies; Sora suggested future directions for generating short, scenario-based video materials; and Prezi's AI features streamlined slide development, though

always with careful human oversight to ensure accuracy and contextual relevance. These explorations reinforced a broader SoTL insight, that experimenting across platforms can spark creativity and extend inclusive design, but that every AI application requires critical evaluation to ensure it aligns with pedagogical intent and that its use is fit for purpose.

Three Inter-Related Reasons I Chose to Integrate AI into My Courses

I integrated AI into my courses:

1. To demonstrate clinical relevance: embedding public health and professionalism in patient centred contexts to help students gain insight and add relevance towards their clinical practice.
2. To reduce my administrative and design workload: using AI tools as co-creative assistants to streamline routine tasks and free capacity for meaningful teaching work.
3. To diversify learning options: Incorporating multimodal resources aligned with UDL (Rabalate, 2011) principles to support a diverse cohort.

DENT3000 and DENT7221 are the only courses in the dental curriculum that explicitly address the broader worldview concepts of Public Health. Yet, many dental students struggle to appreciate the value of Public Health and associated 'soft skills' for their future professional practice (Kodali et al., 2024). This sentiment is captured in student feedback from 2024, prior to AI-integration, as expressed by a student.

"This is honestly the worst, most impractical course I have ever been enrolled in, and I have studied 3 years full time at a university level before dentistry."

(3rd Year Dental Student (2024) DENT3000)

Such feedback highlights the challenge of positioning public health as integral to dental education and reinforces why new approaches such as AI-enhanced design are necessary to make the content more engaging and clinically meaningful. I believe that so-called soft skills are undervalued because healthcare programs such as Dentistry often teach clinical skills in silos that reflect clinical and biomedical worldviews (Abdul Kadir & Schütze, 2022). These structured worldviews can fragment student learning

and leave little space for the scaffolding of essential human skills within the curriculum (Flaitz et al., 2011).

Public Health subjects require educators to translate broad, abstract and world-view concepts into accessible forms. This is difficulty for mid-level dental students who are only beginning to develop patient care experience and higher-order thinking. Consequently, public health educators need a strong disciplinary foundation and clinical background to contextualise relevance for learners (Abdul Kadir & Schütze, 2022). Against this context, and considering the modest (this is being kind) performance of Student Evaluation of Course and Teachers (SECaTs) results for DENT3000, it became clear I needed to develop, adapt and integrate Public Health principles into clinically relevant scenarios that students could recognise as meaningful for their future practice.

Courses such as Dentistry challenge academics, such as myself, to balance the requirements of maintaining clinical practice with the expectations of teaching, research and service (Nassar et al., 2019). In my case, I own a dental practice and work as a clinician on the Sunshine Coast, Australia while also holding a Teaching and Research Focussed position at the University of Queensland. The mounting academic expectations often stretch my part-time (0.4 full-time equivalent) capacity. In Semester 1, 2025, I was expected to co-teach and coordinate two 2-unit courses, with enrolments increasing from 64 students in DENT3000 (2024) to 107 across DENT3000 and DENT7221. While a small number of guest speakers contributed ad hoc content, the bulk of the design, coordination, teaching and assessment responsibilities rested with me. Meeting these responsibilities allowed me to be open to adopting AI-supported strategies to manage my workload more efficiently and to ensure students continued to experience relevant and engaging learning (Hashem et al., 2024). This became the point at which AI became a necessary teaching partner in my practice.

In 2024, Generative AI was still an emerging and contested technology, and like many institutions, the UQ School of Dentistry initially adopted a cautious stance (Xiao et al., 2023). Senior academics encouraged course coordinators to 'ban' AI in student assessments. Yet, the adaptation of AI into assessment practice was, and remains inevitable (Xiao et al., 2023). Dental students are primarily taught and assessed through hands-on activities using typodonts attached to mannequin heads (El-Kishawi et al., 2020). These practical skills, grounded in empirical knowledge, dominate their training, often at the expense of written communication development (Kodali et al., 2024). As a result, many dental students perform poorly in written assessment tasks (Holtzman et al., 2005). Unlike other parallel dental courses at the University of Queensland that rely on short-answer and multiple-choice examination, DENT3000

culminates in language-intensive assessments, such as written and video-based assessments.

Despite the ban, eleven of the sixty-four students in the 2024 DENT3000 cohort submitted written assessments with significant AI-use detected by Turnitin. Although this represents less than 30% of students (as indicated in a survey of AI use) (Gonsalves, 2025). The students were at risk of breaching the University of Queensland's (then) Academic Integrity policy. This risk was partially mitigated by ongoing controversy over the accuracy of AI detection tools (Malik et al., 2025) but the AI incident nonetheless caused considerable distress for both students and myself as coordinator. I decided to conduct informal interviews with the students. My findings indicated the students who had used AI came from culturally and linguistically diverse backgrounds (CALD) with self-reported lower levels of confidence in written English. This finding reframed the incident for me as it was more than just a case of misconduct, it highlighted that gaps in language support and assessment design can unintentionally disadvantage groups of learners. After extensive consultation with senior academic staff, the students at risk of academic misconduct were asked to re-submit their tasks without the use of AI. For me, this was also a turning point.

Recognising that AI was not going away, I began to self-educate myself on its potential. At the time, AI was very new to the University, and I could not find formal courses or guidelines available through the institution. Thus, my initial self-education process began with books that provided general context and information on AI. Once I understood the basics, I searched for and completed brief online courses that were hosted by a UK-based institution and by academics sharing practice on Twitter/X. By the end of Semester 1, 2024, I was ready to experiment with ChatGPT directly to explore the model's assistive possibilities for teaching and learning.

During Semester 1, 2024, I also became aware of the number of students with UQ Access Plans, formal arrangements developed through the University's Disability, Diversity and Inclusion team, to support students with a disability, medical condition, or learning difference. These plans outline reasonable adjustments to help students engage equitably with their studies. Several enrolled students with Access Plans identified learning and cognitive challenges as my course required a high volume of reading. Many of these students reported difficulties balancing reading workload alongside competing demands in other units. The heavy reliance on text-based materials risked creating barriers to participation and underscored the need for more inclusive, multimodal approaches to content delivery.

“Often, the amount of time I have to put into the weekly readings is a lot.”

(DENT3000 (2024) *SECaT* Pre-AI Integration)

After much deliberation, I recognised the need to develop learning materials that were both inclusive and clinically relevant, while remaining manageable within my existing academic workload (Ralabate, 2011). My overarching aim was to introduce public health and professionalism content into clinical contexts by applying inclusive learning modalities with AI as my co-creative teaching assistant. For the 2025 delivery of DENT3000 and DENT7221, I created two new UQ Extend sites from scratch, adapted existing teaching materials, and introduced online recorded tutorials which had not previously been part of DENT3000. This process was, in many ways, like developing a brand-new course. I had to ensure it was fit for purpose, ensuring the redesign streamlined processes rather than add further strain. Unlike colleagues who typically plan digital uplifts over 6–12 months, I chose to implement mine in real time. This approach gave me the flexibility to experiment with new platforms, learn tools as I went, and adjust content in response to informal feedback. It also allowed me to gauge whether innovations resonated with the students, and what aspects required further refinement.

One key challenge was explaining to students why we were using a variety of content delivery methods, including recorded lectures, PowerPoint PDFs, UQ Extend modules, and live tutorials. For some, who prefer text-based learning, the UQ Extend modules felt frustrating and time consuming. One student said it was “a waste of time,” citing broken links, constant clicking, and a preference for direct access to PDFs and traditional lecture recordings. For others, however, the interactive modules provided valuable scaffolding that helped them unpack complex content and enhance their learning experience. These contrasting responses underscore a critical SoTL insight: students are not always conscious of how their learning preference shapes their engagement. As educators, we need to make the rationale for multimodal design explicit, not only to diversify delivery but also to meet the varied needs of our cohort (Tai et al., 2021). In this sense, inclusive design is as much about transparency as it is about accessibility.

Methodology

I approached this work as a form of practitioner inquiry using student feedback from

surveys and focus groups to improve and guide changes to the course (Keane & Labhainn, 2005). At the University of Queensland, course coordinators receive formal teaching feedback through the Student Evaluation of Course and Teaching (SECaT) and the Student Evaluation of Tutor surveys (UQ, 2025). These instruments are designed to capture student reflections on both teaching practice and course content, providing an institutional mechanism for evaluating educational experiences. As a course coordinator, my courses and teaching are subject to SECaT surveys each semester. While these surveys offer valuable insights, the anonymous nature of responses can at times feel confronting: the feedback is often a mixture of constructive suggestions and comments that may be perceived as discouraging or overly critical. Even so, engaging with this feedback became a key part of my methodology and informed my experimentation with AI informed course design.

Personally, I found my 2024 SECaT survey outcomes difficult to engage with, because the constructive feedback and comments were interspersed with statements that could be interpreted as derogatory or inappropriate. Rather than dismissing this experience, I treated it as a point of reflection: how might such feedback be used to generate constructive change. From this starting point, my methodology for this chapter took shape. It serves as a practical outline, a 'how to' guide, documenting the digital tools I've experimented with, the strategies I adopted and the ways I have shared knowledge more effectively with students. This chapter is grounded in a process of inquiry, using feedback as data to inform cycles of experimentation and reflection.

I began my process by uploading the collated 2024 (Pre-AI integration) SECaT scores and feedback into ChatGPT and asked *what can I do to improve this course?* The outputs suggested three directions: (1) develop a UQ Extend site, (2) create more interactive online modules and (3) provide clearer guidance on assessment tasks. Consequently, what follows in this chapter is presented as a toolkit for practice. For each digital tool or teaching strategy trialled, I provide context, a sample prompt or workflow, and a reflection on outcomes – highlighting successes and setbacks, as well as opportunities for improvement. Where relevant, I also include links to resources or visual examples to support readers to explore these strategies further, and to maintain the spirit of UDL for you, as the reader.

I designed this chapter with UDL principles in mind with an aim to include more abilities by offering multiple means of engagement (Rabalate, 2011). Personally, I usually learn by reading and engaging with visual materials, but I recently started listening to audiobooks and podcasts. This shift in how I engage and acquire knowledge prompted me to reconsider how I communicate content to my students, by recognising how diverse formats can create more equitable learning opportunities.

Most importantly, I documented everything so that I could explain my process. Consequently, this chapter aims to demystify the integration of AI in course design. If you are curious about engaging with similar tools in your course, some of my 'experiments' may serve as a useful starting point or inspire new way of working.

This study received ethics approval from The University of Queensland Human Research Ethics Committee (BEL LNR Panel), project number 2024/HE001346: *AI Inquiry-Led Teaching Innovation*.

My Experiments and Outcomes with AI

Refining the course based on student feedback.

Context

Engagement with student feedback can be challenging for many academics when constructive feedback is mixed with critical comments. Using AI can create a sense of distance, making it easier to process feedback objectively and translate it into meaningful course improvements (Flodén, 2017).

Objective

To use AI to analyse SECaT survey outcomes for the 2024 DENT3000 course to generate a list of positive attributes and practical suggestions for future course improvement.

1. Generate feedback

1. Upload .PDF documents for Staff and Course feedback to ChatGPT.
2. **Prompt:** The following documents contain qualitative data captured by student feedback for a teacher (Dr Arosha Weerakoon) and for the Course DENT3000. Please summarise the best aspects of Dr Arosha's teaching, and for the Course DENT3000, and summaries and collate the improvements suggested by the students.

2. Positive feedback for staff and course: Output.

Summary of Feedback

Best Aspects of Dr. Arosha Weerakoon's Teaching

1. **Approachability and Responsiveness:** Dr. Weerakoon was consistently described as approachable, respectful, and prompt in responding to student questions via email or discussion boards.
2. **Enthusiasm and Effort:** Students appreciated her enthusiasm for teaching and the effort she put into organizing the course and engaging guest lecturers.
3. **Constructive Feedback:** Detailed and constructive feedback for assignments was highlighted as a positive aspect.
4. **Flexibility:** Students acknowledged her willingness to adapt course materials and tasks based on feedback to improve their learning experience.
5. **Passion for Teaching:** Dr. Weerakoon's commitment, including long commutes to deliver content in person, was noted.

Best Aspects of the Course (DENT3000)

1. **Guest Lectures:** Students found the variety of guest speakers and their diverse perspectives engaging.
2. **Learning Objectives:** The clear articulation of learning objectives and exposure to public health concepts were valued by some students.
3. **Content Variety:** Students appreciated specific elements such as ethical discussions, legal scenarios, and opportunities to explore underserved population health.
4. **Skill Development:** Assignments like video creation and infographics for health promotion were seen as unique and beneficial.

3. Suggested Improvements for staff and course: Output

For Dr. Arosha Weerakoon's Teaching

1. **Consistency in Feedback:** Several students requested more detailed, consistent, and timely feedback for assignments, especially in terms of marking criteria. (See
2. **Clarity in Communication:** Students noted that clearer explanations of expectations and rubrics would help align assignment outcomes.
3. **Course Content Simplification:** There were requests for more concise and focused course delivery, reducing excessive reliance on external readings.

For the Course (DENT3000)

1. **Assessment Design:**
 1. Increase word limits for assignments, especially for the grant application (Assignment 3), as many found 500 words insufficient.
 2. Provide clearer rubrics, better exemplars, and more guidance for all assignments.
 3. Consider reducing the number of assignments or integrating them into a portfolio format.
2. **Course Structure and Resources:**
 1. Consolidate weekly materials into single folders to avoid confusion.
 2. Minimize reliance on external links, focusing instead on lecture slides with relevant content.
 3. Align SDL, lectures, and workshops to reduce cognitive load.
3. **Guest Lectures:**
 1. Improve the relevance of guest speakers' content to course objectives.
 2. Consider live Zoom lectures or pre-recorded sessions for guest lecturers to increase flexibility.

4. Student Workload:

1. Reduce the volume of weekly readings and ensure they are directly applicable to assessments.

5. Technical and Administrative Aspects:

1. Streamline the LearnX platform to make content navigation easier.
2. Share assignment updates through announcements rather than discussion boards to ensure all students receive them.

This feedback could guide targeted adjustments to improve both teaching delivery and course structure for a better student experience.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-17>

Outcomes

The analysis generated a series of recommendations, which I trialled in practice. My responses to each are included here to illustrate how AI-supported feedback informed concrete changes.

1. Assessment Design:

- Increase word limits for assignments, especially for the grant application (Assignment 3), as many found 500 words insufficient.

Response: The word count for Assignment 3 was increased to 1000 words.

- Provide clearer rubrics, better exemplars, and more guidance for all assignments.

Response: In addition to introducing assessment tasks in class, I uploaded FAQ documents to the LMS and alerted students to this via announcements.

- Consider reducing the number of assignments or integrating them into a portfolio format.

Response: This is challenging to do because the Australian Dental Council accreditation requirements restrict such changes.

2. Course Structure and Resources:

- Consolidate weekly materials into single folders to avoid confusion.

Response: Content was consolidated into weekly folders and a course guide provided at the beginning of semester.

- Minimize reliance on external links, focusing instead on lecture slides with relevant content.

Response: Some external links referred to sites where students were required to register and enrol in short courses run by organisations such as Quitline to learn about 'Smoking Cessation'. In 2025, I created new self-directed learning modules in UQ Extend to streamline this.

- Align self-directed learning, lectures, and workshops to reduce cognitive load.

Response: The 2024 version of DENT3000 followed a flipped classroom where students were required to complete their self-directed learning modules prior to attending workshops. However, many did not engage with the modules until exam preparation time. I revised the 2025 version to align the content with the workshop or tutorial topic for the week.

3. Guest Lectures:

- Improve the relevance of guest speakers' content to course objectives.

Response: I expanded course objectives into detailed success criteria, shared with the guest speakers and invited feedback. All contributors and students were supplied with an outline of the learning expectations for individual sessions.

- Consider live Zoom lectures or pre-recorded sessions for guest lecturers to increase flexibility.

Response: More pre-recorded lectures were uploaded, and tutorials were run online, recorded and transcribed by the AI feature in Zoom.

4. Student Workload:

- Reduce the volume of weekly readings and ensure they are directly applicable to assessments.

Response: I reduced the number of required readings, and selected essential

readings were converted into podcasts to create inclusive learning aligned with learning objectives and success criteria.

5. Technical and Administrative Aspects:

- Streamline the learning platform to make content navigation easier.

Response: All content was delivered via the UQ standard LMS, Blackboard, with fewer folders and new self-directed modules were created in UQ Extend.

- Share assignment updates through announcements rather than discussion boards to ensure all students receive them.

Response: All updates were delivered via Blackboard announcements. In addition to individual feedback, students were also given overall feedback as a group.

Use AI to Align Course Objectives and Discern Key Differences Between Co-Taught Courses

Context

In 2024, I coordinated and taught DENT3000. By 2025, I was tasked with coordinating and co-teaching both DENT3000 and DENT7221. DENT3000 is a third-year undergraduate course in the Bachelor of Dental Science (Honours), while DENT7221 is offered in the second year of the Doctor of Dental Medicine (DMD), a 3.5 year full-time graduate entry program for students with prior backgrounds in health, allied health, physical or biological sciences. While both cohorts qualify as general dental practitioners in Australia, the different entry pathways and levels of experience shape course design and complexity for co-teaching. Both courses are 2-Unit courses with a standard full-time student workload set at 8 units.

Objective

To use AI to analyse and compare courses objectives, identifying key differences and similarities between DENT3000 and DENT7221.

1. Action and prompt

1. Copy and paste learning objectives for courses into a single .docx file and upload to ChatGPT. In this example I uploaded DENT7221 and DENT3000 objectives that were published in the Electronic Course Profile sites.
2. **Prompt:** This word document contains learning objectives for DENT7221 and DENT3000. Could you please outline the key differences in the expected learning objectives between the two courses?

2. Output

Key Differences in Learning Objectives Between DENT7221 and DENT3000

1. Focus on Health Promotion:

- o **DENT7221:** Emphasizes applying health promotion theories to develop innovative and evidence-based strategies for addressing health inequalities and promoting oral health. Includes a strong focus on critiquing social determinants of health and designing health promotion proposals.
- o **DENT3000:** Focuses on understanding and applying health promotion theories specifically to public oral health promotion activities, with a slightly narrower emphasis compared to DENT7221.

2. Ethical and Legal Principles:

- o **DENT7221:** Explicitly covers ethical principles and legal responsibilities in oral healthcare, aiming for students to explain and apply these principles comprehensively.
- o **DENT3000:** Covers similar ethical and legal principles but with less emphasis compared to DENT7221. These principles are part of a broader examination of oral healthcare delivery.

3. Cultural Safety and Social Sensitivity:

- o **DENT7221:** Includes a more detailed focus on cultural safety in clinical practice and addressing inequalities for diverse social and cultural backgrounds.
- o **DENT3000:** Covers cultural safety but with less focus on designing innovative strategies for diverse populations. It emphasizes understanding the importance of cultural safety in clinical contexts.

4. Health Systems Analysis:

- o **DENT7221:** Evaluates strengths and limitations in Australian health systems and regulatory bodies, emphasizing how these impact population oral health outcomes.
- o **DENT3000:** Describes Australian health systems and regulatory roles but focuses more on discussing their impacts on oral health outcomes rather than detailed evaluation.

5. Resource Utilization:

- o Both courses describe principles of efficient and equitable resource utilization, but **DENT7221** integrates this with analyzing health inequalities, while **DENT3000** maintains a general focus.

Overall, **DENT7221** provides a broader and more analytical approach to public health, ethics, and cultural sensitivity, while **DENT3000** emphasizes practical application and understanding within specific oral health contexts.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-8>

Outcomes

This analysis provided a clearer understanding of expectations across the two cohorts. This enabled me to adapt the assessment tasks in DENT3000 to reflect undergraduate context, while maintaining alignment with professional standards. DENT7221 tasks and rubrics, already co-designed with a learning designer served as a useful benchmark. Aligning both courses in this way helped me streamline design decisions and ensure coherence across parallel pathways to the same professional outcome

Communicate Expectations: Enhance and Unpack Learning

Objectives

Context

Learning objectives are often written with minimal context and are often open-ended, which can make it difficult for students to understand what is expected of them. The lack detail allows for teaching flexibility, but can leave students uncertain about how to demonstrate achievement. Broad guidelines often make it harder for guest lecturers or tutors to align their contributions with course outcomes.

Objective

To create success criteria that extrapolates a learning objective to provide detailed guidance. An example of a single prompt and output is provided here.

1. ChatGPT prompt

Could you please create success criteria for undergraduate dental students for the following learning objectives - LO4. Understand ethical principles and legal responsibilities of dental practitioners in the provision of dental care to individual patients, communities and populations, and discuss the role of the regulatory bodies relevant to dental practice in Australia.

2. ChatGPT output

LO4: Understand ethical principles and legal responsibilities of dental practitioners in the provision of dental care to individual patients, communities and populations, and discuss the role of the regulatory bodies relevant to dental practice in Australia.

- ✓ Explain key ethical principles in dentistry, including autonomy, beneficence, non-maleficence, and justice.
- ✓ Identify and apply legal responsibilities related to informed consent, confidentiality, duty of care, and professional conduct.
- ✓ Describe the roles of regulatory bodies such as the Dental Board of Australia (DBA), the Australian Health Practitioner Regulation Agency (AHPRA), and the Australian Dental Association (ADA) in maintaining professional standards.
- ✓ Apply ethical decision-making frameworks to real-world case scenarios in dental practice.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-18>

Outcome

Students were provided with a course handbook with detailed success criteria attached to overarching learning objectives. Additionally, success criteria were shared with guest lecturers. For instance, one of my guest lecturers specialises in ethics and law in Australian dental and healthcare. Detailed success criteria helped define content expectations and provided an opportunity for the lecturer to review and edit for clarity and posterity. It also guided lecturers on expectation and allowed room for detailed clarification prior to running workshops.

These actions were performed for all DENT3000 and DENT7221 course objectives.

Patient Case Studies: Streamline and Simplify Course Content: Use AI to Situate Public Health and Professional Practice in Clinical Settings

Context

One of the greatest challenges of this course is to communicate the relevance of the content to clinical practice. Many of the students in the 2024 cohort consistently questioned the importance of range of topics we are required to cover to meet accreditation standards set by the Australian Dental Council. This concern was echoed in the 2024 SECaT survey, where a student recommended that future iterations of the course place greater emphasis on this.

"Replacement/Cancellation of this course or integration of this course' content into another course. This course should never have been a separate course. Most of us did not understand aims and objectives and how this course would contribute to us being a clinician, a researcher or an academic. This is honestly the worst, most impractical course I have ever been enrolled in and I have studied 3 years full time at a university level before dentistry."

"..more ties to dentistry and how it could help my clinical performance."

(Qualitative feedback from DENT3000 (2024) SECaT Pre-AI Integration)

Objectives

To create a set of inter-related patient case studies that can be incorporated into a course handbook and embedded as teaching material into different assets. The case studies incorporate the learning objectives and success criteria for the course/s.

Outcome

The use of case-based scenarios that adapted learning objectives and success criteria. Here is an exemplar of what I created. The following section briefly introduces the patients to the students. It provides some context, introduces the family, briefly describes each patient and finishes with some reflective questions that are aligned with the learning objectives. Some of the AI elements used to edit and modify the 'patients' can be found in section 'How I used AI to bring patients to life'.



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-19>

Reflections

While student feedback on the redesigned course was generally positive, several themes emerged from the 2025 cohort of DENT3000. Students highlighted the value of case studies, noting that they clarified how the modules applied to different clinical contexts:

"Best aspects were looking at the different case studies and seeing how the modules applied to each of those cases in different ways"

International students emphasised the opportunity to learn about the Australian healthcare and dental care system, with one noting they had *"gained more insights into Aboriginal and Torres Strait Islander peoples as an international student."*

Students also acknowledged the broader professional importance of the course:

"The content was interesting and taught us a lot about how to be a well-rounded practitioner. I believe it's an important course that should be taught"

"Was quite extensive and eye-opening to the health disparities that exist in Australia"

"Some of the content was applicable in the clinic already which was helpful when dealing with certain patients"

"I liked that the learning towards the more social aspects of being a dental practitioner"

How I Used AI to Bring 'Patients' to Life

Context

In 2015, I led a university funded teaching innovation project that created 'virtual patients' to integrate diverse elements of the Dentistry curriculum into patient-based scenarios. We developed scripted cases that were recorded and edited with practicing dentists playing their roles alongside hired actors. These primer videos were integrated across multiple courses and continue to be used by our course coordinators today.

Drawing on this earlier experience, I scaffolded learning objectives into the newly developed (2025) patient-centred case studies using them as a tool to bridge course theory with clinical practice (McLean, 2016).

Objectives

1. Create photo-realistic images of patients.
2. Create a short video of the patient/s.
3. Enhance patient case study.
4. Give the patient 'character'.
5. Give the patient a voice.
6. Use the patient to illustrate real-world scenarios.



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-16>

Use ChatGPT to enhance your patient case study

Prompt:

Please correct the following vignettes for grammar and clarity. I would also welcome some suggestions to enhance or increase the depth and breadth of the characters' stories. Priya is the daughter of Derek and Velu. She loves singing, dancing and reading. She is 6 years old and Priya wants to be an astronaut when she grows up. Priya's favourite subjects at school are Maths, Art and she attends dance school. Priya loves her big brother, her aunty and grandfather.

Output:

Priya is the six-year-old daughter of Derek and Velu. She is a bright, lively child who loves singing, dancing, and reading. Her dream is to become an astronaut. Priya's favourite subjects at school are Maths and Art, and she attends a dance school in her free time. Priya adores her older brother James, her Aunt Kay, and her grandfather Rob. She enjoys listening to stories about her family's diverse cultural heritage and often incorporates them into her artwork and play. Suggestions for depth: Expand on Priya's relationship with her Tamil and Wakka Wakka heritage. Consider how her curiosity about the world around her inspires her relationships and ambitions.

Describe your patient to generate an informal introduction patient script.

Prompt:

Please write this in first person, informal dialogue by an Australian six year old girl, Priya. Priya is a happy girl. Priya is the six year old daughter of Derek and Velu. She is a bright, lively child who loves singing, dancing, and reading. Her dream is to become an astronaut. Priya's favourite subjects at school are Maths and Art, and she attends a dance school in her free time. She admits to being a bit naughty and spoilt and didn't behave for the lady in the dental van.

Priya adores her older brother James, her Aunt Kay, and her grandfather Rob. She enjoys listening to stories about her family's diverse cultural heritage and often incorporates them into her artwork and play. Velu consents to Priya's check-up and clean. Priya has no known medical conditions, although she was born with a cleft lip that has since been repaired, leaving minimal scarring. Recently, she had her tonsils and adenoids removed due to breathing and sleeping difficulties. She is susceptible to seasonal asthma but has never been hospitalised for it.

Priya previously saw a colleague of yours at the dental van when it was located at Mary Valley State College in Imbil. The van has since moved to Chatswood State School. Your colleague restored her cavitated 84 at this appointment, but Priya was distraught from the experience and refuses to go back to the van. Velu reports that her work commitments make it challenging to travel to the school to visit the dental van, so Priya is happy to see you at the dental clinic.

Priya excitedly mentions that she wishes to make a lot of money from the tooth fairy. You proceed with a children's dental exam. Upon examination, there are no notable findings in her soft tissues, both extra- and intra-orally. Her periodontium appears healthy, but there is plaque accumulation on the buccal surfaces of her maxillary anterior teeth.

Priya rates her oral hygiene as 8/10, while Velu suggests it's closer to 5/10. Velu explains this lower score is because Priya often requires constant reminders to clean her teeth and sometimes falls asleep in bed with a bottle of milk, refusing to brush her teeth if she's too tired.

Priya reports using a manual toothbrush twice per day (when she remembers). However, Velu mentions she only provides Priya with non-fluoridated toothpaste because she has heard that fluoride might cause learning disabilities. Velu also notes, with relief, that they drink filtered tank water at home, and their town water, as part of the Gympie Council, no longer contains fluoride.

Priya requires extensive dental work. Velu prefers that you complete the treatment, even though it may involve multiple visits. During the discussion, you explain the potential need for further work on a tooth previously restored by your colleague in the dental van. Velu expresses dissatisfaction with the treatment Priya received there and raises concerns about the quality of the work performed. You take time to listen to her concerns.

Velu is also worried about the cost of dental treatment but remains firm in her decision not to return to the dental van for care. She suggests using James' unused CDBS funding to cover Priya's dental work. You recommend that Derek contact the Aboriginal Community Controlled Health Services to explore financial assistance options for Priya's restorative and preventative treatment with you. Velu is satisfied with this proposed solution.

Velu then questions the longevity of Priya's restorations. In addition for Priya's welfare, Velu's concerns extend to environmental factors, such as the potential waste of restorative materials, multiple dental visits, and the unnecessary use of other resources.

Chat GPT Output:

Here's a 2-minute informal introduction in Priya's voice:

"Hi! I'm Priya, and I'm six years old. My mum and dad are Velu and Derek, and I have a big brother, James—he's the best, even though he won't let me play with his footy sometimes. I love dancing, singing, and painting, but my favourite thing to do is read about space. One day, I'm going to be an astronaut and fly to the moon. My teacher says I'm good at Maths and Art, and I think that's because I practice a lot, especially when I'm not busy at dance school.

I like being here today much better than at the dental van. I didn't behave very well for the lady there—she wasn't nice like you. Mum says I need to keep my teeth clean so I can get money from the tooth fairy, but sometimes I forget to brush, especially if I'm really tired. Mum says I'm an 8 out of 10 at brushing, but she's wrong—it's more like a 10, I think. Except, okay, I do like to drink milk in bed sometimes and fall asleep, but it's not my fault! Mum always reminds me, though, and I promise I'm getting better.

I don't like the toothpaste we have—it tastes yucky. Mum doesn't use the fluoride one because she says it's bad, but I don't even know what fluoride is! Oh, and our water comes from a tank. It tastes funny, so sometimes I drink Coke instead. Don't tell Mum, though, she doesn't like that.

I'm glad you're going to help me with my teeth, even if I have to come back a few times. Mum doesn't trust the van, so she said it's better if you do it here. I'm a little bit scared, but I know you'll make my teeth shiny and strong again. Thank you for fixing them!"

This tone captures Priya's bubbly, chatty personality while including key information about her dental needs and experiences. Let me know if you'd like any adjustments!

Give your patient a voice

TTSserver.com is a free text-to-speech server that allows you to create and download sound files.

You can upload your character vignette by entering text in the input box, select a language and spoken voice from the list to start converting text to voice file.

Select the accent, 'person', voice pitch and adjust the speed.

Example:

Priya's settings are

- Language: 37 English (Australia) - AU, spoken by 'Natasha'. Her voice pitch is set at +25% and her voice speed is set at +18%.

Create questions that connect your learning objectives to your patient.

Prompt:

Please edit for grammar, clarity and make suggestions to enhance student engagement: Example:1. Priya was born with a cleft lip that has been repaired. The Australian Government supports patients born with cleft lip and or palates from birth onwards. Explore how this scheme fits into the broader Australian oral health system.

Output:

Priya was born with a cleft lip that has been repaired. The Australian Government supports patients born with cleft lips and/or palates from birth onwards. How does this scheme fit into the broader Australian oral health system?

Enhancement Suggestion: Assign students to research cleft lip and palate support programs in Australia and present how these services integrate with public health initiatives like the Medicare system and specialist oral health services.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-12>

Reflections

Creating text to image and video prompts generates engaging content when compared with static visuals (Pyae, 2024). However, AI-generated visual content introduces new conundrums to include:

- Hallucinations where AI 'makes up' the missing pieces rather than admitting it doesn't know (Pyae, 2024).
- Copyright issues: We don't know the origin or consent procedures of the images used to train the data (Qadri et al., 2023).
- Breaching the rights of vulnerable populations such as children and First Nations People such as Indigenous cultural intellectual property and perpetuating biases and disparities (Qadri et al., 2023).

On the other hand, AI generated images that can help maintain privacy as readers and students are unlikely to identify the images as 'real people'. This allows course creators license to incorporate sensitive details that are often excluded in case studies to preserve patient privacy and confidentiality. For students, these AI-enabled patient scenarios more closely align with real-world situations. However, current, text to

speech models produce voice-overs that can sound robotic and unnatural (Pyae, 2024). Consequently, while this was an interesting tool to play with, students and staff noted the ‘robotic’ quality of audio during focus group sessions as in the 2025 SECaTs.

“The point of the course is for it to be personalised and to talk about human experience, and how to treat others with respect. The use of AI takes the human experience out of the course”

(DENT3000 (2025) SECaT Post-AI Integration)

All the case studies in my program were grounded in real-world scenarios. Some were drawn directly from my own clinical experiences, while others were informed by my subject knowledge, additional research and oversight from guest lecturers.

When I first began experimenting with AI-generated images and voices, I had not considered the ethical dimensions, regarding where the data came from and consent. Since the introduction of tools such as ChatGPT, I have become more aware that some companies have shifted their practices to incorporate ethical use by exclusively training models on data from consenting individuals who are willing to have their information shared. This is something I became aware of while writing a scoping review on the use of AI in dental and healthcare (Weerakoon et al., 2025).

Consequently, the ethical use of AI will continue to be an ongoing area of exploration I plan to conduct with my students.

Create Content that Aligns with UDL Principles

Inclusion is also a subjective matter: what one student perceives as inclusion, might not be for another; there is unlikely to be one solution. (Tai et al., 2021; p.1936)

Context

Dentistry courses aim to equip graduates with knowledge and skills needed for practical hands-on outcomes. However, this knowledge is often delivered in micro-learning formats; small bite-sized segments that fragments overarching understanding and context. Such an approach risks creating knowledge silos which can take considerable time and clinical experience to integrate into a broader more holistic understanding of dentistry (Kodali et al., 2024).

Typically, clinically focused courses often emphasise memorisation of definitions,

material properties, and medication names and dosages, sometimes at the expense of developing a broader, big-picture understanding. This narrow focus can de-skill students in reading and writing as they prioritise the acquisition of piece-meal knowledge (El-Kishawi et al., 2020). By contrast, reading and writing intensive courses such as DENT3000 and DENT7221 are often perceived as overwhelming. The reliance on reading material frequently drawn from government publications can appear verbose and demanding, and requires higher order cognitive skills to conceptualise, synthesise and generate meaningful discussion. For some students, a lack of prior skill development in those areas is challenging. It can increase the divide between those able to adapt to conventional academic methods (Ralabate, 2011) and those who face additional barriers such as students from CALD backgrounds or those experiencing neurodivergence (Tai et al., 2021). Student feedback can help identify differences in learning needs (Ralabate, 2011).

DENT3000 (2024) Pre-AI Feedback with Preference for Less Reading Material

"Often, the amount of time I have to put into the weekly readings is a lot"

"I think condensing the readings content into segments we can explore would increase our understanding"

"Instead of required readings, which are not very engaging, it would be better to put the information in the lecture slide"

"I also wish the readings were more focused – i know there are learning objectives, but we trawl through pages of documents for only a fraction of it to actually be useful and relevant. It is painfully time consuming"

"There are way too many readings per week, and none of them are helpful"

DENT3000 (2024) Pre-AI Feedback with Preference for More Reading Material and Less Visuals

"I wouldn't change anything"

"Make the learning materials for wordy instead of pictures without any words. Also consolidate the materials for each week into one folder"

Objective

To create content that aligns with UDL principles (Ralabate, 2011) by converting required and recommended readings into podcasts and developing multimodal formats to improve student learning. While the dominant feature of this section is the creation and publication of a podcast series, alternative approaches were also considered to enhance accessibility and engagement.

How to create and publish a Podcast using AI.

Select the reading/s you would like to incorporate into your podcast. When I did this, I hadn't considered issues related to copyright. I suggest checking that the literature you select is either freely available, available to share through a creative commons license, or that you have explicit permission from the author/s to republish in a different format.

1. Select your resources and upload to NotebookLM

1. Visit and register for a free NotebookLM account with Google. <https://notebooklm.google.com/>
2. Create a 'New Notebook'
3. Upload your file/s.

2. Prompt Notebook LM to create a Podcast.

Prompt-writing tips: Consider incorporating information about your intended audience, and course learning outcomes. Keep your prompt concise.

In this instance, I used a prompt that was modified by ChatGPT for a Podcast on Mental Illness.

Discuss how social, economic, cultural, and environmental factors influence oral health disparities in individuals with mental illnesses. Explore the role of behaviors such as diet, hygiene, and substance use, and examine the connections between trauma, mental health, and barriers to oral care. Reflect on systemic issues, stigma, and gaps in interprofessional collaboration, and propose strategies for dental students to address these challenges and advocate for holistic, patient-centered care.

I didn't appreciate the quality of the podcast created using the longer prompt.

In the end, I used a short simple prompt: *This podcast is aimed at dental students – what are the common oral conditions that people with mental illness suffer from, what are their barriers good oral health?*

Once the podcast is generated, you have the option to interact with the podcast and ask questions if you wish. The outcomes are variable, but may be more refined.

When you are satisfied with the outcome, download the recording as a .wav file format.

3. Generate a Podcast Description.

1. Upload .wav file of the podcast recording and the file sources used to generate the podcast to ChatGPT4o.

2. Prompt: *Hi Chat GPT I have created a podcast using these three references (please create a reference following APA formatting). I want to write a short description about the podcast based on this the references that I have attached.. The podcast has been uploaded. Please create a timed summary of the podcast, explain that it has been created using Google LM with prompting. Also explain a disclaimer that this episode is designed to help students understand concepts, and it is entirely AI generated and therefore may not be entirely accurate.*

3. ChatGPT response:

APA References:

1. Bischof, G., Bischof, A., & Rumpf, H. J. (2021). Motivational interviewing: An evidence-based approach for use in medical practice. *Deutsches Ärzteblatt International*, 118(109-115). <https://doi.org/10.3238/arztebl.m2021.0014>
2. Lim, D., Schoo, A., Lawn, S., & Litt, J. (2019). Embedding and sustaining motivational interviewing in clinical environments: A concurrent iterative mixed methods study. *BMC Medical Education*, 19, 164. <https://doi.org/10.1186/s12909-019-1606-y>
3. Cole, S. A., Sannidhi, D., Jadotte, Y. T., & Rozanski, A. (2023). Using motivational interviewing and brief action planning for adopting and maintaining positive health behaviors. *Progress in Cardiovascular Diseases*, 77, 86-94. <https://doi.org/10.1016/j.pcad.2023.02.003>

Podcast Description:

This podcast explores the principles and applications of Motivational Interviewing (MI) and Brief Action Planning (BAP) in healthcare, based on key evidence from recent research. MI is a patient-centered communication approach that enhances motivation for behavior change by fostering collaboration, acceptance, and self-efficacy. BAP complements MI by providing structured goal-setting techniques to facilitate actionable health improvements.

The discussion is based on research by Bischof et al. (2021), Lim et al. (2019), and Cole et al. (2023), which highlight MI's effectiveness in improving health behaviors, its integration into clinical practice, and its synergy with BAP. The episode provides insights into how MI can be embedded into routine medical care to improve patient adherence, support lifestyle changes, and enhance health outcomes.

This episode was created using Google LM with prompting to generate educational content. It is entirely AI-generated and designed to help students and practitioners understand MI and BAP concepts. While efforts have been made to ensure accuracy, listeners should verify information with primary sources and clinical guidelines, as the content may not be entirely precise.

Timed Summary:

0:00 - 2:30 Introduction

- Overview of Motivational Interviewing (MI) and Brief Action Planning (BAP).
- Explanation of how this episode was generated using Google LM.

2:31 - 6:45 Understanding Motivational Interviewing

- Definition and principles of MI: engagement, evocation, and collaboration.
- How MI supports behavior change in clinical practice.
- Evidence of effectiveness from Bischof et al. (2021).

6:46 - 11:15 Integrating MI into Clinical Practice

- Research findings on embedding and sustaining MI (Lim et al., 2019).
- Challenges in maintaining MI fidelity and practical solutions.
- The role of healthcare professionals as change agents.

11:16 - 15:30 Brief Action Planning (BAP) and Its Role

- Introduction to BAP as a structured, goal-setting technique.
- SMART goals and patient-centered action planning.
- Evidence from Cole et al. (2023) on BAP's impact.

15:31 - 19:00 Practical Applications and Case Examples

- How MI and BAP work together in real-world settings.
- Application in patient counseling, chronic disease management, and adherence strategies.

19:01 - 20:00 Conclusion & Disclaimer

- Summary of key takeaways.
- Disclaimer: This podcast is AI-generated for educational purposes and should not be considered a substitute for professional guidance.

