2025

Partnering GenAI: A Practical Primer for GenAI in Higher Education

OFFICE OF STRATEGIC PLANNING

SUTD LEAP

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

This SUTD GenAI primer is produced with ChatGPT, Google Gemini Image Generator, Claude, Perplexity and other AI tools as super-collaborators.

Image attribution: Google Gemini Image Generator, Google Gemini Storybook, and Creative Commons from Freepik, Microsoft, and online sources for all images.

Published by SUTD.

September 2025.

Citation: Sockalingam N, Poon KW. Partnering GenAI: A Practical Primer for GenAI in Higher Education. Singapore: SUTD Publications; 2025.

EDITOR, PRIMARY AUTHOR, AND ART DESIGN

Nachamma Sockalingam, Assistant Director, OSP

CONTRIBUTORS

Poon King Wang, Chief Strategy and Design AI Officer, OSP

Bradley Adam Camburn, Senior Lecturer, EPD

Dorien Herremans, Associate Professor, ISTD

Foong Shaohui, Associate Professor, EPD

Lee Chee Huei, Senior Lecturer, EPD/SMT

Natalie Agus, Senior Lecturer, ISTD

Nilanjan Raghunath, Assistant Professor, HASS

Pablo Valdivia y Alvarado, Associate Professor, EPD

Sam Conrad Joyce, Associate Professor, ASD

Thijs Willems, Research Fellow, LKYCIC

Qian Huang, Research Fellow, LKYCIC

Zerlina Tay, Deputy Director, Marketing & Communications

Norlizah Wahab, Senior Manager, Office of Education & Innovation

Juan David Salazar, Graduate Student, ASD

Chew Rong-Jie David, Undergraduate

Alvin Teo Xi Hao, Undergraduate

Andrew Leng Chi Yeong, Undergraduate

Anieyrudh R, Undergraduate

Ayushi Kalmath, Undergraduate

Berving Bek Jun, Undergraduate

Chin Fu Jie, Undergraduate

Chen Liang Jung, Undergraduate

Ho Li Lian, Undergraduate

Jaryl Low Jia Wei, Undergraduate

Kaviya Babu, Undergraduate

Khong Puey Kee, Undergraduate

Lo Khye He, Undergraduate

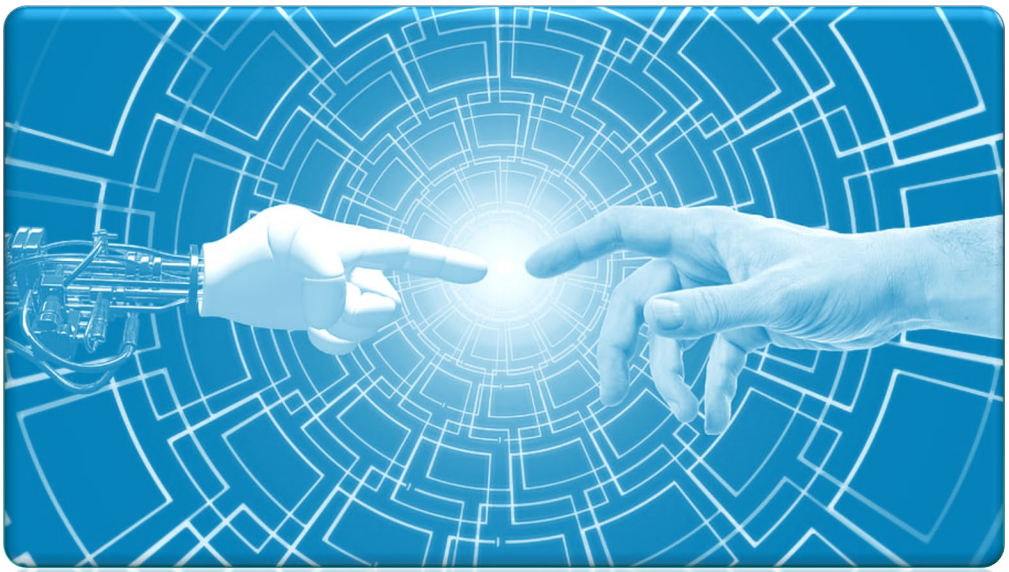
Muhammad Zahid B Mohamad Dali, Undergraduate

Nerissa Kho Wei Na, Undergraduate

Ramanathan Meyyappan Santhoshram, Undergraduate

ACKNOWLEDGEMENTS

We thank students, staff and faculty members from all the various pillars and clusters (ASD, DAI, EPD, ESD, HASS, ISTD, and SMT) and offices at SUTD, such as the Lee Kuan Yew Centre for Innovative Cities (LKYCIC), Office of Education & Innovation, and Marketing & Communications for their inputs and contributions in producing this GenAI primer.



"The future of learning
requires institutions
to lead with deliberate learning design and
iterative, reflective, and evidence-based practices.
It is not just platforms or technologies alone."

