Criteria 4: Innovation & leadership that has influenced & enhanced learning, teaching & student experience.

Context: The rapid advancement and disruptive nature of generative artificial intelligence (GenAI) presents a significant challenge for higher education institutions. Whilst most saw GenAI as a threat to engineering education, I saw it as an opportunity to enhance the profession. To respond to the systemic change, and to lead the GenAI-enabled engineers, I began projects using the tool for student learning, academic workflows and integration in engineering education. This work has now seen more than 15 publications, leading to institutional change.

Student learning is at the forefront of this disruption, as learners grapple with the implications of GenAI for academic integrity (Nikolic et al., 2023), ethical use, and their future careers (Guo & Lee, 2023; Mollick & Mollick, 2022). The widespread accessibility and ease of use of tools like ChatGPT have made it increasingly difficult to sustain traditional assessment practices and uphold academic honesty. Students are often unsure about the appropriate and ethical use of GenAI in their academic work, which leads to confusion and potential misuse. At the same time, academics are encountering similar ethical questions in their own practice, especially when designing learning content.

GenAI offers the potential to significantly enhance student outcomes, particularly by enabling tailored assessments and generating context-specific examples, as seen in engineering education. In response to these challenges and opportunities, I have developed and implemented a comprehensive strategy for integrating GenAI into the engineering curriculum, supporting both student and staff engagement. I currently lead the integration of GenAI into the curriculum at Southern Cross University (SCU) & within the Faculty of Science and Engineering (FSE), impacting more than 2000 academics and thus influencing more than 10,000 students. I contribute to broader communities both within SCU and externally, across national and international contexts through conference presentations, collaborations and professional development. My work includes integrating GenAI into the engineering unit I teach, the development of institution-wide compulsory student and staff modules on GenAI use in learning and teaching, the delivery of professional development sessions for academic staff in Australia and overseas and academic leadership through my role in the Australasian Artificial Intelligence in Engineering Education Centre (AAIEEC).

Innovative integration of GenAI: Ethical considerations driving change: My teaching practice has been guided by a growing body of literature on implementing GenAI in education for improving critical thinking, including research by Mollick and Mollick (2022), Vasconcelos and Santos (2023), and Guo and Lee (2023). Informed by this work, I have focused on enabling students to reach the higher levels of Krathwohl's revision of Bloom's taxonomy (Krathwohl, 2002) as critical thinking is a required skill to effectively utilise GenAI tools. My approach is grounded in two key principles: designing feedback sequences that support learning, and helping students develop the ability to recognise and articulate what 'good' looks like. (Quince & Nikolic, 2025) I lead the development of a comprehensive 32-item taxonomy that outlines the social, economic and environmental implications of GenAI use (Quince and Nikolic et al., 2025). This taxonomy is currently being used at SCU to support ethical integration of GenAI in education. This evidence-based practice is driving change by reshaping our curriculum on a fundamental level, from a focus on information recall to one of evaluative judgment and critical thinking. Based on my work, SCU are now systematically embedding feedback sequences and ethical frameworks into teaching, which ensures that we are not just accommodating GenAI but actively leveraging it to produce more discerning, critically-aware graduates.

Impact on Student Learning: To respond to the students growing overconfidence in GenAI tools when they were first released, I developed a reflective assessment that saw students critically asses a GenAI generated essay and undertake a research informed reflection of where they see GenAI tools in their studies and in their professional careers. The positive impact of this GenAI integration is supported by data drawn from student results, perceptions and assessments. One highlights the social and emotional benefits of GenAI tools: "Another significant benefit of using ChatGPT is the ability to ask questions that may seem 'dumb or stupid' without fear of being ridiculed or embarrassed in front of an entire class. ChatGPT provides a safe space for students to ask questions without fear of

judgment or ridicule." The results from this implementation were striking (Quince et al, 2024). We found that students' own submissions were of significantly higher quality across three of four key assessment criteria compared to the initial AI-generated piece they critiqued. As illustrated in Figure 1a, this demonstrates that the process of identifying weaknesses in an AI's output directly enhances their capacity to produce superior work themselves, which is a clear indicator of improved critical thinking and evaluative skill. Furthermore, this approach successfully cultivated deep ethical engagement as demonstrated by this student comment: "After research, I now view ChatGPT differently. Prior I saw the technology as a threat to jobs and the engineering industry. I now view it as a tool and a technology powerful enough to assist within day-to-day activities and work environments."

Student submissions were systematically mapped against the 32-item taxonomy discussed earlier...The analysis, shown in Figure 1b, reveals that students were able to identify the vast majority of these complex issues, with many demonstrating higher-level reasoning by articulating the nuanced risks and limitations of the technology in their future professional practice.