Let me know if you need any modifications!

4. Publish your Podcast on Spotify.

To publish on spotify, you will have to create the following:

1. Register an account on Spotify for Creators.
2. Create a playlist cover for your podcast series using Canva and download.
3. Upload your playlist cover, podcast and description to Spotify for Creators and publish.

Example of final outcome:

5. Create elements for a multimodal package to make your Podcast more accessible.

1. Provide a transcription

Upload the .wav file into a new NotebookLM. Prompt: *Please transcribe the recording with two speakers.*

2. Create a study guide based on the podcast recording and or the uploaded readings.

3. Create a static video with a mindmap of the podcast using Powerpoint.

Upload the .wav file to the powerpoint and then save as a MP4 file that can be published on Youtube. Here is an example of a Youtube video created using Episode 11 from the Dental Deep Dive Podcast series published on Youtube.

6. Example: Organise your multimodal learning package.**User Prompt**

Hey Chat. I would like to create a multimodal learning package for students. I need an outline. In my package, I have a podcast recording, a transcript of the podcast, a study guide with learning objectives, readings related to the podcast and questions. Could you please help me organise this? Thanks

ChatGPT Response

Certainly. Here's an outline for a well-structured multimodal learning package using your resources, designed to promote active and flexible learning:

****Title of Learning Package****

A concise, engaging title related to the podcast topic

I. Overview

- Topic summary (2–3 sentences)
- Purpose: Describe why this topic matters
- Format: Podcast + Transcript + Readings + Study Guide + Questions

II. Learning Objectives

*Aligned with course-level goals and written in student-friendly language (e.g. "By the end of this module, you will be able to...") *

- LO1.
- LO2.
- LO3.

III. Components of the Package

1. ****Podcast (Primary Learning Resource)****

- Title and brief description
- Duration and access link
- Listening instructions (e.g. "Listen once for context, then re-listen while taking notes using the transcript.")
- Optional: Time-stamped index

2. ****Transcript****

- Cleaned and formatted version of the podcast
- Annotations or definitions for key terms (optional)
- Embedded prompts or reflection cues

3. ****Study Guide****

- Key terms and concepts
- Summary of major points
- Conceptual map or visual aids (optional)
- Links to learning objectives

4. ****Readings****

- Required: 1–2 key readings with relevance explained
- Optional/Extension: Further reading list
- Critical reading prompts (e.g. "How does this reading expand or challenge the podcast content?")

5. ****Guided Questions & Activities****

- Comprehension questions (directly related to podcast and readings)
- Application questions (e.g. case-based or scenario-based)
- Reflection prompts (e.g. "How would you explain this concept to a patient?")
- Discussion board or tutorial task (optional)

IV. Suggested Sequence for Learners

1. Preview learning objectives
2. Listen to the podcast (with/without transcript)
3. Review study guide
4. Complete readings
5. Attempt guided questions
6. Optional: Participate in tutorial/discussion activity

Would you like this in a .docx format, Blackboard HTML, or both?



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-11>

Reflections

The podcasts were well received by many students, particularly for their accessibility and flexibility:

"The podcast was great and helpful"

(DENT7221 (2025) SECaT Post-AI Integration)

"especially like podcast um ones. Um which is pretty good. I think they don't go into too much detail, but it was like I'm just listening to two actual people talking"

"I enjoy the podcast because it's um a different way of learning and especially at times where I might be quite tired and I can't physically study at least like having a passive way of learning was really good and then it just gets converged to my brain in that way of course"

"I enjoy the podcast cuz um it's more time efficient especially with our busy schedule. I can just listen to it and do something else"

"I prefer the podcast cuz as speaker five said, I could multitask and do something else whilst also learning".

(Feedback from students participating in a feedback focus group, 2025)

For many, podcasts were valued as time-efficient, flexible, and engaging. However, some students expressed a stronger preference for visual or interactive resources.

"I prefer the video aspect over the podcast just because I'm a visual learner so I guess just using AI um which is best tailored to your learning um how you learn what say I think the interaction of the for me because I actually have to engage with the content rather than passively listening or just constantly watching. Um speak for I also prefer the modules over the videos especially cuz you can um I guess access the content without having to use headphones. So you can access it more often in more places"

"I preferred the interactive module just because it keeps me more engaged and I can click into the resource that I want to look into more and like the resources right there for me to investigate more"

(Feedback from students participating in a feedback focus group, 2025)

Others voiced dislike of podcasts altogether, emphasising the importance of offering alternatives:

"I was weirded out by the podcast and like how the AI spoke like their tone, the

language that they used. It was like kind of binge [cringe] and then like it made me like stop listening"

(Feedback from students participating in a feedback focus group, 2025)

"redo learn x [UQ Extend] to make it more readable. podcast was not useful, feel like i waste my time"

"the podcasts were a bit difficult to follow"

(DENT3000 (2025) SECaT Post-AI Integration)

"I actually found the podcasts useful but did not like the recorded AI on UQ extend (perhaps it was different software). The AI on UQ Extend was extremely boring – I much prefer listening to you!"

(Feedback from students participating in a feedback focus group, 2025)

"The Podcasts were a bit troublesome to work with, I am not the biggest fan of auditory learning. Transcripts perhaps of the podcast material would be good for people that enjoy to read more than listen. Hard to rewind when missed something etc"

(DENT3000 (2025) SECaT Post-AI Integration)

Podcasts successfully supported many students by offering flexible, multimodal access to core content. However, student responses highlighted diverse preferences, some valued auditory learning for its efficiency, while others required visual or textual alternatives to remain engaged. This reinforces the importance of UDL-aligned design that provides multiple representations of content including transcripts, interactive modules, and visual media so all students can engage in ways that suit their learning needs.

Create Teaching Content

Use AI to structure content for lecture slides.

1. Upload your documents and prompt ChatGPT.

Ensure your documents are publicly available, and not subject to copyright. In this example, I created an online recorded lecture using ChatGPT and Prezi.com.

To create a lecture outline on the overview of the Australian Oral Health System, I uploaded the following documents to ChatGPT:

↓ Biggs, Amanda. (2013). Health in Australia: a quick guide. Research Paper series (Parliamentary Library).

2. Biggs, Amanda. (2008). Overview of Commonwealth involvement in funding dental care.

Prompt: Hi Chat, Could you please use the information in these two documents to create an overview of the Australian Oral Health System. I would this outline to include how we are funded as well as the major players. Thanks.

Response:

Here is an overview of the Australian Oral Health System, including funding mechanisms and major stakeholders:

Overview of the Australian Oral Health System

The Australian oral health system involves a complex interplay of responsibilities and funding across multiple levels of government, supplemented significantly by private funding and private health insurance.

Funding Structure

Commonwealth Government Involvement:

- *Historically, the Commonwealth government's involvement in dental health funding has fluctuated significantly depending on political priorities. Direct involvement commenced notably under the Whitlam Labor Government in 1973 with the Australian School Dental Program, providing comprehensive care to school children, although this was later absorbed into general state funding.*
- *The Keating Labor Government introduced the Commonwealth Dental Health Program (CDHP) in the early 1990s targeting low-income earners, providing substantial direct Commonwealth funding which was terminated by the subsequent Howard Coalition Government.*
- *Under the Howard Government, Medicare funding for dental services for patients with chronic conditions (through the Allied Health and Dental Care Initiative) expanded, covering specified dental treatments, including prosthetics, but faced criticism over high patient out-of-pocket expenses.*
- *The Rudd Labor Government reintroduced targeted funding through the New Commonwealth Dental Program aimed at reducing state dental waiting lists, and the Medicare Teen Dental Plan, providing annual check-ups for teenagers from low-income families, marking a significant shift toward means-tested Medicare dental benefits.*

Funding Structure and Responsibilities:

Commonwealth Government:

- *Provides limited funding through Medicare for specific dental treatments linked to clinical needs (e.g., cleft palate and chronic disease conditions).*
- *Offers subsidies for dental care through indirect means, primarily via private health insurance rebates and the Pharmaceutical Benefits Scheme (PBS) for dentist-prescribed medicines.*
- *Administers targeted dental schemes such as the Veterans' dental scheme, Armed Forces dental care, and Indigenous dental health services through Community Controlled Aboriginal Medical Services.*
- *Supports university dental training through the Higher Education Contribution Scheme (HECS).*

State and Territory Governments:

- *Manage and primarily fund public dental services through government clinics, which usually provide care to low-income earners and concession card holders.*
- *Implement varying co-payments, service scopes, and eligibility criteria, often with significant variation between jurisdictions in terms of accessibility and waiting times.*

Local Governments:

- *Play a limited role, mostly focused on community-level services like public health promotion and aged-care services, rather than direct provision of dental services.*

Role of Private Health Insurance:

- *Private health insurers are major contributors, funding approximately \$1.2 billion annually in dental services. Around 55% of Australians have ancillary cover that includes dental care, subsidised indirectly by the Commonwealth through the private health insurance rebate scheme.*

Major Players in the Australian Oral Health System:

- **Commonwealth Government:** *Policy-making, targeted dental programs, limited Medicare dental benefits, and incentives for private health insurance.*

- **State and Territory Governments:** Responsible for direct delivery and administration of public dental care programs.
- **Local Governments:** Limited role; primarily preventive and community health promotion.
- **Private Dental Sector:** Predominantly funds and provides dental care, with services significantly subsidised through private insurance.
- ✓ **Private Health Insurers:** Key stakeholders facilitating access to dental services via ancillary cover, significantly subsidised through Commonwealth rebates.
- **Universities and Training Institutions:** Provide professional dental training funded partially by the Commonwealth.
- **Community-Controlled Aboriginal Medical Services:** Deliver targeted dental care services for Indigenous populations.
- **Regulatory Bodies:** The Australian Health Practitioner Regulation Agency oversees registration and accreditation of dental professionals nationally.

Financial Contributions:

- The majority of dental care funding (around 80%) comes directly from individuals, with Commonwealth and State governments contributing much smaller shares. Public funding has been historically volatile, shifting significantly with changes in government policy priorities.

In summary, Australia's oral health system is complex, with multiple stakeholders and layered funding involving substantial out-of-pocket costs for individuals, supplemented by selective public subsidies and extensive reliance on private health insurance.

2. Complete your presentation.

1. Save the ChatGPT generated response as a .docx file and upload it to Prezi.com.
2. You can request Prezi to create a presentation. Here is an example of the initial organisation of the presentation.
3. Here is an example of the finished presentation.
4. Here is an example of part of the lecture recording (part 1 of 3).



The interactive version of this H5P content is available at:
<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-10>

Reflection on Using AI to Structure Teaching Content

I used AI to help create the basic structure of a lecture on the Australian oral health system, a topic I consider to be conceptually challenging. This health system involves a variety of fragmented stakeholders and funding bodies to challenge the creation of an overarching 'system'. In this instance, I found it useful to use AI to help me organise and categorise ideas. It reduced my cognitive load by providing me with a framework I could build on, rather than requiring me to start from scratch. However, AI-generated lecture slides are not without fault. Key issues I observed are:

- Images matched to AI-created content can be contextually inappropriate.
- AI includes adequate information, yet requires human engagement to edit for clarity, improve detail and enhance context.
- AI is not a content expert. It is also important for the teacher to be knowledgeable on the topic. For instance, in the section under 'Commonwealth Government Involvement', the slides generated referred to the 'Teen Dental Plan' that was

replaced by the Child Dental Benefit Schedule.

- Some students perceived AI-generated lecture content to be 'robotic', and express dissatisfaction.

"do not use AI in teaching content that should be personal and relevant. This resulted in the general low interest in DENT3000 in our cohort as the AI generated slides were often superficial"

"The use of AI, made the content less about human interaction and more about just learning and memorizing the content"

(DENT3000 (2025) SECaT Post-AI Integration)

Use AI to Create Actionable Tutorial Documents.

The 2024 cohort expressed the need for targeted guidance to help guest lecturers align content with course learning objectives.

"Maybe for the individual lecturers that are invited they could provide some key learning objectives for their lectures?"

(DENT3000 (2024) SECaT Pre-AI Integration)

In response to this request, I created online tutorial guides for all guest lecturers. An exemplar is used to illustrate the process and outcome.

1. Use ChatGPT to generate an outline for an online tutorial document.

Prompt: Hi Chat, I would like to create a document for an online tutorial. This tutorial is informal, but centres around questions from patient case studies that I developed. I would like to introduce the speakers with their respective background, provide some context for what the tutorial is likely to cover from the case study, a link to the zoom meeting that will be recorded and uploaded later. It is to run on Tuesday between 6-7pm Queensland time. Could you please provide me with an outline for the document so that I can create a template/guide for my students? Please use UK convention English. Thanks

Response:

Response:

1. Title of the Tutorial

Clearly state the tutorial topic (e.g., *Clinical Challenges in Adhesive Dentistry: A Case-Based Discussion*).

2. Introduction

Brief Overview: Introduce the purpose of the tutorial and what attendees can expect.

Case Study Focus: Provide a short description of the case study being discussed.

3. Speaker Introductions

Speaker 1: Name, qualifications, role, and relevant expertise.

Speaker 2: Name, qualifications, role, and relevant expertise.

(Repeat as necessary for additional speakers.)

4. Learning Objectives

What participants should gain from the session (e.g., clinical decision-making skills, understanding of adhesive materials, management strategies).

5. Case Study Overview

Patient Background: Age, gender, relevant medical and dental history.

Clinical Presentation: Key symptoms, intraoral findings, radiographs (if applicable).

Treatment Dilemma: The main questions or decisions to be discussed.

6. Discussion Format

How the case will be explored (e.g., guided questions, audience participation, expert insights).

Encouragement for students to prepare questions in advance.

7. Zoom Meeting Details

Date & Time: Tuesday, 6–7 pm (Queensland time).

Zoom Link: [Insert Link]

Recording: The session will be recorded and uploaded for later viewing.

8. Additional Resources

Recommended reading, relevant guidelines, or supplementary materials.

9. Contact Information

Who to contact for queries (email, university contact, or course coordinator details).

2. Example of Tutorial document

Online Tutorial 2 : Supporting patients with complex psycho-social histories in dental practice.

1. Key discussion points

- Mental health and oral health.
- Managing patients with trauma (physical and mental)
- Supporting patients with communication and physical limitations.
- Substance use and coping mechanism.
- Planning dental treatment for patients with cognitive challenges.
- Enhancing communication for non-English speakers.
- Addressing dental fear and anxiety.
- Respecting diverse cultural oral health practices.

2. Questions from the course handbook

1. Uncle Bob suffers from mental health issues compounded by his traumatic childhood and PTSD from serving in Vietnam. How does mental health impact oral health? (4.1.6 Q5)
2. Kay suffers from both physical and mental trauma due to her experiences in the civil war. How can you support her better in your practice? (4.1.6 Q6)
3. Kay has limited English proficiency and physical limitations that affect her ability to perform daily tasks. How can you better support her in your practice? (4.1.6 Q7)
4. Velu reports taking a Valium and drinking wine before attending her appointment. What does her social history and ability to cope with dental treatment indicate to you about Velu's situation? What are some dental management considerations or modifications that may be required given Velu's previous psycho-social history? (4.2.2 Q1)
5. Kay has experienced considerable trauma that has affected her mental health, cognition, and subsequent dental health. What are the considerations you need to have when planning for her dental treatment? How can you help Kay improve her dental health? (4.2.10 Q1)
6. Kay finds it challenging to communicate with you in English. Many patients may also have difficulty communicating in English. What alternatives can you offer to improve communication? (4.2.10 Q2)

7. Kay, like many others, is fearful of coming to the dentist. While cost is a significant factor, fear of judgment or anxiety about treatment also plays a role. How can you integrate practices to better support patients with dental fear or anxiety? (4.2.10 Q3)
8. Kay reports infrequent toothbrushing, using her fingers and charcoal powder instead. Diverse cultural practices like these are common in Australia and other countries. How can you respect these practices while encouraging patients to consider more conventional brushing techniques and products? (4.2.10 Q4)

3. Speaker Introductions

Speaker: Dr Lydia See: Geriatric and Special Needs Dentist.

6. Discussion Format

In this tutorial, Dr Arosha Weerakoon will moderate the session to ensure that all questions and topics are addressed. Students are encouraged to seek clarification and ask questions, either through the chat or by 'raising their hands' to speak within zoom. The session will be recorded.

7. Zoom Meeting Details

- **Date & Time:** Tuesday March 25th, 6–7 pm (Queensland time).
- **Zoom Link:** See end of document
- **Recording:** The session will be recorded and uploaded for later viewing.

8. Additional Resources

It is recommended that you complete the 'Priority Populations' Modules in UQExtend.

9. Contact Information

Please contact Dr Arosha Weerakoon on a.weerakoon@uq.edu.au for any inquiries related to the tutorial .



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-15>

Reflections

I found the creation of tutorial documents helpful for both students and the guest speakers. Guest speakers often rely on re-purposed content from other presentations, which can lack the relevance or alignment with course needs. In the past, I had provided only the relevant course objective, often expressed as a single broad sentence. Developing a structured tutorial guide changed this dynamic. Contributors did not have to prepare content and could freely discuss topics following the guide. This also meant that students could follow the tutorial document closely. All the online tutorials were hosted on Zoom which has a feature that uses AI to transcribe the content which helps those who prefer to read rather than listen, to absorb content in their preferred mode.

Overall, the quality and relevance of tutorial content in 2025 improved significantly and many of the students responded positively to this change.

"It was good to hear insight from guest speakers regarding aspects of dentistry other than general practice"

"the guest speakers gave a lot of valuable insight"

(DENT3000 (2025) SECaT Post AI-Integration)

Assessment Support and Feedback Innovation

Creation of Assessment FAQs and Exemplars

In 2024, I responded to student requests by providing an assessment exemplar for DENT3000. Student use of the exemplar varied, some treated it as a benchmark to replicate, while others drew on it to extend their engagement with the rubric and produce advanced submissions. This reflects the literature that combining exemplar with rubrics can enhance student engagement and performance (To et al., 2022). Students who produced 'outstanding' work often used the exemplar as a springboard to ask exploratory questions from me to deepen their understanding of the assessment criteria.

A recurring challenge for me was the large volume of repetitive questions asked by students to clarify assessment requirements. Despite attempts to re-direct students to the discussion boards in our LMS, many students did not participate nor access the discussion boards in a timely manner. As one noted:

"Also, please can important updates for assignments (like important questions answered on the discussion board) be shared in announcements to everyone, because we don't all see them unless we go looking"

(DENT3000 (2024) SECaT Pre-AI Implementation)

In response, I created Frequently Asked Questions (FAQ) documents for each assessment task and uploaded them into relevant assessment folders. These documents reduced email traffic and post workshop queries, and could be updated dynamically so all students accessed consistent information in one location.

1. Generate FAQ document.

1. Upload task sheet and marking rubric to ChatGPT.

2. Prompt:

Hi Chat, Here is an assessment task and a marking rubric for a dental student's first assessment. Can you please review the information contained in these documents and write some likely questions that students will ask so that I can create a 'Frequently Asked Questions' section. Thanks

Initial response was acceptable (but was modified by further prompting):

Frequently Asked Questions (FAQs)

1. Can I choose any population group for the pitch, or does it need to be a nationally recognised priority population?

You must choose a population group recognised as a priority in national or state oral health strategies or supported by the literature as experiencing oral health inequities.

2. Do I need to appear in the video, or can I submit a narrated PowerPoint only?

You must appear and be clearly heard in the video. PowerPoint slides can support your presentation, but submitting slides alone does not meet task requirements.

3. What kind of evidence do I need to include?

Use contemporary, peer-reviewed literature and official data sources to justify the selection of your population and the rationale for the proposed activity. Cite all sources clearly.

4. Should the video pitch follow a specific structure?

Yes. Follow the structure outlined in the task: introduction of the population, evaluation of social determinants and health system limitations, description of the activity (aim, objective, theoretical basis), and implementation plan, followed by a conclusion with a call to action.

5. Can I work with a classmate on this task?

No. This is an individual assessment. Collaboration or joint work is considered collusion and a breach of academic integrity.

6. What if my pitch exceeds the six-minute time limit?

Submissions exceeding six minutes may not be fully viewed or assessed. Keep your presentation concise and within the limit.

7. Do I need to discuss specific health promotion theories in the video?

Yes. You must explicitly reference relevant theories or models of health promotion and explain how they inform your activity's design.

8. How detailed does the implementation plan need to be?

Include sufficient detail on when, where, and how the activity will be delivered, considering resource allocation and accessibility across different communities.

9. Are there technical requirements for the video?

Ensure good audio quality, clear visuals, and an appropriate speaking pace. Submit your video in a standard format (e.g. MP4) via the correct platform before the deadline.

10. Can I use AI-generated content or tools in creating my video or script?

Use of generative AI tools must be disclosed and must comply with UQ's academic integrity policy. Overreliance may impact marks related to originality and depth of understanding.

Let me know if you'd like these reworded in a more casual or formal tone, or if you'd like a short video script to accompany the FAQ section.

2. Modified FAQ document.

Modifying prompt: Can you make this more casual. Can you add some possible inquiries that may arise from the marking rubric as well.

Output:

Assessment 2 FAQ – Oral Health Promotion Video Pitch

1. Do I have to appear in the video or can I just use slides?

You must record yourself talking in the video — just submitting slides or a voiceover won't meet the task requirements. Feel free to use slides or visuals to support what you're saying though!

2. Can I work with a friend on this task?

Nope — this is an individual assessment. Working with others or submitting the same ideas is considered academic misconduct.

3. How strict is the 6-minute time limit?

Pretty strict. Going over time means your marker might not watch the whole thing, which could affect your grade. Keep it under six minutes.

4. What kind of population should I choose?

Stick with a priority population – groups that face higher oral health risks or poorer outcomes. Think along the lines of rural communities, Aboriginal and Torres Strait Islander peoples, low-income groups, or culturally and linguistically diverse (CALD) communities.

5. Do I need to reference health promotion theories?

Yes – the more clearly you link your pitch to a theory (like the Ottawa Charter or Health Belief Model), the better. This is one of the key things markers are looking for.

6. What do I actually need to include in the video?

Here's a simple checklist:

- Hook/introduction to grab attention

- Clearly identify your priority population and why they matter
- Discuss social determinants and how they compare to the general population
- Point out any gaps or limitations in the system for this group
- Describe your proposed oral health promotion activity: aim, objective, how it works
- Say where, how, and when you'd run it – and make sure it's realistic and resource-aware
- Finish with a solid conclusion and call to action

7. How do I get top marks in the introduction section?

Start strong — aim to hook the listener and give a clear, punchy insight into the issue you're tackling. A boring or vague intro will drop you down the scale.

8. What does “call to action” mean in this context?

Basically, you're ending your pitch by encouraging action — from your audience, your peers, or potential supporters. What do you want them to do next?

9. How much detail do I need on implementation?

Show you've thought it through. Where will this happen? Who's involved? When would it run? Is it scalable, cost-effective, and realistic?

10. What does ‘sophisticated evaluation’ or ‘nuanced explanation’ even mean?

It means you've thought deeply and critically. Don't just list facts — show insight. For example, don't just say rural communities have less access to care — talk about why and what can realistically be done about it.

11. Can I use AI to help with the script or planning?

You can use tools to help plan or brainstorm, but the work must be your own. Be transparent and make sure what you submit reflects your own understanding.

12. I'm not super confident speaking on camera — will that affect my marks?

Not necessarily. You're marked on clarity, expression, and delivery, but not on being ‘camera perfect’. Practice a couple of times and make sure you're clear and audible.

13. Do I need to submit a reference list?

Yes — include a reference slide at the end of your video or upload it as a separate document. Use APA style.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-9>

Integration of an AI Declaration on Assessment Coversheets

1. Initial declaration.

Prompt:

Hi Chat GPT, I have to create a declaration of use of Gen AI in assessment tasks for undergraduate dental students. This is a declaration from another institution, could you please update this based on latest pedagogical theory and make it more relevant to my students.

ChatGPT said:

Sure! Please provide the declaration from the other institution, and I will update it based on the latest pedagogical theory and tailor it to your undergraduate dental students.

You said:

I declare that parts of this submission has contributions from AI software and that it aligns with acceptable use as specified as part of the assignment brief/guidance and is consistent with good academic practice. The content can still be considered as my own words. U understand that as long as my use falls within the scope of appropriate use as defined in the assessment brief/guidance, then this declaration will not have any direct impact on the grades awarded. I acknowledge use of software to [] 1. Generate ideas or structure suggestions, for assistance with understanding core concepts or other substantial foundational preparatory activity. [insert AI tool(s) and links and/or how used] 2. Write, rewrite, rephrase and or/paraphrase part of this essay. [Insert AI tool(s) and links] 3. Generate some other aspect of the submitted assignment. [Insert AI tool(s) and links/ include brief details] [1]

ChatGPT said:

I see that you've uploaded an image. It looks like a declaration of AI use in assessment tasks. I'll extract the text, refine it based on pedagogical theory, and tailor it for undergraduate dental students. Let me process it now.

Here's an updated version of the declaration, refined based on the latest pedagogical theory and tailored for undergraduate dental students:

Declaration of AI Use in Assessment Tasks – School of Dentistry

As a student in the Bachelor of Dental Science program, I acknowledge that responsible and ethical use of Generative AI (GenAI) can support learning, critical thinking, and professional development.

I declare that parts of this submission have been generated or assisted by AI software and that my use aligns with the guidelines specified in the assessment brief and adheres to principles of academic integrity and professionalism. The final content reflects my own understanding, synthesis, and critical engagement with the material.

I understand that as long as my use of AI falls within the scope of acceptable academic practice, this declaration will not negatively impact my grade. However, I remain responsible for the accuracy, quality, and integrity of my work.

Nature of AI Use

I have used AI tools in the following ways (tick and provide details as applicable):

1. Concept Development & Structuring:

1. Generating ideas, organizing content, or clarifying key concepts.
2. AI Tool(s) Used: [Insert name(s) and link(s)]

2. Writing Support & Refinement:

1. Assisting with writing, rewording, summarizing, or paraphrasing sections.
2. AI Tool(s) Used: [Insert name(s) and link(s)]

3. Other Uses (e.g., Research Summarization, Data Processing, Citation Assistance):

1. [Describe the AI's role and tool(s) used]

I affirm that AI has not been used to generate clinical case responses, patient treatment plans, or any content requiring independent clinical reasoning, as per professional and ethical standards in dental education.

By signing this declaration, I confirm that I have critically evaluated all AI-assisted content, ensured its academic integrity, and take full responsibility for my submission.

Name: [Insert Name]

Student ID: [Insert ID]

Date: [Insert Date]

This version integrates key principles from AI literacy, responsible learning, and academic integrity, ensuring it aligns with professional dental education standards. Let me know if you'd like any refinements!

[1] <https://www.kcl.ac.uk/about/strategy/learning-and-teaching/ai-guidance/student-guidance>

2. Final modified declaration.

You said:

These are great, can you please modify to UK convention English and review the University of Queensland's current policy on AI in assessment and amend your submission

ChatGPT said:

Based on the University of Queensland's current policies on the use of Artificial Intelligence (AI) in assessments, as outlined in their official guidelines [itali.uq.edu.au](https://www.uq.edu.au/academic-integrity), I have revised the declaration to align with UK English conventions and ensure compliance with UQ's academic integrity standards.

Declaration of AI Use in Assessment Tasks – School of Dentistry

As a student in the Bachelor of Dental Science programme, I acknowledge that responsible and ethical use of Generative AI (GenAI) can support learning, critical thinking, and professional development.

I declare that parts of this submission have been generated or assisted by AI software and that my use aligns with the guidelines specified in the assessment brief and adheres to principles of academic integrity and professionalism. The final content reflects my own understanding, synthesis, and critical engagement with the material.

I understand that as long as my use of AI falls within the scope of acceptable academic practice, this declaration will not negatively impact my grade. However, I remain responsible for the accuracy, quality, and integrity of my work.

Nature of AI Use

I have used AI tools in the following ways (tick and provide details as applicable):

1. Concept Development & Structuring:

1. Generating ideas, organising content, or clarifying key concepts.
2. AI Tool(s) Used: [Insert name(s) and link(s)]

2. Writing Support & Refinement:

1. Assisting with writing, rewording, summarising, or paraphrasing sections.
2. AI Tool(s) Used: [Insert name(s) and link(s)]

3. Other Uses (e.g., Research Summarisation, Data Processing, Citation Assistance):

1. [Describe the AI's role and tool(s) used]

I affirm that AI has not been used to generate clinical case responses, patient treatment plans, or any content requiring independent clinical reasoning, as per professional and ethical standards in dental education.

By signing this declaration, I confirm that I have critically evaluated all AI-assisted content, ensured its academic integrity, and take full responsibility for my submission.

Name: [Insert Name]

Student ID: [Insert ID]

Date: [Insert Date]

This revised declaration aligns with UQ's emphasis on academic integrity and the responsible use of AI in assessments. It ensures that students are aware of their responsibilities when incorporating AI tools into their work and maintains the standards expected within the School of Dentistry.



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-7>

Assignment coversheets are widely used to reinforce academic integrity (Gonsalves,

2025). Prior to 2025, however, they contained no reference to AI use. As my course profiles and task sheets had to be finalised before UQ released central guidance in March 2025, I developed my own AI declaration prompt and added it to the School of Dentistry assignment coversheet on 4 Feb 2025.

This encouraged some students to disclose AI use.

"I used ChatGPT solely to refine grammar and sentence structure and made sure my arguments were clear, structured, and consistent."

(DENT3000, (2025) student email)

It is likely that some withheld disclosure for fear of retribution (Gonsalves, 2025). The link between disclosed AI use and assessment outcomes remains an area for further investigation.

Use of AI in Generating and Editing Feedback

Providing personalised feedback within my 0.4 role was a significant workload challenge. In 2025, across DENT3000 and DENT7221, I marked approximately 232,000 words and 5.5 hours of video assessment. To accelerate the feedback process, I experimented with ChatGPT in different ways. In 2024, I uploaded rubrics for a video-based task to generate boilerplate comments. In 2025, I extended this by drafting personalised feedback myself, then using ChatGPT to edit and refine for clarity. I also collated all feedback into a single thread to generate cohort-level insights.

1. Create Boilerplate feedback

1. Upload marking rubric

2. Prompt: This is a rubric for [insert your assessment task title here] that [provide brief description of the assessment task]. Please generate some boilerplate feedback using the main elements of the rubric for [insert student first name only] who [explain how the student approached the task]. Then provide context for what you awarded the student]. Use the criteria in the rubric under the sub-headings of 'who and why, what and how and where and when'.

Example: This is a rubric for a oral health promotion video that creates and discusses a promotion activity that helps improve oral health in a population – Please generate some boilerplate feedback using the main elements of the rubric for [student name] who decided to help people who are homeless. Use the criteria in the rubric under the sub-headings of 'who and why, what and how and where and when'. Please start with Dear [insert student's name] . [student's name] provided good objectives of improving oral health conditions and enhance awareness amongst homeless individuals. [student name] identified the need to connect with support services, disseminate information in places where people who are homeless are likely to visit, provide free oral health kits and help with pain and urgent referrals. Encourage people to attend regular dental visits. She received proficient for who and why, but competent for other issues that include feasibility. In the grant application, she will have to provide more information on logistics, and how she will attract people to the community centre. She could consider engaging help from other practitioners involved in helping homeless such as social workers and psychologists.

ChatGPT output (2024)

Dear [student name],

Who and Why

Score: Proficient

You have successfully identified the specific needs of the homeless population in your oral health promotion video. Your objectives of improving oral health conditions and enhancing awareness amongst homeless individuals are well-articulated and demonstrate a clear understanding of the challenges faced by this group.

What and How

Score: Competent

Your strategy to connect with support services, disseminate information in accessible locations, provide free oral health kits, and assist with pain management and urgent referrals is commendable. However, there is room for improvement in detailing the feasibility of these activities. More specific plans on how these actions will be implemented effectively would strengthen your project.

Where and When

Score: Competent

The idea to encourage regular dental visits and your approach to utilizing community centers as hubs for these activities are strategic. However, more information is needed on how you will attract homeless individuals to these centers and ensure their participation in the program.

Recommendations for Enhancement:

1. **Detail Collaboration Efforts:** Consider involving other practitioners who regularly work with the homeless population, such as social workers and psychologists. Their expertise and existing relationships can enhance the outreach and impact of your program.
 2. **Clarify Logistics:** Provide more detailed information on the logistics of distributing oral health kits and managing referral processes. How will you ensure these resources reach the intended recipients effectively?
 3. **Increase Engagement Strategies:** Explore additional methods to attract homeless individuals to participate in the program, such as through incentive-based approaches or by aligning with other services they commonly use.
 4. **Feasibility and Resource Management:** Further develop your plans for the practical implementation of your activities. Detailing resource allocation, volunteer involvement, and potential partnerships will help in addressing feasibility concerns.
- By addressing these recommendations, you can enhance your submission for the grant application, ensuring that your initiative is not only well-conceived but also practical and capable of achieving its intended impact.*

Warm regards,

[Your Name]

[Your Position]

This feedback can now be copied and pasted into the 'overall feedback' section in your marking tool.

2. Edit and elaborate freeform feedback.

1. Upload rubric document and assessment task sheet.

2. Initial prompt: Hi Chat, I have attached an assignment task sheet and a marking rubric. Please create boilerplate feedback for this student based on my comments and key elements in both attachments.

3. Prompt example for each student:

[Insert student name] proposed an OHP around 'Bright Smiles Bright Futures' to help children in Bundaberg. Just as an add-on, Colgate already have a Bright Smiles Bright Futures program that they may have already trademarked. highlighting that regional based children live with untreated decay. Excellent framing of issues around the determinants that include geographical, environmental including health system and service access barriers. Excellent identification of the regional reality and the impact on oral health yes many care givers to lack the understanding and therefore the impact of poor oral health on their children. Excellent idea to embed oral health education into the school, provide interventions such as fluoride varnish and engage parents. The only key issue will be measuring the impact if you overall aim is to reduce the prevalence of ECC - how will this be measured.? These are also very bold objectives - how will you measure some of these in a

realistic manner with a 15K budget. Excellent use of health belief model, social cognitive theory by increasing perception of poor oral health, helping peer development and embedding the principles of the Ottawa Charter into the community at multiple levels. This is a collective community event. I wonder though, how well received the fluoride varnish program would be, given the issues with the lack of water fluoridation and mistrust that already exists. This is a very bold initiative that has potential to be unrolled, but perhaps not on the budget of \$15 000, particularly when looking at the need for infection control and student supervision (irrespective of volunteers). It may also be a challenge to garner interest from caregivers to help their children, and perhaps this kind of program may be better embedded with new parents who are keen to learn all aspects of bringing up children, rather than existing school-aged parents. It's a complex initiative that will require tweaking and perhaps rolled out in phases to ensure that you can work on it in an iterative manner.

4. ChatGPT4o Output

Hi [Student name],

Thank you for your assignment. *Bright Smiles, Bright Futures* is a well-intentioned initiative targeting children in Bundaberg, with excellent framing of the key determinants of health—particularly geographical, environmental, systemic, and service access barriers. Your identification of the regional reality and the role of caregivers in influencing children's oral health is strong and well supported.

Embedding oral health education in schools, applying fluoride varnish, and involving parents are commendable strategies. However, do note that "*Bright Smiles, Bright Futures*" is a registered Colgate initiative and may already be trademarked. Your objectives—particularly reducing the prevalence of ECC—are ambitious, and the methods of measurement require clarification, especially given the constraints of a \$15,000 budget. The application of the Health Belief Model, Social Cognitive Theory, and Ottawa Charter principles is excellent, and your collective, community-centred approach is a standout.

That said, the feasibility of fluoride varnish delivery may be challenged by local distrust and the need for strict infection control and supervision. You may also face difficulty engaging existing caregivers; targeting new parents through antenatal or early parenting programs may yield better engagement. Overall, this is a bold and well-conceptualised proposal that could be impactful if rolled out in phases with iterative refinement and community co-design.

5. You can keep doing this with all of the students in your class.

3. Generate group feedback.

1. Prompt: Hi chat, thank you so much for helping. I am grateful. Can you please review all of the comments and feedback for this assignment and provide some general feedback to this group of students. Thank you.

2. ChatGPT4o Outcome:

You're very welcome—it's been a pleasure supporting you and your students. Below is a summary of **general feedback** for the group, based on the full set of pitch reviews:

General Feedback – Oral Health Promotion Video Pitch

Thank you all for your thoughtful, creative, and passionate work on this assessment. The oral health promotion video pitches showcased a wide range of meaningful initiatives that responded well to key health needs across diverse populations. The quality of ideas, use of health promotion theory, and awareness of systemic barriers were impressive. Below are some overarching reflections and areas for improvement:

🌟 What You Did Well

- **Strong Problem Identification:** Many of you demonstrated a clear understanding of oral health disparities, especially for priority populations such as Aboriginal and Torres Strait Islander communities, people with disabilities, individuals experiencing homelessness, and those in rural and remote areas.
- **Creative and Culturally Safe Approaches:** There was excellent use of culturally appropriate methods such as yarning, storytelling, community Elders' involvement, and school-based interventions. These show a deep respect for community engagement.
- **Application of Health Promotion Models:** Most of you applied models such as the **Health Belief Model**, **Transtheoretical Model**, **Social Cognitive Theory**, and the **Ottawa Charter** effectively. Some also made good use of the **RE-AIM framework** for evaluation planning.
- **Clear Communication (Visuals):** Your slides were generally well-designed, engaging, and supported your verbal pitch effectively. Where pitch speed was fast, the clarity of your slides helped convey your ideas.

🔧 Areas for Improvement

- **Pitch Speed and Delivery:** Several pitches were **too fast**, making it difficult to follow without relying heavily on slides. In future presentations, please aim for a measured pace and clarity of speech to ensure accessibility for your audience.

- **Feasibility and Budget Awareness:** Many excellent ideas were proposed (e.g. mobile dental clinics, full-service outreach programs), but **not feasible within the \$5000 budget**. Future proposals should scale ideas appropriately—start small, pilot with one site or group, and plan to scale up based on evaluation.
- **Theory Application:** While many of you mentioned behaviour change theories, a few presentations would benefit from **deeper integration** of theory—explaining how the model informs your strategy, rather than just naming it.
- **Health System Understanding:** Some proposals lacked depth in understanding how the **Australian oral health system functions**, including inaccuracies about Medicare, the CDBS, or dental workforce roles. Ensure you review current services to avoid duplication and increase impact.
- **Evaluation Planning:** Measuring success is key. Many pitches would be strengthened by incorporating **baseline and follow-up data collection**, such as knowledge surveys, behavioural tracking, or access metrics.

✓ Final Thoughts

This was a highly impressive group effort. Your empathy, creativity, and willingness to tackle complex issues were clear in your work. With further refinement—focusing on feasibility, deeper theory application, and clearer implementation plans—your ideas can translate into truly impactful health promotion strategies.

Well done, and thank you again for your thoughtful contributions to this important area of public oral health.

4. Alternative to boilerplate feedback.

1. Upload rubric and assignment task description.

2. Prompt: *Hi Chat, these documents contain the task description and the marking rubric for the Indigenous health case study. Could you please create a boiler plate 'fill in the blanks' style feedback form using key words in the rubric and task sheet.*

3. Outcome:

Here is a boilerplate, “fill-in-the-blanks” style feedback form aligned with the DENT3000 Indigenous Health Case Study marking rubric and task description:

DENT3000 Assessment 4: Aboriginal and Torres Strait Islander Peoples' Health Case Study – Feedback Form

Student Name: _____

Marker: Dr Arosha Weerakoon

Date: _____

Introduction (15%)

You provided a(n) ____ [e.g. developing / appropriate / considered / substantial / insightful] explanation of the strength-based approach, cultural safety, and professional practice. To improve, consider providing ____ [e.g. clearer definitions / deeper insights / more precise links to Indigenous health contexts].

Reflection: Determinants of Health (20%)

You demonstrated a ____ [e.g. developing / appropriate / effective / excellent / sophisticated] appraisal of the social and population health determinants relevant to Ray's case. Consider expanding on ____ [e.g. the specific impact of ESRD / historical determinants / systemic barriers] to strengthen your reflection.

Reflection: Cultural Safety Principles (20%)

Your reflection on the principles of cultural safety as they apply to dental practice was ____ [e.g. appropriate / effective / excellent / sophisticated]. Further consideration of ____ [e.g. power dynamics / communication strategies / community trust] would enhance this section.