MESSAGE FROM SUTD'S CHIEF STRATEGY AND DESIGN AI OFFICER

Poon King Wang

Chief Strategy and Design AI Officer, Office of Strategic Planning

Director, Lee Kuan Yew Centre for Innovative Cities

Singapore aims to anchor deep national capabilities in Artificial Intelligence (AI), thereby creating social and economic impacts, growing local talent, building an AI ecosystem, and putting Singapore on the world map.

At the Singapore University of Technology and Design (SUTD), we believe that this future can be achieved by designing the future of learning, work, and innovation.

As the world's first Design AI university, SUTD is not simply integrating GenAI into our classrooms. We are fundamentally rethinking how Design, AI, and human learning interplay.

Though AI spans a wide spectrum of technologies, it is Generative Artificial Intelligence (GenAI) that has become one of the most prevalent in everyday use, and we focus on that in this primer.

While higher educational institutions are debating whether to accept the use of GenAI, SUTD is leaping to see how we can meaningfully leverage GenAI. However, this is not with blind faith, but careful deliberation.

This GenAI primer reflects our commitment to preparing students not just to use GenAI, but to shape its role in society, creatively, critically, and ethically. This is also to support faculty members in using GenAI in their teaching meaningfully, by sharing inspiring real-life stories from SUTD.

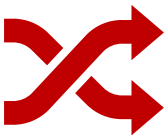
This primer captures how we approach GenAI at SUTD, not as an efficiency shortcut, not as a marketing strategy, but as a platform for deeper inquiry, collaborative design, and societal impact. It represents our pedagogical DNA: interdisciplinary, iterative, and always anchored in purpose.

We share this primer not just to describe what we do, but to invite others to reimagine what is possible when GenAI meets human-centered design to innovate education.

EDITORIAL

Design and Technology are the two strands of Singapore University of Technology and Design (SUTD)'s DNA. SUTD's educational model blends design, technology, and human-centered thinking to prepare students for a world in constant transformation.

With the rise of Generative AI (GenAI), we are witnessing one of the most significant shifts in how knowledge is created, accessed, and shared. SUTD is committed to embracing these changes by supporting our faculty, students, and staff as they adapt to this new landscape.



The challenge is not with the technology tools but with the transformation of our teaching and learning practices. While there is a mixed reaction towards the use of GenAI at universities, SUTD is taking a structured and evidence-based approach to using GenAI in education.

The Office of Strategic Planning, with the SUTD community, has put together this primer to provide clarity, context, and guidance on the use of GenAI at SUTD.

This guidebook introduces readers to GenAI, SUTD's take on the use of GenAI, how students and faculty are currently using GenAI, and gets us thinking about designing the future of learning with GenAI.

Grounded in well-established pedagogical frameworks, from constructivist learning to distributed expertise and cognitive apprenticeship, this primer emphasizes a deliberate approach to teaching and learning with GenAI.

SUTD's university-level Design AI strategy and institutional-level Tools, Teammate, and Neither approach reflect this deliberateness.

This primer is both a guide and an invitation. An invitation to think critically, act ethically, and teach and learn with passion, in the age of GenAI.

Yours sincerely

Nachamma Sockalingam

Assistant Director, Office of Strategic Planning

EXECUTIVE SUMMARY

- **Generative Artificial Intelligence (GenAI)** is transforming the higher education landscape.

- Research suggests that GenAI flourishes in **learning environments shaped by design thinking, interdisciplinarity, and active, learner-centered pedagogy** [1-3, 8, 9].

- **SUTD's Design AI approach** blends design thinking, GenAI technology, and human-centered practices, making it well-suited to prepare learners who create the future with GenAI [4] rather than be just consumers of GenAI.

- **SUTD's Tool, Teammate, and Neither (TTN) approach,** which stems from LKYCIC work, explicitly addresses cognitive, collaborative, and ethical dimensions of GenAI, offering more actionable guidance [4]. **More use cases and examples can be found in the primer.**

KEY TAKEAWAYS

GenAI is NOT a passing trend:
AI literacy is essential for teaching and learning in the age of GenAI.