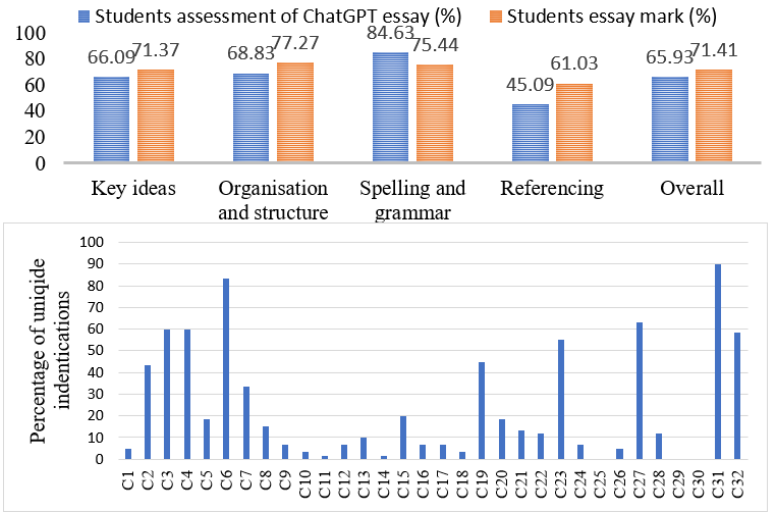

Fig 1. (a) – top, comparison of students own work compared to their assessment of a ChatGPT generated essay. (b) – bottom, GenAI ethical implications of the use of the technology derived from students assessments mapped against designed framework that consisted 32 ethical implications.

Student reflections also provide valuable insight into the learning impact of these initiatives. One student noted, "With ChatGPT's ability to learn, there is a potential that future models will be able to hold specific design knowledge and assist an engineer in solving problems in a fraction of the time."

Assessment Redesign in Physics: A GenAI-Responsive Case Study: I am currently leading by example through curriculum transformation, where I led a peer-reviewed case study on assessment redesign in response to institutional GenAI policy, co-developed by me. This work focused on PHYS2001, a second-year undergraduate engineering unit, in which I applied the SCU-developed AAM-GenAI framework to systematically evaluate and adapt assessment tasks for academic integrity, alignment, and authentic engagement. Through a detailed risk matrix analysis, each assessment item was assessed for vulnerability to GenAI misuse and reclassified using SCU's Tool Use Descriptors (Full Use, Purpose-Specific, No Use). In redesigning assessment tasks, I included embedding ethical GenAI use guidance, which meant I had to update rubrics to reflect responsible engagement with tools and scaffolding tasks to promote student reflection and conceptual ownership. Post-implementation review showed a measurable reduction in misuse risk and enhanced clarity for students around appropriate GenAI integration. This work demonstrates how my discipline-specific implementation of GenAI pedagogy can enhance both assessment integrity and student learning outcomes. This case study provides an example of how my leadership in the space has informed ongoing iterations of SCU policy and serves as a model of best practice in GenAI-responsive curriculum design within STEM education. This work has been utilised in more than five GenAI implementation workshops, ten unit design conversations within SCU and is currently under review at the University's Learning and Teaching Journal. The plan is to embed this as a practical case study for a public facing University video series about enhancing students learning with GenAI.

Leadership Practice: I implemented several key strategies to improve both my work and the work of those I influence through my role and research. One strategy is staying abreast of sector-wide GenAI policy developments to help create and improve guidelines and resources for the engineering education community. Such resources include running professional development workshops, panel discussions and seminars focused on effective GenAI integration. These events support knowledge-sharing and help build a community of practice that is responsive to evolving technological and ethical contexts. In a recent example, I delivered a two-hour seminar and workshop with the Taiwan Engineering Higher Education Academy, focused on academic capacity-building in the GenAI space. Another strategy involves my leadership and establishment of feedback loops with both students and academic staff to continuously evaluate and improve our practices. By actively collaborating, I ensure that the curriculum remains aligned with professional expectations and the changing demands of the workplace, and that GenAI is being used in ways that are pedagogically and professionally sound.

Community building and future directions: I currently lead a large Microsoft Teams network with more than 30 members across 15 institutions that supports more than five working groups researching GenAI integration in engineering education and higher education. By leading the coordination of the site, I help remove collaboration barriers, improve access to key resources, and enable smoother, more efficient teamwork. As a result, in the past 12 months, the various research groups I am leading have developed more than 15 publications, and this platform has become a vital hub for interdisciplinary cooperation and knowledge exchange, improving both the quality and reach of GenAI-related research, further supporting my leadership in this space.

One such publication was the Project-work Artificial Intelligence Integration Framework (PAIIF) (Nikolic & Quince et al., 2025) developed by a team of 16 educators from 9 Universities across Australia. This project developed a comprehensive framework for implementing GenAI into project-based learning units. The initial implementation round has recently concluded with seven courses and five institutions activity utilising this framework. The project is now in its second implementation, offering a scalable model for embedding GenAI into engineering education.

Reflecting on these initiatives, I am encouraged by the measurable improvements in student outcomes and the positive feedback from students and colleagues. These experiences highlight the importance of addressing the ethical, professional and societal implications of emerging technologies such as GenAI. Through continued collaboration with industry partners and educational institutions, I aim to continue to contribute to a national dialogue on the ethical and effective use of GenAI in engineering education. My leadership in the use of GenAI is ensuring that students are not only digitally capable but also equipped to apply these technologies responsibly in their future careers.

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