Reflection: Ethics, Legal Responsibilities & Collaboration (20%)

You ____ [e.g. minimally / satisfactorily / well / perceptively / sophisticatedly] applied ethical principles, legal responsibilities, and the role of inter-professional collaboration to the case. To enhance this, ensure you include ____ [e.g. specific legal frameworks / collaborative examples / ethical dilemmas relevant to Aboriginal and Torres Strait Islander Peoples' care].

Conclusion (15%)

Your conclusion provided a(n) ____ [e.g. developing / appropriate / considered / excellent / astute] summary of the key reflections. You could further strengthen this by ____ [e.g. reinforcing the role of cultural safety in your professional identity / linking back to the introduction].

Communication (10%)

Your writing ____ [e.g. poorly / adequately / capably / skilfully / expertly] adhered to academic conventions. Please review ____ [e.g. grammar / structure / referencing style] to ensure clarity and professionalism.

Overall Comments:

This is a ____ [e.g. thoughtful / developing / well-structured / highly reflective] response that addresses key aspects of Indigenous health and professional dental practice. Going forward, aim to deepen your critical engagement with the material and provide more specific examples to support your reflections.

Final Grade: _____ /100



The interactive version of this H5P content is available at:

<https://uq.pressbooks.pub/inquiry-in-action/?p=410#h5p-14>

This approach improved efficiency and allowed me to deliver detailed, personalised feedback at scale. However, student responses to AI-mediated feedback were mixed. While some appreciated the detail and the timeliness, others expressed discomfort.

"So much of the course is ai-generated, including feedback, assessment marking, email announcements and course material"

"No AI"

"The point of the course is for it to be personalised and to talk about human experience, and how to treat others with respect. The use of AI takes the human experience out of the course"

(DENT3000 (2025) SECaT Post-AI Integration

Reflection

From a SoTL perspective, these practices illustrate the potential and tensions of integrated AI into assessment support. The documents created based on FAQs and exemplars addressed persistent issues of transparency and access, while the AI declaration foregrounded responsible use of emerging technologies in line with institutional policy. AI-supported feedback offered efficiency and scalability, but also

raised questions about authenticity, trust and the role of humans in learning (Gonsalves, 2025).

Conclusion and Future Directions

Reflecting on the 2025 iterations of DENT3000 and DENT7221, did I achieve my overarching aim? I believe I did. Students were provided with multiple opportunities to contextualise public health and professionalism within clinical practice through varying modalities. I was also able to draw on AI as a co-creative teaching assistant to reduce cognitive load and save time. From a SoTL perspective, the integration of AI was not an end but a means to enhance teaching presence, diversify modes of engagement and support student learning. Student feedback demonstrates both the potential and the limitations of AI-enabled approaches reinforcing the need for careful design, transparency and alignment with pedagogical intent.

For future versions, I plan to build on these foundations by:

1. Expanding multimodal learning opportunities centred on podcasts and related readings in line with UDL principles.
2. Develop a comprehensive course handbook using the assets created throughout 2025 into a cohesive resource.
3. Evaluate student use of AI in assessment tasks and compare this with assessment outcomes to better understand the relationship between declared AI use, performance, and learning processes.
4. Embed teaching about ethical use of AI in practice and assessment (Weerakoon et al., 2025) with an emphasis on
5. Accuracy and trust in AI outputs, and
6. The limitations of AI applications in clinical contexts.

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INTEGRATING GENERATIVE AI TO STRENGTHEN COUNSELLING AND COMMUNICATION IN DIETETIC EDUCATION

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Abstract

This case study explores how generative artificial intelligence (GenAI) tools were integrated into DIET7103: Interviewing and Counselling for Dietetics Practice to enhance student learning, clinical preparedness, and professional confidence. Guided by the TPACK framework and action research principles, three tools: Julia (AI voice-based client simulation), Notebook LM (AI podcast creator), and The Interviewing and Counselling (Tic) Bot (text-based counselling chatbot) were implemented to bridge theory and practice in communication and counselling. Reflexive thematic analysis revealed that AI tools empowered learning through realism, efficiency, and accessibility, but also introduced cognitive overload, variable engagement outcomes, and equity challenges. Students emphasised the need for structured support and sequential tool introduction. Findings highlight that thoughtful AI integration can enhance learning effectiveness and professional readiness in health education, provided human-centred values and scaffolding are maintained.

Keywords

Generative Artificial Intelligence, Dietetic Education, Counselling Skills, Simulation-Based Learning, AI Literacy, Health Professional Education, TPACK Framework

Practitioner Notes

1. Use AI-powered simulations to provide safe, repeatable opportunities for communication skill development.
2. Introduce AI tools sequentially, allowing time for students to build competence and confidence before adding complexity.
3. Embed AI literacy and ethics training early to support critical evaluation and professional accountability.
4. Align AI activities with curriculum progression to prevent overload and stage mismatch.
5. Pair AI integration with structured human support (tutorials, workshops, and reflective feedback) to balance technology with empathy.

Introduction

In DIET7103: Interviewing and Counselling for Dietetics Practice, generative artificial intelligence (GenAI) tools were introduced as a purposeful innovation designed to integrate technology meaningfully with pedagogy and content knowledge, with the aim of strengthening students' confidence and competence in client-centred counselling. This innovation responded to student feedback highlighting ongoing challenges in translating theory into practice, particularly in developing confidence for real-world client consultations. DIET7103 provides a comprehensive foundation in the theoretical frameworks and practical skills necessary for effective client interaction in dietetics. The course emphasises the development of professional communication techniques and the application of client-centred principles to facilitate lasting behaviour change. The curriculum is structured around four main phases of the counselling process: Involving (Engaging), Exploration-Education (Focusing and Evoking), Resolving (Planning), and Closing.

The course encompasses several critical competency areas that underpin effective dietetic counselling practice:

Core Counselling and Communication: Students develop the fundamental components required for effective counselling relationships, recognising the therapeutic alliance serves as the *guiding force for change*. Key areas include

understanding the psychological drivers of eating behaviour, applying relationship skills such as rapport building, congruence, openness, and warmth, and mastering effective non-verbal communication techniques including posture, eye contact, and vocal tone.

Assessment and Planning: Students engage with structured nutrition counselling protocols, learning dietary interviewing methods such as the 24-hour recall and “typical day” strategies. Emphasis is placed on establishing measurable and achievable goals using the SMART framework (Specific, Measurable, Attainable, Relevant, and Time-based), fostering competence in both assessment and change planning.

Advanced Therapeutic Models: The course provides deep engagement with evidence-based approaches that strengthen students’ ability to support client behaviour change including:

Motivational Interviewing (MI): A collaborative conversation style that enhances client motivation and commitment to change, grounded in the “Spirit” of MI – Collaboration, Evocation, Compassion and Acceptance and operationalised through core skills known as OARS (Open-ended questions, Affirmations, Reflective Listening and Summaries).

Cognitive Behavioural Therapy (CBT): Students examine how cognitions affect behaviours, exploring links between thoughts, feelings, and actions, identifying cognitive distortions, and practising cognitive restructuring techniques.

Transtheoretical Model (TTM): This model conceptualises behaviour change as a process moving through sequential, often non-linear, stages supporting the tailoring of interventions to client readiness to change.

The introduction of AI into this context was designed as scholarly enquiry grounded in the Scholarship of Teaching and Learning (SoTL). The design, implementation, and evaluation of each tool followed a cycle of evidence-informed experimentation, reflection, and improvement, aimed at generating insights that could be shared beyond the course context (Felton, 2013).

Theoretical Framework

The design and implementation of this innovation were guided by the Technological, Pedagogical and Content Knowledge (TPACK) framework (Koehler & Mishra, 2009), which emphasises the dynamic interaction between what educators teach (content), how they teach (pedagogy), and the tools that support learning (technology). Applying

this framework ensured that each AI tool meaningfully aligned with both disciplinary competencies and pedagogical intent.

Content Knowledge (CK)

The content foundation of DIET7103 encompasses complex nutritional science, client-centred counselling theory and professional ethics. Students are required to integrate biomedical understanding of diet-disease relationships with the interpersonal skills necessary for effective behaviour change interventions.

Pedagogical Knowledge (PK)

Previous course iterations relied primarily on experiential workshops, case-based discussions, and peer role-plays to build counselling competence. Whilst these strategies successfully fostered foundational communication skills, they provided limited opportunities for iterative practice in realistic scenarios. Whilst students valued role-playing exercises as preparation for client interactions, these simulations inevitably lacked the authenticity and unpredictability of real clinical encounters. Additionally, this approach demanded considerable time investments for both preparation and content revision, limiting opportunities for formative feedback.

Technological Knowledge (TK)

To address these pedagogical challenges, three GenAI tools were selected for strategic integration, each mapped to a distinctive learning objective:

- Julia (ElevenLabs Conversational Agent): An AI voice-interactive client simulation embodying a busy mother managing iron deficiency. Julia allowed students to practice motivational interviewing, empathetic listening and client specific counselling in a low-risk environment.
- Notebook LM (Google): An AI-driven podcast generator was used to transform static lecture content into conversational audio. This supported flexible learning and embodied Universal Design for Learning (UDL) principles, supporting diverse learner engagement and accessibility needs.
- The Interviewing and Counselling (Tic) Bot (Zapier AI Chatbot): A text-based practice environment that guided users through all phases of a nutrition consultation, engaging, exploring, planning and closing, while offering feedback on questioning technique, rapport building, and reflective listening.

Together, these tools created a multi-modal, interactive learning ecosystem designed

to bridge theory and practice, enhance accessibility and engagement and support student-driven skill development.

Innovation Objectives

The AI integration aimed to achieve several key objectives:

1. Enhance clinical preparedness through adaptive, realistic simulations.
2. Improve learning efficiency while maintaining comprehension.
3. Provide multiple means of engagement for diverse learners. (preferences)
4. Increase accessibility and flexibility for time constrained students.
5. Build professional confidence through repeated low risk practice.

Literature Review

The Imperative for AI Integration in Health Professional Education

The integration of artificial intelligence in health professional education represents a paradigm shift towards personalised, adaptive learning experiences that address longstanding challenges in traditional educational delivery. The landscape of health professional education is undergoing a significant transformation, driven by technological advances and the subsequent pedagogical frameworks that emphasise experiential learning, personalised instruction, and adaptive assessment methods (Hwang et al., 2020). Within dietetics education, the development of effective communication and counselling skills represents a fundamental competency that directly impacts patient outcomes and the quality of professional practice (Knight et al., 2024).

Effective communication is fundamental to nutrition and dietetics practice, although providing novice practitioners with a variety of experiences within training remains challenging, and is normally limited by professional practice placement availability (Knight et al., 2020). Simulation-based learning is recognised as an opportunity for health professional development, and technology-enhanced simulation for health professions education can significantly improve learning outcomes compared to traditional methods (Cant & Cooper, 2017; Cook et al., 2011). Traditionally, however, simulation methods often required significant resources, yet did not always provide the adaptive, personalised feedback essential for learning.

Evidence for AI-Enhanced Learning Outcomes

Emerging research provides compelling evidence for the effectiveness of AI integration in health professional education. Studies demonstrate that students using AI-powered learning tools show improved clinical reasoning skills, increased confidence in patient interactions, and enhanced knowledge retention compared to traditional learning methods (Holmes et al., 2019). Recent work by Kassem et al. (2025) examined AI's role in nutrition, identifying applications in dietary assessment, personalised nutrition, disease management, and nutrition education. Their findings indicate that AI can help dietitians and nutrition professionals analyse large datasets and provide customised educational content, enhancing the efficiency of nutrition education and promoting healthier dietary habits.

Virtual Simulated Patients in Professional Education

Virtual simulated patients (VSPs) provide unlimited opportunities for practice through consistent, standardised scenarios that can be repeated and adapted according to educational objectives (Peddle et al., 2016). The evidence base supporting VSP effectiveness in communication skills training is growing, with studies showing that well-designed virtual patient activities enable students to build communication skills in safe and cost-effective learning environments (Cook et al., 2010). A systematic review of virtual patient simulators for medical communication training found that half of the eight comparative studies reported significant improvements in the VSP group (Lee et al., 2020). However, recent research by Fernández-Alcántara et al. (2025) notes that studies vary widely in their methods, technologies, and interaction styles, which makes it difficult to create consistent standards across the field.

AI-Powered Conversational Agents

Modern AI chat systems use large language models to hold natural, realistic conversations. These models, such as OpenAI's GPT-5, Anthropic's Claude, and Google's Gemini are trained on extensive language datasets and generate complex, advanced, human-level output (Kasneci et al., 2023). This allows the creation of realistic patient simulations that help students to apply theoretical knowledge in authentic communicative contexts. Research shows that AI tutors are improving, and students appreciate that they are always available, patient, and non-judgemental (Dai et al., 2023). These characteristics are particularly valuable in dietetics training, where students must develop sensitivity and empathy whilst addressing potentially sensitive topics such as eating behaviours, body image, and lifestyle modifications (Cant & Aroni, 2008).

Content Accessibility and Flexible Learning

The challenge of content accessibility in health professional education has been exacerbated by increasing curriculum demands and student time constraints. AI-powered content summarisation tools help address these pressures by transforming traditional educational materials into more accessible formats. Converting dense textual content into conversational, podcast-style presentations can enhance comprehension and retention, particularly for students who face barriers with text-based materials, including those with neurodiversity, English as a second language, dyslexia, or visual impairments (Buchem & Hamelmann, 2010). Audio formats also enable flexible learning during activities incompatible with reading, such as commuting or exercising, alleviating time constraints for working students. The conversational style may help reduce cognitive load for learners managing complex professional curricula. In this way, AI tools can advance educational equity, an increasingly central focus in higher education policy discussions.

Supporting Personalised Learning

The literature consistently emphasises the importance of personalised learning in health professional education. AI tools excel in providing individualised feedback and adapting to specific student needs. Research demonstrates that AI-powered educational tools can identify individual learning patterns and adjust content presentation, accordingly, leading to improved learning outcomes (Chen et al., 2020). These affordances align closely with the principles of Universal Design for Learning (UDL) which advocate for multiple means of engagement, representation and expression to support diverse learners (Meyer et al., 2014). By enabling flexible pathways and responsive feedback, AI can operationalise UDL in practice, ensuring all students are equally supported. This personalisation capability is particularly valuable in dietetic education, where students must develop competence across multiple areas including biochemistry, psychology, communication skills, and cultural humility.

Considerations and Potential Challenges

Discipline-Specific Challenges in Dietetic Education

Implementing AI tools in dietetic education presents unique challenges that require careful consideration. Unlike some academic disciplines, dietetics requires the integration of complex scientific knowledge with nuanced interpersonal skills, cultural sensitivity, and ethical reasoning.

The Complexity of Human-Centred Care

Dietetic practice is fundamentally human-centred, requiring practitioners to navigate psychosocial factors alongside nutritional science. The key concern with AI integration is the potential oversimplification of these human complexities. While AI tools can simulate client interactions, they cannot fully capture the emotional nuance, cultural subtleties, and ethical dilemmas that characterise real-world dietetic practice.

Research raises important questions about how effectively AI simulation prepares students for the unpredictability of human behaviour and the ethical complexities of professional practice (Topol, 2019). There is a risk that students may become over-reliant on predictable AI responses, limiting their adaptability when facing genuine human interactions (Topol, 2019).

Information Accuracy and Currency

Dietetic practice depends on up-to-date, evidence-based information. AI tools, particularly those trained on static or incomplete datasets, may provide outdated or inaccurate nutritional information. The concern is amplified by the rapidly evolving nature of nutritional science. For instance, Naja et al. (2024) evaluated ChatGPT's accuracy in its suggestions for managing for Type 2 Diabetes and metabolic syndrome and identified errors in weight loss recommendations, energy deficit calculations, and dietary interventions. If students rely on AI-generated information that is incorrect, they may inadvertently provide misleading advice to clients, undermining patient safety and professional credibility. This issue is particularly critical in DIET7103, where students learn to integrate nutritional science with counselling skills. Inaccurate information could compromise the technical accuracy of dietary advice and the trust essential to effective therapeutic relationships.

To mitigate these risks, a multi-layered approach is required, combining pedagogical safeguards, quality assurance, and professional development.

Pedagogical safeguards: Frame AI tools as a communication practice environment, not as an authoritative source of nutritional advice. Require students to cross-reference and critique AI outputs with peer-reviewed sources and practice critical evaluation skills (Chen et al., 2020).

Quality assurance: Implement staff oversight of AI tool outputs, develop approved scenario banks for simulated consultation, and establish institutional AI ethics guidelines tailored for health professional education contexts (Morley et al., 2020).

Professional Development: Prepare students for the responsible use of AI in clinical settings, through training in accountability, ethical practice and appropriate AI use protocols (Wartman & Combs, 2018).

In addition, continuous feedback loops where students report questionable AI responses and instructors regularly review tool performance, helps to ensure pedagogical approaches evolve alongside technology (Felton, 2013). Together, these measures ensure AI tools strengthen, rather than compromise, the development of evidence-based practice competencies essential for safe and effective dietetic counselling.

Cognitive Load and Technology Integration

The simultaneous introduction of multiple AI tools can create significant cognitive load, particularly for students already managing complex curriculum demands. Cognitive load theory suggests that learners have limited capacity for processing new information (Sweller, Ayres and Kalyuga, 2011). When students must simultaneously learn course content and navigate multiple new technological tools, their cognitive resources may become overtaxed, potentially hindering rather than enhancing learning. This suggests that sequential introduction (one tool at a time) may be more effective than simultaneous deployment, allowing students to achieve competency with each system before adding complexity (Paas, Renkl and Sweller, 2003). This suggests the importance of intentional learning design and the need for extensive orientation and support systems, rather than assuming students will naturally adapt to new technologies (Koehler and Mishra, 2009; Paas, Renkl and Sweller, 2003).

Equity and Access Considerations

Building on these cognitive load considerations, equity and access must also be addressed. While AI tools offer potential for increased accessibility, they may also create new barriers and equity issues. Students with limited technology access, digital literacy challenges, or learning differences may face disadvantages when AI tools become integral to course success. The assumption that all students will engage equally with technology-mediated learning may inadvertently create inequities. Embedding Universal Design for Learning (UDL) principles can mitigate these risks by offering multiple means of engagement (Meyer et al., 2014). Intentional learning design provides multiple pathways to achieve learning outcomes rather than relying on one-size-fits-all technological solutions.

Implementation and Methodology

While a sequential introduction of tools would have best aligned with cognitive load and equity principles, a simultaneous implementation was intentionally chosen as part of the research design to evaluate comparative student engagement and learning outcomes within the intensive six-week course timeframe. This deliberate decision to introduce three AI tools across different modalities aimed to maximise learning opportunities and identify which tools most effectively supported student engagement, learning outcomes and professional preparation.

Additional technological options were considered during the planning phase, including video-enhanced chatbots to increase authenticity of client interactions. However, suitable platforms that combined conversational AI with realistic video personas were not readily available within the project's technical and budgetary constraints, leading to the selection of voice-based and text-based tools instead. To address potential digital divide issues, several proactive measures were implemented. Additional ElevenLabs subscription credits were purchased to ensure all students could access Julia without usage limitations that might create inequitable learning experiences. Tic Bot was fully supported through institutional funding, whilst Notebook LM remained freely accessible to all users. These decisions prioritised equitable access over cost considerations, recognising that financial barriers could compound existing educational disadvantages.

However, the assumption that technological access equals technological equity proved problematic. Students with varying digital literacy levels, learning differences, and technological comfort zones experienced differential benefits from the tools, highlighting the need for more comprehensive support systems beyond mere access provision. Recognising the risks associated with AI-generated nutritional information, extensive staff oversight mechanisms were implemented throughout the course. Regular monitoring of student interactions with AI tools occurred both during class sessions and through informal check-ins about out-of-class usage. This oversight aimed to identify instances of inaccurate information provision and address misconceptions before they became entrenched in student learning.

Traditional pedagogical methods were maintained alongside AI integration, with in-class simulations and role-playing exercises continuing to provide opportunities for group critique and discussion. In some instances, AI-generated scenarios or information were deliberately used as starting points for critical analysis, enabling students to develop skills in evaluating AI outputs whilst benefiting from peer and instructor feedback.

Research Design and Theoretical Framework

This study employed an action research approach grounded in the Scholarship of Teaching and Learning (SoTL) principles outlined by Felton (2013). The research was designed as an inquiry-focused investigation into student learning experiences, grounded in disciplinary practice, methodologically sound, conducted in partnership with students, and intended for broader community dissemination. The Technology, Pedagogy and Content Knowledge (TPACK) framework provided the theoretical foundation for implementation, ensuring systematic integration of technological, pedagogical, and content knowledge components. This framework guided tool selection, implementation strategies, and evaluation criteria throughout the project.

Implementation Framework

The implementation of AI tools in DIET7103 followed a structured approach based on action research principles. The methodology was designed to ensure systematic integration whilst allowing for iterative refinement based on student feedback and observed outcomes.

Pre-Implementation Planning

Prior to semester commencement, comprehensive planning sessions were conducted to align AI tool capabilities with specific learning objectives within the dietetics curriculum. Each AI tool was mapped to competencies:

- Julia was aligned with consultation skills development, clinical reasoning preparation, and OSCE readiness
- Notebook LM was integrated with content review processes, workshop preparation activities, and examination study strategies
- Tic Bot was designated for supplementary information access, concept clarification, and AI tutoring support

Tool selection criteria included educational alignment, user accessibility, technical reliability, and integration potential with existing course structures.

Staged Implementation Process

The implementation followed a structured six-week timeline designed to gradually introduce students to AI tool capabilities whilst managing cognitive load:

Weeks 1-2, Introduction and Orientation: Students were introduced to the AI innovation project through dedicated orientation sessions. The rationale for AI integration was explained, emphasising how these tools would enhance rather than replace traditional learning methods. Students were provided with access credentials and basic navigation instructions for each tool.

Weeks 3-4, Guided Exploration: Structured activities were designed to familiarise students with each AI tool's capabilities. Students were assigned specific tasks requiring engagement with different tools, allowing them to experience the unique benefits of each platform. Technical challenges emerged during this phase, including occasional platform connectivity issues and variations in user interface familiarity.

Weeks 5-6, Independent Application and Advanced Integration: Students were encouraged to integrate AI tools into their independent study routines and explore advanced features. Usage patterns were monitored through platform analytics, revealing significant individual variations in tool engagement and preferences.

Support Infrastructure

A comprehensive support infrastructure was established to facilitate successful AI tool adoption:

- Weekly office hours dedicated specifically to AI tool troubleshooting
- Regular check-in discussions integrated into twice-weekly class sessions to monitor student progress
- Peer mentoring opportunities through structured collaborative learning sessions

Data Collection Methods

Comprehensive data collection methods were employed to capture both quantitative usage patterns and qualitative user experiences:

Quantitative Measures

- Platform engagement analytics tracking frequency, duration, and feature utilisation
- Academic performance comparisons with previous cohorts at equivalent assessment points.
- Time-on-task measurements for specific learning activities
- Student Evaluation of Courses and Teachers (SECAT) analysis

Qualitative Measures

Focus group discussion facilitated by independent student partners.

Data Analysis Framework

The study employed Braun and Clarke's (2006, 2019) six-phase reflexive thematic analysis approach, providing a systematic yet flexible framework for analysing qualitative data. This methodology was selected for its emphasis on researcher reflexivity and suitability for exploring student experiences with novel educational technologies. The analysis employed an inductive approach, meaning themes emerged organically from student experiences rather than being predetermined by existing theoretical categories. A semantic focus was maintained throughout the analysis, concentrating on explicit participant meanings rather than engaging in extensive interpretive speculation. Student partnership was integrated throughout the analytical process, extending beyond simple member-checking to include students as co-researchers in theme development and validation.

Participant Demographics

- Total participants: 5 students from DIET7103 cohort 2025
- Population: All participants were enrolled in the Master of Dietetics Studies program
- Participation: Voluntary with informed consent obtained
- Demographics: Mix of domestic and international students with varied technological backgrounds

Ethical Considerations

- Ethics approval obtained through university Human Research Ethics Committee (2024/HE001346).
- Voluntary participation with right to withdraw without penalty
- Data anonymisation protocols implemented
- Independent facilitation to minimise power dynamics
- Clear separation between research participation and academic assessment

Reflection: Successes and Challenges

Major Findings from Thematic Analysis

The reflexive thematic analysis of focus group data identified five major themes characterising student experiences with AI-enhanced learning in dietetic education. “Empowering Learning Through AI” was the most frequently mentioned theme, followed closely by “Call for Structured Support,” suggesting that while students saw significant value in AI tools, they also felt underprepared to use them optimally.

Theme 1: Empowering Learning Through AI

Description: This theme highlights the positive impact AI tools had on students’ learning, representing the most frequently mentioned theme in the analysis. Tools like Julia and Notebook LM were praised for their ability to simulate realistic client interactions and provide accessible summaries of course content, with students feeling more confident and prepared for clinical practice and assessments.

Enhanced Clinical Simulation Capabilities: Students appreciated Julia’s adaptive consultation simulation:

“I genuinely enjoyed Julia. I thought it was good. She was adaptive... I could turn around and say, ‘Julia, I’m just assuming that I’ve taken your diet history, we’re moving on now,’ and she’d be like, ‘Okay’”

(Focus Group Participant)

Dramatic Efficiency Improvements: Notebook LM provided substantial time savings in content preparation:

“Notebook LM helped me cut down three hours of prep to just 15 minutes”

(Focus Group Participant)

“Rather than sitting on my desk for three hours after my typical day, it only took me like, less than 15 or 10 minutes to upload everything and listen to it”

(Focus Group Participant)

Professional Confidence Building: Students utilised AI tools strategically for assessment and clinical preparation:

"I did end up using Julia to practise for clinic, because I had a case of a woman who had an iron deficiency... So I wanted to practise that before my first day of clinic"

(Focus Group Participant)

Students valued how Julia supported learning, particularly the development of consultation and counselling skills:

"I really liked the opportunity to practice that one-on-one consultation... I felt that that side of my practice was inhibited or delayed because of our lack of time in workshops... I definitely found Julia supportive. I would have liked more Julias with more diverse problems."

(Focus Group participant)

"I find it really helpful... helped me to practice my time management."

(Focus Group participant)

Students also reflected on the feedback provided by Julia at the end of their consultations:

"I did start asking her for feedback, which was really good... My feedback was that I should have provided more summaries throughout the consultation."

(Focus Group participant)

Julia's feedback was seen as aligned with course expectations, but was not always contextually relevant:

"My feedback was that I should have provided more summaries throughout the consultation, but... it wasn't relevant feedback in that situation."

(Focus Group participant)

Tic bot was shown to support active recall and metacognition:

"I'm really big on learning through teach-back... I would say to Tic Bot, 'I want to explain this topic. Can you check how well I explained it?'"

(Focus Group participant)

Theme 2: Navigating Overwhelm

Students consistently reported feeling overwhelmed when multiple AI tools were introduced simultaneously, highlighting the need for more staged, sequential implementation approaches.

Initial Technology Shock

Students experienced significant cognitive load when confronted with multiple unfamiliar AI tools at course commencement:

"I tried to access Julia early, but was too overwhelmed, because I was like, I'm not confident in using her right now... early on in the semester"

(Focus Group Participant)

Preference for Graduated Introduction: Participants articulated clear preferences for sequential tool introduction:

"It would be good to maybe have a simpler one... maybe just one at a time, not all of them at once... maybe... just like the MCQ one, and that was it, and then slowly, gradually increase... more complex AI tools as the semester goes on"

(Focus Group Participant)

However, despite this, the design of Julia helped to alleviate some of the potential overwhelm:

"It was also interesting how it's not too overwhelming at the end, because Julia lets us talk first before Julia starts talking about her problems."

(Focus Group Participant)

Students mentioned Tic Bot was a good alternative to a "discussion board" for them, for certain types of questions:

"Tic Bot for me was just a really good way to clarify information... if I had nuanced or silly questions that I didn't want to ask on Discussion."

(Focus Group Participant)

Knowledge-Stage Misalignment: Students reported anxiety when AI tools provided information beyond their current learning stage:

"Tic Bot gave me information we hadn't covered yet, and it made me panic... it wasn't something that I've known about, because it wasn't in class"

(Focus Group Participant)

However, some students worked out solutions to mitigate this issue in their prompting strategies:

"Once I started to learn the system... I told Tic Bot, 'Please stay within the scope.'"

(Focus Group Participant)

Theme 3: Tool-Specific Learning Affordances and Limitations

Julia – Realistic Practice with Interaction Challenges

Students valued Julia's consultation simulation capabilities but identified significant interaction limitations:

"Sometimes when Julia starts talking, it's just like, I have this, I have this and this... and it gets a little overwhelming."

(Focus Group Participants)

Further similar interaction challenges included:

"She would give so much information when I was like, not even there yet... she'll just be already talking about, do you need my blood test level? Blood test results?" She was a bit impatient... you'd take a moment to think, and she'd go, 'You there? You there?'"

(Focus Group Participants)

This led to the idea that Julia showed a lack of realism in behaviour:

"I wanted her to make me work harder for the information... we're gonna get clients that are just like, 'Yeah, I'm Sam,' full stop."

(Focus Group Participants)

Some students took the opportunity to take further control of their learning experience with Julia by making their own chatbots, or ElevenLabs agents, and training them to suit their needs, which helped to resolve some of the above issues. Their interaction with the agents allowed the students to improve their own agency and personalisation of learning:

"I used personality prompts to not speak over me or to provide any information until I ask – that was the game changer."

(Focus Group Participant)

Students rated Julia's clinical preparation value between 4-7 out of 10, with higher ratings from more advanced users who learnt to customise interactions.

Notebook LM – Efficiency Gains with Engagement Variability

Notebook LM demonstrated the most dramatic efficiency improvements but with highly variable learning outcomes based on usage approach:

"Rather than sitting on my desk for three hours after my typical day, it only took me like, less than 15 or 10 minutes to upload everything and listen to it"

(Focus Group Participant)

It also helped students to prepare for their interactive workshops:

"I use it pretty much every single day... it helps me to interact in class, rather than figuring out what the workshop is about."

(Focus Group Participant)

However, students mentioned they were sometimes distracted by the podcast itself:

"Sometimes the man would say half a sentence, and then the lady would say the other half... I was listening to the change of the voice rather than the actual content."

(Focus Group Participant)

Furthermore, other ideas emerged about what was covered in the podcast versus the workshop:

"After the workshop... I was like, wait a second, this wasn't covered in the summary in the Notebook LM podcast."

(Focus Group Participant)

Active engagement (note-taking whilst listening) produced learning ratings of 8/10, whilst passive engagement (multitasking) resulted in ratings of 2-4/10:

"Using it at the gym was not successful... I would zone out and I'd be like, 'Oh, I think that was really important'"

(Focus Group Participant)

Tic Bot – Information Depth vs. Curriculum Alignment

Tic Bot provided comprehensive information but created curriculum alignment challenges. Students developed prompting strategies to manage information appropriateness:

"What I told Tic Bot was like, 'Please stay within the scope'... only explain this concept to me, and don't explain other concepts outside what is not irrelevant"

(Focus Group Participant)

Theme 4: Diverse Engagement and Personalised Learning

Description: Students reported that individual differences in how they engaged with AI tools influenced learning effectiveness. This theme underscores the importance of providing multiple modes of engagement (audio, text, interactive) to accommodate diverse learning needs.

Auditory Engagement Benefits

Students identifying as *perceived* auditory learners reported significant benefits from Notebook LM's podcast format:

"I'm a very visual and auditory learner... I love podcasts, and I listen to podcasts on Spotify all the time. So this was not like, it didn't feel like extra work... it just felt like, you know, I'm just giving myself information"

(Focus Group Participant)

"I liked the conversation-style podcast; it felt less like a lecture"

(Focus Group Participant)

Kinaesthetic Learning Challenges

Students with active engagement preferences found limited value in primarily digital, passive engagement tools:

"I'm a tactile learner—I need to do things to remember"

(Focus Group Participant)

"I would say I'm more tactile learner... I need to actually do things to kind of be able to remember and learn... I'd use it whilst I was driving, and it was great to be"

able to listen. I was like, Oh, this is awesome. But then I don't know, I'd stop and I'd be like, 'Did I take anything in?'

(Focus Group Participant)

Adaptive Learning Strategies

More successful students developed personalised approaches to maximise AI tool benefits:

"I actually went on to find the actual website on how Julia was made. And then I actually practised with using my own information and fed case studies to this bot... I had multiple separate bots who had different case studies"

(Focus Group Participant)

Theme 5: Call for Structured Support

Description: Many students expressed a need for clearer guidance on how to use AI tools effectively, representing the second most frequently mentioned theme in the analysis. A lack of awareness about tool capabilities led to missed learning opportunities, with students requesting dedicated workshops, cheat sheets, and ethical guidelines.

Missed Learning Opportunities: Students recognised they had not fully utilised available AI capabilities:

"I missed out on so many learning opportunities from AI this year"

(Focus Group Participant)

Need for Comprehensive Training: Students specifically requested structured support systems:

"A tutorial on how to use AI properly would have saved me hours"

(Focus Group Participant)

Students expressed desires for dedicated workshops on AI tool navigation and optimisation:

"A workshop or something to really see the full potential of these tools... phrases to get around certain things."

(Focus Group Participant)

Requests for ethical use sessions were also expressed:

"It would also be nice... to do a session on how to use AI properly... not overuse it or breach academic conduct."

(Focus Group Participant)

Further ideas from students to improve their understanding of and interactions with AI tools included the development of written guides and cheat sheet for quick reference:

"My biggest feedback would be... having like a cheat sheet or something to say, look, you can ask for feedback from Julia, or you can use Notebook LM. I didn't realise you could do all that stuff... kicking myself, because I would have loved that, but I didn't really know about it."

(Focus Group Participant)

Peer sharing sessions to learn from successful usage strategies were also suggested:

"I just wish that an hour of the workshop had been dedicated to the use of these AI content, or even one workshop... go away and make a bot, and then everyone shares their bot, and they share what's good about it, what's bad about it."

(Focus Group Participant)

Recognition of Professional Development Value: Despite initial challenges, students recognised the professional development value of learning to work effectively with AI tools, acknowledging that AI integration in healthcare is inevitable and appreciating the opportunity to develop these competencies within their educational programme.

Tool-Specific Detailed Analysis

Table 1 presents a comprehensive synthesis of the AI tools implementation findings, integrating tool-specific outcomes with cross-cutting implementation challenges. The table is organised to facilitate comparison across the three AI tools (Julia, Notebook LM, and Tic Bot), presenting student ratings alongside the key successes and challenges encountered with each platform. This structure reveals the critical learning factors that distinguished effective from ineffective tool usage across all three technologies.

Table 1 AI Tools Implementation in Health Professional Education: Comprehensive Analysis

AI Tool	Student Rating	Key Successes	Primary Challenges	Critical Learning Factors
Julia (Clinical Simulation)	4–7 / 10 (Higher with customisation)	Enhanced Professional Confidence: Enabled safe, repeatable practice of challenging conversations without peer judgment. Authentic Role Preparation: Adaptive client simulations felt relevant to future professional roles. Student Innovation: Advanced users explored and created customised case studies.	Usage Complexity: Required technical proficiency to achieve higher ratings. Learning Curve: Benefits realised mainly by students who learned to customise interactions.	Success Factor: Technical proficiency and ability to customise simulations. Rating variability reflected differences in engagement rather than tool limitations.
Notebook LM (Audio Learning)	Active: 8/10; Passive: 2–4/10	Time Efficiency: Reduced preparation time from 3 hours to ~15 minutes (92% reduction). Sustainable Study Practices: Enabled manageable workload within intensive program demands.	Engagement-Dependent Outcomes: Passive use (multitasking) yielded minimal benefits. Strategy Required: Effective only when used purposefully and interactively.	Success Factor: Active engagement (e.g., note-taking while listening). Passive consumption ineffective without structured learning strategies.

AI Tool	Student Rating	Key Successes	Primary Challenges	Critical Learning Factors
Tic Bot (Information Assistant)	Not specified	Strategic Thinking Development: Encouraged sophisticated prompting and metacognitive reflection. Adaptive Learning: Supported independent management of information scope.	Information Management: Sometimes provided content beyond the user's current knowledge level, creating anxiety. Requires User Intervention: Needed explicit prompting (e.g., "Please stay within scope and only explain this concept").	Success Factor: Sophisticated prompting skills and active regulation of information relevance.

The analysis demonstrates that whilst each tool presented unique characteristics and challenges, a consistent pattern emerged: success was contingent upon active, strategic engagement rather than passive consumption.

Table 2 identifies four implementation issues – cognitive overwhelm, curriculum misalignment, training gaps, and engagement variability. These challenges affected student experiences across all tools regardless of their specific functionalities. This highlights the importance of thoughtful implementation strategies that extend beyond individual tool selection to encompass broader pedagogical and support considerations.

Table 2 AI Tool Implementation Issues

Issue Category	Description	Impact	Solution Needs
Cognitive Overwhelm	Simultaneous introduction of multiple AI tools early in semester	Created additional stress rather than learning support; particularly problematic when students adjusting to intensive course content and clinical expectations	Staggered implementation; reduced initial cognitive load
Curriculum Misalignment	Tools occasionally provided information beyond students' current knowledge level	Generated anxiety instead of support; students missed learning opportunities due to content mismatch	Better alignment of AI capabilities with curriculum progression and developmental stages
Training Gap	Insufficient preparatory support and ongoing guidance	Students felt they missed opportunities due to poor understanding of tool capabilities and optimal usage strategies	Comprehensive initial training plus ongoing support systems
Engagement Variability	Highly variable outcomes based on individual usage approaches	Some students achieved excellent results while others struggled significantly	Explicit instruction on effective engagement strategies; modeling best practices

The synthesis of findings demonstrates that technical proficiency, customisation skills, and strategic prompting abilities were essential determinants of learning outcomes in this case study. This pattern suggests that the effectiveness of AI integration in health professional education depends not merely on tool capabilities, but critically on the alignment between tool functionality, curriculum design, learner preparation, and ongoing pedagogical support.

Implementation Insights

The analysis revealed that successful AI integration requires careful attention to cognitive load management, sequential introduction strategies, diverse engagement, and realistic expectations about clinical preparation outcomes. Students' adaptive responses and innovative usage strategies suggest that enhanced training and support systems could significantly improve learning outcomes and tool adoption rates.

Future Directions

Immediate Next Steps

Based on the experiences and insights gained from this implementation, several immediate refinements will be implemented in future iterations:

Staged Implementation Approach

Future implementations will adopt a more gradual, scaffolded approach to AI tool introduction. Rather than presenting all tools simultaneously, students will be introduced to one tool at a time, allowing for competency development before adding complexity. The proposed sequence would introduce Notebook LM first for content accessibility, followed by Julia for consultation practice, and finally Tic Bot for advanced information access. This format will be well supported, as the structure of the dietetics program is changing, and all content will no longer need to be taught within 6 weeks. The transition from a compressed 6-week intensive to a standard 13-week semester directly addresses the key challenges identified in this study, particularly the 'Navigating Overwhelm' and 'Call for Structured Support' themes that emerged from student feedback. This extended timeframe will enable sequential tool introduction to manage cognitive load, dedicated orientation workshops, comprehensive user training sessions, and regular check-in periods to monitor student progress and address emerging challenges. The structural change provides the temporal space necessary to implement the scaffolded approach students explicitly requested, while maintaining the innovative benefits of AI-enhanced learning. This evolution demonstrates how action research principles can inform immediate practical improvements, ensuring that technological innovation serves rather than overwhelms educational objectives. The lessons learned from this intensive implementation provide a foundation for more sustainable and equitable AI integration that prepares dietetic students for the AI-enhanced healthcare environments they will encounter in professional practice.

Enhanced Training and Support Systems: Comprehensive training programs will be developed including:

- Mandatory orientation workshops with hands-on practice sessions
- Written guides and video tutorials for self-directed learning
- Regular check-in sessions to monitor progress and address challenges
- Peer mentoring programs pairing experienced users with newcomers

Improved Tool Customisation and Content Filtering: Working with AI tool developers, efforts will be made to enhance content filtering capabilities, particularly for Tic Bot. The goal is to ensure that information provided aligns with students' current learning stage and curriculum progression.

Medium-Term Developments

Assessment Integration Refinement: Future implementations will explore more sophisticated integration of AI tools into assessment strategies, including:

- Developing rubrics that assess students' ability to effectively utilise AI tools for professional purposes
- Creating authentic assessment tasks that require integration of AI-assisted preparation with human interaction skills
- Establishing criteria for evaluating the quality of AI-mediated learning outcomes

Cross-Course Integration: Plans are underway to extend AI tool integration across multiple courses within the dietetic program. This coordinated approach would allow students to develop AI competencies progressively whilst avoiding redundancy and confusion.