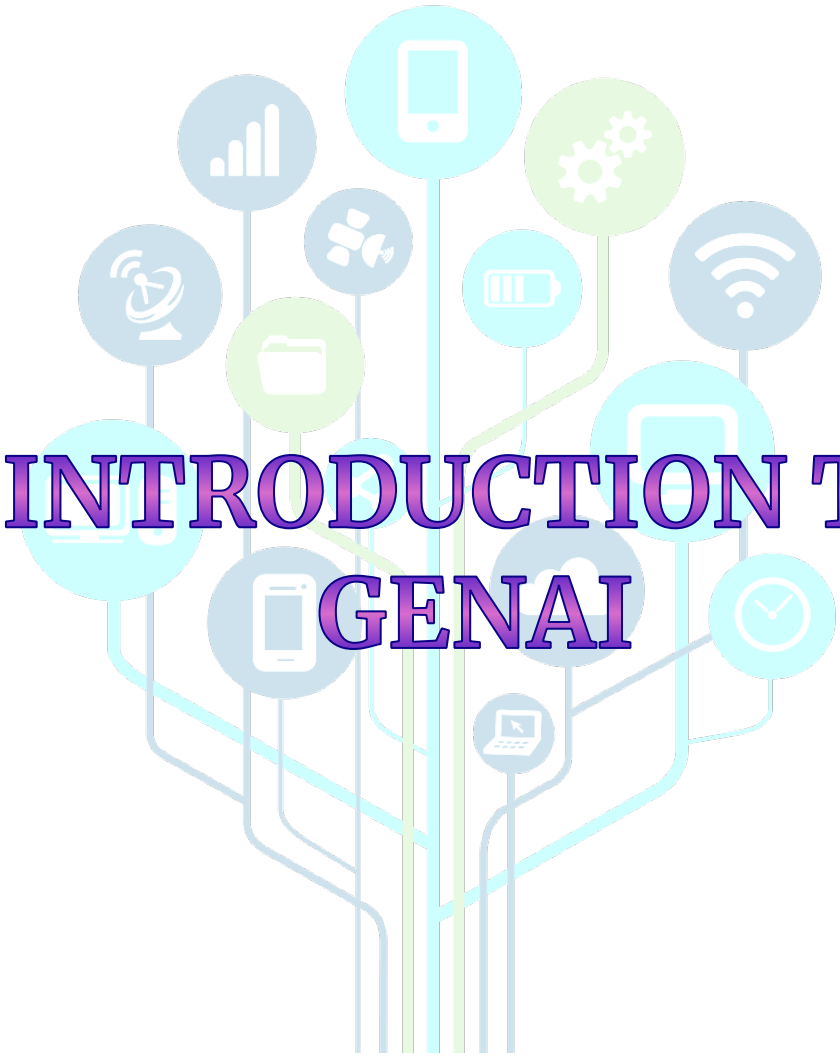
GenAI is NOT a replacement for teachers:
Human empathy, mentoring, and critical judgment remains irreplaceable.

GenAI is NOT a shortcut:
It is about deliberate and critically engaged, active, and interactive use of GenAI.

GenAI is NOT infallible:
Transparent, ethical use with integrity and validation is essential.

GenAI is NOT absolute and for all purposes:
SUTD takes an evidence-based approach to GenAI integration.

TABLE OF CONTENTS



INTRODUCTION TO GENAI

WHAT IS GENAI?

"Generative artificial intelligence (AI) describes algorithms (such as ChatGPT) that can be used to create new content, including audio, code, images, text, simulations, and videos."

- McKinsey Explainers [8]

"AI systems that are trained on enormous amounts of data and can produce (rather than just analyse) human-like text, images, speech, music, video, computer code, and more by predicting the next unit of content."

- Tillmanns *et. al.* [5]

" Generative AI, sometimes called GenAI, is artificial intelligence (AI) that can create original content such as text, images, video, audio, or software code in response to a user's prompt or request."

– IBM [6]

WHAT IS GENAI?

"Generative AI enables smarter content creation, deeper data insights, streamlined automation, and enhanced AI performance."

- Nvidia Website

"Generative models are a key enabler of machine creativity, allowing machines to go beyond what they have seen before and create something new."

- Ian Good Fellow [7]

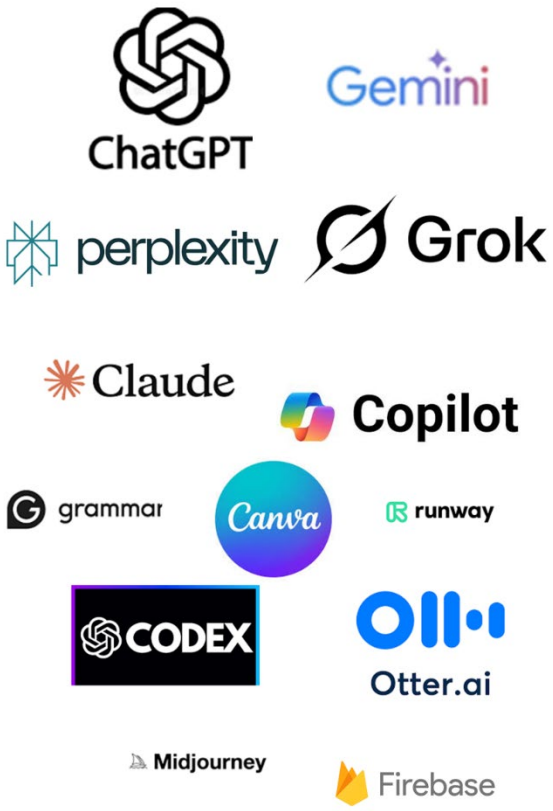
EXAMPLES OF GENAI

"All Large Language Models are GenAI. But not all GenAI are LLMs."