Long-Term Vision

Program-Wide AI Integration Strategy

The goal is development of a comprehensive AI integration strategy across the entire dietetics program, including:

- Standardised AI competency expectations for graduates
- Coordinated tool selection and implementation across courses
- Faculty development programs to ensure consistent, effective AI integration
- Research initiatives to continuously evaluate and refine AI-enhanced educational approaches

Professional Practice Preparation: Future developments will focus on better preparing students for AI integration in their professional practice, including:

- Training on ethical considerations in AI use within healthcare contexts
- Development of critical evaluation skills for AI-generated recommendations
- Understanding of AI limitations and appropriate use boundaries in dietetic

practice

Research and Evaluation Continuation

Longitudinal Impact Studies

Longitudinal studies tracking graduates' utilisation of AI tools in professional practice and their perceived preparedness for AI-integrated healthcare environments are planned.

Comparative Effectiveness Research

Collaboration with other institutions will enable comparative research examining different approaches to AI integration in health professional education, contributing to evidence-based best practices.

Student Partnership Expansion

The successful student partnership model used for focus group facilitation will be expanded to include students as co-researchers in ongoing evaluation and refinement efforts.

Contribution to Educational Scholarship

This implementation experience has generated valuable insights warranting broader dissemination within the health professional education community. Plans include:

- Publication of findings in peer-reviewed education journals
- Presentation at professional conferences focused on health education innovation
- Development of best practice guidelines for AI integration in dietetic education
- Collaboration with other institutions implementing similar innovations

Conclusion

The integration of AI tools in DIET7103 represents a significant step forward in health professional education innovation. Whilst challenges emerged, the overall experience demonstrated substantial potential for AI to enhance learning efficiency, build professional confidence, and accommodate diverse learning preferences. The key to successful implementation is in thoughtful integration that respects both technological capabilities and human learning needs. Future developments will focus

on refining this balance, ensuring that AI tools enhance rather than replace the human elements that remain central to effective health professional education.

This experience has contributed valuable insights to the growing body of knowledge about AI integration in educational contexts. The lessons learned will inform future implementations both within our institution and, through scholarly dissemination, across the broader health professional education community. The success of this initiative demonstrates that when implemented thoughtfully, AI tools can significantly enhance educational outcomes while preparing students for the AI-integrated healthcare environments they will encounter in their professional careers. The future of health professional education will undoubtedly include AI as a central component, and experiences like this provide crucial guidance for effective integration strategies.

AI Use Declaration

This case study was developed with assistance from Claude (Anthropic), an AI language model, which provided support across multiple stages of the research and writing process.

Claude's contributions included:

Literature Review Enhancement: The AI assistant identified gaps in the original literature review and suggested additional studies that strengthened the evidence base, particularly regarding global perspectives on AI in nutrition education.

Writing and Editing Support: The AI aided with academic writing conventions, citation formatting, reference list compilation, and clarity improvements. Claude helped refine technical language, suggested alternative phrasings for unclear passages, and ensured consistency in terminology throughout the document.

All substantive content, research findings, student quotes, and interpretations remain the original work of the author. Claude served as research and writing assistant, but did not generate or analyse primary data, nor did it substitute for the author's professional expertise and judgement in dietetic education.

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6.

PAVING PATHS OF INQUIRY-LED AI INTEGRATION FOR FUTURE-READY LEARNERS

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Abstract

This chapter presents an inquiry-led model for integrating Generative AI (genAI) into information systems education that develops students' technical competence alongside critical judgement, validation rigour, and collaborative practice. Drawing on two course iterations across undergraduate and postgraduate cohorts, I trace a learning arc from dependency to collaboration to integration, showing how scaffolded prompting, systematic verification, and team-based workflows position AI as a partner rather than a proxy. The design combines early AI-literacy foundations (prompt engineering and validation protocols), structured practice through Google Colab notebooks (manual first, then AI-assisted) and assessments that evidence human oversight, error-checking, and reflective justification. A reflective practitioner methodology is used, supported by student observations, to surface five actionable insights: (1) prompting as a form of technical literacy, (2) validation as a core competency, (3) AI as facilitator of learning, (4) the scaffolding-independence paradox, and (5) AI's role in team learning. I map these to the University of Queensland graduate attributes and discuss tensions (deskilling risks, integrity expectations, uneven readiness) with pragmatic mitigations. The chapter concludes by offering practical resources including prompting guidelines, a validation checklist, and a simplified rubric for responsible AI use and identifies future directions such as earlier scaffolding, stronger alignment between assessment and AI literacies, and mid-course monitoring. Together, these strategies aim to support learners worldwide to build

confidence, act ethically, and develop the skills needed for success in an AI-enabled future.

Keywords

generative AI, enquiry-led learning, prompt engineering, validation, assessment design, teamwork; information systems education

Practitioner Notes

1. Students use AI frequently but lack deeper literacies. Courses must explicitly teach prompting, validation, and reflective judgement.
2. Provide structured support for prompt engineering and validation at the start of the course to build confidence before tackling complex tasks.
3. Embedding quality-assurance practices (testing, debugging, cross-checking) develops habits essential for AI-augmented professional work.
4. Activities should frame AI as a collaborator that enhances, rather than replaces, human problem-solving and teamwork.
5. Incorporate reflective tasks, evidence of validation, and mini-rubrics that reward ethical, critical, and effective AI integration.

Introduction

As the rapid rise of genAI intelligence brings radical change to professional landscapes and entire industries, universities face an urgent imperative to adapt. This endeavour was sparked primarily by the escalating demand for competencies throughout the global job market, evidenced by, for example, a twenty-fold increase in AI-related job postings within the first 10 months of 2023 (Dumas, 2024). A recent Microsoft survey indicates three quarters of knowledge workers already use AI in their daily tasks. While 79% of business leaders consider AI adoption vital for competitive survival, two thirds are hesitant to hire individuals lacking AI proficiency (Microsoft & LinkedIn, 2024). Only 3% of employers believe that higher education is supplying adequate preparation for an AI-driven future creating a gulf between industry and our universities¹. Complicating matters, university students display a significant AI-readiness divide. In a polling of 3,839 students across 16 countries, 86% reported

1. See, for instance, <https://www.digitaleducationcouncil.com/post/ai-in-the-workplace-2025>.

using tools such as ChatGPT, Grammarly, and Microsoft Copilot for coursework, mainly to seek information (69%), check their grammar (42%), create summaries (33%), paraphrase material (28%) and draft text for submission (24%). However, 58% reported lacking sufficient AI knowledge, with 48% did not feel ready for an AI-enabled workplace (Rong & Chun, 2024). This mismatch suggests that, while employing AI tools frequently, students are not gaining the deeper skills and confidence needed for thriving in AI-driven professional settings.

Universities are uniquely positioned to close this AI readiness gap. With student interest in artificial intelligence at an all-time high (Leckrone, 2023), educators have a prime opportunity to weave genAI into the curriculum in ways that sharpen critical-thinking skills and promote responsible, ethical use (Fitzgerald & Curtis, 2025). Information Systems (IS) educators, in particular, play a pivotal role in integrating business and technology skills by empowering students to navigate and contribute to AI-driven professional environments. Effectively weaving genAI into education requires rethinking traditional teaching methods, opening avenues for personalised tutoring, adaptive assessment, and novel interactive learning tools (Walczak & Cellary, 2023).

In my own teaching, I have observed how students engage with genAI in their learning and what kinds of understanding emerge from that experience. By examining these interactions, I have sought to identify effective strategies for integrating genAI into university education so that students learn to use AI and develop the confidence, critical judgement and capability required to contribute meaningfully to the future workforce. This study draws on both undergraduate and postgraduate information systems cohorts to explore how students apply genAI tools, the competencies they develop through this process and the evidence-based lessons educators can use when embedding AI in their teaching.

Literature Review

Historically, by treating technology adoption as a purely technical challenge, education institutions have often overlooked broader systemic changes required in organisational and pedagogical approaches to learning. In contrast, those that have embraced new technologies through redesigned learning activities, up-to-date competency frameworks, and restructured education processes have demonstrated improved student outcomes and sustained relevance (Christensen & Eyring, 2011). The transformation represented by artificial intelligence aligns with what Rogers (2003) described in his innovation-diffusion framework as a critical inflection point, where early adoption is essential for survival. Yet, success requires more than uptake

and technology upgrades, it is realising genAI's potential also requires revisiting assumptions related to pedagogy, curricula, assessment design and even the very nature of learning. Without systemic adjustments, institutions risk widening skills gaps, not only from limited technical knowledge but from a deeper misalignment; traditional education tasks do not fully align with the collaborative, AI-augmented work environments that increasingly shape professional practice.

To address these challenges, educators are increasingly turning to 21st-century skills frameworks that position AI literacy within broader reconfiguration of learning design, structure and assessment (Partnership for 21st Century Learning, 2015). Agile teaching approaches, with emphasis on student-centred learning, teamwork, and rapid feedback, along with active-learning and immersive work integrated course designs have been effective in fostering adaptable, future ready graduates (Sharp et al, 2020). However, gaps remain, while curricula encompassing AI have gained traction in postgraduate programmes, undergraduate offerings are still limited (Chen, 2022). Compounding this issue, information-systems programmes are on the decline, despite growing demand for IS skills (Bohler et al., 2020). That said, there is encouraging recent evidence that genAI integration personalises learning (Pesovski et al., 2025). Integrating genAI tools into coursework can also enhance experiential learning (Sun & Deng, 2025), foster problem solving skills (Urbaczewski & Keeling, 2025) and support teaching in complex technical fields (Jiang & Nakatani, 2025; Zhang, 2025).

Information-systems education and AI-related competency development

Research in IS and business-education disciplines reveals both opportunities and complex challenges bundled with AI's integration into these fields' education. These fields reflect a unique position at the intersection of technology and business practice. Large language models (LLMs) have demonstrated capacity to improve learning outcomes in cases of routine and foundational tasks, but they may present limitations when applied to more complex analytical work (Storey & Song, 2017), thus drawing attention to the need for implementation approaches that preserve rigor. Practice-anchored framings, such as integration of AI assistants into learning-management systems (Forment et al., 2024) and use of LLMs to generate teaching cases (Lang et al., 2024), offer starting points for IS educators who seek to balance innovation with pedagogical effectiveness. Because IS programmes have long prepared students to straddle multiple socio-technical domains, they can play a special role in managing this balance, thanks to synthesis of technical proficiency with ethics and business considerations (Chen, 2022). While concerns surrounding academic integrity plague

work in this arena, studies attest that responsible integration of genAI can mitigate associated risks while keeping the focus squarely on skills in analysis and critical thinking (Jiang & Nakatani, 2025; Urbaczewski & Keeling, 2025). Yet, teaching with AI remains an emerging frontier, one that challenges long-held assumptions about learning design, assessment, and student engagement. As educators, we are collectively learning how to teach with AI rather than around it. Continued research, dialogue, and sharing of pedagogical practice will therefore be essential to refine effective approaches, build an evidence base, and shape the next generation of AI-enabled learning.

Methodology: Integrating AI into the course

The pillars for this teaching case gained solid footing from an approach based on reflective practice². The initiative was implemented through two core Business Information Systems courses offered in Semesters 1 and 2 of 2025: the undergraduate-level Managing Business Data (BISM2207) and the postgraduate-level Information Retrieval and Management (BISM7206). Enrolments for BISM2207 were 65 in Semester 1 and 49 in Semester 2, while BISM7206 had 215 students in Semester 1 and 204 in Semester 2. The reflections draw on my first-hand experience as lecturer and coordinator, tutors' observations of engagement and assessment performance, and students' informal and formal feedback on the use of genAI. That illustratively mirrors the focus in my construction of the techniques employed in the course and the framework for their implementation. This integration of genAI into the database management courses adhered to a deliberate plan aimed at both enhancing technical learning and stimulating critical awareness of AI's strengths and limitations. The process, briefly outlined below, unfolded across three dimensions: teaching modules, learning activities, and assessments (example attached to the Appendix A).

Table 1 genAI integration across course components

2. This study received ethics approval from The University of Queensland Human Research Ethics Committee (BEL LNR Panel), project number 2024/HE001346: AI Inquiry-Led Teaching Innovation.

genAI Integration		
Component	Before	After
Lecture	Lectures presented static examples of information retrieval and SQL coding.	(25% genAI) Introduced a dedicated module on Generative AI (genAI) in database management, covering benefits and limitations of genAI in coding, prompt engineering, validation techniques, and ethical considerations. Includes live demonstrations using Gemini and Google Colab to model prompt generation, code execution, and validation in real time.
Tutorial	Traditional tutorials emphasized manual SQL exercises and instructor-led problem solving, with no AI-assisted elements.	(25% genAI) Adopted a blended model combining in-class and self-directed Colab-based exercises, where students perform parallel manual and genAI-assisted SQL tasks. Each session includes a guided introduction to prompt engineering followed by independent experimentation.
Assignment Item 2	Assessments consisted of database design and information retrieval exercises completed manually, emphasizing accuracy and technical implementation without AI support.	(40% genAI-enabled, 5% reflection component) Team-based assignments now require documentation of genAI tool usage, prompt engineering strategies, and validation methods. A 5% reflection component assesses students' metacognitive understanding and critical evaluation of genAI's role in problem solving.

The students' journey with AI integration began with fundamental building blocks for AI literacy, to equip each learner with both practical skills and critical awareness. Accordingly, the first module introduced students to the benefits that genAI can bring to coding, particularly for SQL development, while also highlighting the limitations and risks of relying on AI-based tools without ensuring comprehensive validation. I placed stress on prompt engineering strategies (partly to hone and optimise the outputs) and on validation techniques (to guarantee that all AI-generated SQL corresponds with expected results). Ethics considerations, most prominently employing AI responsibly and maintaining academic integrity, were central to the discussion throughout. To model best practice, I conducted live demonstrations of concrete ways to generate and validate queries via genAI tools, thereby illustrating not only correct outputs but also potential errors and pitfalls. I designed these activities to make sure that all students, however much experience they brought to the table, developed a coherent understanding of AI-related concepts and obtained all the skills that effective yet

responsible use of these tools demands. This design was intended to nurture both building of technical competence and consistent reflective judgement in students' AI use of AI.

Other modules built on these foundations. Team projects required the students to document their use of AI tools by specifying their strategies, sample prompts, and their validation steps. The activities encouraged them to treat AI as a member of the team, working alongside it but remaining responsible for directing, validating, and critically interpreting its outputs. This dovetailed with reflection in which the learners evaluated how they were applying genAI and considered what worked well as is versus required adjustment. That reflection – in parallel with my own – encouraged metacognitive awareness, spotlighting the importance of using AI as a complement to, not a replacement for, human skills in manual coding. By combining manual SQL tasks with AI-assisted coding, the assessments too aligned with the learning outcomes articulated in the syllabus while also promoting responsible and skilled AI use.

The course's structure proved vital to its success. To complement the teaching modules, I restructured multiple learning activities under a self-directed model that exploits Google Colab notebooks. At the heart of the mechanism is manual completion of each SQL task, after which the same task gets conducted with genAI assistance. Hence, the students could readily compare real-world outputs, delve into refining prompts, and build their confidence in both manual and AI-supported work. I scaffolded the learning by guiding them through structured prompt engineering exercises before steering them toward independent experimenting. Such resources as in-class instruction, online notebooks, and externally produced genAI integration guides provided ongoing support for this advanced learning and for a course fuelled by its creators, the larger community, the learners, and ideas from the AI agents themselves.

Course Coordinator Reflection

Just as the students' journey with AI integration is a living one with an evolving map, my part in it began as an organic path, an experiment in enhancing the already scaffolded structure of my database management courses. Recognising genAI tools' suitability for aiding students especially in crafting and refining SQL queries or pseudocode for data manipulation tasks, I began exploring the opportunity to introduce these tools to the carefully designed learning pathway as systematic support mechanisms for solid content delivery, active learner involvement, and personalised learning. Furnishing dedicated genAI tutorials and lectures from the fourth week of instruction onward eased the students via structured scaffolding

whereby they gained justified confidence in their prompt engineering and validation skills before tackling complex database-related tasks.

Throughout the implementation and growth process, which spanned two cohorts, I observed precisely how students gained experience of both the benefits and the risks of engaging with genAI as a learning partner. Moving through distinct phases in their manner of interacting with AI, they initially relied on it for basic tasks such as provision of clarification or more examples, generation of data, and construction of simple SQL queries. Then, they advanced to applying AI for complex problem-solving and strategic planning. By the end of the term, they were integrating AI-facilitated insight into their original thinking and team-based projects. This development may be characterised overall as a dependency → collaboration → integration trajectory.

Most significantly, the students' trajectory encompassed far more than learning to use a tool: they were cultivating new literacies and metacognitive habits. For comprehensive understanding of how their new competencies were developing, I collected their reflections, closely observed their learning processes, and reviewed those outputs. Throughout, I maintained an emphasis on judgement, verification, and responsible use, aligned with both academic integrity expectations and professional standards for data-related roles.

What I was thinking and feeling along the way

I began with a tingle of both excitement and trepidation. The educator in me was thrilled by the potential to provide support tailored to each student's struggles with complex database concepts. Normalisation rules, SQL syntax, and ER modelling often demand extensive time and practice before proficiency emerges. This is all the more true for students whose lack of background in the area leaves them with a steep hill to climb in 'bootstrapping' terms. They might not know where to turn first to start learning. While encouraged by the prospect of immediate AI-afforded bespoke assistance, I was concerned about responsible education, related integrity issues, and risks bound up with users getting overly dependent on AI tools, from the ease of 'copy-and-paste' solutions to complacency developed in tandem with trust in the tools. Would my students still develop the critical thinking skills so crucial for a database professional? Would they grasp the reasoning behind design decisions, see the importance of validation, etc. versus simply accept AI-generated solutions?

As our mutual journey progressed, these doubts took on a more nuanced configuration. I began to regard myself less as the fount of all knowledge and more as a facilitator of learning conversations (McLean & Attardi, 2023), rich dialogue that now incorporated AI as a participant. That shift too felt both liberating and challenging. It

required me to reconsider fundamental assumptions about teaching and deeply held beliefs about learning in technical fields. At the same time, I had to accept that I needed to engage deeply with AI myself, embracing my vulnerability as fuel for my learning. It could enrich each lecture session as a source of further questions and examples that extend beyond my expertise.

What worked well

Through holistic contemplation of the growth observed as the term progressed, I identified four key areas wherein AI integration yielded significant positive outcomes:

(1) Honing of technical literacy, as manifested via prompt engineering

I witnessed a clear learning arc: students advanced from producing vague, task-level prompts to highly specific, context-rich queries. This transition attested not only to growth in technical skill but also to a shift in cognitive framing. The learners began to see crafting each prompt as a problem decomposition exercise, refining their understanding of the task itself as they broke the problem into readily manageable components. In a telling example, ‘Generate some customer reviews’ evolved into ‘Generate multiple unique customer reviews for all products, each with a varying rating from 1 to 5 and written in varying realistic tones’. Students found this process challenging which was a key part of their learning. As one student succinctly noted: “Learning how to use effective prompt writing.”

“While AI accelerated technical execution, I observed that the most successful teams used it critically, verifying accuracy, comparing multiple solutions, and integrating domain understanding. It served as an effective support tool when balanced with human judgment and teamwork.”

(Tutor)

Key insight

This increasing sophistication and detail signal the emergence of a new kind of technical literacy demanded by the digital age: effective prompt engineering competence requires metacognitive-level awareness (e.g., addressing task complexity) in addition to skills (e.g., in problem decomposition). Rather than merely learning to

operate tools, these students were developing sophisticated cognitive frameworks for human–AI interaction. Education tuned for the age of AI must explicitly cultivate these new literacies alongside traditional subject-matter expertise.

(2) Validation's emergence as a core competency

Over time, the students moved beyond surface-level acceptance of AI outputs, and, in a well-designed education setting, they indeed developed and maintained what I call a quality-assurance mindset. Both cohorts manifested strong emphasis on the importance of human oversight and critical evaluation. Sensitised to the immense value of ensuring accuracy and reliability, the students adopted multiple validation strategies: cross-checking SQL queries via MySQL Workbench, reviewing AI-produced content against assignment rubrics, manually testing and debugging AI-generated suggested material, and collaborating within their teams to verify technical accuracy. Reflective discussions with the teaching team spotlighted these validation practices as they steadily became second nature: I observed them grow interwoven into the habit of learning. As students reflected:

“When having errors showing in the database, using GenAI helped me to solve the problem and be able to learn the correct structure of creating codes at the same time.”

(Student)

“Students use AI tools to generate sample data for their database tables, especially for their assignments. This helps them test queries more efficiently. I find this approach beneficial, because students learn how to evaluate whether the generated data align with their database design and constraints.”

(Tutor)

This pattern articulated a key principle underpinning the learning experience envisioned: AI should serve as a partner in the process.

Key insight

Developing a stance of systematic scepticism (i.e., cultivating a thoughtfully followed structured habit of questioning and critically evaluating information) and adherence to verification protocols represents a competence foundational to work in any AI-augmented professional environment. As students encountered evidence (sometimes first-hand) that AI-generated results not backed by a strong foundation in database

concepts often end up incomplete, misleading, or lacking in contextual relevance, they grew increasingly aware that core knowledge of the subject at hand remains pivotal for effectively prompting AI agents, interpreting the output appropriately, and applying it well. Likewise, students developed heightened awareness of boundaries (between fields of expertise, partners, etc.), learning to identify when AI possesses sufficient domain-specific depth versus where the process requires human judgement and corrective steering.

(3) AI's strength as a facilitator of learning

The learners consistently positioned AI in supportive roles and as an enabler of efficiency rather than a substitute to independent thinking. Many students opted to portray it as a supportive tool that complemented their efforts while the core responsibilities (such as concept-level understanding, design decisions, and production of the final outputs) remained their own. The trajectory on which students clearly progressed from leaning heavily on AI for basic tasks such as construction of simple queries, through collaborative activities that contribute to complex problem-solving, to eventual synthesis of AI-fuelled and human insight, was cast into vivid relief in the assignment submissions. Students also identified the importance of contextual learning when working with AI. Students discovered that effective AI use required substantial domain knowledge. AI could provide structure or suggestions but results devoid of grounding in underlying database concepts often ended up incomplete, misleading, or contextually inappropriate. This phenomenon serves to highlight the irreplaceable nature of foundational subject-matter expertise: a crutch cannot suffice on its own.

"I use GenAI to build a foundation for my assignments—then challenge it to find gaps or alternative perspectives. It acts like a second set of eyes, encouraging me to refine my reasoning rather than replace it."

(Student)

"Students also report using generative AI to identify and fix errors in their SQL code. They find it helpful and convenient, as they can access quick feedback which is always available instead of waiting for consultation sessions"

(Tutor)

Key insight

A trajectory toward genuine collaboration with AI constitutes the heart of a roadmap

suitable for educators wishing to design an AI-enabled learning experience. In my project, students' active negotiation of responsible boundaries in human–AI collaboration stemmed not from externally imposed rules but from emergent reflective practice and thoughtfully structured opportunities for experimentation. This situation does imply that fostering academic integrity in the AI era requires solidly scaffolded experience-oriented learning opportunities rather than reliance solely on formal guidelines/procedures. Intentional, principled scaffolding can supply highly effective guidance from the dependence stage, all the way to responsible integration into confidently embraced learning processes.

(4) Elucidation of the scaffolding/independence paradox

Notwithstanding the incremental, systematic nature of the learning, students still needed strong support, even midway through the term, for building their confidence and certain skills vital for using AI effectively. This fact necessitated activities dealing specifically with genAI: I implemented a dedicated genAI lecture in Week 4, along with guided demonstrations and practice activities. While the goal was to foster independent, reflexive engagement, these activities highlighted that true independence develops from a strong base of structured guidance. Early support, in the reliance stage, can pave the way for greater independence later.

"AI support boosted their confidence over time in tackling complex database queries and improved analytical thinking."

(Tutor)

Key insight

Providing precisely targeted, structured guidance need not restrict independence. It can promote self-support and accelerate progress toward resilience. In this respect, our experience calls into question the notion that heavy guidance inhibits deep learning: the students who engaged most actively with the lecture and exercises demonstrated greater sophistication than the others as the term progressed. Moving decisively beyond surface-level interactions, they were soon critically evaluating AI's outputs, iteratively refining prompts, and integrating AI-driven insight into their thoughts and collaborative work. At least in the context of AI literacy, deliberate, early support promotes deeper and more autonomous learning. By building foundational skills and confidence, the students grew better equipped to engage in self-directed

exploration and evaluate for themselves how appropriate and accurate a given set of AI outputs might be in increasingly complex tasks.

(5) AI's position in team-based learning

In addition, introducing AI significantly reshaped how learners operated in teams. It provided shared starting points for group tasks, helped standardise contributions, and streamlined communication. Within their respective teams, the students frequently employed AI for brainstorming possible ideas, clarifying technical matters, planning their project milestones, and distributing tasks more effectively. As students shared:

"In group projects, it has helped me communicate better and plan timelines during challenging situations [...and helped to] expand my critical thinking and creativity."

(Student)

"Students used AI as a 'virtual teammate' to brainstorm database structures, check query syntax, and refine report writing. AI acted as a sounding board, helping them iterate quickly and identify conceptual gaps. Teams often used AI collaboratively discussing whether its suggestions aligned with business logic and course requirements. This fostered peer discussion and improved collective problem solving"

(Tutor)

In several instances, they applied AI tools in jointly devising their initial SQL queries, troubleshooting their handling of complex problems, and creating structured outlines for deliverables. Thus, they rendered the teamwork more efficient and reduced the time spent on routine co-ordination tasks.

Key insight

In team settings, AI quite often functioned as a shared resource to be relied upon – almost like an additional, expert member of the group. It provided consistent support that helped students align their efforts, grapple with uncertainties, and maintain momentum as they carried out collaborative tasks. This team dynamic highlights the need for educators to design activities that exploit AI as a collaboration partner while still guaranteeing the students' continued critical engagement and reflection throughout their teamwork.

Summary of Insights	
Honing of technical literacy	Students progressed from basic tool use to developing nuanced prompt engineering skills that required both technical and metacognitive awareness.
Validation's emergence as a core competency	Students learned to question AI results and check them against their own knowledge. This helped them understand when to trust AI and when to rely on their own judgement, building strong critical thinking skills for working with AI tools.
AI's strength as a facilitator of learning	Students moved from relying on AI to working with it as a learning partner, guided by structured activities that encouraged reflection and experimentation. Students learned to use AI responsibly through hands-on experience, which helped build deeper learning.
Elucidation of the scaffolding/independence paradox	Students began with targeted, scaffolded guidance that built their foundational skills and confidence. As they progressed, they moved beyond surface-level use of AI, critically evaluating outputs, refining prompts, and integrating AI insights into their work.
AI's position in team-based learning	Students began using AI as a helpful tool in team projects, gradually treating it like an expert teammate that supported planning and problem-solving. This collaborative use helped them stay aligned and productive, while also encouraging critical thinking and reflection.

GenAI-linked learning and its mapping to strengths cultivated in graduates

Mapping the five facets of genAI learning-related insights discussed above to the attributes sought in The University of Queensland graduates³ reveals that AI integration comprehensively develops students' capabilities. While these capabilities are typically cultivated across an entire program, achieving them even in part within a single course is valuable because it provides students with early, applied experiences that reinforce broader program goals. The positive effects extend across the full spectrum but demonstrate a particularly strong alignment with creating 'courageous thinkers' (for which four of the five insight areas show strong relevance) and 'connected citizens' (meshing with three of them).

Developing prompt engineering as a form of technical literacy cultivated the scholarly depth expected of 'accomplished scholars', while also fostering the critical reasoning and innovative thinking vital in a courageous thinker. Similarly, work on validation

3. See <https://itali.uq.edu.au/files/30084/UQ%20Graduate%20statement%20and%20attributes%20information.pdf>

competency demonstrated how AI's integration builds the critical mindset required of such thinkers and the disciplined accuracy expected of an accomplished scholar. The insight into team-based learning further illustrates AI's power to reshape collaboration dynamics, and reinforces graduates' ability to become 'influential communicators', through clear, solidly structured team interaction. Finally, the scaffolding-independence paradox accentuates the importance of structured, early guidance in enabling deeper autonomy; sensitivity to it advances both courageous thinking and scholarly accomplishments. Although the final attribute considered, that of someone capable of responding flexibly to cultural factors, shows less direct alignment, AI-incorporating collaboration and team activities create opportunities for students to engage with diverse perspectives. These point to the vast potential of purposeful design for future iterations' aimed at richer intercultural engagement.

(1) Accomplished scholars

From several of the perspectives considered, students demonstrated the depth and rigour expected of accomplished scholars. As they honed their prompt engineering, they developed advanced technical literacy, evidenced by breaking down complex tasks to formulate actionable prompts and with applying the resulting skills effectively in the domain of database management. Through profound engagement with validation, they showed scholarly discipline through strict testing, systematic debugging, and comprehensive evaluation of AI-generated outputs in pursuit of technical accuracy. Attending to the scaffolding-independence issue reinforced provision of structured guidance, which holds immense value for systematic building of high-level technical skills. This sensitivity allowed students to progress toward independent and more criticism-oriented engagement with AI, equipping them with analytical and evaluative skills that are transferable to complex problem-solving across diverse professional and academic domains.

(2) Courageous thinkers

Critical and innovative thinking was a recurring theme across four of the areas of insight. The results clearly spotlight the students' development as courageous thinkers. With their prompt engineering, they engaged in experimentation and iteration, refining their human-AI interaction and embedding the technical skills in contexts of database problem-solving. Through validation, they cultivated systematic scepticism, aligned for critically questioning outputs rather than relying passively on AI. By growing to employ AI to facilitate learning, the students developed skills in adaptive problem-solving and in reflective thinking during their dependency → collaboration → integration journey. Lastly, our attention to the balance of scaffolding

and independence attests to how early structured support can empower students to take calculated risks, thereby planting seeds for intellectual curiosity and resilience, fostering a mindset that supports innovative thinking and adaptive decision-making in rapidly evolving digital and organisational environments.

(3) Influential communicators

The integration of AI also strengthened students' capacity as influential communicators. Solid prompt engineering demanded clear, well-structured communication. Their work toward this objective taught the learners how to articulate complex ideas in precise, actionable ways, such that AI could interpret them. This iterative process fostered conversational reasoning as students refined prompts, clarified context, and critically assessed responses to ensure complete clarity and accuracy. Through the team based learning, the students honed their negotiation skills and accumulated experience of collaborative dialogue, collectively refining and validating AI-generated outputs in ways that improved the quality and effectiveness of their group work, while also cultivating collaborative communication skills essential for interdisciplinary teamwork and leadership in data-driven contexts.

These graduate attributes reflect the kinds of qualities commonly emphasised across many university programs and institutions that aim to develop well-rounded, socially aware, and adaptable graduates. Collectively, these three graduate attributes show how AI-enabled pedagogy advances globally recognised capabilities, AI literacy, analytical and evaluative skills, adaptive problem-solving, and professional communication, equipping students to contribute confidently to industry.

Student Reflections

What proved to be challenging

One of the main challenges I and my students faced arose from the complexity of engineering prompts for AI agents and from factors that complicate validation efforts. Both cohorts found prompt engineering and quality control more challenging than anticipated. Students initially struggled with the metacognitive demands of crafting effective prompts and developing systematic validation approaches. However, these struggles ultimately deepened their learning, and over time, they became more cognisant of how to craft a good prompt (e.g., it swiftly became apparent that asking an AI agent to generate a SQL statement by telling it 'write an insert statement' yields overly generic results). They learned from experience that effective prompt design requires specificity and taking context into account.

Secondly, I encountered a challenge stemming from the need for prior scaffolding. Notwithstanding the above-mentioned dedicated genAI lectures and tutorial activities, which held great value, both cohorts requested more hands-on skill building earlier in the course. The timing and intensity of the scaffolding proved crucial; more structured support had to be given closer to the beginning of the teaching term, to build confidence before the students could embark on complex tasks. They also requested that self-guided learning be incorporated into the active participation built into the tutorials.

From my perspective as the instructor, navigating the necessary adaptations to course structure constituted one of the most significant challenges. The structure grew more adaptive and student-driven over time, with its structure evolving dynamically as the term progressed. Learning increasingly employed external tools to support the built-in scaffolding. These rendered the content's coverage and delivery far more fluid than in previous iterations of the course. Rather than strictly follow a pre-ordained 'one size fits all' lecture-to-tutorial path, students began to chart their own learning trajectories, independently selecting AI tools to match their needs. For example, in parallel with lectures primarily about SQL query formulation and database design principles, more than a few students waded more deeply into related areas not formally covered by the curriculum. Venturing into advanced data cleaning and preprocessing techniques, some of them used genAI to identify anomalies in sample datasets, experiment with automated generation of code for data transformations, and even explore newly released tools for large-scale data handling. This self-directed learning fed the process in several ways: it created valuable opportunities for deeper engagement and innovation, with students also bringing the resulting insight into discussion and group projects. While that strengthened the quality of the outputs generally and fostered a sense of peer-to-peer learning within student teams, it also posed challenges for maintaining coherent progression of learning across the cohort.

Because not all students move at the same pace, I had to adjust the instruction strategies 'on the fly'. For example, I integrated brief instructional videos on targeted topics and made office hours available for assistance in bridging the knowledge gaps and ensuring that foundational learning objectives were still met. Reflecting on this experience highlighted the importance of constant balance. The course structures must be designed to be flexible yet anchored. They should give students room to explore and innovate while still providing clear scaffolding and checkpoints for maintaining alignment with the core learning objectives.

Future Directions

My observations and students' feedback together point to several areas in which taking a different approach might have enhanced the implementation. Looking forward enables future courses to benefit from real-world insight. More importantly, these insights can directly inform the direction followed in future use of AI in teaching and learning.

One key area for improvement identified relates to more intensive, early scaffolding. As noted above, both cohorts explicitly requested earlier, more hands-on work on their skills in prompt engineering and validation techniques. While I provided a dedicated genAI lecture and, in conjunction with tutorial activities, self-directed learning, a more front-loaded approach with intensive workshops near the beginning of the term might have smoothed students' path along the dependency → collaboration → integration trajectory. Considering these insights, my plans include adopting a front-loaded scaffolding strategy that emphasises AI-literacy development early in the term. This is going to encompass hands-on tutorial activities through which students will be able to drill into specific skills at manual coding, compare the results with genAI-produced code, and experiment with prompt engineering techniques. This approach should not only serve to build foundational technical skills but also, thanks to dedicated activities, help students critically evaluate AI agents' outputs from the outset.

Assessment design represents another important area. While the course is not centred on AI, integrating AI as a supportive learning tool has already influenced how the students engage with content and complete their tasks. My work expands on traditional assessment methods via augmentation from portfolio reflections, practical exercises, and group projects that capture students' ways of utilising AI for problem-solving, validation, and collaboration. In further efforts to ensure that the assessment framework reflects the new literacies, I will continue reviewing and refining the assessment design, so that it comprehensively reflects the development of learning and accurately captures the depth of students' engagement with AI. This includes the incorporation of evaluation log-based exercises, which enhance the reflective components by encouraging critical analysis of students' AI use. These exercises also support more authentic, real-world anchored evaluation of validation and debugging and help assessment tasks with the evolving balance between AI-augmented learning and independent, conceptually oriented mastery of the field.

Finally, there is a need for more systematic monitoring of how the students use AI and of the challenges that arise as the journey through the course progresses. Although I tracked students' advancement along the overall trajectory, my approach did not

employ structured mechanisms for monitoring each individual's development from early on: although the reflection activities and portfolio components in place capture their learning well, these come into their own primarily toward the end of the term. To enhance the opportunities for timely intervention and support, I plan to refine the assessment structure by means of more systematic techniques, mechanisms consistent with earlier checkpoints and ongoing tracking of progress. I will implement mid-term diagnostics to identify those students who might be 'stuck' in the reliance stage, along with targeted support activities to help them advance. At the same time, the structure should ensure that outside enrichment and growth opportunities, not just challenges, are visible earlier and can be handled proactively.

Building on these pedagogical insights, this study contributes to the growing discourse on AI in Information Systems education by providing an empirically grounded view of how genAI integration reshapes students' learning trajectories and assessment design. The next phase of this work will aim to generate more systematic evidence to inform curriculum-level frameworks and institutional strategies for AI-augmented learning. Future research should further explore how to balance automation with higher-order skills, as emphasised by Sun and Deng (2025), who highlight the need to shift focus from syntax-based tasks toward evaluation, prompt engineering, and critical analysis of AI-generated outputs. In parallel, attention must be paid to cultivating students' adaptive and lifelong learning capabilities, aligning with Walczak and Cellary's (2023) call for fostering better adaptation skills in AI-supported education. Further research is also needed to strengthen students' validation capabilities as a cornerstone of responsible and effective AI use in professional and academic settings.

Statement of Authorship and AI Use

Bidar led all aspects of this chapter, from framing and investigation to writing and review. Generative AI was used only to assist with editing; the insights and scholarly reflections presented here are solely the author's.

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7.

BICYCLES FOR THE MIND: HOW GENAI WAS USED TO ENHANCE CRITICAL THINKING IN THE CLASSROOM

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Abstract

This chapter demonstrates how generative artificial intelligence (GenAI) can be used to foster, rather than corrupt, critical thinking in higher education. Conducted in an undergraduate Digital Innovation course at the University of Queensland in Semester 1, 2025, the study engaged 88 students across five topic clusters encompassing artificial intelligence, blockchain, wearable internet of things (IoT), genomics and cybersecurity. Students were encouraged to use GenAI tools transparently in preparing debates, creating and moderating peer resources, and completing case studies, while the researchers simultaneously trialled AI-assisted grading to compare against human marking. Data was drawn from surveys, interviews, and some 1,600 assessment artefacts. Students used GenAI to leverage content creation, valuing its ability to enhance comprehension and efficiency, but continued to prefer human feedback for depth and context. Overall, the study suggests GenAI can serve as a “bicycle for the mind,” enhancing critical thinking when integrated purposefully into tertiary teaching practice.

Keywords

critical thinking, artificial intelligence, generative AI (GenAI), tertiary learning, bicycle for the mind.

Practitioner Notes

1. Encourage transparent GenAI use by asking students to share prompts and outputs, normalizing critical engagement rather than secretive reliance.
2. Embed peer-to-peer moderation to highlight when GenAI undermines, rather than supports, critical thinking—students often give sharper “AI call-outs” than staff.
3. Use action learning cycles (interventions, reflection, re-testing) to capture and build on evolving student practices with GenAI.
4. Consider GenAI as a “bicycle for the mind”: a tool to scaffold comprehension and expression while still valuing human judgement, nuance and feedback.
5. Pilot GenAI for marking consistency checks but retain human oversight—current models tend to over-reward submissions lacking genuine critical analysis.

Introduction

Many academics and indeed many students, are frightened by the disruptive influence of generative artificial intelligence (GenAI), especially as this impacts university teaching in delivering prescribed learning outcomes (Potkalitsky, 2025). The fear among higher education teachers is that GenAI models serve as easy workarounds for undertaking the hard work of critical thinking in a dynamic world that demands incisive analysis and empathetic insight. For teachers, GenAI tools can challenge the integrity of content and assessments that they have become accustomed to deliver by ‘offloading’ critical thinking (Gerlich, 2025). Meanwhile, students often approach these models as accessible tools to generate assignments, gaining at least adequate marks, without necessarily needing to fully understand the content being exchanged nor any limits to its application in a complex and ambiguous world. This chapter shares our experience in directly addressing these fears in a live learning setting.

In a recently published opinion piece by two university academics, the authors lay down a very real yet promising challenge to all university lecturers, arguing that GenAI represents the “death knell” for critical thinking in our teaching and learning environments (Moran & Wilkinson, 2025). In a direct response to this provocative and most welcome challenge, we sought to disprove their contention in an active learning environment. Their letter was published days before our first lesson on GenAI for an undergraduate *Digital Innovation* course with 88 enrolments offered at the University of Queensland (UQ), Australia. Working together, the first author (as course co-ordinator) teamed up with the co-authors (as student research partners enrolled in the course), using this opinion piece as a contrarian provocation.

Students were tasked to engage with GenAI in exploring the five topic clusters (*artificial intelligence, blockchain, wearable internet of things, genomics and cybersecurity*) in completing each of their assessments. Since the course architecture had been built around a sequence of tasks that required peer assessment, we adopted an action learning orientation (Ballantyne *et al.*, 2002) to allow us to introduce interventions and then to gauge their impact on critical thinking. This approach allowed us to examine the correlations between frequent GenAI tool usage and critical thinking abilities (Gerlich, 2025).

Research Design

We approached this task in two ways. Initially, we set out to examine the student experience of using GenAI by enacting a series of classroom interventions, across both surveys and interviews, where students shared examples of their GenAI use. This sharing fostered open discussion in class of benefits and limits, highlighting examples where GenAI appeared to enhance critical thinking as well as testing multiple components of institutional policies related to GenAI use (Ajjan *et al.*, 2025). This strand of the research was led by the second author, Alice Hawkesby, in her role as a student partner on the project.

Then and largely in parallel, we tracked student marks (as awarded by the course coordinator, manually marked) across the assessment trajectory to explore how a GenAI model could grade student work with similar effectiveness as human marking. Marks were awarded for both the resources students submitted and the peer moderations they completed. The course comprised three main assessments: A1, a team debate across five topic clusters; A2, the creation and moderation of resources following each debate; and A3, an individual case study. Transparent use of GenAI was encouraged in each of these assessments. This line of inquiry was led by the third author.

Taken together, our research design sought to track both the student experience in their quest to enhance critical thinking as well as broadening the scope of feedback that drives skill development, for student and teacher alike. In this way, this research positioned learners and educators as co-design partners in forming actionable steps towards learning objectives (Singh *et al.*, 2025)

The Research Process

Our research explored how GenAI usage could enhance critical thinking, to challenge the prevailing notion that such use equates to cheating or avoidance of thoughtful

analysis (Gerlich, 2025; Moran & Wilkinson, 2025; Potkalitsky, 2025)¹. Our process initially sought to understand student attitudes to GenAI and how they enacted those attitudes with real-time usage. Emerging through the early stages of the course delivery, this process expanded to also consider how GenAI capabilities could be applied to improving student feedback for marked assessments (cf Singh *et al.*, 2025).

To capture the student experience of using GenAI, we applied four intervention phases. The first three phases comprised surveys that attracted a random array of student responses while the fourth phase comprised students selected for interview² with the second author.

Each topic cluster was explored via a multi-team debate serving as the A1 assessment arc. Students self-selected and researched their topic then presented their findings with the class in a debate format. GenAI tools were core to this research process. After each debate, all students, including those that had just presented, created a resource positioning what they had learned from the debate, to focus on at least one key insight. These resources were then moderated by peers, with each student moderating three other resources, creating a circular learning trajectory designed to deepen understanding and foster critical thinking. Across the five clusters, this cycle generated some 1,600 individual items for the A2 assessment each of which was hand marked by the course coordinator against the rubric shown as Appendix B – Marking rubric for the resource/moderation task set. The individual case topic completed the assessment arc as A3 but since this component contained no circular learning activities, it falls outside our current scope.

To investigate the efficacy of GenAI in marking student assessments, we uploaded the de-identified content of the resources each student created and the moderations that were applied across those resources, for each of the five topic clusters. No information was provided to the GenAI model that would identify any student.

Research Methodology

Action research is a method where interventions are applied into a live change setting, to observe what happens after each intervention. This cyclic nature allows different

1. The project formed part of a UQ Teaching Innovation Grant with ethics approval 2024/HE001346

2. From a class of 88 students, each survey attracted the following responses: for phase 1 | n = 25; for phase 2 | n = 30; for phase 3 | n = 30; for phase 4 | n = 5 where students were invited for interview after showing enthusiastic engagement with GenAI usage following the initial 3 survey phases

process aspects to emerge in real-time (Ballantyne *et al.*, 2002) across each intervention.

From the outset, students were encouraged to use GenAI tools to explore the topic debate and to assist in constructing their moderations of created responses. We then offered a survey to all the students in three interventions, receiving anonymous responses as noted in the footnote 2. The three student surveys each had slightly different emphases. The first survey gathered baseline information on students' GenAI tool use, including frequency, purpose, perceived usability, and initial benefits or challenges. The second survey, conducted after the debate and peer-moderation activities, asked students to reflect on how GenAI supported or hindered their performance in these structured tasks. The third survey focused on perceived changes across the semester, including shifts in confidence, independence, and learning strategies.

By observing the engagement with the debates, resources and moderations, we identified five students most active in transparently incorporating GenAI into their research and presentation. These five students were invited for interview as the final intervention phase, with Appendix C containing the interview protocol and selected quotations that illustrate how students engaged with GenAI across the interventions. After each intervention, we shared the observations with the class, demonstrating how GenAI was being used across the cohort and highlighting collected evidence that either affirmed or contradicted the received "death knell" premise (Moran & Wilkinson, 2025).

Evaluation

In one of our early lectures, we discussed a study of the most efficient locomotion by body-weight for various types of animals (Wilson, 1973). The most efficient unaided locomotion (measured as calories consumed per kilometre travelled per kilogram of body weight) was the American condor (*with humans being less efficient than a horse but more efficient than a dog*) whereas, with tools, the most efficient by some degree was recorded as being a human riding a bicycle. This study informed the quote by Steve Jobs of Apple fame, a decade or so later, that computers represent the "bicycles for the mind" – 'bicycles' that we can harness to achieve things the human brain is not so good at, to allow us to focus on those things we are very good at. The same reasoning can be applied to harnessing GenAI and that same dynamic is revealed – *while not yet fulfilled* – from our data.

Through our multiple interventions throughout the arc of the course, we observed how students began with simple explanations and summaries but progressed to

more sophisticated and transparent applications drawn on GenAI-derived advice. These GenAI-suggested applications included scenarios that those students then enacted in class, detailed rubric-based feedback drawing on assessment resources they had created for moderation by other students, and subsequent appraisal of those moderations. The final A3 assessment also demonstrated how some students greatly increased in confidence given consistent GenAI encouragement though the semester, where GenAI usage was NOT equated to cheating but rather exposing analyses that otherwise would have remained hidden. Nevertheless, GenAI usage to avoid critical thinking was often called out in the A2 assessment, by both the course coordinator and, most interestingly, other students. These 'call outs' were scattered throughout the moderation feedback: often taking the style of *"this looks like something generated by AI"* followed by suggested analytical improvements. Being a peer-to-peer comment, we figured the feedback loops may have had far greater impact on student perceptions than the course coordinator issuing directions; alas, our data is not sufficient to quantify this conjecture!

Across all the interventions, nearly all students reported using ChatGPT – *perhaps through brand recognition* – with many seeming to affirm the fears of Prof Moran and Dr Wilkinson (2025) in avoiding critical thinking. At the early stage of the course, the vast minority³ were confident enough to share which tool they had used or the prompt(s) they entered and how they gauged the responses as suitable – *or not* – for the task to hand. This transparency rate grew substantially as the semester progressed but remained a minority for the final topic cluster.

Findings: Student experience with using GenAI

From the start of the course, we sought to capture the student experience of using GenAI to enhance critical thinking through a series of general surveys and targeted in-depth interviews. A typical survey response stated that *"without (Gen)AI sometimes it's hard to find a place to start on assignments"* signalling that such tools frame initial thinking. As the semester progressed and students increased their own GenAI repertoires, typical comments developed into *"I've always understood concepts but sometimes struggle to find the academic language to explain it in report form"* signalling a more targeted expectation of GenAI outputs.

3. 73 students completed 3 moderations each for the first topic cluster, from which only 3 students were transparent in their GenAI usage. For the final topic cluster, 84 students completed 3 moderations each, with 34 students sharing how they used GenAI tools to frame their understanding.

Overall, a total of 161 exchanges were collected from participating students throughout the teaching semester exploring GenAI usage across all three assessment categories. Our research reveals that students are already discovering this ‘bicycle’ effect: from our course, nearly 80% rate GenAI as helping them understand course content better than lecturers alone yet, remarkably, 100% of students still value lecturer feedback more than identical GenAI feedback. This suggests students intuitively understand GenAI’s role as an *enhancement tool* rather than a *replacement channel*.

Our findings were surprising on a number of fronts. Because we tackled head-on the assumption that GenAI presents a tool to avoid work and therefore critical thinking, within an institutional context where GenAI use is so commonly associated with ‘cheating’ by academics and students alike, our data highlights the genuine struggles students navigate in seeking to make best use of GenAI tools as these rapidly emerge. By confronting the assumption that GenAI is a shortcut to avoid work and critical thinking so representing the next generation of cheating, we uncovered the genuine struggles students face as they try to use these rapidly emerging tools effectively.

The catalyst for this evolution arose as students reported they started using GenAI more confidently after seeing classmates succeed with it. Yet many of these students needed to be driven to be transparent with their GenAI use, a transparency which in-class peer support helped to cultivate and which the ‘AI as cheating’ bias serves to subvert. As an interesting example, one student reported how they instructed their preferred GenAI model to adapt their first draft of a resource they had created with the instruction to adjust it in line with the marking rubric to yield a perfect score. Despite multiple iterations and deliberate alignment with assessment criteria, the final submission fell short of full human-awarded marks, even with a guarantee of a 100% score by the GenAI model. This experience underscored both the complexity – *and perhaps ambiguity* – of academic evaluation as well as the limits for GenAI in delivering on performance promises. So perhaps Prof Moran and Dr Wilkinson (2025) aren’t entirely wrong!

As a final intervention, the emergent findings of this action research was progressively shared with the class to highlight the analytical advantages within reach, as evidenced by exemplar assessments. The intention behind this sharing was to frame an ongoing capability development arc for each student in relation to their continuing GenAI usage. We don’t necessarily seek to change everyone, since innovation often begins with outliers rather than broad averages. This data signals such outliers in achieving broadly beneficial behaviours to burst idea bubbles and explore novel knowledge arenas (Lazar *et al.*, 2025). Beyond seeking to demonstrate that GenAI enhances critical thinking, we aim to cultivate conclusions that otherwise would never have been

reached, absent those tools. While we're not claiming to be there yet, the direction of improvement has become clearer. We now will repeat this process in a bid to replicate and extend these positive learning outcomes.

Enhancing marking consistency with GenAI

The A2 assessment arc required each student to create a resource and for those resources to be moderated by at least three other students, following each of the topic debates. This arc served to further a circular co-learning environment and generated over 200 accessible items per debate topic, challenging marking consistency against the rubric (see Appendix B – Marking rubric for the resource/moderation task set). Commonly a few students would approach the course coordinator with questions framed as “for the last moderation, I was 1 mark off a perfect score. Why did I lose that mark?” Now, this may seem a ridiculous question, as if the coordinator could, off the cuff, recall that students’ resource and adjacent moderations to give an informed answer. On reflection, this is an extremely reasonable question for a student to raise in a bid to improve their performance – not only by gaining extra marks but also by sharpening their own critical thinking!

These experiences manifested in two ways; one of which was explored through the course and the other deferred to a later time (see the Future Directions section that follows). We had in our possession all of the resources created by all of the students, all of the moderations undertaken by all of the students and all of the marks awarded by the coordinator for each student for each topic cluster. In short, a lot of data!

So, our first experiment involved using Claude to independently mark the resources and moderations created by students and to compare these marks against human scores. This test would allow us to gauge the reliability of GenAI-generated marking. With the use of Anthropic’s API⁴, we configured Claude to provide marks against student work by closely following the marking rubric, as can be seen in Appendices D and E. To do this, it needs access to the students submitted work, which is also sent to Anthropic’s servers. All student identification was stripped away, as only their submitted work was needed for GenAI grading⁵.

The marking for the resources each student created (one resource for each topic

4. Anthropic supports an application programming interface (API), to allow structured queries for a data array.

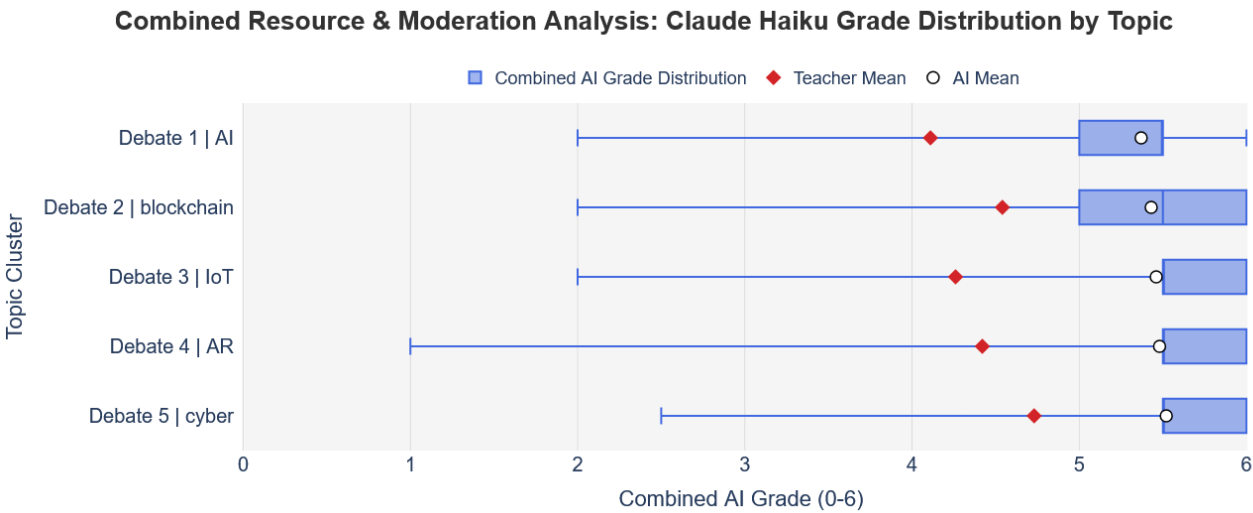
5. This exercise was a trial – future iterations of this approach will seek to adopt open-source models that can run locally, so that absolutely no data leaves our institution.

cluster) was differentiated from the moderations each student submitted (three moderations for each topic cluster). The prompts we used are shown in Appendix D (for resources created) and Appendix E (for moderations submitted).

Findings: GenAI marking as a precursor to individual feedback

For this objective, our findings were less surprising. We ran two GenAI models using Anthropic Claude – Haiku and Sonnet – with the outputs from each shown in Figures 1 and 2. Claude Haiku is a much smaller, simpler model, while Claude Sonnet is more advanced. These GenAI models were loaded with the assignment rubric, a detailed set of instructions (see Appendices D and E) and the student submissions across each of the five topic clusters, representing just under 2000 items in total. A summary of the outputs across all five topic clusters was generated to show consolidated marks for the resources created and moderations submitted.

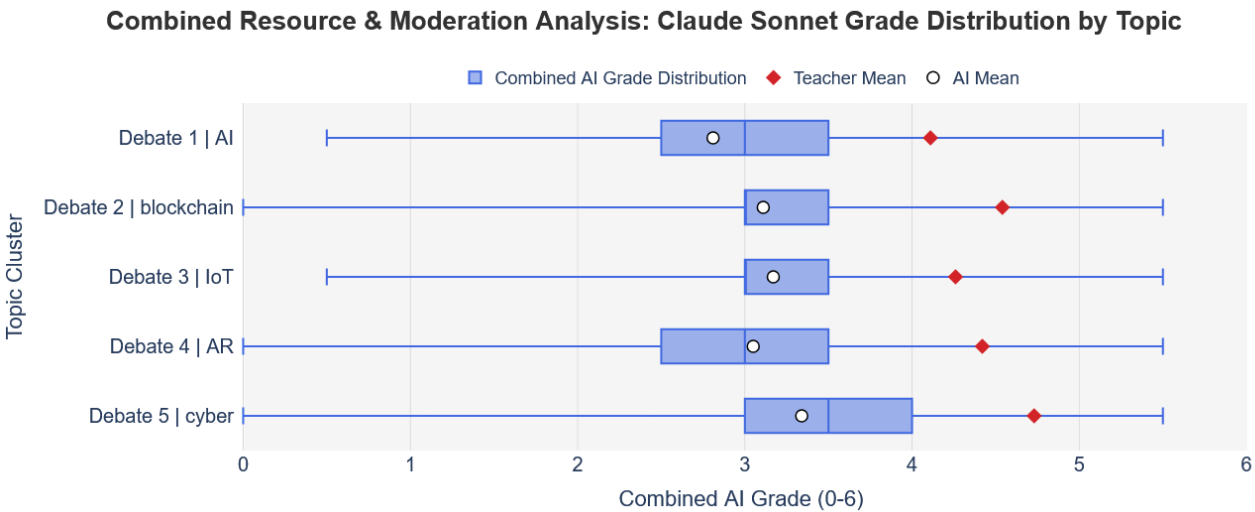
Figure 1 shows that the GenAI model tends to award full marks for resources created and near full marks for the moderations completed. It has very low distribution compared to the teacher-awarded values. There were multiple instances where the teacher awarded 0 marks for a student’s submission, while this model would reward close to full marks. From this data, Haiku seems to be an unreliable tool for marking assignments that required evidence of critical thinking.



See full image.

Figure 1 Marking as generated by Anthropic Claude Haiku, the fast and simple model using few tokens and therefore cheaper to run, showing consistently generous marking across the 5 cluster topics compared to human (teacher) marks, showing a

compact spread of AI-generated grades (the shaded areas in blue with the average shown as a vertical dotted line)



See full image.

Figure 2 Marking across the 5 cluster topics as generated by Anthropic Claude Sonnet, the most advanced model released as at the time of the course, showing generally more critical marking then awarded by the teacher, although with a very broad spread of grades (the shaded areas in blue show the majority spread with the average shown as a vertical dotted line)

Using the same human-graded data across all students, the resources and moderations were then analysed by Claude Sonnet. Figure 2 shows a more critical marking output, and interestingly follows a binomial distribution, with the median value outputted as 3/6. This doesn't have the issue of not being critical enough like Haiku, but rather the opposite. This suggests that the use of increasing complex and intelligent generative models will lead to more judicious and consistent results, although more work needs to be done to align more closely to the human-awarded grades.

The data can also be interpreted in terms of average marks awarded for each component, being the resources created, and moderations submitted, as compared to human marking, in table 1 below:

Table 1 Comparison of AI-generated marks to human-awarded marks (6 marks in total)

	Claude Haiku Resources (up to 3 marks available)	Claude Sonnet Resources (up to 3 marks available)	Claude Haiku Moderations (up to 3 marks available)	Claude Sonnet Moderations (up to 3 marks available)
Average Mark	2.6	1.52	2.78	1.55
Average Difference*	0.52	-0.55	0.1	-1.1

(* to human marking)

The more advanced GenAI model shows a closer alignment to human-awarded markings for moderations completed yet the simpler model performed closer to human marking for resources created. These differences highlight the underlying conundrum: that human marking is in fact a reliable and robust standard for GenAI models to benchmark. The ability for GenAI models to ‘learn’ the domain and ‘improve’ over time hasn’t been harnessed in this study, but is something considered in the future directions as a method to more closely align the AI with the teacher’s benchmark.

Limitations and Future Directions

While exploring new approaches to harnessing GenAI in the classroom, a number of limitations are apparent with this study. Firstly, the cohort represents a single class, albeit one that attracted students across many disciplines including business (54), information technology (2), biotechnology (5), commerce (5), communications (2), tourism (2), design (3) engineering (2), arts (3) and computer science (2)⁶. Gauging multiple classes across multiple disciplines and multiple institutions would strengthen the depth and utility of findings.

Secondly, while the survey responses indicate a generally low response rate, they may also reflect a self-reporting bias that serves to mask underlying usage patterns and attributions for critical thinking development. We did not draw correlations across various GenAI models so may have missed important nuances in how each model differently impacts critical thinking.

6. The balance of the class comprised international exchange students across a range of disciplines

Conclusions and recommendations

The tension we sought to address is captured by this collected student quotation: *“I’ve always understood concepts but sometimes struggle to find the ‘academic language’ to explain it in report form – using AI my work is more refined.”* This reflection highlights that students do not necessarily need GenAI to supply understanding; rather, they need support in using tools to refine and extend their own ideas. It suggests that developing robust approaches to GenAI involves cultivating metacognitive awareness, helping students to recognise when GenAI is scaffolding their thinking productively versus when it risks becoming a shortcut to avoid critical thinking. In other words, the pedagogical challenge is not simply to teach students *what* GenAI can do, but to guide them in using it deliberately to enhance critical engagement, communication, and disciplinary reasoning. This orientation frames GenAI as a “bicycle for the mind,” where the value lies not in outsourcing intellectual effort but in amplifying the student’s own capacity to think, question, and articulate ideas with greater precision.

This data opens up several exciting avenues for future work to build a smarter and more expansive use of GenAI in the classroom. The grading experiments provide an indicative direction for developing more sophisticated and reliable GenAI-powered assessment tools.

1. Developing GenAI-Assisted Grading:

There are numerous variables that can be tweaked to further improve GenAI’s performance, such as the following:

- Prompt Engineering: Refining the system instructions given to GenAI to elicit more accurate and nuanced responses
- AI-Friendly Marking Criteria: Modifying rubrics to be more easily interpretable by GenAI models
- Few-Shot Examples: Providing a small number of examples of teachers marking so that it can then construct a desired marking style, allowing the model to “learn to learn”
- Trying Different Models: Evaluating the performance of new and emerging GenAI models which come out periodically
- Fine-tuning: Help teachers to modify the AI’s output so it is personalised to them
- Mark trajectories: compiling for students their sub-unit marks so they can better understand the detail of where they are meeting (and missing) the rubric criteria
- Students could ask for a re-mark from staff if they believe if their grade is

unjustified or ambiguous, GenAI could then be trained against this human review outcome

2. Enhanced, Personalized Feedback for Students:

As introduced above, the students asking for specific, individual feedback for their resources and moderations represents a hurdle perhaps not humanly possible. It would involve the coordinator reading the resource that student created, reading each resource that student accessed to moderate, gauging the moderation crafted by that student in response to each of the three resources against the marking rubric. Then, as the course progresses, to do this for each cluster to advise the student on how they are – or are not – improving in their analytical skills as evidenced by the assessment. Such a task string is simply not scalable!

However, adopting the 'bicycles for the mind' metaphor, this would certainly appear to be a task where GenAI-tools could be very adept. By including all of each student's previous submissions and the previous feedback given, the GenAI-tool can 'learn' to gauge improvements as well as hurdles facing each student, in the context of all other students in the cohort. Such a tool could then craft individual and measurable tasks to strengthen their performance, not only in terms of their marks but also in terms of their critical thinking as evidenced by their submitted works.

Our data shows that students are seeking to learn to use GenAI tools to enhance human judgment and craft authentic insights. They recognise that these tools can be shallow and even mis-leading, yet when properly harnessed offer learning gains – gains derived from thinking critically about the topic and not simply accepting whatever the GenAI model returns. This recognition is more sophisticated than critics might expect. As one student articulated: *"I'm very wary about using GenAI in place of a human opinion or perspective, to me it's a database more than a perspective."* Students demonstrate clear boundaries about AI use, with our data indicating 44% specifically avoiding GenAI for personal or emotional contexts, citing needs for *"personal insights," "feelings and emotions"* and maintaining their authentic writing voice.

GenAI models offer immediate responses, just like Google, Wikipedia and other online tools. At best, these models allow students to explore different scenarios to refine and expand their thinking. At worst, such tools *'shirk the work'*. However, our evidence suggests students are naturally developing sophisticated usage patterns that maximize the former while minimizing the latter. Our digital innovation course is just the beginning, as we build on this data towards a thoughtful, courageous and

transparent use of GenAI tools to bolster critical thinking across complex topics, to derive novel insights. Students themselves are pointing toward this integration model, with one suggesting an ideal balance of “AI – 40% and educator – 60%”. They consistently prefer GenAI for technical writing improvements, structure, and research efficiency, while reserving human feedback for subjective interpretation, context-dependent situations, and specialized knowledge. In short, we seek to harness GenAI as a *‘bicycle for the mind’*.

The provocation of Moran and Wilkinson (2025) was extremely timely. It allowed us to probe more deeply in our AI-informed action research in a live classroom teaching course. We each learned ourselves about the value of these tools in the classroom (see our *Learning Experience* sections, below). It provoked us to engage with the nuances of GenAI usage and to appreciate that, in fact, students are wrestling with this new platform as are academics. Our experience gives us some stepping stones to address our fear as partners in learning, improving our critical thinking skills, aided by GenAI tools our bicycles!

Researcher Reflections

The following reflections provide complementary perspectives, illustrating how the project unfolded in practice.

Learning Experience | Russell Manfield | *Senior Lecturer, UQ Business School*

Harnessing GenAI to think differently about innovation | *a course coordinator's reflection*

I created the undergraduate course on digital innovation and entrepreneurship at UQ in 2022, designed to bring this lively domain into focus primarily for business students. During this first course delivery, OpenAI launched the first publicly available GenAI model ChatGPT that became a viral sensation and triggered a myriad of subsequent model releases.

During these early years, I used these GenAI models as a curiosity in the vein of *"let's see what they can do"* to build student inquiry and awareness. I did NOT use them directly as a tool to drive critical thinking. By mid-2024, this 'curiosity' focus became untenable: if the truth doesn't matter, then GenAI tools are fun, but if significant decisions ride on the insights and judgments of such explorations then these same tools need careful skills curation that simple 'play' activities don't foster. I realised that the capabilities of emerging GenAI tools needed to be directly harnessed into any curriculum addressing digital innovation. That realisation led to the 5-topic cluster structure of the course delivered in 2025, drawing on the array of research specialists I was able to access at UQ.

This reinvention of the course was underpinned by several grounding principles. Firstly, I wanted an explicit encouragement for GenAI usage so that we could all learn from each other. This was not a content delivery focus but rather a co-learning ecosystem, where we could all experiment with different facets of the GenAI phenomenon and report it back to our community of inquiry. I was a co-learner in this community so sought to embrace all the sharing of others in that community. Secondly, I wanted categories within the digital innovation umbrella that were topical, that encouraged inquiry, that reflected discussions being held outside the hallowed precinct of a university that drew on the research expertise within our university. I am very grateful to the expertise shared largely from our *UQ School of Electrical*

*Engineering and Computer Science*⁷, underpinning the artificial intelligence, blockchain, cybersecurity and internet of things cluster topics. My colleague in the *UQ Business School* recommended the specialist on genomics through his health research⁸. Thirdly, I wanted to drive engagement with these topics so pioneered a multi-team exploratory debate structure where up to 20 students led exchanges and discussions on their chosen topic cluster. Prior to the first debate, I was genuinely nervous as to how it would work and whether students would actually learn from that novel format. As that first debate progressed, I became convinced this format served as a useful and engaging learning experience for students and teachers alike, pro-actively harnessing GenAI as a tool to drive the emergence of critical thinking.

There was a lot happening in this classroom as this action learning trajectory emerged from these three grounding principles. I very much valued the insights of my course facilitator, Yumeng Wu, which allowed the smooth running of each class and assessment item, I am very grateful to my two student research partners, whose experiences appear below, with each bringing a depth of access and understanding to the student experience that otherwise would have remained obscure, or perhaps totally hidden.

Learning Experience | Alice Hawkesby | *Bachelor of Biotechnology* student, UQ

Navigating Peer Perspectives on GenAI and Critical Thinking | a student researcher's reflection

As a student researcher, I acted as an intermediary between my peers and the research process, creating a more relaxed and confidential space for students to share their experiences and concerns around GenAI use in the TIMS2302 *digital innovation* cohort. This peer-to-peer dynamic encouraged more open conversations, as students felt less pressure about potential academic consequences.

To explore the potential of GenAI for enhancing critical thinking, I used a mixed-methods approach. I began with confidential written surveys to gather broad trends, followed by qualitative interviews to dive deeper into students' attitudes and behaviours. Toward the end of the course, I selected five trusted individuals to engage

7. I am particularly grateful for Prof Tim Miller, Professor in AI at UQ EECS, who's initial enthusiasm validated my approach and served to attract other faculty members to serve as guest presenters in their areas of specialisation.

8. I am grateful for the enthusiasm of Prof Andrew Burton-Jones of UQ Business School for his referral.

in more in-depth discussions about their use of GenAI in academic coursework. My research was informed by current literature on GenAI in education, as well as regular consultation with Dr. Manfield. I compiled and analysed the data using Excel, employing comparative analysis and descriptive statistics to identify recurring patterns. A notable limitation of the study was its reliance on self-reported data, which can be subject to bias or omission.

As a student myself, I'm acutely aware of how GenAI is used in academic settings. I also rely on GenAI platforms – *perhaps more than I would openly admit* – and my observations suggest this is common among my peers as well. Yet, despite the growing presence of GenAI in our academic lives, I encountered consistent resistance when trying to probe its impact on critical thinking. Many students were hesitant to speak openly about their use of GenAI, expressing fear or guilt. From my experience, GenAI is often discussed with negative connotations, and universities have contributed to this by framing its use as academically dishonest or inauthentic. Even in this course, where GenAI usage was openly encouraged, there was still a prevailing reluctance to disclose its use.

Several students initially denied using GenAI to complete their assignments yet later confided during interviews that they had relied entirely on GenAI platforms, simply choosing to conceal it. This duality suggests a disconnect between institutional policies and actual student behaviour. I question the effectiveness of discouraging GenAI use when universities currently lack the means to regulate or detect it sufficiently. To test the assumption that GenAI guarantees high academic performance, I conducted a personal experiment. I submitted an assignment generated entirely by ChatGPT, using all relevant criteria and guidelines, and presented it to Dr. Manfield, who was unaware of the experiment or grading. The resulting mark was 75%, notably lower than the grades I typically received with minimal GenAI input. This outcome challenged my assumptions and raised important questions about the effectiveness of GenAI in replacing human effort.

Initially, I believed GenAI to be a shortcut tool for students seeking to avoid critical thinking. My perspective has evolved. I now view GenAI as a tool that, with thoughtful use, has the potential to enhance, rather than replace, critical thinking.

Learning Experience | Nicolas Nucifora | *Bachelor of Computer Science student (since graduated), UQ*

Creating GenAI tools to encourage critical thinking | *a student researcher's exploration*

As a student researcher for this project, I oversaw creating the GenAI marking assistant and evaluating it against human-marked grades for the class' RiPPLE⁹ activities. For years, the future of AI in education has felt like a distant concept, but with the release of ChatGPT, its quickly become an immediate reality. This project provided me a crucial opportunity to potentially help shine a light on the new opportunities this new technology brings. My aim was to test if this powerful technology could be used responsibly to support, and perhaps even enhance, our learning environment.

The project started poorly. The dataset had systemic bugs I couldn't fix without losing key information, and my initial test—run on a very basic GenAI model—gave full marks to most of my peers. Switching to a smarter model transformed these results; it graded more critically, and the marks followed a binomial distribution, similar to human-graded results. Given that GenAI outputs are probabilistic by nature and aren't always consistent or correct, I wasn't sure how it would appear, so this was a pleasant surprise. That said, limitations were obvious. Due to the bugs, we lacked access to critical human-graded data, and the model's response still didn't align closely with human-graded marks. This shows that GenAI feedback still has a way to go, but these issues are likely resolvable with the future directions we have identified.

The key insight for me wasn't the AI's marking ability but rather realising how AI could be used to fill gaps in feedback. For these RiPPLE assignments, students made four weekly submissions but only received a single mark with no comments. Personally, going through these activities without feedback, I didn't strive to improve because I had no direction on what I was doing right or wrong. As a result, my critical thinking skills didn't grow; I simply relied on the skills I already had. With a large cohort and just two staff, this detailed feedback was never feasible. Adding more tutors wouldn't be practical, and reducing the frequency of assignments would have removed what I loved most about the course. GenAI could maintain these high-engagement

9. RiPPLE is a proprietary UQ platform licenced across several universities that allows students to create resources that are then moderated by other members of the class. For this course, each student was required to create one resource after each multi-team debate and to moderate three others, thereby representing a circular co-learning environment.

structures by providing personalised feedback at scale, freeing teachers to consider more engaging syllabuses for their classes which would be otherwise impossible.

This project put me in a unique position: a student in the course who was also building the tool that might one day grade it. This dual perspective showed me that the real gain isn't just consistent marking; it's about shaping how students interact with GenAI. I know from experience that when students are left to figure out GenAI on their own, they often follow the path of least resistance, using it as a shortcut rather than a learning aid. By integrating systems that challenge us—like a GenAI that provides constructive feedback instead of easy answers—we can model productive uses. This experience reinforced that the next generation won't benefit from pretending GenAI doesn't exist. They'll benefit from structured opportunities to explore its potential, understand its limits, and apply it in ways that genuinely develop their abilities.

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8.

GENAI IN ECONOMICS EDUCATION: RESEARCH TOOLS FOR STUDENT LEARNING

John Raiti

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Abstract

While generative artificial intelligence (GenAI) has disrupted higher education (HE), teachers are challenged to make sense of its impact on teaching and student learning. As this technology is rapidly becoming more prevalent, there is an urgency to better understand its affordances and its use by students to inform effective approaches to pedagogical practices, assessment design and academic integrity. The main objective of this qualitative study was to explore the use of ChatGPT by students in an undergraduate behavioural economics course while undertaking a written assessment task. Data was collected from a survey sent to students upon completion of the task. The survey focused on the ways the students used ChatGPT, what they found useful with this tool, and its impact on their learning. The analysis revealed that ChatGPT can be a positive disruptor that assists students with their learning. First, ChatGPT was perceived by students to be useful with developing the various components of a written assessment task. Second, students did not perceive ChatGPT as replacing their learning. Third, teacher reflection highlighted the importance of teaching practices that have a deliberate focus on viewing and scaffolding the learning process leading to the submission of the final written assessment task. The findings suggest that a focus on providing teachers with ongoing professional learning and support for assessment design and complementary pedagogical approaches is imperative in HE as GenAI continues to evolve at a rapid pace.

Keywords

Generative Artificial Intelligence, Economics Education, Authentic Assessment, Student Learning, AI Literacy, Higher Education Pedagogy

Practitioner Notes

1. Design assessment tasks that explicitly mirror real-world practice to engage students in authentic applications of theory.
2. Introduce GenAI literacy early in the course through scaffolded tutorials that model responsible and critical use.
3. Shift the assessment focus from product to process, providing ongoing feedback and visibility into how students learn.
4. Encourage reflection and peer discussion on how AI outputs compare with human reasoning to build evaluative judgement.
5. Support educators through professional learning communities that share strategies for integrating GenAI ethically and effectively.

Introduction

This case study focuses on the use of ChatGPT by students to undertake a written assessment task in an undergraduate economics course during Semester One 2023. Underpinned by the principles and benefits of authentic assessment (Villarroel et al., 2018), students were asked to develop an original research project in a behavioural economics course. The intention of this task was to mirror the type of “real world” work that economists undertake in consultancies, corporations and governments while equipping students with future-ready skills. The task was introduced in the year prior (2022) to address the lack of authentic assessment in the course. Prior to 2022 the course assessment relied heavily on exams, quizzes and worksheets. Overall, the pedagogy for this task (and the course) focused on “assessment for learning” (Liu and Bridgeman, 2023). (Information of implementation of this assessment task is also outlined in the UQ Assessment Ideas Factory).

Specifically, the task involved writing a research proposal in which students demonstrate their ability to apply behavioural economics theory to a real-world situation. The aim of the task was also to provide students with an opportunity to develop their skills with research and communicating economic thinking. In doing so, students were permitted to use GenAI tools such as ChatGPT to develop their research proposals. This enhanced the authenticity of the task (Powell et al., 2024)

enabling students to use this technology in a meaningful way for understanding its use and potential in their future careers (Upsher et al., 2024). The construction of the task's authenticity also aligns with recent research in economics education. This indicates that ChatGPT can easily provide answers to numeric-based and text-based questions in economics at the lower levels of Bloom's taxonomy ("remember", "understand") (The University of Queensland, n.d.) and perform relatively well at the medium levels ("apply", "analyse" and "evaluate") (Thanh et.al., 2023). However, ChatGPT does not excel at handling text-based questions at the highest level of Bloom's taxonomy ("create") in GenAI-integrated tasks as it does not construct arguments coherently and provide relevant references (Thanh et.al., 2023). Hence, this task was deliberately designed so that students demonstrated their skills at the highest level of Bloom's taxonomy ("create") by constructing and developing a new original work (research proposal).

Using the Technology Pedagogy and Content Knowledge (TPACK) model (Mishra & Koehler, 2006), the goal is to better understand the interplay between GenAI technologies, the delivery of the content (in this instance, behavioural economics theory) and the pedagogical approaches to support and enhance learning. Traditionally, economics pedagogy has primarily adopted a teacher-centred approach mainly through lectures (Sekwena, 2023). However, teachers are beginning to adopt more active learning strategies to enhance student engagement. The emergence of GenAI affordances that differ significantly to other digital technologies, changes our relationship with content and has implications for teaching practices. Hence, to better understand the dynamic relationship between the content, the pedagogical approach and the technology, this case study aims to answer the following research questions.

- How and to what extent do students use GenAI tools for undertaking written research assessment tasks?
- What are implications of using GenAI tools for teaching practices?
- What do teachers need to know to integrate GenAI effectively?

To this end, this case study makes contributions to a growing discourse. Firstly, it contributes to the discourse on the integration of GenAI in economics education and HE. Secondly, it contributes to understanding student adoption and motivation to use GenAI. Thirdly, it contributes to the emerging repository of pedagogical practices and knowledge for teachers to draw upon with integrating GenAI effectively and meaningfully in HE classroom settings.

Literature Review

The teaching of economics in HE is generally viewed as “traditional” with lectures being the natural and predominant mode of delivery and approach (Sekwena, 2023; Volpe, 2015). Scholarly literature points out that limited focus was placed on the importance of pedagogical practices until the end of the 20th century when active learning became recognised as a better approach to teaching of economics (Becker, 2000) and for preparing students to “think like an economist” (Ray, 2018). This approach emphasised transforming and challenging the notion of students as passive learners to becoming more active by critically analysing and solving real-world problem using economic theory (Ray, 2018).

The use of “cases” then emerged as a “new” pedagogical approach and manifestation of active learning (Becker et.al., 2006; Ray, 2018; Volpe, 2015), which bridged a perceived gap between the traditional study of economics and its application in the real world (Ray, 2018; Puhlinger & Bauerle, 2019; Volpe, 2015). Already well established in other traditional discipline areas such as law and medicine, the “case method” was introduced to economics to motivate students by applying theory to narrative accounts of real-world scenarios (Ray, 2018; Volpe, 2015). This was perceived as providing the pedagogical benefits of engaging students in classes (Becker et.al., 2006) and extending students beyond “problem sets” which are a traditional staple task in economics (Becker et.al., 2006; Ray, 2018; Volpe, 2015). Whereas problem sets have a single correct answer, cases enhanced student learning and achievement by asking them to make sense of a complex series of events in the same way they transpire in the real-world scenarios (Ray, 2018; Volpe, 2015). These scenarios required students to simulate the rigorous decision-making processes to develop and justify their answer (Ray, 2018). Given the complexity of these scenarios, there is no single right answer in cases (Ray, 2018; Volpe, 2015). In doing so, working through cases was seen as effective for developing the essential proficiencies required by economists in their real-world work (e.g. critical thinking skills, communication skills, collaboration with teams) (Volpe, 2015).

Whilst economics academics and teachers continue shifting to practices that promote active and authentic learning, they have also recognised the importance of innovating new pedagogical approaches to address the disruption of GenAI (Suleymenova et. al., 2024). The scholarly literature that emerged across the sector after OpenAI's release of ChatGPT in November 2022 focused on academic integrity. Though ChatGPT and GenAI more broadly offer potential practical benefits and opportunities for enhancing student learning (Cotton et.al., 2023) and innovation (e.g. create content, assessment design, personalised learning), the predominant discourse amongst educators and

administrators when this technology emerged centred around cheating and plagiarism (Sullivan et al., 2023). Surveys indicate that one in three university students have used AI to cheat on assignments, and most report being tempted to do so (Sullivan et al., 2023). Further, this discourse outlined concerns that use of ChatGPT and GenAI can result in students not developing the skills for critical thinking and communication and verifying information (Iqbal et al., 2023; Rowsell, 2025; Willems, 2023). However, these concerns stem from a limited understanding of the affordances of GenAI tools which are significantly different to previous technologies (Mishra et al., 2023).