- LLMs are generally text-based. Some GenAIs generate image, audio, video, or designs using different architectures like GANS or diffusion models.

- Below are some examples of GenAI used in academic settings. One of the top-most used GenAI globally is ChatGPT, which is an LLM.

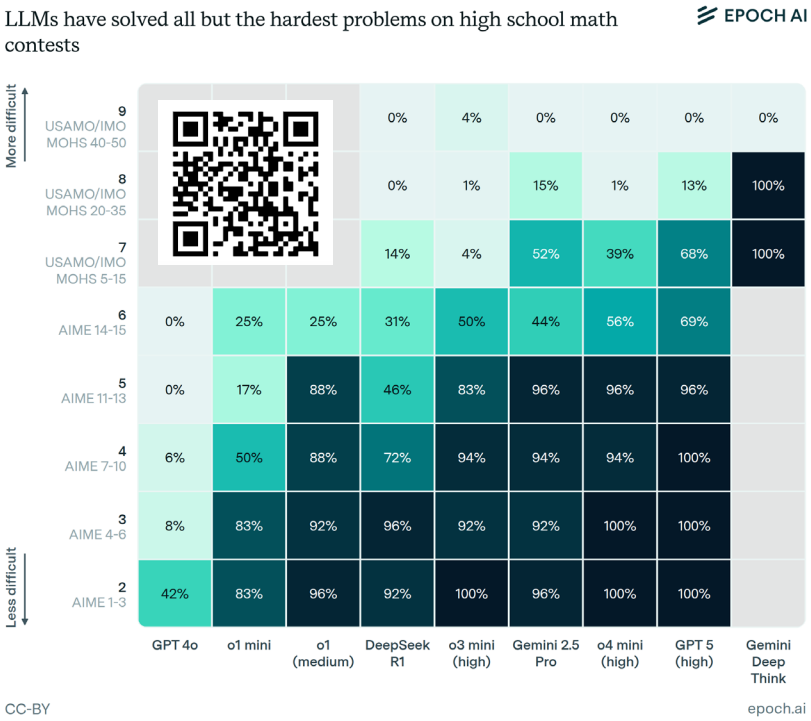
- In some cases, it may be useful to create a workflow with multiple GenAI tools.One such example is visualizing the DAI Fab Lab using Google Nano Banana and Midjourney.



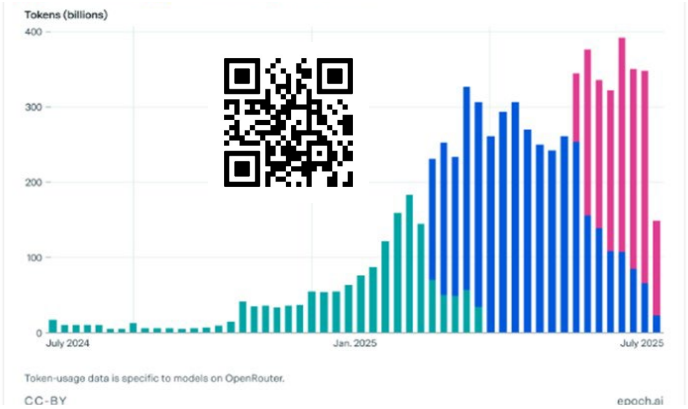
EVOLVING LLM

"While less capable than humans in many real-world scenarios, GPT-4 exhibits human-level performance on various professional and academic benchmarks, including passing a simulated bar exam with a score around the top 10% of test takers."