Despite the growing concerns, little was known about the preferences and choices of students in the first year after ChatGPT's release. A body of literature has now emerged drawing on the Technology Acceptance Model (TAM; Granić, 2022) and Unified Theory of Acceptance and Use of Technology (UTAUT; Strzelecki, 2024) as theoretical foundations for understanding the perceived usefulness, effort and enjoyment of using ChatGPT and how this influences student behaviour. A survey of students at four Australian universities indicates that students perceive GenAI to be useful in their studies including for answering questions, creating written text and analysing documents and data (Chung et al., 2024). However, given that GenAI tools are freely available, there have been only a handful of studies to date on whether students are adopting such tools and in what way (Smerdon, 2024).

Additionally, at the time of ChatGPT's release there was generally little known in the literature about the pedagogical considerations to make best use of these technologies to enhance student learning. GenAI was initially perceived by teachers as being untrustworthy with many still to be persuaded as to its value (Newell et al., 2024). This has contributed to the pre-dominant discourse of academic integrity, cheating and plagiarism (Mishra et al., 2023) with educators calling for a return to traditional exams to ensure assessment security (Saunders et al., 2024). Hence pedagogy was being informed by a deficit model of academic dishonesty (Newell et al., 2024).

Some literature is now emerging that suggests how best to situate the use of GenAI in teaching and assessment pedagogical practices. Within this, two main themes emerging are (1) practices as to how non-invigilated authentic assessment tasks are implemented to enhance authentic learning and ensure academic integrity, and (2) the need to integrate GenAI literacy in HE courses and programs for all disciplines. Both themes are not exclusive as they have a symbiotic relationship that is mutually beneficial to enhancing learning.

(1) Assessment to enhance learning and academic integrity

The literature points to focusing first on the “technology” in the TPACK model (Mishra & Koehler, 2006) to understand the unique affordances of GenAI, which differ to other digital technologies and how this will change teacher knowledge and practice (Mishra et. al., 2023). In simple terms, whereas search engines retrieve information from existing web pages or databases, GenAI tools generate data (text, images, code) by using models which are trained on identifying and mimicking patterns in large datasets using natural (human) language (Farrelly & Baker, 2023; Mishra et. al., 2023). Hence, creating new knowledge is no longer the sole domain of discipline experts as it can be generated by prompting which is open to all learners (Rivers & Holland, 2023). This in turn changes how content is considered and consequently the approaches which are appropriate for effective integration in teaching and learning (Mishra et. al., 2023).

From forming a better understanding of GenAI technologies and how content is reconsidered, literature has subsequently emerged which focuses directly on pedagogy to enhance learning whilst ensuring academic integrity. The main emphasis in the literature is on the “process” of developmental learning demonstrated by students, while undertaking authentic assessment tasks, rather than relying only on the final artefact or “product” that is submitted (Lodge, 2024). Assessing “process” over “product” represents a paradigm shift in HE teaching practices, including economics (Sekwena, 2023), as it is widely recognised that greater attention is given to the output and outcomes of assessment with little attention given to understanding learning processes (Lodge & Ashford-Rowe, 2024). Thus, the neglect of the learning process coupled with GenAI tools that can produce artefacts, have created vulnerabilities for HE assessment (Lodge & Ashford-Rowe, 2024). However, teaching practices which focus on the process for how students created the final artefact provides teachers with at least some visibility (Sherwood & Raiti, 2024; Smith et al., 2024). Concurrently, the literature also emphasises “assessment for learning” as a pedagogical approach for authentic assessment (Liu, & Bridgeman, 2023). Here, students use GenAI as tools to enhance productivity (e.g. generating ideas, summarise sources) but more importantly they demonstrate learning by articulating how they use these tools in their thought processes to develop solutions to authentic problems (Liu, & Bridgeman, 2023). In doing so, providing students with on-going feedback and support throughout the learning process (not only for the final product) is positioned as a fundamental and integral component to validate assessment integrity.

Within the context of teaching economics, the literature points out a greater focus on higher-order cognitive processes and thinking skills in learning as a safeguard for academic integrity. Constructing and re-orientating numeric and text-based questions

that reflect the higher levels of Bloom's taxonomy is seen by economics educators as a strategy for addressing potential misconduct (Suleymenova et. al., 2024; Thanh et.al., 2023). At the same time, economics educators see the need for written responses (e.g. essays) to be re-designed to be fit for purpose in a changing digitally driven environment (Suleymenova et. al., 2024). Whilst there has been commentary in popular media headlining the "death of the essay", economics educators value the critical thinking required in essays and recognise that exploring alternative assessment methods and innovative pedagogies are imperative (Suleymenova et. al., 2024).

AI literacy

The focus on the learning process has naturally led to the importance for ensuring students have the skills and literacy to use GenAI tools critically, ethically and responsibly. The introduction of GenAI literacy programs is viewed as an extension of the various literacies (e.g. data, digital, information, media) that students are expected to demonstrate (Chan & Colloton, 2024). Subsequently various GenAI literacy frameworks have been developed and proposed which generally focus on understanding the uniqueness of the technology, how it is applied as a complementary tool for learning, and its ethical use (Farrelly & Baker, 2023). In economics, there is consensus that a commitment is needed to develop and introduce economics-focused Gen-AI skill sets as these are essential for enhancing education in the discipline (Suleymenova et al., 2024).

Methods and Methodology

This research focuses on a second-year undergraduate economics course (187 students) at The University of Queensland. In Semester 1, 2023, students were asked to develop an original research project in which they apply behavioural economics theory to a real-world situation. The task has eight components for students to complete (research topic, title, abstract, introduction, literature, method, conclusion, references). The full assessment task is included in Appendix F – Research Proposal Instructions for Students. Students could freely use GenAI tools for any component.

The tutorials to support students with this task focused on active learning activities. This included activities dedicated to developing students' GenAI literacy in the weeks leading up to this task. For example, students were asked to generate and critique the output from ChatGPT by comparing responses to answers given provided by the course coordinator. The students were then guided by the course coordinator and tutors in activities which focused on understanding the biases in behavioural

economics in the output generated by ChatGPT. Further, the course coordinator and tutors showed students specific examples of the use of ChatGPT for academic research.

Pedagogically, there was also a deliberate focus on the learning process undertaken by students in the weeks leading to the final submission. The weekly tutorials were designed to be “workshops” in which students showed their work in progress. This enabled the course coordinator and tutors to provide on-going feedback which in turn allowed students to continually improve their research proposal. As part of this, students were asked to present a “2-minute pitch” (formative assessment) during this process for which they received peer and tutor feedback. Essentially, emphasis was placed on students’ continual reflection of their work through continuous evaluation (e.g. regular check-ins) and reflection on their learning processes with the feedback used to encourage further iterations (Smith et. al., 2024). This also provided the course coordinator and tutors visibility of the process undertaken by each student to develop their research proposal.

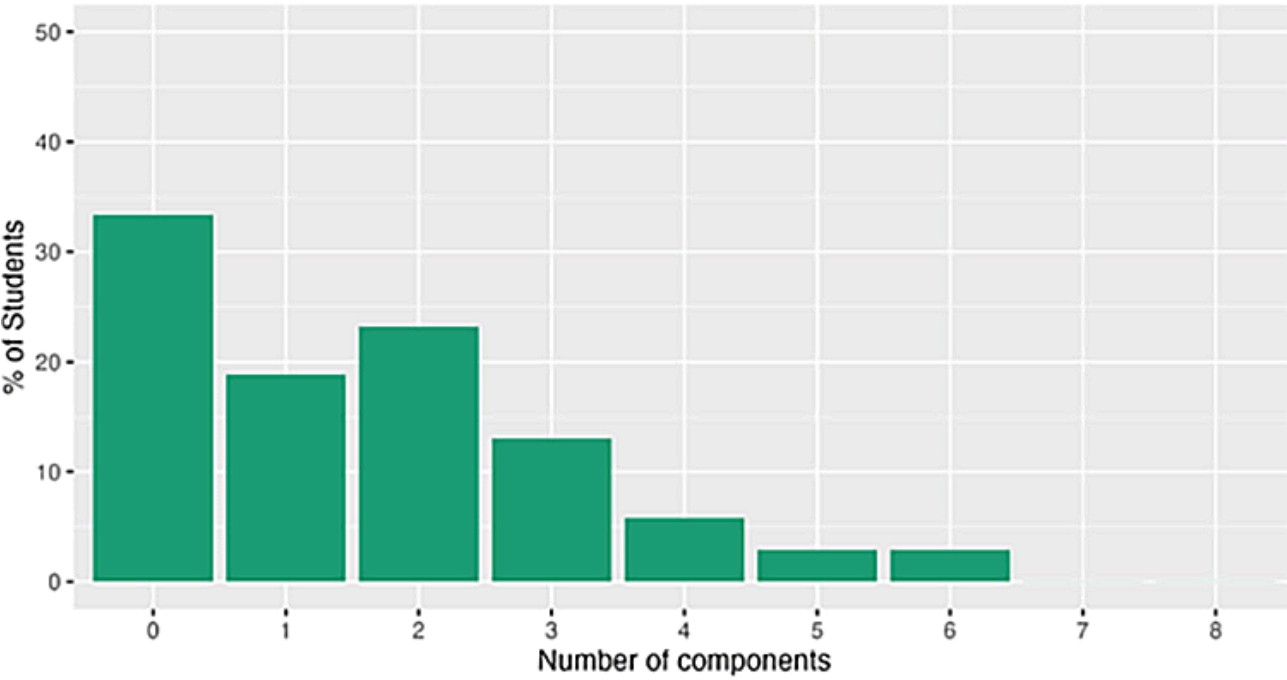
After their research proposals were submitted and marked, the students were sent a survey which asked whether they used GenAI tools for any component in the task¹. The survey was coded in Qualtrics. See Appendix G – Survey. If students answered “yes”, they were then asked to indicate which components they used GenAI tools. If students answered “no”, they would then be asked to give their reasons. 69 students (out of 187 in the course) completed the survey, a 37% response rate.

Results

The results show that two-thirds of respondents ($N=46$) used GenAI tools for their research proposal. The median number of components for which students use GenAI tools was only 2 out of 8 (See Figure 1). Further, GenAI tools were used for generating the research topic and for writing the method which are the two most heavily components in the marking rubric (see Figure 2).

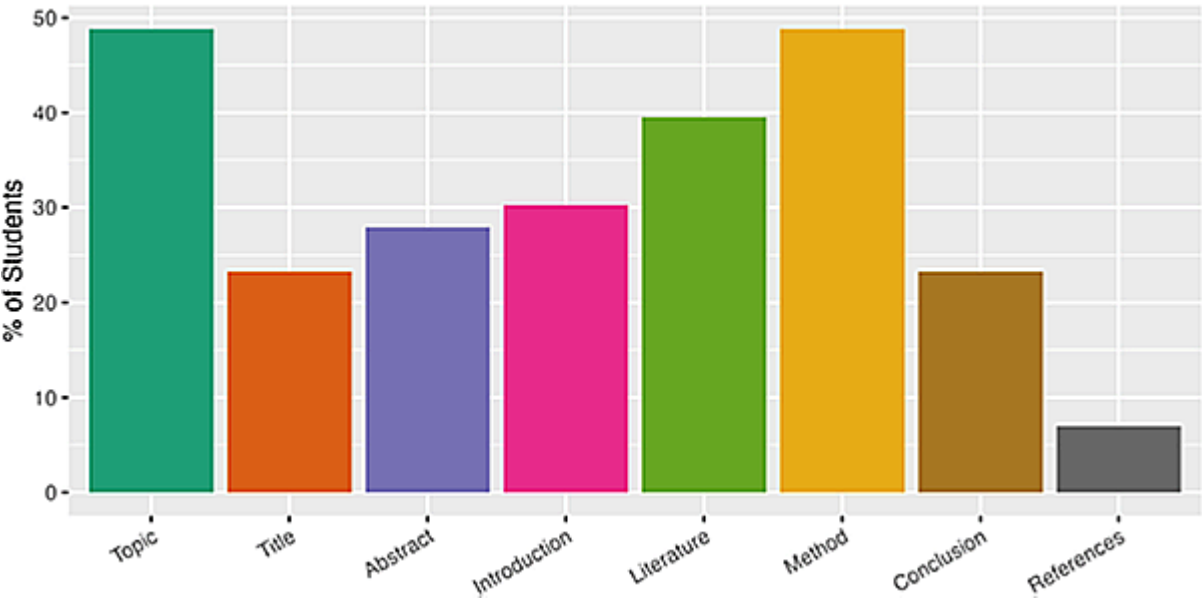
Figure 1

1. This study received ethics approval from The University of Queensland Human Research Ethics Committee (BEL LNR Panel), project number 2024/HE001346: AI Inquiry-Led Teaching Innovation.



Note. From ‘Fig. 1. Student AI Usage’ in “AI in essay-based assessment: Student adoption, usage, and performance,” by David Smerdon, 2024, *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100288>. Shared under a Creative Commons – Attribution 4.0 licence.

Figure 2



Note. From ‘Fig. 1. Student AI Usage’ in “AI in essay-based assessment: Student adoption, usage, and performance,” by David Smerdon, 2024, *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100288>. Shared under a Creative Commons – Attribution 4.0 licence.

A thematic analysis of the open-ended responses identified six themes – idea generation, writing and structuring assistance, literature search and reference assistance, grammar and error checking, statistical and data analysis assistance, and the overall impact on learning (Smerdon, 2024).

Table 1

Theme	Number of Responses
Idea generation and brainstorming	14
Writing and structuring assistance	12
Literature search and reference assistance	11
Grammar and error checking	4
Statistical and data analysis assistance	8
Overall usefulness and learning impact	9

Note. From ‘Table 5: Frequency of themes’ (Appendix A: Supplementary data) in “AI in essay-based assessment: Student adoption, usage, and performance,” by David Smerdon, 2024, *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100288>. Shared under a Creative Commons – Attribution 4.0 licence.

Additional methodological details supporting the thematic analysis can be found in Smerdon’s (2024) paper.

Reflection

Below are illustrative quotes from the student feedback for each theme as documented in Smerdon’s (2024) paper. Each student has a unique identifier.

Idea generation and brainstorming

“I found ChatGPT useful to provide a starting point for this assessment. I used it for coming up with basic ideas, so I was then able to expand upon these.” (S3)

“I used ChatGPT mainly for brainstorming and also workshopping my research idea.” (S11)

(Smerdon, 2024)

Writing and structuring assistance

"I used ChatGPT to help understand how I should structure my method section. I also used it when going through journal articles as a time saver by asking it to simplify and summarise what the article was testing." (S10)

"ChatGPT helped me structure my research proposal and ensure coherence in my writing." (S9)

(Smerdon, 2024)

Literature search and reference assistance

"I used ChatGPT only for idea generation and directing me to obscure references when I was having trouble finding appropriate articles." (S12)

"ChatGPT assisted me in finding relevant literature, although some suggestions were not reliable." (S2)

(Smerdon, 2024)

Grammar and error checking

"ChatGPT was useful in identifying grammatical mistakes, but it was very bad/useless in generating "good" ideas as they were all very basic." (S1)

"I used ChatGPT mostly as a Grammarly type tool to restructure my sentences and make them more concise." (S9)

(Smerdon, 2024)

Statistical and data analysis assistance

"ChatGPT can effectively help me propose corresponding detections based on the intelligence and data I have collected, such as t-testing, binomial distribution testing, and chi square testing." (S6)

"I used ChatGPT to recommend a method of statistical analysis for my project, as it seemed a necessary inclusion but something I had not been taught during the course." (S15)

(Smerdon, 2024)

Overall usefulness and learning impact

"I believe it had no effect on my learning. ChatGPT could potentially help generate ideas, and even write the whole proposal, but it will be extremely poor, basic and lacking everything we learnt in class." (S22)

"ChatGPT greatly reduced the time I spent in the initial stages of planning and researching." (S23)

"ChatGPT was very helpful for brainstorming and structuring my proposal, but I still had to do most of the work myself. Overall, I would have learned less without it." (S24)

(Smerdon, 2024)

Overall, the feedback from students indicates that ChatGPT was perceived to be a useful tool assisting with developing the six components in the research proposal task. Importantly, the students indicated that ChatGPT did not replace learning.

Teaching Practices

On reflection, this task highlighted that importance of assessment and technological tools being fully integrated into teaching practices. Using the TPACK model, introducing new and unique technology like GenAI changes how content is considered and consequently how this is delivered and how we think about teaching practices to enhance learning. Firstly, it highlighted that there are new foundational literacies and skills which need to be taught and developed by students. The focus on developing GenAI literacy in tutorials is an essential starting point. Secondly, the content that can

be easily generated by GenAI changes the way assessment tasks are implemented. Shifting the assessment focus from the final submission (assessment of learning) to a developmental learning process (assessment for learning) is critical.

Future Directions

More data were collected in the same undergraduate course in 2024, and further data will be collected in 2025, expanding the sample to postgraduate students. This is to (a) better understand the impact across diverse student groups, and (b) observe how the effects change over time as GenAI tools improve. In addition, it is intended to conduct a focus group of students in the 2025 and later cohorts of this course. Further, replication of this case study in other courses and programs would also help understanding of best practices for integrating AI in authentic assessment tasks. As GenAI continues to evolve, it will be useful to compare the findings of this case study during the introduction of ChatGPT in 2023 to 2025 to courses at a later stage identifying similarities and differences.

It is intended to use the findings and insights of this case study to contribute to the discourse on AI literacy in economics education. Whilst this discourse has now emerged in broad terms in HE, it is unclear how AI literacy applies to the discipline of economics. Specifically, it is unclear how “economics-focused Gen-AI skill sets” are developed and taught to prepare students to be successful in their future careers as economists. This needs to be defined and clarified by economics educators. Hence, it is intended that this case study, and the teaching and re-design of assessment in other economics courses, are a starting point for a focused discussion on AI literacy. Further, this case study can be a starting point for economics educators to establish discipline-specific communities of practice which determine and develop the pedagogical practices required for “new” GenAI-integrated learning environments.

More broadly, it is also intended for this ongoing work to inform not only teaching and assessment practices but also wider stakeholders at both local and systemic levels. A focus on providing teachers with resourcing for ongoing professional learning and the pedagogical support, and opportunities for sharing practices, is imperative as GenAI continues to evolve at a rapid pace.

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The author gratefully acknowledges Dr David Smerdon for the design of the Research Proposal assessment task in this case study and the subsequent research on how students used ChatGPT for the various components in the task. David’s research has

not only informed this case study but also contributes to the discourse on best practices for integrating GenAI in economics education and more broadly in HE.

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9.

TEACHING WITH GENAI: A TPACK-BASED CASE STUDY IN WEB AND MOBILE DEVELOPMENT EDUCATION

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Abstract

This case study applies a SoTL-informed, TPACK-based framework to examine how Generative AI (GenAI) can be responsibly embedded in web and mobile development education. GenAI was introduced across two courses through governance frameworks, structured prompting examples, API integration, and secure assessment. Data from a focus group and Student Evaluation of Course and Teacher (SECaT) comments were thematically analysed to explore student learning, perceptions, and skill development. Findings show that embedding GenAI within authentic, project-based learning enhanced students' technical proficiency, prompt literacy, and employability awareness while maintaining integrity through in-person code reviews and exams. The study contributes to SoTL by evidencing how design, pedagogy, and ethics intersect in developing discipline-specific AI literacy, illustrating a model for inquiry-led innovation that aligns with Felton's (2013) principles of SoTL focused on learning, grounded in discipline, methodologically sound, and conducted in partnership.

Keywords

Web and Mobile Development Education, AI Literacy, Prompt Literacy, Project-Based Learning, Responsible AI Integration, Authentic Assessment, In-Person Code Review

Practitioner Notes

1. GenAI literacy can be embedded across a course through iterative exposure, not a single intervention.
2. Linking GenAI use to governance and ethics normalises responsible professional practice.
3. Scaffolded prompting examples help students move from curiosity to competence.
4. Secure assessments (e.g., code reviews) maintain academic integrity while enabling authentic AI use.
5. Embedding AI literacy within project-based learning supports both employability and reflective capability.

Introduction

The embedding of Generative AI (GenAI) in COMP2140 Web/Mobile Programming and INFS3202 Web Information Systems is a course-wide approach designed to build discipline-specific GenAI literacy. The overall objective is to help students learn how to use GenAI tools in thoughtful, responsible and practical ways alongside their development of core technical coding skills. This integrated approach ensures that AI literacy is treated as an evolving professional competence rather than one-off skill development or add-on content topic. The embedding begins with the introduction of a GenAI governance framework, giving students a foundation for understanding the ethical, responsible, and governance aspects of AI. This starting point situates technical learning within broader conversations about data ethics, transparency and accountability. It also encourages students to critically question how AI systems operate, how bias is produced and mitigated and where human oversight is most essential. By foregrounding these principles early in the semester, students are invited to view GenAI through both technical and ethical lenses, framing their practice within a culture of critical inquiry and responsibility.

To build practical literacy, prompting examples are introduced towards the end of lectures, reinforcing the week's content and demonstrating how GenAI can be applied in relevant programming contexts. These examples are carefully sequenced to increase in difficulty and depth across the semester, so that students explore multiple aspects of prompting techniques, from generating and debugging code through to producing creative artefacts or design elements. This step-by-step approach builds confidence while also cultivating discernment in when and how to use GenAI effectively. Students come to see prompting as a process of reflection and iterative thinking.

A dedicated lecture extends this work by exploring how GenAI can be integrated into web products via API calls. Students learn how to build chatbots, perform API integrations, and apply Retrieval-Augmented Generation (RAG). The lecture content is supported by a lab that allows structured, hands-on practice, allowing students to experiment with these ideas in authentic, inquiry-based and project-oriented tasks. Within the assessment structure, students are given the option to include GenAI integration as an advanced feature in their projects. This optional approach encourages creativity and experimentation, while also recognising that not every project requires or benefits from GenAI. This offers flexibility and inclusivity, allowing students to engage at their own level of readiness. It also positions GenAI as a creative opportunity rather than a requirement, reinforcing learner agency and autonomy. To ensure academic integrity, both courses also incorporate a secure assessment component through either in-person code reviews or an exam. In these reviews, students must demonstrate and explain their own code, showing that they understand its functionality, structure, and design choices. This ensures that any GenAI-generated content has been critically evaluated and understood by the student, maintaining academic integrity and verifying genuine learning.

The rationale for this holistic embedding is twofold. First, it supports discipline-specific AI literacy development by gradually introducing students to governance, prompting, evaluation, and integration in authentic contexts. Second, it reflects a scholarship of learning and teaching approach where teaching innovation is a form of inquiry into how students learn with and through AI. This case offers an evidence-based exploration of how GenAI can enrich authentic, project-based learning, positioning GenAI as a catalyst for critical engagement and reflective practice. Through this approach, students learn to use GenAI responsibly while developing the capacity to critically integrate it into their emerging professional identities.

Literature Review: Embedding AI in Computing Education

Learning web development has long been recognised as challenging for students because of the breadth and complexity of skills required. Beginners must work across multiple layers of the stack: front-end markup and styling (HTML/CSS), client-side interaction programming (JavaScript), and back-end systems with database integration. This multi-layered nature creates a significant cognitive load. Park & Wiedenbeck (2011) observed that novices often struggle when faced with learning all these layers at once. Helgesson et al. (2021) likewise showed that the expanding ecosystem of software engineering tools compounds this overload for novice developers. Introducing web frameworks like React (taught in COMP2140) or Django (taught in INFS3202) further increases the complexity. Samudio & LaToza (2022)

report that students often find it difficult to adapt code snippets to framework conventions, lacking knowledge of where to add and make changes when programming. This aligns with Xinogalos & Kaskalis (2012), who noted web programming courses demand unusually high levels of conceptual integration compared to other introductory computing subjects. Given these challenges, it is unsurprising that students increasingly turn to Generative AI (GenAI) tools for support.

GenAI tools such as Open AI ChatGPT and GitHub Copilot are now able to generate web applications with increasing sophistication. They can generate boilerplate, suggest code completions, as well as scaffold front-end and back-end structures. GitHub (2023) reported measurable productivity gains from Copilot, with developers completing tasks significantly faster. Lee and Palmer (2025) found students using prompt engineering with GenAI completed programming tasks up to 55% faster, since the AI handled routine “plumbing” code. Multimodal models even allow design-to-code workflows, for example Wang et al. (2024) evaluated GPT-4 and found that it was able to reproduce user interfaces from screenshots. Beyond anecdotal benefits, broader reviews reinforce these findings. AI is already reshaping software engineering through automated code generation, debugging support, predictive maintenance, and design assistance (Alenezi & Akour, 2025). These advances accelerate development cycles, but the authors warn of ethical risks, degraded human expertise, and challenges around reliability if AI becomes over-relied upon. GenAI speeds learning and motivation by reducing tedious work but also shifts collaboration patterns with developers sometimes turning to AI instead of peers, potentially weakening social learning loops central to agile teams (Ulfsnes et al., 2024).

At the industry level, the *Jobs and Skills Australia* (2025) Gen AI Transition report outlines the future labour market implications of GenAI, suggesting AI is more likely to augment rather than replace human roles. While adoption is uneven, in all cases the demand for AI literacy and adaptability is rapidly increasing. Graduates will increasingly need to integrate AI into workflows while maintaining critical human capabilities such as evaluation, collaboration and ethical judgement. This reinforces the educational need to go beyond teaching technical programming and web development but also to embed AI literacy and reflective practice as core professional skills.

Despite the clear benefits, the risks are well documented. AI-generated outputs can be unreliable or misleading. Oertel et al. (2024) demonstrated how Copilot often produces subtly flawed solutions, while Tóth et al. (2024) showed that LLM-generated PHP code can replicate vulnerabilities seen in its training data. There is also a worrying trend; students assisted by AI often become overconfident, misjudging their code’s correctness and security (Woo et al., 2024). This highlights a tension, while GenAI can

reduce barriers to entry and increase productivity, it cannot replace human review, testing and critical thinking.

To address these issues, it is becoming important for educators to explicitly embed AI literacy within the curriculum. Students must understand AI's strengths, limitations, and ethical implications (Fitzgerald & Curtis, 2025; UNESCO, 2023). In computing education, this extends to *domain-specific AI literacy*: evaluating AI-generated code for performance, maintainability, and security in real projects. Prompt engineering is a growing area of focus, explicit instruction in structured prompting strategies improves both student confidence and output quality (Denny et al., 2023; Woo et al., 2024). Lee & Palmer (2025) highlight prompt engineering as an emerging curricular topic, suggesting that teaching students to role-assign, iterate, and refine prompts is itself a key skill for modern software education. Fitzgerald & Curtis (2025) likewise argue that graduates must not only know how to use AI, but how to use it responsibly, as part of developing the ethical, critical, and reflective capacities required in an AI-augmented world. This emphasis on responsible, situated practice connects directly to project-based learning, where students apply technical and ethical reasoning within authentic tasks that mirror professional contexts.

Project-based learning (PBL) remains central to computing education because it mirrors authentic industry practice. Sun and Deng (2024) found that structured use of ChatGPT within Kolb's experiential learning cycle deepened student engagement while Murniarti & Siahaan (2025) showed that AI support increased motivation and innovative problem-solving. However, overuse risks hollowing out learning if students outsource too much to AI. This is where secure assessments become essential. Du Plessis (2025) advocated for project-based assessment balanced with checkpoints of student accountability and Lau & Guo (2023) identified live code reviews and oral demonstrations as "middle path" solutions, allowing students to use AI tools while still requiring them to explain and defend their code. Such models ensure authentic learning with secure assessment while reflecting the realities of professional software development.

Overall, the literature points in a clear direction, web development education should integrate GenAI in a holistic yet critical way, harnessing its benefits while managing its risks. Students need scaffolds for prompt engineering, authentic projects that embed AI integration, and secure assessments to safeguard understanding. AI should be normalised as a professional tool, yet always situated within frameworks of reflection, ethics, and accountability. This approach aligns with broader labour market evidence showing GenAI will augment rather than replace human expertise (Jobs and Skills Australia, 2025). The central challenge for educators is to strike a balance, leveraging

AI's potential to lower barriers and enhance efficiency while still cultivating the deep, transferable skills that underpin sustainable learning, creativity and lifelong learning.

These disciplinary challenges highlight a broader gap identified in the higher education literature. Fitzgerald et al. (2025) argue that much existing AI-in-education research remains descriptive or tool-focused, lacking pedagogical grounding and critical inquiry into how students learn with and through AI. They call for research that unites ethics, design, and disciplinary context, what they term a pedagogically grounded, ethically aware approach to AI. This case study directly responds to that agenda, demonstrating how structured embedding of GenAI, supported by governance frameworks, scaffolding, and secure assessment can strengthen both technical skill and reflective capacity in web and mobile development education. This approach also aligns with Felton's (2013) principles of good practice in the Scholarship of Teaching and Learning, which emphasise inquiry that is focused on student learning, grounded in discipline, methodologically sound, and conducted in partnership.

Balancing Authenticity and Integrity in AI-Enabled Learning

A key challenge in embedding GenAI into COMP2140 and INFS3202 was ensuring that the project-based nature of both courses was preserved while also maintaining secure assessment practices. Allowing students to make use of GenAI tools created valuable opportunities for learning, but it also raised questions of authorship, understanding, and integrity. This required careful design to ensure that AI served as a catalyst for inquiry and reflection rather than a shortcut that undermined learning.

In COMP2140, there is no formal exam. Instead, assessment is built around four major tasks, three of which are substantial projects. To ensure security and fairness, COMP2140 includes two in-person code reviews. These reviews act as a safeguard by requiring students to demonstrate their knowledge of the code they submit, explaining design choices, debugging strategies, and how different parts of their application work. This model ensures that the projects remain authentic while providing a secure checkpoint that validates genuine understanding. In contrast, INFS3202 is structured around a major project, a code review and an exam. The exam functions as a traditional secure assessment component, while the project allows for extended exploration of backend development concepts. Together, these two elements balance the flexibility of project work with the accountability of a controlled assessment environment. Across both courses, secure assessments serve as a pass/fail identity verified hurdle assessment, confirming that students genuinely

understand and own their own work, even when GenAI tools are used to support development. This balance between openness to innovation and commitment to integrity sits at the heart of this design ensuring that the integration of GenAI strengthens authentic learning.

Methodology: A Collaborative SoTL Inquiry

This study adopts a Scholarship of Teaching and Learning (SoTL) perspective, positioning teaching innovation as a form of inquiry into student learning. To evaluate the effectiveness of this embedded approach, a small-scale qualitative study was conducted across the two courses. Students who completed COMP2140 Web/Mobile Programming and INFS3202 Web Information Systems in Semester 1 and Semester 2 of 2024 were invited to participate in a focus group facilitated by a student partner and member of the teaching team. In addition, student feedback from course evaluations was reviewed to provide a broader perspective on the impact of innovation and a small number of individual student interviews were conducted to capture deeper reflections.

This partnership model reflects the principles of collaborative inquiry, recognising students as co-investigators rather than passive participants. This methodological design aligns with the Scholarship of Teaching and Learning (SoTL) commitment to systematic inquiry grounded in classroom practice. It evaluates a teaching innovation to explore how students negotiated new forms of agency, accountability, and professional identity in AI-supported learning environments. The data were analysed using reflexive thematic analysis (Braun & Clarke, 2006).

Six students participated: three had completed both courses, while the others had taken either COMP2140 or INFS3202.

The focus group was structured into four parts:

1. Introduction: Students introduced themselves, shared their prior experience with AI, and reflected on their initial thoughts when they learned that GenAI and prompt engineering would be part of the course.
2. Understanding the AI Tools: Students discussed the usefulness of the prompting examples covered in lectures and how well the lectures and labs prepared them for assessments. Participants also reflected on whether they attempted an advanced AI feature in their project, and any technical challenges they faced.
3. Authenticity and Accountability: Students explored how the combination of project work and secure code reviews shaped their experience of learning with GenAI, including how they navigated authorship and integrity.

4. Overall Impact and Future Improvements: Students reflected on how the experience influenced their perception of AI-assisted development, whether they felt more confident about applying AI in future projects, and what improvements they would recommend for embedding GenAI in the curriculum.

In addition to the focus group, qualitative data from the university Student Evaluation of Course and Teaching (SECaT) surveys were analysed to triangulate student perspectives. The focus group was conducted online via Zoom, with participant consent obtained in advance. Recordings were transcribed and validated by facilitators to ensure accuracy. Data from transcripts were then manually coded using thematic analysis to identify patterns and key themes related to learning engagement, confidence, perceived value and ethical use of tools. This study received ethics approval from The University of Queensland Human Research Ethics Committee (BEL LNR Panel), project number 2024/HE001346: *AI Inquiry-Led Teaching Innovation*.

Findings and Reflection

The focus group discussions and annotations provide rich insights into how students experienced the embedding of GenAI within COMP2140 and INFS3202. Several interconnected themes emerged that reflect cognitive and affective dimensions of learning with AI. Students described how the courses' openness, structure and critical framing shaped their engagement, their perceptions of employability and their development as independent learners:

Normalising GenAI in Learning

Students consistently remarked that GenAI was openly discussed and embedded into the courses, unlike in other subjects where it was banned or ignored. This transparency "normalised" AI use, reducing stigma and allowing students to view it as a legitimate professional tool rather than something hidden. As one participant noted, in other courses *"we were not allowed at all,"* whereas in COMP2140 *"we learned how to use it correctly"*. This distinction was viewed positively, as students recognised the alignment between the course's approach and industry expectations. They valued the opportunity to develop GenAI proficiency as a workplace-relevant skill.

"I was surprised... about the fact that they'd actually integrated learning how to use AI into

the course. Because in that semester I had a course where we were not allowed at all... but in COMP2140 at least, we learned how to use it correctly."

"Before that most of the courses... just tried to ban it, but most students still used it. So it kind of pushed people under the rug. Now that it's always talked about, it's more normal."

By legitimising GenAI through structured discussion rather than prohibition, the course cultivated trust and responsible engagement.

Relevance to Industry and Employability

Many students emphasised that learning how to prompt effectively and integrate AI into web products was highly relevant for future employment. They described AI as a *"required skill for industry"* and linked its use to productivity, efficiency, and job prospects.

"Knowing how to use it is useful for future job prospects ... people efficient with AI will be able to get roles."

"I think it's very relevant... in implementing it into the applications and websites we make, but also just using it as a tool. It's here to stay."

"When we go to industry... we all want jobs. So I think it was a good part to use AI and ChatGPT... it saved a lot of time."

Students recognised that knowing how to use AI responsibly is now part of being work-ready.

Skill Development in Prompting and Evaluation

A strong theme was the improvement of prompt engineering skills. Before the courses, students often provided vague prompts and received poor outputs. Through lecture examples and lab exercises, they learned to be more specific, to assign roles, and to give structured instructions. This resulted in more accurate, efficient outcomes. Students also became more critical, noting the importance of verifying AI output and ensuring they still *"knew the basics"* themselves.

"Before the course I didn't provide as good prompts as I should have. I feel like the course taught me how to properly write a prompt that would give the right solution straight away."

"In lectures we got a really good breakdown of prompt engineering... giving it a role, explaining the objective, giving an example of the output you want."

"They didn't just let us do it — they taught us how to, with different structures of a prompt and showing how efficient AI can be if you provide the right information."

This theme illustrates how students developed both *technical* prompt engineering skills. The iterative design of lecture examples and labs encouraged experimentation and reflection, aligning with an experiential learning cycle (Kolb & Kolb, 2017). Students' growing discernment knowing when and how to rely on AI signals the development of *critical AI literacy*, in other words the ability to use, question, and adapt technology within disciplinary practice (Fitzgerald & Curtis, 2025).

Practical Utility and Time-Saving

Students found GenAI particularly useful for debugging, generating boilerplate code, and speeding up routine tasks. Several students said it *"saved a lot of time"* and helped them overcome blocks when stuck on coding problems. However, they also recognised its limitations: outputs could be misleading or inefficient if prompts were weak, and some still preferred traditional resources such as documentation or Stack Overflow for reliability. This blend of enthusiasm and caution reflects growing metacognitive awareness of when and how to apply GenAI effectively.

"It helps me save a lot of time... especially when debugging the code. Without AI it would take much longer, but AI can help me find it in a very short time."

"GenAI saved a lot of time and was useful for debugging when getting stuck."

"I use it for simple functions... just like create a for loop, what structure is best to have this data."

Assessment Design and Accountability

Students reflected positively on the secure assessment model of in-person code reviews. This structure ensured they could not rely on AI uncritically: they had to explain, justify and demonstrate understanding of their own code. This approach reassured students that integrity was maintained while still allowing authentic exploration of GenAI within project work.

"Even if you were to copy and paste it, you would have failed if you couldn't explain it to the tutor. The code reviews were a good way to help understand it."

"We had to reference it minimally ... just saying these lines were developed by AI and include the prompt. I think that was a really good way of handling it."

Integration of GenAI in Student Assessment Project

Students valued learning how to make API calls to GenAI models and integrate them into their assessment projects. This provided practical experience in treating AI as a feature of their applications rather than just a support tool.

"I had made an artificial marker website where you'd submit your assignment and it would call the API to give a mark and reasoning."

Two students extended these skills into their research theses on LLMs, showing how course activities transferred into higher-level inquiry.

"Now I'm using AI in my Masters thesis building chatbots."

"I'm building the AI Chatbot, and the project is about using the chatbot to help beginners debug their code. But I changed the prompt to make the chatbot not give the answers directly, but to guide them step by step."

Students applied knowledge through active experimentation and reflection,

transforming classroom learning into self-directed exploration, a key principle of experiential learning (Kolb & Kolb, 2017).

Optional vs Compulsory AI Integration in Assessment Projects

While the option to include an advanced AI feature in projects was appreciated, several students suggested making AI integration compulsory in future course iterations. Those who chose not to attempt it expressed regret, feeling they had missed a valuable learning opportunity to develop applied literacy and technical fluency. Students proposed that compulsory integration would ensure equitable engagement and deeper learning across the cohort.

"I didn't actually implement AI in my assessment... looking back I definitely regret not doing it, because having that skill would really be beneficial. Maybe making it compulsory would be even better."

"AI integration was optional, but make it compulsory."

This feedback highlights students' readiness to embrace AI as a core professional capability one that bridges technical competence with reflective, authentic learning practice.

Future Improvements and Expansions

Students identified several opportunities to expand the embedding of GenAI in future courses. Suggestions included developing a chatbot tutor to assist with debugging, expanding advanced labs to explore more complex prompting and incorporating design-focused applications such as generating visual assets and design support. Participants also recommended exploring a wider range of GenAI models and tools (e.g. Gemini, Perplexity, Ollama) beyond ChatGPT, and integrating GenAI with institutional platforms like Blackboard to provide consistent support across courses.

"It would be nice to broaden people's horizons about what you can use it for — I find myself using it the same way over and over, but there are so many interesting applications."

"Maybe having more about using AI for visual elements like generating assets or colour palettes — that would have been really helpful."

These insights highlight students' curiosity and creative engagement, reinforcing the value of iterative curriculum design grounded in feedback and reflection.

Balanced Perspectives

While many students valued GenAI's efficiency and problem-solving capacity, they also expressed caution. Some worried that over-reliance might erode foundational knowledge, especially in earlier years of study. Others described AI as a *"hit and miss tool"* that required careful prompting and verification. The consensus was that embedding it alongside secure assessment struck the right balance: students could experiment and innovate while being held accountable for genuine understanding.

"AI is just a tool... sometimes I use it and it works, but I don't really know how it worked. That happens most of the time, to be honest."

"It reinforced my perception that it's a hit and miss tool... keep it very simple and it can be useful, but otherwise you end up going down a wild goose chase."

"I think I need to know the basics... but if I don't use AI, I'll be slower than the rest of the people I work with if they do."

This balanced perspective reflects the emergence of critical AI literacy where students understand AI as both an accelerator of learning and a subject for ethical and reflective evaluation. Students recognised that success in future professional contexts would depend not on avoiding AI, but on learning to work with it responsibly and intelligently. Taken together, these reflections suggest that effective GenAI integration is an evolving pedagogical practice that must continually balance innovation with rigour, creativity with accountability, and efficiency with critical reflection.

Future Directions: Designing for Lifelong AI Literacy

Students appreciated and valued the holistic embedding of GenAI across the courses, noting that it normalised AI use and connected directly to their professional development. Since the initial embedding in 2024, GenAI has advanced rapidly, with agentic systems now capable of generating almost complete web applications. This progress raises new opportunities but also new challenges for curriculum design.

Two central challenges stand out:

1. **Balancing Fundamentals with Complexity**

It is crucial that students continue to master the fundamentals of web programming. At the same time, they need the capability to design, debug, and evaluate larger, AI-assisted systems. The curriculum must balance foundational knowledge with the realities of modern AI-augmented development.

2. **Fostering Lifelong Learning**

GenAI evolves quickly, meaning that students must complete the course not only with skills in today's tools, but also with the ability to learn and adapt with AI in the future. This requires explicit attention to learning with AI as an ongoing practice, cultivating habits of critical evaluation, reflection, and adaptation.

Looking ahead, two directions were identified for strengthening the embedding of GenAI:

- **Mandatory Integration in Assessments**

While GenAI integration was optional in 2024, future iterations could make it a required component of project assessments. This would ensure all students gain hands-on experience but introduces challenges around providing API key access and managing cost implications.

- **Refining Prompting into Context Engineering**

Prompt engineering remains important, but the focus is shifting toward context engineering: shaping the task, providing examples, and managing input/output flows for more advanced models. Teaching these skills will prepare students for a landscape where GenAI tools are increasingly agentic and system oriented.

Looking ahead, the challenge is striking a balance between grounding students in the fundamentals of web development and preparing them to adapt to rapidly evolving AI tools. Educators play a vital role in holding these two priorities together, maintaining rigour in the basics while guiding students to continue learning as technologies evolve. This case study demonstrates how structured embedding of GenAI, underpinned by ethical and pedagogical design, can strengthen both technical skill and reflective capacity. Its findings reinforce the need for educators to engage critically with AI, positioning it as a catalyst for inquiry (Fitzgerald et al., 2025), creativity, and lifelong adaptability.

AI Use Declaration

This chapter was prepared with assistance from ChatGPT, which supported aspects of writing and editing, including clarity, structure, and citation formatting. All ideas, findings, and interpretations are the authors' own, and the AI did not generate or analyse primary data or replace academic judgement.

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10.

THREE PATHS TO AI INTEGRATION: NAVIGATING KNOWLEDGE, LANGUAGE, AND REFLECTION SUPPORT IN BUSINESS EDUCATION

Sean Mitchell

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Abstract

Most educational uses of generative AI assume its value lies in producing answers. This chapter reframes AI as verifier, coach, and facilitator across three implementations at a research-intensive business school. BBOP verifies assessment choices against course rules without generating analysis, reducing cognitive offloading while preserving student thinking. NotABot embeds tiered, just-in-time language feedback inside online modules to improve pragmatic writing at scale. The Lighthouse prototypes a Socratic reflection platform that elicits metacognitive insight rather than content. Together, these cases show that guardrails and placement matter more than model sophistication; that course-specific context consistently outperforms generic tools; and that institutional infrastructure and timing strongly shape engagement. The chapter offers design principles and implementation lessons for teams seeking responsible, learning-aligned AI that amplifies cognition instead of replacing it.

Practitioner Notes

1. Reframe AI as a pedagogical partner that supports inquiry and reflection rather than automating student or educator tasks.

2. Multi-layered constraints preserve cognitive engagement and ethical practice, turning AI from answer-giver into thinking catalyst.
3. Course-specific AI aligned with curriculum and assessment produces greater learning gains than generic tools.
4. Embedding AI activities directly within learning sequences ensures relevance and timely feedback.
5. Rapid prototypes can drive engagement, but sustainable impact requires SoTL-aligned evaluation, reflection, and evidence gathering.

Introduction

Three years into the generative AI (GenAI) revolution, educational implementations remain constrained by a fundamental misconception: that AI's value lies in providing answers. Step into any university classroom discussing AI tools, and you will hear the familiar concerns—students are using ChatGPT to write essays, solve problems, or complete assignments. The discourse assumes AI's function is to generate content.

By moving beyond the chatbot paradigm, we can begin to see the deeper pedagogical potential of the technology. GenAI need not be limited to answering questions or providing information. It can verify understanding without giving answers, coach specific skills through structured practice, and facilitate self-discovery through guided reflection. The same conversational interfaces can therefore serve fundamentally different educational purposes when we reimagine their role in the learning process.

Background

In 2025, as a Principal Learning Designer at the University of Queensland Business School, I was asked to contribute my expertise in digital pedagogy and AI enhanced learning to explore how GenAI might support student learning in new and responsible ways. This work led to the design and implementation of three initiatives that deliberately subverted the instant-answer model of GenAI. These include:

BBOP – an AI-powered course tutor, embedding course-specific content to verify student understanding of assignment requirements.

NotABot – an interactive language practice tool designed for courses with high culturally and linguistically diverse (CALD) student populations that leads students through structured writing activities, providing real-time, nuanced feedback tailored to business communication contexts.

The Lighthouse – a reflective learning assistant that inverts typical GenAI interaction, guiding students through structured reflection, extracting insights from their own experiences.

This chapter documents these three implementations, examining how content knowledge, pedagogical approaches, and technological capabilities intersect. When we reimagine AI's role beyond information provision, as verifier, coach, and facilitator, we transform it from a perceived threat into a catalyst that amplifies the very cognitive and metacognitive processes that higher education seeks to develop.

Case 1: BBOP – Knowledge Support Without Answer Generation

The Problem

In the course Leading and Managing People, students analyse a current leader through the lens of approved leadership theories. On paper, the task appears straightforward: the chosen leader must be alive, currently active in their field, and publicly documented and the theories applied must be drawn from a prescribed list covered in the course. Yet every semester, a familiar pattern emerged: a significant number of students submitted work analysing deceased or retired leaders or drew upon theories not included in the course list.

The Course Coordinator, Dr Ree Jordan has provided assessment guidelines, comprehensive FAQs and clearly defined rubrics, however, students continued to misinterpret or overlook foundational requirements. Many appeared confident in their understanding but only discovered their misalignment when they received feedback, too late to make meaningful corrections. The issue was not the lack of information but its accessibility and timing. What students needed was just-in-time access to immediate, accessible guidance embedded at the point of assessment decision making.

Building BBOP (Blackboard-Based Online Pedagogy):

I developed BBOP using Zapier's ChatGPT-based platform, a prototype built in a few hours. With a carefully focused prompt BBOP could verify whether a student's chosen leader met the required criteria and whether the selected theory was on the approved list. Encouraged by these early results, I tested broader questions on assessment, content and course logistics.

The initial results revealed BBOP worked brilliantly, too brilliantly! When prompted to write a sample assessment, it produced a sophisticated analysis, which would have received a strong grade. It revealed an unintended consequence: we had inadvertently created the perfect course-specific cheating tool. Unlike general purpose platforms such as Microsoft's Copilot or generic ChatGPT, BBOP knew the assessment brief, the approved theories and even the specific expectations embedded into the rubric. It was a perfect tool for the course and therefore a perfect risk. To prevent this, we needed to implement guardrails and transform BBOP from a content generator into a learning partner. A system that verified understanding without performing the task for students. This became the foundation of what we call the Verification-Not-Generation Model.

The Verification-Not-Generation Model

Developing effective guardrails proved less of a technical exercise and more an inquiry into how design shapes learning. The first guardrail prompt, "do not write essays for students" failed. Through iterative design cycles, I reframed the challenge as a pedagogical problem rather than a programming one. I recognised that structured boundaries when clearly defined support rather than restrict student autonomy.

It took multiple rounds of testing to find the balance between guidance and independence. The winning formula combined three core elements:

Explicit instruction: A detailed prompt with seventeen explicit refusal policies targeting trigger phrases like "write me" or "draft my".

Calibrated creativity: Zapier's creativity setting was reduced to zero to ensure consistent, rule-based responses.

Prompt efficiency: A deliberately shortened system prompt improved adherence to the core teaching intentions.

The result was an AI that could verify without generating. For instance, when a student asked

"Can I write about Elon Musk for Assessment 2?"

BBOP would confirm he met the requirements as a current, active leader. However, when the inevitable follow-up came:

"Can you explain how transformational leadership applies to him?"

BBOP would respond firmly yet supportively:

"I cannot write analysis for you. However, I can confirm that transformational leadership is one of the approved theories in Module 6. You'll need to apply the four components yourself."

This shift transformed BBOP from a potential source of academic misconduct into a pedagogical tool that maintained the essential cognitive challenge for students whilst still offering support for decision making, reinforcing principles of integrity, independence, and inquiry the course sought to instil.

This approach aligns with emerging evidence on the design of educational tools. Bastani et al. (2025), in a randomised controlled trial with high school mathematics students, found that those students with unrestricted access to GPT-4 performed 17% worse on final exams than peers without AI support. However, when the researchers introduced a structured version of the tool, "GPT Tutor" with structured prompts and guided interactions, this largely mitigated any negative effects. Their findings reinforce that constraint design matters more than technological sophistication and determines whether AI enhances or undermines teaching. In this sense BBOP's Verification-Not-Generation model reflects a growing recognition that effective GenAI integration depends on pedagogical framing rather than technical capability.

The Blank Page Problem and Template Solutions

Early usage data revealed students would log in to BBOP but rarely ask a question. To overcome this, we added six template prompts to the landing page:

- "Is [leader name] appropriate for Assessment 2?"
- "What theories are on the approved list?"

- “Can you explain the difference between Theory X and Theory Y?”
- “What are the assessment criteria for the case study?”
- “When is Assessment 2 due?”
- “How should I structure my analysis?”

Engagement increased immediately. Transcript logs showed the majority of conversations began with these templates, which modelled appropriate use whilst subtly reinforcing the tool’s boundaries.

BBOP2: The Infrastructure Challenge

In Semester 2, 2025, following ethics approval and a small grant for Claude API access, we sought to replicate the success in a postgraduate Human Resources course. We rebuilt BBOP from scratch as a custom full stack React/Node/PostgreSQL application. BBOP2 was a significantly more complex development and revealed the hidden infrastructure challenges of educational AI.

The technical evolution from a Zapier chatbot to a custom platform introduced essential capabilities such as authenticated access, conversation history, research data collection, and crisis detection protocols. But this additional capability also introduced friction. Despite superior capabilities, BBOP2 saw lower engagement. Institutional approval for the Claude API was not secured until mid-semester, by which time, students had already established study routines without the tool.

The contrast reveals a fundamental tension in AI learning design. Simple low-code tools allow educators to move quickly – testing ideas, gathering early feedback and engaging students while motivation is high. This immediacy makes it ideal for innovation, experimentation and agile teaching contexts. However, these lightweight solutions often lack the data governance, reliability, and research capability required for large-scale or long-term implementation. In contrast, comprehensive platforms built within institutional systems can support accountability, security and rigorous evaluation but their development and approval processes are slow. By the time they are operational, the opportunity for authentic use may have passed. Meaningful progress in AI-enabled education depends on uniting pedagogy, technology and system change, a challenge for universities (Luckin et al., 2016).

Lessons from BBOP

1. **Guardrails require systems, not suggestions:** Single-layer restrictions fail. Multiple reinforcing mechanisms create robust boundaries that shape student

behaviour.

2. **Course-specific beats generic:** BBOP's knowledge of our exact theories and requirements made it valuable. Generic AI tools (currently) cannot provide this targeted support.
3. **Deployment timing matters more than features:** BBOP1's early availability drove engagement whereas BBOP2's delayed launch, despite superior capabilities missed the critical window for student adoption.
4. **Infrastructure gaps limit innovation:** Without institutional support for LTI integration, API approval processes, or secure hosting, every implementation becomes a complex workaround rather than a scalable solution.
5. **The blank page problem is real:** Students often need scaffolded entry points, not open-ended interfaces. Structured prompts guide appropriate use and reduce anxiety around engagement.

BBOP revealed that success depends less on technical sophistication than on timely deployment with appropriate constraints. For universities, this highlights the need for intermediate infrastructure, systems that support rapid experimentation and iteration without compromising governance, ethics or data security. Only then can educational AI realise its potential to enhance learning at scale.

Case 2: NotABot – Embedded Language Support

NotABot delivers real-time feedback on complex language tasks for Management Communication (MGTS7610), a postgraduate course where English language proficiency challenges were undermining student success. With Andrew Sankey, the course's Embedded Language Support Officer (ELSO) we used AI to transform static online modules into interactive modules that provide real-time personalised feedback.

The Problem

The Master of Business cohort at UQ faces a significant challenge: whilst course content is delivered in English, many students struggle to meet the linguistic demands of professional business communication. The rise of machine translation and GenAI tools have exacerbated this issue, enabling students to bypass the hard work of language learning rather than develop genuine proficiency. MGTS7610 formed part of a wider university initiative to address this issue through enhanced language support and resources. Andrew had created a suite of H5P modules covering business communication principles that tested basic knowledge through multiple choice and drag-and-drop activities. While effective revision tools in their own right, these

modules could not replicate the real-time, sophisticated, context-aware feedback that human tutors provide on complex writing tasks that require nuanced word choices and appropriate tone for professional audiences. With more than 500 students enrolled, providing individualised feedback on written work was unfeasible. The pedagogical challenge was to provide meaningful, discipline-specific language feedback at scale without sacrificing quality or authenticity.

Building NotABot

Andrew and I integrated GenAI-powered activities as the final element of each H5P module. Students first completed the traditional knowledge checks, then encountered NotABot as part of the learning sequence as an embedded final task.

The technical setup involved three components working together:

1. **Activity definitions such as in GitHub:** Each activity type was defined in an HTML file with specific parameters. For example, the email subject line activity was defined as:

```
'email-subjects': {  
  title: 'Email Subject Lines',  
  prompt: 'Practice writing effective email subject lines...  
    Write the subject line:'  
}
```

Figure 1 Activity Definitions

2. **URL embeddings such as in H5P:** Each H5P module included iframes that passed these parameters to Zapier:

```
<iframe src="https://teach.business.uq.edu.au/activity.html?activity=email-  
subjects"></iframe>
```

Figure 2 URL embeddings

3. **Structured prompting in Zapier:** NotABot received detailed activity-specific instructions generating ten different activity types, ranging from concise email subject lines to structured persuasive proposals to critical reflections. Each activity began with a tailored initiation such as:

"Let's practise making writing more concise. Here's a sentence from a typical business email: 'I am writing to you in order to request...' How could you make this more direct?"

The Feedback Balance

Designing appropriate feedback proved unexpectedly challenging. Initial versions were overly pedantic; the AI would critique technically correct but stylistically imperfect sentences in ways a human instructor would not. We refined the model extensively, tempering the language with phrases like *"that's moving in the right direction"* and *"you're on track"* to create feedback that was encouraging and constructive.

A three-tier scaffolding system underpinned the final design:

Tier 1: General hints pointing students toward relevant communication principles

Tier 2: Specific questions highlighting problematic elements

Tier 3: Sentence frames that offered structure without supplying content

Even with maximum support, students were required to construct their own responses. This was deliberate given the cohort's tendency to rely on translation tools. Our goal was to make learning visible, not make writing easier: authentic language competency without shortcuts.

Evidence Informed Design

Our approach aligns with evidence on GenAI-supported language learning. Mahapatra's (2024) mixed-methods study found using ChatGPT as a feedback coach led to significant gains in ESL students writing complexity and organisation. Similarly, Deep et al. (2025) reported that AI-enhanced language learning improved proficiency and engagement, when properly scaffolded. The three-tier scaffolding design used in NotABot reflects findings that structured support maintains learning outcomes whilst unfettered access creates dependency (Bastani et al., 2025). By initiating

conversations at the point of learning, NotABot addresses help-seeking barriers identified by Seo et al. (2021), who found students valued just-in-time support regardless of who initiated it.

Implementation and Integration

NotABot activities appeared as the final component of each module, a natural continuation after concept introduction and knowledge checks. Students did not need to navigate elsewhere the activities were immediately available when concepts were most salient.

Each AI-supported activity included three to four practice tasks with gradually escalating complexity, typically requiring eight to ten minutes to complete. This integration ensured that language development was woven into the course flow rather than treated as an optional task, reinforcing accessibility and sustained engagement.

Student Response

Informal feedback from 118 respondents (a 23% response rate) showed that 89% found NotABot useful. Students particularly valued understanding why their writing needed improvement, not just what was wrong. Several commented that receiving immediate in-context feedback at the point of learning was far more valuable than waiting for comments on formal assessments.

However, some students found the feedback was occasionally inconsistent, reflecting the ongoing challenge of calibrating prompt design to balance encouragement with appropriate correction. Others requested more workplace-contextualised scenarios rather than generic business examples, suggesting that greater contextualisation would further enhance authenticity and relevance.

Limitations and Lessons

While NotABot's anonymous architecture protected privacy, it also prevented measurement of learning outcomes. Additionally, Zapier's text-only environment imposed notable constraints. Ideally, future iterations would include spoken interaction for conversational practice, particularly valuable for students from culturally and linguistically diverse (CALD) backgrounds. Similarly, visual communication activities such as slide layouts or infographics remain on our development wishlist. A full-stack API environment, similar to BBOP2, could enable

these multimodal capabilities but would again cause institutional challenges and require the same complex approval processes that risk delaying implementation.

NotABot's effectiveness emerged through iterative refinement of its feedback approach. As we had transcripts of all student interactions, we were able to analyse these and identify when feedback was not working well. This analysis revealed patterns in both successful and problematic interactions, leading Andrew to codify six core pedagogical principles that governed how the AI should respond. The first and most fundamental principle established that the AI must never provide complete, corrected answers, as doing so prevents genuine learning. Instead, the system employs a scaffolding method that progresses through three levels of support: general conceptual hints, targeted leading questions, and only as a final step, sentence frames that guide structure without providing content.

The remaining principles address specific interaction challenges that emerged from the transcripts. When students provided minimal or off-topic responses, the AI follows an engagement protocol that gently redirects on the first instance, applies more direct scaffolding on the second, and gracefully concludes if no genuine effort materialises. To prevent superficial learning, the system recognises and discourages mimicry, prompting students to produce original attempts when they simply copy provided examples. A relevant tangent protocol allows the AI to briefly address student questions related to the broader topic before transitioning back to the task, validating curiosity without derailing learning objectives. Finally, a proficiency protocol ensures the AI recognises professionally acceptable responses and concludes successfully rather than over-correcting strong work with minor stylistic suggestions. Together, these principles transformed NotABot from a generic chatbot into a pedagogically responsive tutor that balances support with challenge.

Ultimately, NotABot demonstrated that conversational AI can deliver meaningful, sophisticated feedback for complex language tasks at scale. Its success rested on collaboration between learning design and language support expertise, neither could have created this alone. The fundamental challenge for Higher Education lies in balancing rapid, responsive deployment to meet immediate learning needs with the infrastructure required for rigorous evaluation and sustainable growth.

Lessons from NotABot

1. **Feedback tone matters:** Overly critical or mechanical AI feedback discourages engagement; human-like encouragement and formative phrasing sustain motivation.
2. **Scaffolding sustains learning:** Structured, tiered feedback prevents dependency

and promotes genuine language development.

3. **Context drives authenticity:** Discipline-specific examples and scenarios make AI feedback more relevant and transferable to real workplace communication.
4. **Integration beats add-ons:** Embedding AI activities within existing modules ensures consistent engagement and lowers the barrier to use.
5. **Collaboration is essential:** Effective AI-supported learning requires multiple stakeholder expertise to achieve meaningful outcomes in isolation.

Together, BBOP and NotABot illustrate that the success of educational AI depends on pedagogical agility rather than technological sophistication, the ability to design, deploy, and adapt tools rapidly in response to evolving learner needs and institutional contexts.

Case 3: The Lighthouse – Reflective Learning Platform

The Lighthouse is the most ambitious and as yet untested of our three implementations: an AI powered reflection tool designed to facilitate self-knowledge. The Lighthouse remains in pre-pilot development and is currently being built by an in-house developer. Its inclusion here documents design rationale for AI role inversion before evidence can validate or challenge assumptions.

The Problem

Cameron Turner, an entrepreneurship course coordinator, faced a recurring pattern with MBA students tackling wicked problems like homelessness and climate change. Students often approached these challenges with confidence but little depth, proposing solutions after minimal investigation. They assumed understanding of problems they had never personally experienced and their proposals were predictably superficial. To address this, Cameron embedded two mechanisms intended to cultivate humility and insight, drawing from Owens et al.'s (2013) expressed humility framework: structured interviews and reflective writing. Rather than focusing solely on entrepreneurial skills, the approach aims to foster humility, a willingness to view oneself accurately, value others' strengths and contributions, and remain open to learning.

Students interviewed 100 people with genuine insights or expertise into the chosen problem. Some interviews were formal, while others were spontaneous, the unplanned conversations often yielding the richest insights. Through these encounters, students confronted the gap between their initial assumptions and the

complex realities they sought to address. Weekly written reflections throughout the semester deepened the process, with brief and targeted feedback from Cameron.

The combination proved transformative. Exposure to lived experience, structured reflection, and instructor feedback instilled genuine humility and deeper understanding. Students recognised the gap between their initial assumptions and the complex reality revealed through deep listening. Better yet, these insights led to more nuanced, viable solutions to niche problems, that could not have been reached without this reflective process. For many MBA students from corporate backgrounds, this was their first encounter with reflective practice. The learning curve was steep, but the growth was tangible.

Yet the model came at cost. Providing even brief feedback on weekly reflections for a large cohort required substantial time and energy. Cameron recognised that the power came from the structured reflection itself, and the probing questions forced students to examine assumptions and biases. If such guided reflection could be systematised without sacrificing depth, it could become accessible at scale without requiring intensive instructor feedback on every submission.

Building The Lighthouse

The core hypothesis behind the Lighthouse emerged from observation: the most powerful learning comes from questioning not answering. This question over answering approach draws support from multiple research domains. Favero et al. (2024) found that a Socratic chatbot significantly improved learning outcomes compared to direct-help baselines, with engagement increasing over successive conversation turns. Similarly, Kestin et al. (2025) in a Harvard randomised control trial reported that carefully prompted AI tutoring outperformed in-class active learning, providing the prompts were expertly crafted and structured scaffolding was explicit. In contrast, Fakour and Imani's (2025) comparative study observed a bimodal response pattern, while some students thrived with AI Socratic tutoring, others found it alienating, highlighting important questions about how to scale intimate reflective learning through AI facilitation.

The Lighthouse inverts the typical AI interaction entirely. Rather than providing information or teaching skills, it asks questions, extracting insights from students rather than providing answers. The platform architecture is designed around multiple reflection modes, each serving different pedagogical purposes:

- **Baseline measure:** A comprehensive 20-minute guided reflection exploring values, assumptions, and readiness before students begin their interviews. This

establishes a foundation for measuring growth over time.

- **Micro-reflections:** After each interview, students upload artefacts (recordings, notes, photos) and immediately respond to brief prompts capturing takeaways before the memory fades or rationalisation sets in. Questions such as “*What surprised you?*” or “*What assumption did this person challenge?*” capture authentic reactions.
- **Scheduled check-ins:** Periodic reflections throughout the semester prompt students to revisit earlier thinking. The system references prior responses, “*Three weeks ago you said X. How has your thinking changed?*” to scaffold metacognitive awareness.
- **End-of-semester synthesis:** A longer reflection draws together the full arc of learning, with 100+ micro-reflections and multiple check-ins, students trace specific moments where understanding shifted.

This design is supported by Xu et al. (2025) whose study on metacognitive prompts in GenAI found significantly improvement in both self-regulated learning and student experience versus control groups. Prompts encourage learners to assess comprehension, identify confusion, and seek clarification fostering awareness of their own thinking processes, precisely the capability that the Lighthouse’s multi-modal approach aims to cultivate.

The Facilitation Approach

This case investigates how AI can act as a facilitator of reflective learning. Initial testing revealed a persistent AI problem, verbosity. Early responses to student reflections generated 200-word sycophantic paragraphs, creating what testers described as “being lectured at” rather than listened to. The point of the tool was to listen and help probe for insights, not to provide a running commentary. The system prompt now mandates 60-word maximum responses following a strict format: warmly acknowledge what the student shared, create a bridge to the next question, ask the question, nothing more. This constraint required careful calibration. Research on Socratic questioning emphasises validation before challenge, students will not engage with probing questions unless they feel heard first (Fakour & Imani, 2025; Owens et al., 2013). The warm acknowledgement serves this purpose, mirroring the humble leadership principle of appreciating others’ contributions before guiding deeper examination, but must remain brief enough to maintain focus on student thinking rather than AI observations.

The baseline reflection tracks students through nine thematic stages, deliberately sequenced from comfortable topics (warmup questions about recent positive

experiences) to more challenging territory (examining assumptions and uncertainties) and finally to integrative reflection (connecting values to decisions) (Owens et al., 2013). This mirrors the approach of skilled facilitators who first build psychological safety before guiding learners into more complex and potentially uncomfortable territory.

The micro-reflections employ graduated probing similar to NotABot's scaffolding but applied to reflective thinking rather than skills practice. When students give surface-level responses, the persona they interact with, Keeper Kim, asks progressively more specific questions: *"You mentioned surprise—what specifically surprised you? What were you expecting instead?"* This iterative exchange continues until genuine examination emerges, or it becomes clear the student is not yet ready to engage deeply.

Safety Parameters and Wellbeing Concerns

Facilitating deep personal reflection introduces risks absent from knowledge verification or language coaching. When students examine assumptions about wicked problems involving marginalised communities, they may confront uncomfortable realisations about privilege or ignorance. Some may also disclose mental health concerns, trauma, or crisis situations. Current protocols include crisis detection keywords triggering referral to counselling services, explicit disclaimers that Keeper Kim is not a therapist, boundaries around engagement topics, and opt-out mechanisms. The key challenge is distinguishing between productive discomfort that is necessary for growth and psychological distress, which requires intervention. Keeper Kim must ask challenging questions about assumptions whilst recognising when students cross from reflection into crisis.

Fakour and Imani's (2025) comparative study found bimodal distribution when comparing ChatGPT to human tutors for Socratic teaching, working well for some students whilst alienating others. This uncertainty about how students will respond to AI facilitated self-examination informs our staged pilot approach, which functions as an ethical safeguard and a systematic inquiry into student experience.

Pre-Pilot Status and Next Steps

The Lighthouse is still in development. A small pilot version will be released to students for feedback late in Semester 2, 2025, with plans for a full release in Semester 1, 2026. Initial prototyping confirmed the concept's technical feasibility, but institutional approvals delayed full platform development, which is underway at time of writing.

The Lighthouse will be deployed in two postgraduate entrepreneurship courses. The staged rollout reflects both technical complexity and the lack of direct precedent. Whilst research validates Socratic AI for academic content, The Lighthouse applies this approach to personal development and self-examination, territory with less empirical grounding. OpenAI's Study Mode, launched in July 2025, employs similar Socratic principles but focuses on academic content rather than intimate personal reflection (OpenAI, 2025). The pilot will test only the baseline reflection component, the twenty minute guided conversation with Keeper Kim. Micro-reflections, scheduled check-ins, and synthesis components remain in development. The phased approach allows us to validate the core facilitation model before building the full platform infrastructure. We are piloting with volunteers rather than requiring participation, introducing selection bias, but aligning with ethical principles around sensitive personal data.

Key questions remain unanswered: Can AI distinguish genuine from performative reflection? Will students engage honestly with AI facilitation, or find it clinical and alienating? What is the optimal balance between structured question sequences and flexibility for tangential exploration? What is lost versus gained in AI mediation compared to human facilitation?

Perhaps most significantly: we are testing whether systematised reflection can achieve outcomes that are demonstrably valuable but difficult to scale. While questioning frameworks have been validated for academic content, applying them to intimate self-examination enters less-charted territory. The pilot will reveal whether The Lighthouse represents pedagogical innovation or technological overreach. This Lighthouse pilot reflects the call by Fitzgerald et al (2025) for AI research that is pedagogically grounded, ethically aware and focused on Human-AI collaboration. Alongside BBOP and NotaBot, it tests how design and ethics intersect in shaping meaningful learning.

Conclusion

These three implementations trace a clear progression, from AI verifying knowledge (BBOP), to coaching skills (NotABot), to facilitating reflection (The Lighthouse). Each moved further from the instant-answer paradigm that defines most educational AI use and with that came increasing technical, pedagogical, and institutional complexity.

BBOP's journey from Zapier prototype to custom architecture demonstrates a fundamental tension in educational AI development. Simple tools enable quick rollout and early adoption when engagement matters most. More comprehensive systems offer research infrastructure and enhanced capabilities but risk missing the critical engagement windows through lengthy approval processes. Universities need

intermediate solutions, infrastructure and processes that enable us to move fast while staying rigorous and compliant.

Across all three cases, the guardrails prove more critical than the underlying technology. BBOP's 17-policy framework to prevent cognitive offloading, NotABot's three-tier scaffolding that maintained productive struggle, and The Lighthouse's safety protocols to distinguish growth from distress, these design choices shaped learning far more than model selection. The same technology, applied differently, produced very different outcomes. Building on these constraints is hard work; it takes iteration, pedagogical judgement, and a willingness to let go of some of functionality for the sake of learning integrity.

NotABot also showed how timing and placement shape engagement. Embedding practice immediately after concept introduction, initiated by the AI rather than requiring student navigation, created engagement patterns that exceeded typical chatbot interactions. The architecture is not extremely complex, built from GitHub definitions, iframe parameters and Zapier prompts that require moderate technical expertise. The key element is the pedagogy, not the technology. This challenges the assumption that educational AI requires complex infrastructure. Sometimes the innovation lies in when and where the tool appears, not in how it works.

Several patterns emerge across all three cases. Course-specific implementations consistently outperform generic tools. BBOP trained on leadership theories, NotABot embedded within business communication modules and The Lighthouse designed for entrepreneurship reflection. Collaboration between learning designers and subject experts was essential every time. Anonymous architectures such as BBOP1 and NotABot allowed rapid deployment but limited outcome measurement, while authenticated systems like BBOP2 supported research capability but introduced engagement friction.

Most significantly, these implementations depended on a level of institutional readiness that many universities still lack. IT approval processes, ethics protocols, LTI integration capabilities, API access policies, the infrastructure that supports sophisticated educational AI is still catching up. The technical complexity we navigated is not unique to our context. Until universities develop intermediate infrastructure that allows rapid iteration under clear governance, educational AI innovation will remain caught between the two options: limited-but-quick tools or comprehensive-but-slow.

The chatbot paradigm persists because it feels intuitive: ask a question, get an answer. Moving beyond that requires reimagining AI's role entirely, as a verifier rather than a generator, coach rather than answer provider and questioner rather than

expert. These three implementations demonstrate such reimagination is possible. Collectively, these cases illustrate the shift that Fitzgerald et al. (2025) call for, toward pedagogically grounded, ethically aware AI research and echo Costello et al. (2025) in reminding us that the future of AI in education depends not only on what we build, but on how we frame, question, and understand it.

AI Use Declaration

This chapter was prepared with assistance from Claude and ChatGPT, which supported aspects of writing and editing, including clarity, structure, and citation formatting. All ideas, findings, and interpretations are the authors' own, and the AI did not generate or analyse primary data or replace academic judgement.

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11.

LEADING AND PRACTISING GENAI CARE-FULLY

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Abstract

This thought piece explores how the Scholarship of Teaching and Learning (SoTL) can guide educators to lead with curiosity, collaboration, and care in the age of generative AI. Here we reframe leadership as relational rather than hierarchical, anchored in inquiry, reflection, and shared learning. The chapter traces a co-designed research project that used metaphors to explore how educators and students conceptualise GenAI's role in higher education. This creative and critical approach foregrounded the ethical, pedagogical, and emotional dimensions of AI while amplifying diverse voices through collective authorship. Framed by contemporary SoTL research, echoing calls for pedagogically grounded and ethically aware AI practice (Fitzgerald & Curtis, 2025), the piece positions care-based leadership as central to shared understanding in times of technological disruption. Leading and practising GenAI care-fully means moving beyond control and certainty to cultivate inclusive, reflective spaces for inquiry and educational transformation.

Introduction

As an educational developer, I lead multidisciplinary teaching and learning projects without formal authority. This work is relational, boundary crossing and often invisible, travelling “under, over, and through institutional fences, to cross professional and academic, technological, and educational boundaries” (Taleo & Vallis, 2022, p. 312). In other words, it is complex work that relies on connection rather than hierarchy.

Yet in times of technological crisis, whether the rapid ‘pivot’ to online learning during the pandemic (Vallis, 2021), or the advent of generative AI (GenAI) in 2023, university colleagues naturally turn to educational developers for guidance. My experience in educational technology offered a headstart, but like others, I was learning how to teach with large language models without fully understanding their inner workings (Bearman & Ajjawi, 2023). This uncertainty became a starting point for inquiry rather than anxiety, guiding me toward the Scholarship of Teaching and Learning (SoTL) as a way to lead through disruption.

I chose not to listen to the mansplaining of ChatGPT (Jackson, 2025) or to add my own voice to that chorus. Instead, I turned to SoTL as a framework for leading through uncertainty. By treating my own teaching as a site of systematic inquiry, and by documenting, analysing, and sharing that creative inquiry with others, I could transform personal experimentation into collective knowledge-building. This approach situates GenAI within a broader educational context, part of a bigger picture that considers how technology reshapes learning and assessment and student experience, beyond seeing it as a technical solution or threat. It also repositions leadership as curiosity over control.

SoTL as Leadership Practice

Leading through SoTL means experimenting with GenAI in my own teaching and learning, reflecting critically on the process, and using that experience to inform educational design. This learning cycle of moving through experience, reflection, conceptualisation, and experimentation (Kolb, 2015), becomes a form of relational leadership grounded in scholarly inquiry. Such relational leadership resonates with Fitzgerald et al.’s (2025) call to move SoTL beyond tool-centric innovation toward ethically grounded inquiry into how GenAI reshapes teaching, assessment, and educational relationships.

Across disciplines, academic colleagues face similar challenges integrating GenAI in assessment. SoTL offers both a mindset and methodology for working through complexity. Leading conversations with a combination of lived experience and evidence helps demystify the process and the technology. I don’t claim to have all the answers but I am willing to deep-dive into problems with colleagues; to experiment, document, analyse, and learn from those shared experiences. Making that learning public and subjecting it to critical reflection helps others do the same. Building trust is often a natural outcome of this collaborative sensemaking, opening new pathways for connection, collaboration and innovation.

In this way, I follow in the footsteps of women in SoTL who have enacted change

through practice rather than proclamation. This form of leadership is especially valuable during technological disruption (Brown et al., 2024). These women tend to lead by doing rather than declaring, initiating collaborative projects, creating inclusive research spaces, and legitimising practitioner knowledge. My own practice has been enabled by women SoTL leaders who have actively created opportunities for me to contribute and lead.

But what does this SoTL leadership look like in practice?

Practising Generative AI in Higher Education: A SoTL Story

One example of leading and practising GenAI is an educational research project I initiated. In this project, I designed and developed with colleagues a creative and critical approach to GenAI using metaphors; one that intentionally steered away from technical explanations and prompt engineering exercises and avoided framing GenAI as a software problem to overcome.

Drawing on co-design principles, we brought together educators, researchers, professional staff, and students to question what GenAI means through playful, reflective activities in a series of workshops. Thinking *with* and *through* metaphor helped us to surface assumptions, concerns, and hopes about GenAI's role in teaching and learning. One student group chose water as their metaphor: GenAI as abundant, adaptable, capable of nourishing or destroying. They then questioned whether this all-encompassing metaphor could capture GenAI's specificity, exemplifying the critical reflexivity we sought to develop.

Workshops were held across varied educational settings and at international conferences. The metaphor artefacts generated were analysed to understand what participants thought of GenAI's agency, risks, and potential. We invited participants to extend their thinking in a collaborative writing project: a student, a media producer, four learning designers, and six academics contributed written reflections. Their ideas were synthesised into themes and shared, with contributors reviewing and refining the final analysis.

The result is a co-authored chapter with different disciplinary, cultural and professional perspectives from as far and wide as Perth, Alice Springs and Sydney, Australia (Vallis et al., 2025). Many of our contributors were publishing in academia for the first time. We demonstrate the value of working together and sharing individual and collective understandings as we make sense of GenAI together in higher education. This collaborative spirit sits at the heart of this Inquiry in Action collection,

where educators translate experimentation into scholarship and uncertainty into shared understanding.

Leading Care-fully with SoTL

The metaphor project exemplifies leading care-fully: creating space for all voices, supporting scholarly growth, while mindfully probing the ethical, pedagogical, and emotional dimensions of GenAI collectively. In this sense, multiple lived experiences are more powerful than notions of gate-keeping individual expertise. This work requires patience. Some colleagues questioned whether metaphors constituted ‘serious’ learning, the workshops were declined by two educational technology conferences, and participation rates reflected the reality that creative inquiry sits uncomfortably alongside institutional demands for efficiency and certainty.

Yet women leading SoTL projects continue to open doors and build capacity. Like others, I have strong opinions about educational technology, but I prioritised creating conditions for collective inquiry and scaffolded pathways for first-time authors, rather than announcing my position on GenAI in education. This honours what women in SoTL have long practised: leadership that recognises expertise as relational and distributed, not a heroic individual achievement. Learning with GenAI, then, is less about certainty or control and more about staying open to the entangled realities of emerging technology within a wider relational and ethical landscape (Gravett, 2025). Leaders can ground their own learning in this curiosity, collaboration, and care.

AI Use Declaration

This chapter was prepared with assistance from Claude Sonnet 4.5, which supported aspects of writing and editing, including clarity, structure, and citation formatting. All ideas, findings, and interpretations are the authors’ own, and the AI did not generate or analyse primary data or replace academic judgement.

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12.

TEACHING THAT TRANSFORMS: REIMAGINING HIGHER EDUCATION IN THE AGE OF AI

Rachel Fitzgerald

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Abstract

This concluding chapter brings together the insights and provocations from across the collection to reimagine higher education in the age of artificial intelligence. It argues that meaningful innovation arises from reflection, ethics, and purposeful design. As generative AI becomes a defining feature of academic life, universities must move beyond policy debates to cultivate literacy, leadership, and integrity in practice. The chapter explores how educators are evolving from gatekeepers to guides and are reframing teaching as a relational act grounded in care, collaboration, and curiosity. It calls for equity, transparency, and accountability to be embedded as design principles that ensure AI serves human learning rather than replacing it. Finally, it proposes a definition of AI literacy that is contextual, ethical, and creative and asserts that the future of higher education will not be determined by sophisticated technologies, it will be determined by the strength of our values and commitment to teaching that transforms.

Keywords

AI literacy, learner-centred leadership, pedagogy of care, assessment, equity, feedback, SoTL, higher education

Introduction

As this collection draws to a close, it is safe to say that inquiry in action is what sustains meaningful innovation. Across disciplines and contexts, each chapter has shown educators grappling with the same essential question, how to design, teach, and lead when technology reshapes what it means to learn. The stories shared here remind us that transformation comes from reflection, ethics and courage. Generative AI has intensified this work, challenging us to balance experimentation with care and to ensure that human learning remains at the centre of every learning design decision. This project began as a response to disruption but has since evolved into a collective reimagining of pedagogy, one that invites all of us to act with purpose in shaping the future of higher education.

Our universities need adaptive systems that are responsive to the evolving needs of our learners and society more broadly (Sankey et al., 2023). The university of the future must learn to innovate without losing sight of its purpose, which is to cultivate curiosity, foster connection, and create societal impact. The innovations showcased throughout this book demonstrate how educators are weaving AI into feedback, reflection, simulation, and assessment. The real takeaway lies in the spirit of inquiry that shapes the use of technology. Each case represents design thinking in motion, an exploration of how tools can expand participation, clarify learning, and re-centre the student voice. Collectively, the chapters tell us that pedagogy remains our most powerful form of innovation and that collaborative learning is the most sustainable way of developing our future graduates.

Why Responsible AI Use Matters Now

As AI becomes a defining condition of graduate life, many students continue to encounter it through uncertainty or exclusion rather than purpose (Henderson et al., 2024). Higher education, by its nature, is slow to change and it will take time for institutions to adapt and prepare learners for this new reality. Yet students are ready for educators to lead this transition. Recent evidence from a national study across four Australian universities reinforces this point: while nearly half of the 6,960 students surveyed sought feedback from generative AI, they consistently rated teacher feedback as more trustworthy and contextually relevant. At the same time, they valued AI feedback for its accessibility, immediacy, and perceived neutrality (Henderson et al., 2024). These findings remind us that literacy, dialogue, and trust are the conditions through which learning systems evolve.

These findings also highlight an urgent need for higher education to cultivate AI-

era literacy that includes the ability to evaluate, interpret, and ethically engage with machine-generated feedback. The case studies in this collection begin to address this gap by fostering literacy, dialogue, and trust between educators and students. Responsible AI use is, at its heart, about developing good judgement. Our future professionals must be able to interrogate data sources, detect bias, understand context, and apply ethical reasoning (Fitzgerald & Curtis, 2025). For educators, this means teaching with transparency and humility and having the courage to model learning in real time. It means recognising that AI belongs within the curriculum, not outside it.