– GPT4 Technical Report

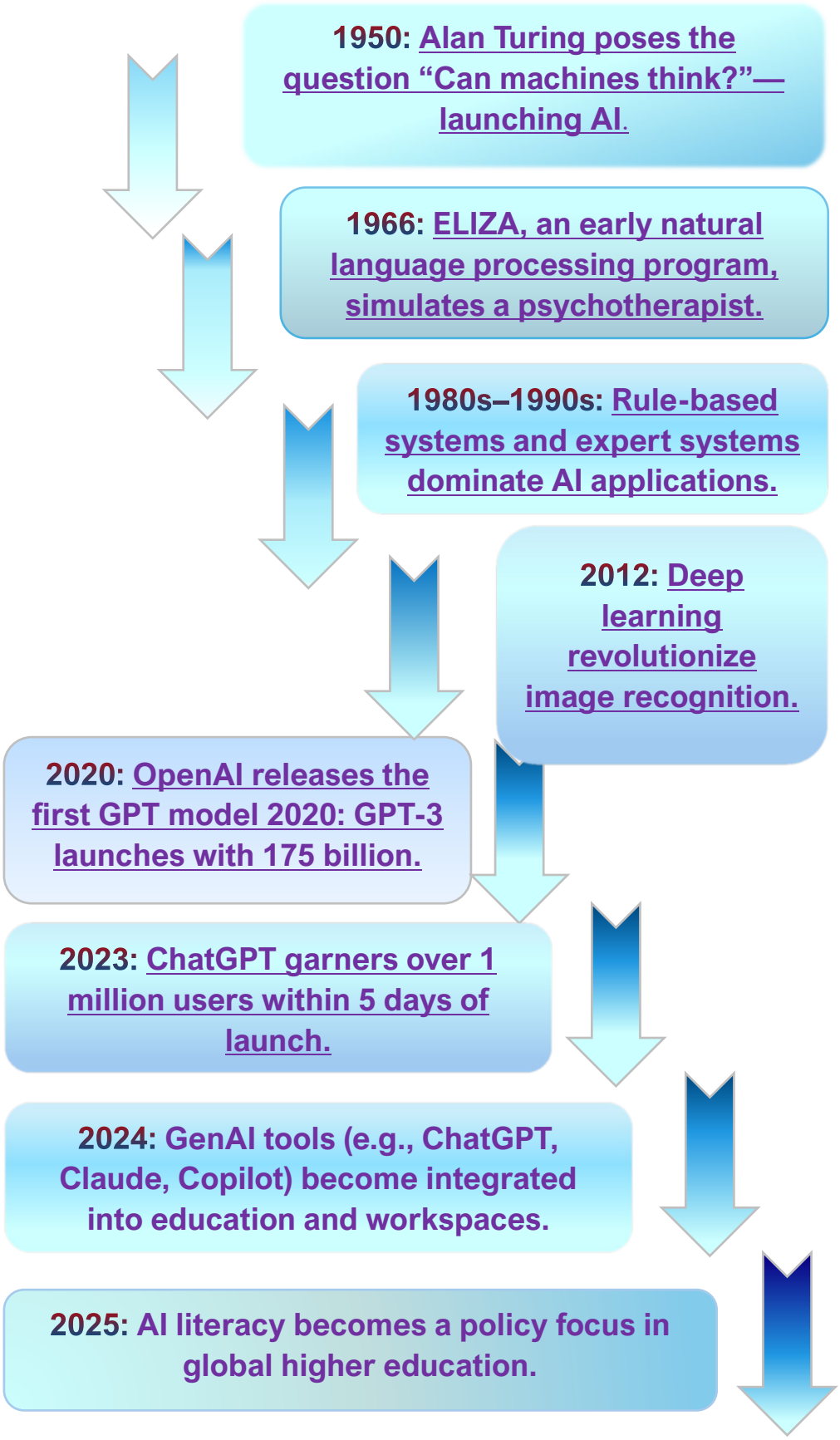


Amazing LLM Score in Math Contests: But Yet to Solve the Hardest Problems



New Versions Over Older Versions of LLM Reflecting Quick Adoption

A QUICK PEEK INTO GENAI HISTORY



GLOBAL TRENDS OF GENAI IN HIGHER EDUCATION

Student Usage of GenAI Exploding Worldwide

In a UK-based study, 92% of undergraduate students (N = 1041) use GenAI, up from 66% in 2024; 88% use it for assessments, with 18% including it verbatim in coursework.

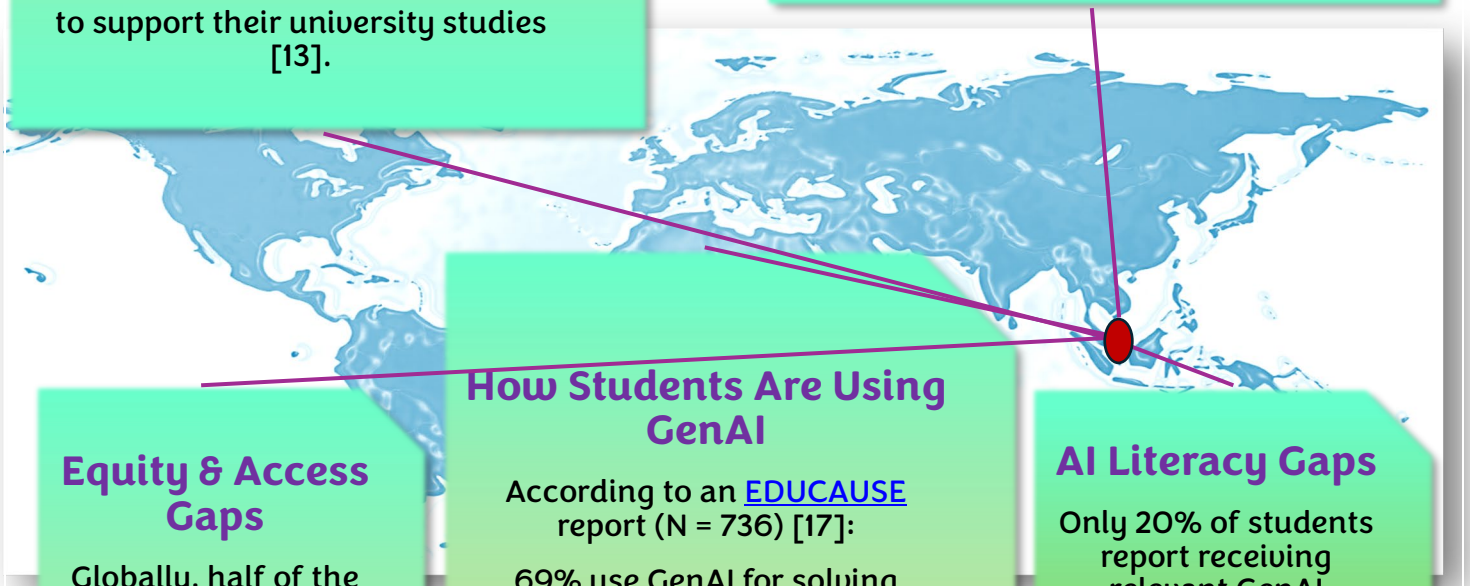
While the use of GenAI has increased, attitudes to it are more mixed. In some areas, students are more hesitant about AI [12].