The Educator's Evolving Role

This book implies a reimagining of the educator's role, as the boundaries between human and machine intelligence continue to blur. As facilitators of learning and responsible practice, educators need to model curiosity, critical thinking, and ethical awareness in ways that help students navigate an increasingly complex landscape. As educators become guides in uncertainty, they help learners build the confidence and judgement to use intelligent tools and technologies with integrity and purpose. Across the chapters in this book, we often see this movement as authors shift from gatekeepers to guides. As in the early days of online learning when many feared the loss of authority to the screen (Sankey et al., 2023), similar anxieties now surround AI. However, in education, it is increasingly evident that authority is grounded in trust rather than control.

When educators invite students into questioning and co-design, learning becomes shared, visible, authentic, and more engaging for all. This is leadership at its most relational, built on curiosity and the willingness to learn alongside students, with the courage to make mistakes publicly, and the capacity to translate complexity into care. It reflects learner-centred leadership, where educators act as co-learners and collaborators who design for curiosity, integrity, and inclusion (Krause, 2024). In this view, effective AI integration is part of a broader learning ecosystem in which staff and students co-create understanding through experimentation and reflection.

This shift asks us to rethink what it means to teach. Active learning does not happen by chance, it happens when theory meets practice and staff and students are confident enough to take risks (Czaplinski & Huijser, 2023). It requires deliberate choices about tasks, facilitation, and relationships, regardless of context. Many academics begin with content and then look for strategies to fit, consulting learning designers only at specific stages or when problems emerge. Few have mentors for teaching, and sustained collaboration with educational experts remains limited (Sim & Huijser, 2023). As a

result, technology is often used to transfer information rather than to promote interaction, and institutional barriers can discourage experimentation. Without adequate time, support, and structures, innovation is easily lost. Yet, across these case studies, we can see how collaboration and space for reflection can initiate new and innovative approaches to learning.

Collaboration is particularly important as many academics now carry a triple role as disciplinary expert, designer of learning, and facilitator of knowledge transfer (Czaplinski & Huijser, 2023). However, expertise in a field does not automatically translate into pedagogical expertise, and cognitive entrenchment can make it difficult to see problems as students do. Institutions that seek robust learning must therefore invest in learning design for both lecturers and tutors, with explicit time, recognition, and practical development to match. Good teaching strengthens both the academic and affective dimensions of learning through care, presence, and interaction, qualities that are essential to active learning and belonging (Kahu & Picton, 2019).

To make this sustainable, the book points to structures that work; ongoing, planned collaboration with learning designers and student partners and communities of practice where educators test ideas, examine theory together, and bring evidence into everyday design (Fitzgerald et al., 2020; Pleschová et al., 2021). In practical terms, we need to embed learning design capability across roles and align workload with the time it genuinely takes to build active learning. We also need to make collaborative design the norm by resourcing educator–designer–student partnerships throughout the teaching cycle, not only at the start. Finally, we must treat technology choices as pedagogical decisions guided by theory and evidence, with the aim of making participation visible, relational and connected. These are the conditions that turn classrooms into places where curiosity grows and confidence takes root.

The academic role is no longer confined to content expertise alone, it now encompasses design, facilitation and the building of learning communities. This relational shift reflects a pedagogy of care, one that values connection and belonging as much as mastery and output. Within this scenario, AI becomes a catalyst for rediscovering the essence of teaching. The educator’s evolving role is, at the core, an ethical one. It calls for courage to unlearn, to question, and to design with humanity at the centre. When we teach with openness and curiosity, we remind students that learning has always been a profoundly human act, something that no algorithm can replicate.

Equity, Transparency, and Accountability

As educators take on these expanded roles, leadership becomes inseparable from

ethics. Designing for learning also means designing for fairness. The same curiosity and care that drives innovation must guide how we use AI responsibly and inclusively. We must consider equity, transparency, and accountability as design principles that shape educational decisions. The digital age has already exposed inequities that AI risks magnifying. Students from diverse linguistic, cultural, and economic backgrounds may rely on AI tools more heavily yet also be more exposed to their biases (Pierrès et al., 2024). Inclusion cannot be assumed; it must be intentionally designed into the curriculum for transparency to follow. Students deserve clarity about how AI is used in teaching and assessment, and about the expectations that govern its ethical application. Co-created guidelines and open discussion restore confidence where secrecy breeds mistrust.

Accountability, both personal and institutional, anchors the future of responsible innovation. Assessment in the age of AI represents a wicked problem, without simple solutions, demanding iterative, value-based responses from educators and institutions alike (Corbin et al., 2025). As AI becomes embedded in feedback, analytics, and administration, universities must evaluate the efficiency of such systems and more importantly, the impact. Accountability begins with owning decisions, listening to students, and aligning technological choices with pedagogical purpose. In this context, leadership means openness, transparency and inclusive design that advances both equity and excellence.

From surface to substance: Redefining AI literacy

If equity and transparency form the ethical foundation of AI use in higher education, then literacy is the practice that sustains it. Too often, AI literacy is reduced to a functional skill set, a matter of learning prompts or mastering tools. Genuine literacy goes deeper. It requires students and educators to understand how AI systems produce knowledge, whose perspectives are embedded within them, and how their use shapes learning itself. The case studies in this collection show that AI literacy is not about what students can make AI do, but how they interpret, evaluate, and apply its outputs responsibly. Students may be quick to experiment with generative AI tools, but without guidance they risk mistaking fluency for understanding. True literacy involves developing evaluative and nuanced judgement and the ability to discern when to trust, adapt, or question machine-generated feedback (Corbin et al., 2025).

AI literacy must evolve from surface familiarity to deep engagement. It should be contextual, ethical, and creative. Contextual literacy enables students to recognise how AI functions differently across disciplines. Ethical literacy helps them identify bias, question transparency, and consider the social impact of automated systems. Creative

literacy allows experimentation, encouraging students to use AI to extend rather than replace human thought. Such literacy cannot be taught through a single module or policy but should be woven through the curriculum as a living practice cultivated through dialogue, reflection, and shared responsibility to turn AI from a black box into a catalyst for critical inquiry (Fitzgerald & Curtis, 2025).

The Future of Higher Education – Reclaiming the Human

As we look ahead, the lessons of this book point to a simple truth, the future of higher education will not be determined by the sophistication of our systems or the technologies we can use but by the strength of our values. AI may change how we access and apply knowledge, but it cannot define what knowledge, or indeed wisdom, means. That remains our responsibility. Sustainable transformation relies on sensemaking, the collaborative process of interpreting complexity and change (Krause, 2024), and being able to embrace iteration and reflection (Corbin et al., 2025).

Generative AI magnifies this need. Educators must continuously interpret new contexts, engage in dialogue, and anchor their practice in values that prioritise learning. The human relationship at the heart of learning remains irreplaceable. Students value the empathy, contextual understanding, and credibility teachers bring to feedback (Henderson et al., 2024). The challenge is to design learning systems in which human and AI complement each other and serve distinct pedagogical purposes.

This is an education system that teaches students to use intelligent tools and to live and learn thoughtfully in a world shaped by such tools. To ensure that every graduate can engage with AI critically, ethically, and imaginatively, we must remember that education is not content and information delivery but the development of wisdom. The educators who contributed to this book have already begun that transformation. They model what leadership in learning and teaching looks like in this new era, collaborative, reflexive, and grounded in care. Their practices remind us that meaningful change begins in classrooms. In the end, this book is not about technology at all; it is about people and their capacity to question, to connect, and to create meaning in a world transformed by intelligent tools. If we can hold on to that, then the future of higher education will be AI-enabled and humanity-enriched. May we continue to design futures where technology serves humanity, and learning remains our most transformative act.

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APPENDIX A

Task Reflection in Student's Assignment

Generative AI (GenAI) use and prompt engineering process:

Briefly explain how you used GenAI through the process of completing this assignment. Specify which GenAI tools you used (e.g. ChatGPT) and for what specific purposes (e.g., brainstorming, drafting, code generation, validation, etc.). Provide two examples of prompts, clearly showing the progression from your initial attempts to the prompts that produced satisfactory results. For each example, explain the issues you encountered and how you revised the prompt to overcome those issues. How do you validate your results? Reflect on what you learned about effective prompt engineering through this process. (200 – 500 words).

APPENDIX B

TIMS2302 – A2 rubric – analytical thinking for debate arguments – *across each topic presented**

(* each student creates 1 resource & moderates 3 others on the RiPPLE platform to earn up to 6 marks per topic | across all 5 topics)

Criterion	7	6	5	4	3	2	1	0
Insight (LO1) 2 marks	Clearly articulates and justifies the value gained from the observed debate linking to digital innovation impacts.	Clearly articulates the insightful value gained from the observed debate with links to broader digital innovation contexts.	Clearly articulates the relevant value gained from the observed debate and applications to digital innovations.	Articulates the relevant value gained from the observed debate for digital innovations.	Articulates obvious or superficial value gained from the observed debate with limited links to broader digital innovations.	Unclearly articulates irrelevant or inaccurate value gained from the observed debate.	Simple observation with insight missing.	Not attempted.
Analysis (LO2) 2 marks	Critically evaluates debate arguments by assessing evidence quality, identifying logical reasoning, and examining counter-arguments. Analyses effectiveness of supporting examples and real-world applications presented.	Systematically assesses debate arguments' credibility through evaluation of evidence and reasoning. Identifies strengths and limitations in presented examples	Evaluates main arguments presented, considering evidence quality and logical connections. Recognizes key strengths and weaknesses	Identifies main arguments and assesses basic evidence presented. Limited evaluation of argument strength.	Lists arguments with minimal assessment of evidence quality or reasoning.	Superficially describes arguments without evaluating their merit.	Arguments identified incorrectly or without analysis.	Not attempted.
Communication (LO4) 2 marks	Articulates compelling and constructive pathways for improving the debated arguments.	Articulates constructive pathways for improving the debated arguments.	Articulates actionable pathways for improving the debated arguments.	Articulates appropriate pathways for improving the debated arguments.	Offers obvious pathways for improving the debated arguments.	Offers superficial pathways for improving the debated arguments.	Constructive contribution missing.	Not attempted.

APPENDIX C

To complement the survey findings, five students participated in follow-up interviews that explored their experiences with GenAI in greater depth. The interview protocol below was used with all informants. Following the protocol, we provide selected student quotations that exemplify how students engaged with GenAI across the different interventions.

Interview Protocol

1. Before using GenAI in this course, how did you typically seek feedback on your work?
2. What challenges did you face when preparing for debates, writing reports, or moderating discussions without AI support?
3. Can you describe a specific time you felt unsure about your work but didn't receive feedback? What did you do?
4. When did you start using AI to help with your coursework? What prompted that decision?
5. What kinds of prompts did you first try?
6. How did you use AI to stimulate feedback – for example, did you ask it to play the role of a lecturer or tutor?
7. Describe a specific task or assignment where you used AI in place of educator feedback. What did you ask? What did it give you?
8. What differences did you notice in the quality, structure, or clarity of your work after incorporating AI?
9. Can you provide or describe the difference between an earlier piece of work (without AI) and a later one (with AI)? What improved or changed?
10. Do you feel AI gave you better, faster, or more helpful feedback than a human educator? Why or why not?
11. When do you still prefer human feedback? When do you rely on AI?
12. How has AI changed your sense of independence or confidence in completing academic tasks?

Exemplar Quotations

- *“Without AI sometimes it is hard to find a place to start on assignments of the ‘correct*

academic language' to answer the question when you know the answer."

- *"I gave it my task and rubric then gave it a copy of my work, and it provided comments on each of the criteria and ways to improve."*
- *"I've always understood concepts but sometimes struggle to find the 'academic language' to explain it in report form – using AI my work is more refined."*
- *"I prefer human feedback always, rely on AI for expanding research e.g. find a source I like and ask for similar ones."*
- *"Using AI has made me more independent – I don't need to wait for feedback to keep working."*

APPENDIX D

System prompt for marking resources

You are an AI marking assistant. Your task is to evaluate a student's post that they have created based on the detailed rubric provided below. For each criterion, you need to:

1. Determine which Performance Level (0-7) best describes the student's work for that criterion give a concise – use this information to evaluate what mark to give the student at the end. Each category is weighted the same, so take the average.
2. Provide a concise, brief justification for your chosen performance level, referencing specific aspects of the submission and the rubric descriptors.
3. Give an overall mark out of 3 for the resource provided – each category (insight, analysis, communications) is evenly marked as 1 mark each

Course description: Learn how innovators and entrepreneurs use digital technologies to design, create and offer new products and services, acquire and retain customers, and to grow and potentially scale ventures rapidly. Students will gain an understanding of how digital technologies as enablers allow innovators and entrepreneurs to evaluate and realise novel business ideas, how innovators and entrepreneurs can realise digital technology products that can continuously evolve with customer needs and potentially scale rapidly, and how the increasingly digital business environment creates opportunities for innovators and entrepreneurs to create novel value propositions. Given that digital

products and services are becoming the new normal, this course provides students with a critical understanding of how to survive and thrive in today's world. Among other things, students will learn about the unique modular-layered architecture of digital products and services; digital platforms and their potential for network effects; data analytics and their application for growth-hacking; and the use of artificial intelligence to create innovative new products and services.

Assignment 2 Info

After each team debate, each student will craft one resource in RiPPLE to describe a key element of the debate they observed, and a key learning or application they derived from that discussion. Focus lies in actionable learning to share with the class.

AI Statement – Artificial Intelligence and Machine Translation are emerging tools that may support students in completing this assessment task. Students may appropriately use AI and/or MT in completing this assessment task. Students must clearly reference any use of AI or MT in each instance. A failure to reference generative AI or MT use may constitute student misconduct under the Student Code of Conduct.

****OVERALL INFO ON MARKING RUBRIC****

Insight

1. Identify key debate insights
2. Link to broader digital innovation context
3. Demonstrate practical applications

Analysis

1. Evaluate evidence quality
2. Assess Logical Reasoning
3. Examine counter-arguments
4. Consider real-world implications

Communications

1. Present clear improvement pathways
2. Provide constructive feedback
3. Structure analysis logically

Additional Notes:

1. Digital innovation context: Connect debate points to industry trends, emerging technologies, or market shifts comparing with parallel innovations
2. Constructive feedback: Highlight strengths, suggest specific improvements, provide supporting examples, connect to local business challenges
3. Argument evaluation: Assess source credibility, data validity, real-world applicability, reference any regional regulatory impacts

****MARKING RUBRIC START****

—

****Criterion 1: Insight (LO1)****

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Clearly articulates and justifies the insightful value gained from the observed debate linking to digital innovation impacts.

* **Level 6:** Clearly articulates the insightful value gained from the observed debate with links to broader digital innovation contexts.

* **Level 5:** Clearly articulates the relevant value gained from the observed debate and applications to digital innovations.

* **Level 4:** Articulates the relevant value gained from the observed debate for digital innovations.

* **Level 3:** Articulates obvious or superficial value gained from the observed debate with limited links to broader digital innovations.

* **Level 2:** Unclearly articulates irrelevant or inaccurate value gained from the observed debate.

* **Level 1:** Simple observation with insight missing.

* **Level 0:** Not attempted.

—

Criterion 2: Analysis (LO2)

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Critically evaluates debate arguments by assessing evidence quality, identifying logical reasoning, and examining counter-arguments. Analyses effectiveness of supporting examples and real-world applications presented.

* **Level 6:** Systematically assesses debate arguments' credibility through evaluation of evidence and reasoning. Identifies strengths and limitations in presented examples.

* **Level 5:** Evaluates main arguments presented, considering evidence quality and logical connections. Recognizes key strengths and weaknesses.

* **Level 4:** Identifies main arguments and assesses basic evidence presented. Limited evaluation of argument strength.

* **Level 3:** Lists arguments with minimal assessment of evidence quality or reasoning.

* **Level 2:** Superficially describes arguments without evaluating their merit.

* **Level 1:** Arguments identified incorrectly or without analysis.

* **Level 0:** Not attempted.

—

Criterion 3: Communication (LO4)

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Articulates compelling and constructive pathways for improving the debated arguments.

* **Level 6:** Articulates constructive pathways for improving the debated arguments.

* **Level 5:** Articulates actionable pathways for improving the debated arguments.

* **Level 4:** Articulates appropriate pathways for improving the debated arguments.

* **Level 3:** Offers obvious pathways for improving the debated arguments.

* **Level 2:** Offers superficial pathways for improving the debated arguments.

* **Level 1:** Constructive contribution missing.

* **Level 0:** Not attempted.

—

MARKING RUBRIC END

Remember, use the levels you have identified to best estimate a mark/3 value, and remember that criterion 1, 2, and 3 are weighed equally, at 1 mark each.

#**EXTREMELY IMPORTANT: Your Evaluation Output:**#

Please structure your response for the criterion as follows. Note that there needs to be

an overall mark given out of 3, and the value can be in increments of 0.5 (ie 0, 0.5, 1, 1.5, 2, 2.5 & 3)

Insight:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

Analysis:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

Communication:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

###

Mark: [Your value here]/3

"

EXTREMELY IMPORTANT: Make sure to use ### as the separator between the explanation at the start and the mark given at the bottom. It is also imperative that "Mark: " is also used afterwards.

APPENDIX E

System prompt for marking moderations

You are an AI marking assistant. Your task is to evaluate a student's post that they have created based on the detailed rubric provided below. For each criterion, you need to:

1. Determine which Performance Level (0-7) best describes the student's work for that criterion give a concise – use this information to evaluate what mark to give the student at the end. Each category is weighted the same, so take the average.
2. Provide a concise, brief justification for your chosen performance level, referencing specific aspects of the submission and the rubric descriptors.
3. Give an overall mark out of 3 for the resource provided – each category (insight, analysis, communications) is evenly marked as 1 mark each

Course description: Learn how innovators and entrepreneurs use digital technologies to design, create and offer new products and services, acquire and retain customers, and to grow and potentially scale ventures rapidly. Students will gain an understanding of how digital technologies as enablers allow innovators and entrepreneurs to evaluate and realise novel business ideas, how innovators and entrepreneurs can realise digital technology products that can continuously evolve with customer needs and potentially scale rapidly, and how the increasingly digital business environment creates opportunities for innovators and entrepreneurs to create novel value propositions. Given that digital products and services are becoming the new normal, this course provides students with a critical understanding of how to survive and thrive in today's world. Among other things, students will learn about the unique modular-layered architecture of digital products and services; digital platforms and their potential for network effects; data analytics and their application for growth-hacking; and the use of artificial intelligence to create innovative new products and services.

Assignment 2 Info

After each team debate, each student will need to moderate 3 other resources a student has made on the debate to further deepen topic understanding, further describe a key element of the debate they observed, or a key learning or application they derived from that post that they derived from. Focus lies in actionable learning to

share with the class. Feedback on how to improve the students post is also greatly appreciated.

AI Statement – Artificial Intelligence and Machine Translation are emerging tools that may support students in completing this assessment task. Students may appropriately use AI and/or MT in completing this assessment task. Students must clearly reference any use of AI or MT in each instance. A failure to reference generative AI or MT use may constitute student misconduct under the Student Code of Conduct.

****OVERALL INFO ON MARKING RUBRIC****

Insight

1. Identify key debate insights
2. Link to broader digital innovation context
3. Demonstrate practical applications

Analysis

1. Evaluate evidence quality
2. Assess Logical Reasoning
3. Examine counter-arguments
4. Consider real-world implications

Communications

1. Present clear improvement pathways
2. Provide constructive feedback
3. Structure analysis logically

Additional Notes:

1. Digital innovation context: Connect debate points to industry trends, emerging technologies, or market shifts comparing with parallel innovations
2. Constructive feedback: Highlight strengths, suggest specific improvements, provide supporting examples, connect to local business challenges
3. Argument evaluation: Assess source credibility, data validity, real-world applicability, reference any regional regulatory impacts

****MARKING RUBRIC START****

****Criterion 1: Insight (LO1)****

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Clearly articulates and justifies the insightful value gained from the observed debate linking to digital innovation impacts.

* **Level 6:** Clearly articulates the insightful value gained from the observed debate with links to broader digital innovation contexts.

* **Level 5:** Clearly articulates the relevant value gained from the observed debate and applications to digital innovations.

* **Level 4:** Articulates the relevant value gained from the observed debate for digital innovations.

* **Level 3:** Articulates obvious or superficial value gained from the observed debate with limited links to broader digital innovations.

* **Level 2:** Unclearly articulates irrelevant or inaccurate value gained from the observed debate.

* **Level 1:** Simple observation with insight missing.

* **Level 0:** Not attempted.

****Criterion 2: Analysis (LO2)****

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Critically evaluates debate arguments by assessing evidence quality, identifying logical reasoning, and examining counter-arguments. Analyses effectiveness of supporting examples and real-world applications presented.

* **Level 6:** Systematically assesses debate arguments' credibility through evaluation of evidence and reasoning. Identifies strengths and limitations in presented examples.

* **Level 5:** Evaluates main arguments presented, considering evidence quality and logical connections. Recognizes key strengths and weaknesses.

* **Level 4:** Identifies main arguments and assesses basic evidence presented. Limited evaluation of argument strength.

* **Level 3:** Lists arguments with minimal assessment of evidence quality or reasoning.

* **Level 2:** Superficially describes arguments without evaluating their merit.

* **Level 1:** Arguments identified incorrectly or without analysis.

* **Level 0:** Not attempted.

—

Criterion 3: Communication (LO4)

* **Max Marks for Criterion:** 1 mark

* **Performance Level Descriptors (0-7):**

* **Level 7:** Articulates compelling and constructive pathways for improving the debated arguments.

* **Level 6:** Articulates constructive pathways for improving the debated arguments.

* **Level 5:** Articulates actionable pathways for improving the debated arguments.

* **Level 4:** Articulates appropriate pathways for improving the debated arguments.

* **Level 3:** Offers obvious pathways for improving the debated arguments.

* **Level 2:** Offers superficial pathways for improving the debated arguments.

* **Level 1:** Constructive contribution missing.

* **Level 0:** Not attempted.

—

MARKING RUBRIC END

Remember, use the levels you have identified to best estimate a mark/3 value, and remember that criterion 1, 2, and 3 are weighed equally, at 1 mark each.

*****EXTREMELY IMPORTANT: Your Evaluation Output:*****

Please structure your response for the criterion as follows. Note that there needs to be an overall mark given out of 3, and the value can be in increments of 0.5 (i.e. 0, 0.5, 1, 1.5, 2, 2.5 & 3)

Insight:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

Analysis:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

Communication:

Level: [The 0-7 performance level you determined]

Justification: [Concise Feedback here based on your findings]

###

Mark: [Your value here]/3

EXTREMELY IMPORTANT: Make sure to use ### as the separator between the explanation at the start and the mark given at the bottom. It is also imperative that "Mark: " is also used afterwards.

APPENDIX F

The following pages contain the research proposal instructions provided to students for their final assessment. Students were additionally supplied with examples of past submissions and their marks for a range of performance levels.

Summary of task

The goal of this assessment is to write an original and interesting proposal for a research project related to behavioural economics. You will come up with your own research question and describe a practical and feasible method for how you would go about answering it. The word limit is 1,500 words, which excludes the title page, abstract, tables and figures, references, and any appendixes. This is a hard word limit, and you will be penalised for exceeding it. Submission will be through Turnitin.

Getting started

*Your first step is to decide your topic, and specifically, your **research question**. For example, it could be a test of a mainstream economics concept, an extension of a behavioural economics concept, or the application of a behavioural economics theory to a novel population or setting (such as a behavioural “nudge”). Typically (but not always), a good question can be rewritten in the form “Does X cause Y?”, where X and Y are some characteristics or outcomes of interest.*

There is quite some flexibility with the format of your proposal, and you should not feel constrained by the guidelines below if you think you can do it better with your particular topic. These guidelines are there to help improve the quality of your proposal, but if you can write a high-quality paper in another way, you will not be penalised for unorthodoxy. Likewise, feel free to include anything in an appendix that is not an appropriate fit in the main document but that you do refer to in the text, such as specific experiment instructions, a variable dictionary for an existing dataset, or other background information or material. Most proposals will not need an appendix, but, seeing as it does not count for your word limit, you may wish to exploit it for material that is relevant but not critical to your research proposal.

*Regardless of your preferred format, however, your structure **must** include the following sections:*

Title page

Abstract

Introduction

Related literature (with mandatory recent journal article reference)

Method (with mandatory inclusion of a table or figure)

Conclusion

References

You may add other sections or subheadings for readability if you wish, but be careful of your word limit.

Details of each section

1. Title page

*Your title page should contain your proposal's Title, your name and student number, date of submission, your abstract, and an **accurate word count** (which excludes the title page, abstract, tables and figures, references, and any appendixes).*

2. Abstract

The abstract (placed on your title page) should be a four-sentence summary of your entire research proposal, so make sure it includes what you believe are the absolute key ingredients of your paper. The structure and content are flexible, but a typical format would be:

*First sentence: jump right into the topic or **research question**. (In some cases, you might prefer a first sentence of motivation instead.) It would typically start with something like "This research proposal..." followed by what it is you are proposing to investigate/answer.*

*Second sentence: State what the **contribution** is of your research proposal. What has the previous literature proposed or found, and what will your proposal contribute to fill the gaps in our knowledge? E.g. "While previous literature has found that/assumes that/predicts that [...], this proposal contributes to our knowledge of this issue by testing whether [...]"*

*Third sentence: This should be about **how you plan to answer your question**. State your method (or "empirical" approach). E.g.: "I propose..." followed by the method, e.g. "I*

propose to run a lab experiment in which I will test how changing X affects people's behaviour towards Y." If there is a treatment/explanatory variable and an outcome variable (and there should be!), or details of a specific context or sample that is being tested, they should be clearly specified.

Fourth sentence: Add any remaining critical details of the method, and/or include the bare minimum of your analysis plan: what do you plan to test, how do you plan to test it (e.g. a t-test between control and treatment groups, or a linear regression on your data), and what conclusions will you draw depending on these results? E.g. "I will run a t-test to determine whether there are differences in [Y] between the treatment and control groups, and if the treatment group's [Y] is significantly larger, this would support the hypothesis that [...]"

3. Introduction

This section should be started on a new page to your title page/abstract, and should be short, typically 1-3 paragraphs. Provide a motivation for the broad topic and why you think the reader should be interested in it, and introduce any relevant economic theories (mainstream or behavioural). You may wish to highlight where there is currently a gap in our knowledge (which your research proposal will aim to fill). But don't dwell for too long on setting up the context; make sure your research question clearly appears by the end of the first paragraph. If different school of academic thought predict different answers to your research question, you may then want to spend 1-2 sentences outlining these predictions, and/or to briefly introduce which method you are proposing to use to test these predictions.

In terms of your writing, try to avoid flowery language, embellishments, or ambiguities. Write clearly and matter-of-factly. Academic papers are often considered "dry" in style, which can be true; the purpose of an academic paper is not to entertain with the writing, but to convey the material as clearly as possible; how "interesting" an academic paper is will be typically judged on the worthiness of the topic and the quality of the research.

Here are some examples of introductions of behavioural economics papers that broadly follow the structure that is expected of you.

Most children think of their potential future occupations in terms of what they will be (firemen, doctors, etc.), not merely what they will do for a living. Many adults also think of their job as an integral part of their identity. At least in the United States, "What do you do?" has become as common a component of an introduction as the anachronistic "How do you do?" once was, yet identity, pride, and meaning are all left out from standard models of labour supply. This omission is understandable: identity, pride, and meaning are difficult to

quantify and are thus hard to incorporate into the empirically driven field of labour economics.

In this article, we focus on minimal perceived meaning by the labour producing force and investigate how it influences labour supply in controlled laboratory experiments. Our intention is to compare situations with no meaning (or as low a level of meaning as we can create) with situations having some small additional meaning. Thus, our investigation will focus not on occupations highly endowed with meaning, like medicine or teaching, but on the least-common denominator of meaningfulness that is shared by virtually all compensated activities.

– Ariely, Kamenica and Prelec (2008)

Neoclassical models include several fundamental assumptions. While most of the main tenets appear to be reasonably met, the basic independence assumption, which is used in most theoretical and applied economic models to assess the operation of markets, has been directly refuted in several experimental settings

(Knetsch 1989; Kahneman, Knetsch, and Thaler 1990; Bateman et al. 1997). These experimental findings have been robust across unfamiliar goods, such as irradiated sandwiches, and common goods, such as chocolate bars, with most authors noting behaviour consistent with an endowment effect. Such findings have induced even the most ardent supporters of neoclassical theory to doubt the validity of certain neoclassical modelling assumptions. Given the notable significance of the anomaly, it is important to understand whether the value disparity represents a stable preference structure or if consumers' behaviour approaches neoclassical predictions as market experience intensifies.

In this study, I gather primary field data from two distinct markets to test whether individual behaviour converges to the neoclassical prediction as market experience intensifies.

– List (2003)

Charitable contributions in the United States were estimated to exceed \$300 billion annually in 2007, 2008, and 2009. This is roughly \$1000 for each person in the US, a not insignificant amount. Given the reliance of charitable organizations on these contributions, it is quite important to try to identify and implement effective methods for enhancing the revenue received. There has been some recent work on suggested donations to public radio, and some

study of the notion of paying-what-you-want as a pricing device. We extend both of these notions to fund-raising in a restaurant venue, exploring whether the suggested amount (if any) mattered with respect to the contributions raised.

Businesses like grocery stores and restaurants often ask customers (typically through having a donation jar at the check-out register) to donate money to a certain charity organization. One often sees a suggested certain donation level. But there has been little by way of systematic and controlled study regarding how the suggested donation level affects behaviour in this environment. Our research question is to attempt to determine the optimal amount to suggest, or whether it is better to make no suggestion.

– Charness and Cheung (2013)

Improving energy efficiency reduces costs for firms and mitigates CO₂ emissions. This is particularly important in the transportation sector, which is responsible for approximately 25%–28% of greenhouse gas emissions in Western industrialized countries (cf. EEA, 2018, EPA, 2018). Fuel accounts for around 40% of variable costs for transportation companies. We conducted an analysis to determine if loss aversion helps motivate drivers to drive in a fuel-efficient manner. If successful, this could reduce fuel consumption by about 22%.

– Hoffman and Thommes (2020)

Nudging has been found to affect human behavior across a wide range of domains. In particular, it has been used to improve the payment morale of citizens when they owe money to public institutions. While the traditional view (Allingham and Sandmo, 1972) considered citizens' tax compliance as a matter of audits and harsh fines, it is by now well understood that tax morale is also a very important factor for compliance (Kirchler, 2007). In fact, nudging has been frequently applied to improve tax morale, even though with mixed results. In the realm of taxation, taxpayers are very likely to anticipate, however, that the government will ultimately enforce correct tax payments, which is why nudges might have a good chance to work. In other situations, however, public institutions may not want to enforce the collection of citizens' payments for social or ethical reasons. Whether or not nudging also works in such a setting and whether it can have persistent effects even after abolishing the nudge again are the key questions of this paper.

– Sutter, Rosenberger and Sutter (2020)

4. Related literature

Please make sure that you clearly relate your research question to the existing academic literature. What are the possible answers to your research question that have been discussed in past studies? What papers answer a similar question to yours, and what do they find? (For example, if you are researching “Do tennis players exhibit loss aversion?”, you would want to cite studies that investigate whether other sporting players exhibit loss aversion). It is possible that closely related studies come from fields other than economics, such as psychology or even more specialised fields (for example, in the previous example, papers from sports journals might be relevant). But when in doubt, prioritise economics papers.

*What you must **definitely avoid** is proposing a study that has already been carried out. So, make sure that your literature search is thorough. Google Scholar is the best place to start, and once you find a close paper, use the “Cited by” feature to filter by recent, related papers.*

A common question is “How many papers should I cite?” This is hard to answer other than the general comment “The most important ones, but no more”. While it is important not to omit any critical paper, it is equally important not to spread yourself too thin such that you cite many papers but with insufficient detail for the relevance to be clear to the reader. Here are some types of examples.

If your proposal is an extension of one specific paper, then you may justify citing only this paper, so that you can go into deep detail about this paper and what your extension contributes to it. For example, you may be adding an original extension to the design of Niederle and Vesterlund’s (2007) competitiveness experiment.

If your extension has a very similar design to one study but applies it in a different domain – for example, you apply the Apesteguia and Palacios-Heurta (2010) paper about soccer penalty kicks to rugby union – you would want to (at least) cite both this paper and the most relevant paper about psychological pressure in your new domain (rugby union).

If your research proposal tries to reconcile two or more papers that reached contradictory conclusions, then you would want to describe these papers in detail (and you may not need to cite more). For example, Albrecht and Smerdon’s (2022) design references three contradictory theories in its review, and cites the main papers for each theory.

If your research proposal covers several topics – for example, you are comparing whether confirmation bias or the sunk cost fallacy can best explain why people don’t sell their crypto investments – you may need to cite more papers (in this case, ones on both biases in

general, and also on broad psychological biases in the crypto market). Many research topics fall into this category.

At the end of this section, you should state in one sentence what the specific contribution of your research would be to this literature. What is the gap that you are filling in the academic landscape?

5. Method

This should be the longest section of your proposal, roughly half of your allocated word count. Typically, the method for your research proposal will be either an experiment (lab or field) or an empirical study of existing data. Your proposed method must be: (a) able to answer your research question, (b) practical, and (c) ethical.

If you choose an experiment, your proposal must include the following details:

The experimental design, including the type and number of subjects, the groups, and how you will administer the treatment(s)

The experimental procedure. This can be in broad terms, but all critical information must be included such that another researcher who reads your proposal would be able to implement the experiment you describe

You may wish to check the experimental papers assigned as readings in this course for examples of how to describe the experimental design and procedures.

If you choose an empirical study of existing data, your proposal must include the following details:

The source of the data (e.g. "OECD PISA data wave 2015"), or how you would plan to collect it (e.g. "Scrape all Champion's League football games from 2021-22 from the UEFA website")

The key explanatory variable(s) (this would be the "X" variable) and outcome variables(s) (the "Y" variable) from the data

An explanation of how you plan to address any potential statistical biases such as selection bias in your analysis. This may involve describing additional control variables that you propose to include in your analysis of the data. If your design will make use of a natural experiment, clearly detail the source of the randomisation and why it means that your proposed method will accurately answer your research question.

For example, in Apesteguia and Palacios-Huerta (2010), the method of choosing which football side gets the first penalty kick is random, which prevents selection bias. In Gong

(2015), the author made use of an existing program (the VCT) that randomly assigned HIV testing.

No matter which method you use, you should clearly describe your treatment variable (or variables; the “X”) and outcome variable (or variables; the “Y”).

Next, you should state how you plan to analyse the (experimental or natural) data, including any statistical tests that you propose to use (such as a t-test). If there are other variables that are important in your dataset (either an existing data set or one you will collect from your experiment), describe them and how you will use them.

Finally, you should clearly state your hypotheses as they relate to the variables and tests. This will include any sub-sample effects (also known as “heterogeneous effects”), e.g., does your effect differ for males and females? (and how would you test this)?

6. Conclusion

Your conclusion should be short (1 paragraph). You may wish to describe what you will conclude about your hypotheses or the motivating theories depending on which way your results turn out, as well as any limitations of your research or risks for its implementation (and how these might be mitigated). You should also describe the implications that you think your results might have, for either existing economic theories or for policy-makers / industry / other relevant groups.

7. References

Your research proposal should be fully (and correctly) referenced, both within the text and by including a full bibliography. You are free to use any of the standard referencing styles so long as you are consistent. To save time and guarantee accuracy, especially if you use a lot of references, you may wish to use a referencing software like Zotero or Endnote. For instance, Zotero (free!) can be installed as a web browser extension, which is very handy because once you find a paper online, you can import it into your Zotero library with one click. It also has a Word extension, meaning that you can import your library references into your Word document and also add an automated bibliography of references that updates by itself. (If you don’t use many references, it’s just as easy or easier to do things manually.)

Criteria & Marking:

Criteria	Maximum possible marks
<i>Presentation</i> <i>Clarity and quality of written expression (15)</i> <i>Referencing (5)</i>	20
<i>Research Topic</i> <i>Originality (5)</i> <i>Clarity and justification of research question (5)</i>	10
<i>Literature and economic concepts</i> <i>Identification and critical use of literature (10)</i> <i>Understanding and explanation of relevant economic concepts (10)</i>	20
<i>Research Methods</i> <i>Appropriateness and feasibility of proposed method (5)</i> <i>Suitability to test a causal claim while avoiding selection and other biases (5)</i> <i>Description of method, including setting, sample, variables, design, procedures (20)</i> <i>Hypotheses and analysis plan (10)</i>	40
<i>Implications and limitations</i> <i>Implications of research (5)</i> <i>Limitation/risks of research proposal (5)</i>	10
Total	100

Submission:

Submit via the Turnitin link on Blackboard by the specified deadline. Requests for the granting of extensions must be made online with supporting documentation before the submission due date/time. If an extension is approved, the new agreed date for submission will be noted on the application and the student notified through their student email. Extensions cannot exceed the number of days you suffered from a medical condition, as stated on the medical certificate.

If your proposal is submitted late without an approved extension, a penalty of 10% of the maximum possible mark will be deducted per day for up to 7 calendar days, at which point

any submission will not receive any marks unless an extension has been approved. Each 24-hour block is recorded from the time the submission is due.

APPENDIX G

See below the Qualtrics survey sent to students after their assessment submissions had been marked.

Start of Block: section_use

studentID Student ID: (e.g. 12345678)

ChatGPT_use Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your research proposal?

Yes (1)

No (2)

End of Block: section_use

Start of Block: section_noChatGPT

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = No

noChatGPT_why Could you briefly list your reason(s) why you didn't use ChatGPT (or similar) on your assignment?

- It didn't feel ethical (1)
- I didn't know it was allowed (2)
- Too lazy (3)
- I didn't know how (4)
- I didn't trust its output (5)
- I wanted it to be all my own work (6)
- Other (please explain): (7) _____

End of Block: section_noChatGPT

Start of Block: section_ChatGPT

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = Yes

ChatGPT_idea Did you use ChatGPT (or similar) for help with coming up with your research proposal **idea**?

- Yes (1)
- No (2)

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = Yes

ChatGPT_sections Finally, please select all the sections of your research proposal in which you used ChatGPT (or similar).

- Title (1)
- Abstract (2)
- Introduction (3)
- Related Literature (4)
- Method (5)
- Conclusion (6)
- References (7)

End of Block: section_ChatGPT

Start of Block: section_feedback

ChatGPT_feedback If you want to leave any comments, feel free to do so in the text box below.

End of Block: section_feedback**Start of Block: Consent**

Consent [Redacted for Anonymity]

End of Block: Consent**Start of Block: section_use**

ChatGPT_use Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your research proposal?

- Yes (1)
- No (2)

End of Block: section_use**Start of Block: section_noChatGPT**

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = No

noChatGPT_why Could you briefly list your reason(s) why you didn't use ChatGPT (or similar) on your assignment?

- It didn't feel ethical (1)
- I didn't know it was allowed (2)
- Too lazy (3)
- I didn't know how (4)
- I didn't trust its output (5)
- I wanted it to be all my own work (6)
- Other (please explain): (7) _____

End of Block: section_noChatGPT**Start of Block: section_ChatGPT**

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = Yes

ChatGPT_idea Did you use ChatGPT (or similar) for help with coming up with your research proposal **idea**?

- Yes (1)
- No (2)

Display This Question:

If Did you use ChatGPT or any similar AI chatbot (e.g. Bing Chat, Google Bard) for help with your re... = Yes

ChatGPT_sections Finally, please select all the sections of your research proposal in which you used ChatGPT (or similar).

- Title (1)
- Abstract (2)
- Introduction (3)
- Related Literature (4)
- Method (5)
- Conclusion (6)
- References (7)

End of Block: section_ChatGPT

Start of Block: section_feedback

ChatGPT_feedback If you want to leave any comments, feel free to do so in the text box below.

End of Block: section_feedback

REVIEW STATEMENT

This chapters in this book have undergone peer review by contributors and by leaders in higher education from Institute of Teaching and Learning Innovation (ITaLI) at the University of Queensland.

Reviews were structured around considerations of the intended audience of the book, and examined the relevance, accuracy, structure and clarity of the content. The Open Textbooks @ UQ Peer review guide has more details of the process.

We would like to thank the contributors and ITaLI for the time, care and commitment they contributed to the book. This book would not be the robust, valuable resource that it is were it not for their feedback and input.

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