Another international survey of 11,706 undergraduate students across 15 countries, found that 80% of students worldwide have used GenAI to support their university studies [13].

Faculty & Institutional Uptake

61% of global faculty (1,681 faculty members at 52 higher education institutions from 28 countries) have used GenAI in teaching; however, most use is surface-level [14].

Leading U.S. institutions report 93% of faculty and administrators (N=445), expect to expand GenAI usage, though bias and policy concerns persist [15].



Equity & Access Gaps

Globally, half of the campuses do not offer institution-wide (N = 108) GenAI access; Access is often uneven across departments.

Digital equity issues persist [16].

How Students Are Using GenAI

According to an EDUCAUSE report (N = 736) [17]:

69% use GenAI for solving academic problems

67% for proofreading/editing

61% for summarizing content

55% for brainstorming

54% for media creation

AI Literacy Gaps

Only 20% of students report receiving relevant GenAI training, despite 55% considering it critical for future careers.

Less than 36% of UK students have been formally trained despite widespread usage [12].

FAQ ABOUT GENAI USE AT SUTD

WHAT PEDAGOGY IS SUITABLE FOR GENAI ADOPTION?

That is a great question to start with the pedagogy. Often, people start with the technology. We need both.

Research studies show that GenAI thrives in environments shaped by design thinking, interdisciplinarity, and active, learner-centered pedagogy [1-3, 8, 9].

Approaches such as constructivism, socio-participatory learning, and cognitive apprenticeship provide the ideal foundation for integrating GenAI, not just as a tool, but as a creative and critical partner in the learning process [1-3, 8, 9].

At SUTD, these principles are embedded in our DNA. We prepare students to not just use GenAI, but to design with it, reflect on its impact, and lead in an AI-augmented world.

WHAT ARE THE USER SENTIMENTS OF GENAI ADOPTION AT SUTD?

At SUTD, we are open-minded about using GenAI, but that does not mean we follow with blind faith.

As in all cases, adoption of GenAI comes with mixed sentiments and scepticism, which is healthy [17]. On the conservative side, the concern is that GenAI can be misused/overused, that it is not used effectively for learning, and that it is even detrimental to learning.

These are valid concerns, and we must test them out in safe contexts [17]. It is not just about the technology, but how we use it.

However, it is also about planning and preparing. GenAI adoption in SUTD courses is growing. SUTD's weekly DAI newsletter captures many of these practices, and these use cases are comparable to international case studies [15].

Check out the chapters on Design AI and the TTN framework to understand SUTD's institutional strategy and approach.

HOW ARE SUTD FACULTY MEMBERS USING GENAI IN THEIR TEACHING AT SUTD?

Faculty readiness is an important factor for GenAI adoption [18]. Many faculty recognize the need to redesign lessons and assessments to ensure genuine learning [19].

Others are working on clear boundaries for GenAI use to maintain academic integrity, and to foster creativity rather than dependency.

Adapting to these changes requires a shift from traditional lectures and exams toward more inquiry-based learning, critical judgement, and meaningful student-GenAI collaboration.

Faculty members are exploring and experimenting with the use of GenAI tools in their teaching and assessments.

See the chapter on faculty use of GenAI at SUTD and their reflections for inspiring ideas.

HOW ARE STUDENTS USING GENAI AT SUTD?

LKYCIC, together with the Office of Strategic Planning and faculty members, is researching AI/GenAI use at SUTD. We will learn more in time to come from such studies.

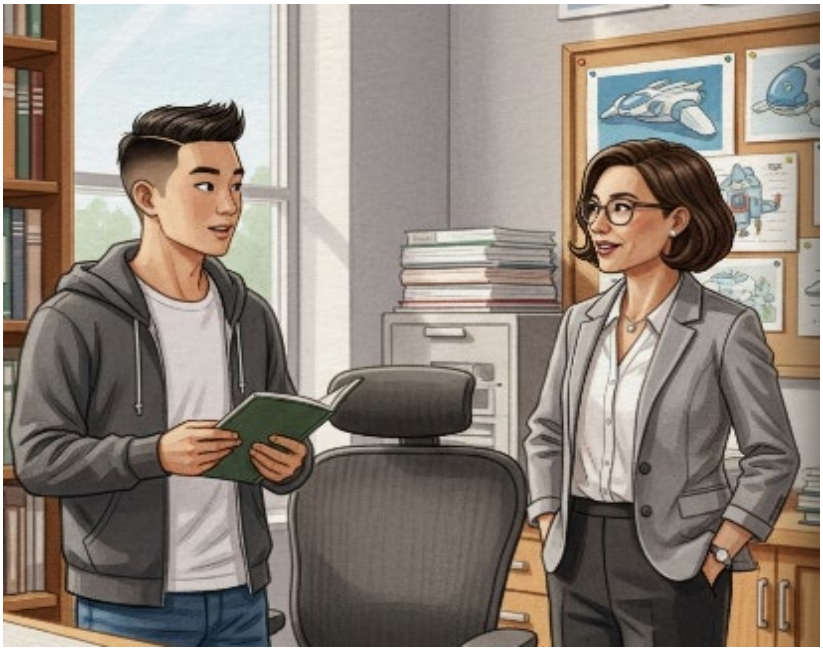
While SUTD students may increasingly use GenAI, true impact comes not just from usage, but from learning how to work these tools thoughtfully and strategically.

To fully harness GenAI's potential, students need guidance, structure, and opportunities to reflect on when, why, and how to use GenAI as a partner. SUTD's TTN framework supports this.

This guidebook is one of the support systems made available to students to provide clarity on the use of GenAI at SUTD. You can refer to the chapter on student use of GenAI at SUTD and their reflections, and the essentials of GenAI use for inspiring ideas.

You can reach out to student-led initiatives such as the AI-Interest group, AI literacy workshops, and the Building O initiative. You can also connect with your faculty members and even proactively initiate GenAI-related projects.

WHAT ARE THE GUIDELINES FOR USING GENAI AT SUTD?



GenAI offers possibilities but also has risks and raises critical questions.

Custom GPTs, code copilots, and AI tutors are becoming common. While these enhance ideation, feedback, and productivity, they also raise questions about bias, misinformation, and dependency.

As designers, SUTD learners must be skilled to critically frame problems, select the right tools, and evaluate AI outputs. The TTN framework serves as a good reference for using GenAI.

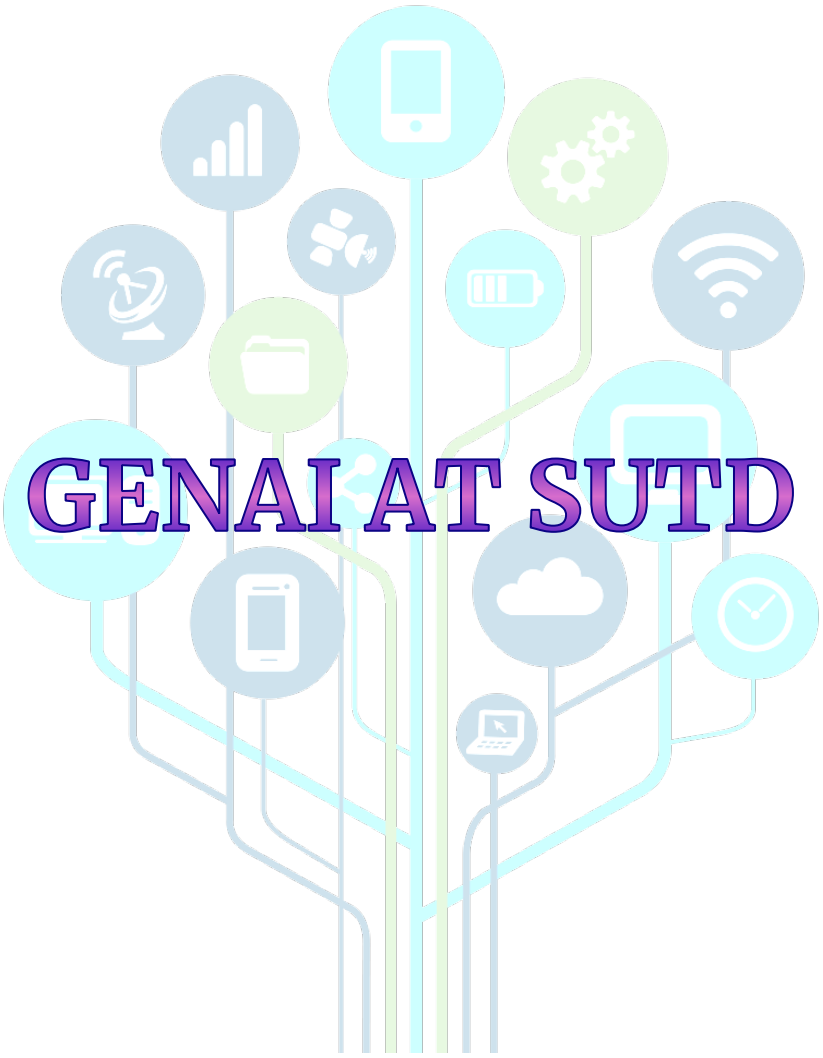
You can also refer to Gateways and Guardrails in using GenAI, and also SUTD's Communiques on AI use at SUTD.

The rule of thumb is that "*Adopting mastery goals is more meaningful than performance goals*" [28].

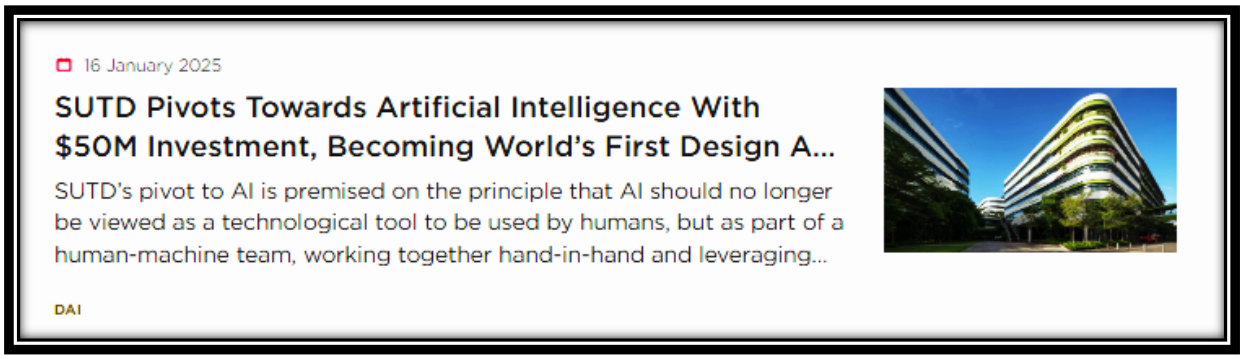
TEN MYTHS ABOUT GENAI: DEBUNKED

While enthusiasm for GenAI is rising, so too are misconceptions. Here are some of the most common myths and the grounded realities.

MYTH	REALITY
1. AI will replace teachers.	AI supports teaching but cannot replace human empathy, mentoring, or contextual judgment [17, 27].
2. Using AI is cheating.	When used transparently and ethically as per course requirements, AI is a tool for learning [19]. Check the course and assessment requirements first.
3. AI always gives correct answers.	AI can "hallucinate"—it often produces plausible but false content. Verification and validation are essential [20,21].
4. AI understands meaning.	GenAI predicts patterns in data based on probability; it doesn't understand context or intent [6, 8].
5. Longer prompts are better.	Clarity and specificity beat length- whether short or long. Well-structured prompts get better results [17, 22, 23].
6. Students won't learn if AI helps.	Learning deepens when AI is used to explore, reflect, and iterate, not just give answers [10].AI is a technology, and learning depends on how one uses it.
7. Faculty must be tech experts.	Starting small(e.g., drafting rubrics or feedback) builds up the AI muscle. It is about pedagogy, not programming [18].
8. AI is neutral and unbiased.	AI inherits the biases in its training data. Users must apply ethical awareness [24].
9. Only STEM subjects benefit from AI.	AI enhances design, writing, social analysis, and more across all disciplines [1, 8, 24].
10. AI is just a passing trend.	GenAI is becoming foundational, like the internet or smartphones. We must learn to use it well [25].


GENAI AT SUTD

DESIGN AI: AN INSTITUTIONAL APPROACH



In most universities, AI is viewed as a subject to be studied, a tool to be used, or a technology to be restricted [26]. But at the Singapore University of Technology and Design (SUTD), AI (including GenAI) is something more foundational.

Here, AI is designed with, not just used. It is integrated into the very fabric of how students learn, how faculty teach, and how research and innovation are imagined.

This is the essence of Design AI. SUTD's core pedagogical and institutional stance goes beyond GenAI as a trend. Design AI reflects SUTD's bold declaration: "We are the world's first Design AI university". Design AI is not a software platform or a curriculum add-on, or a new type of AI.

"It is a shift in mindset, from using AI as a productivity tool to engaging AI as a creative, collaborative, and critical design partner."

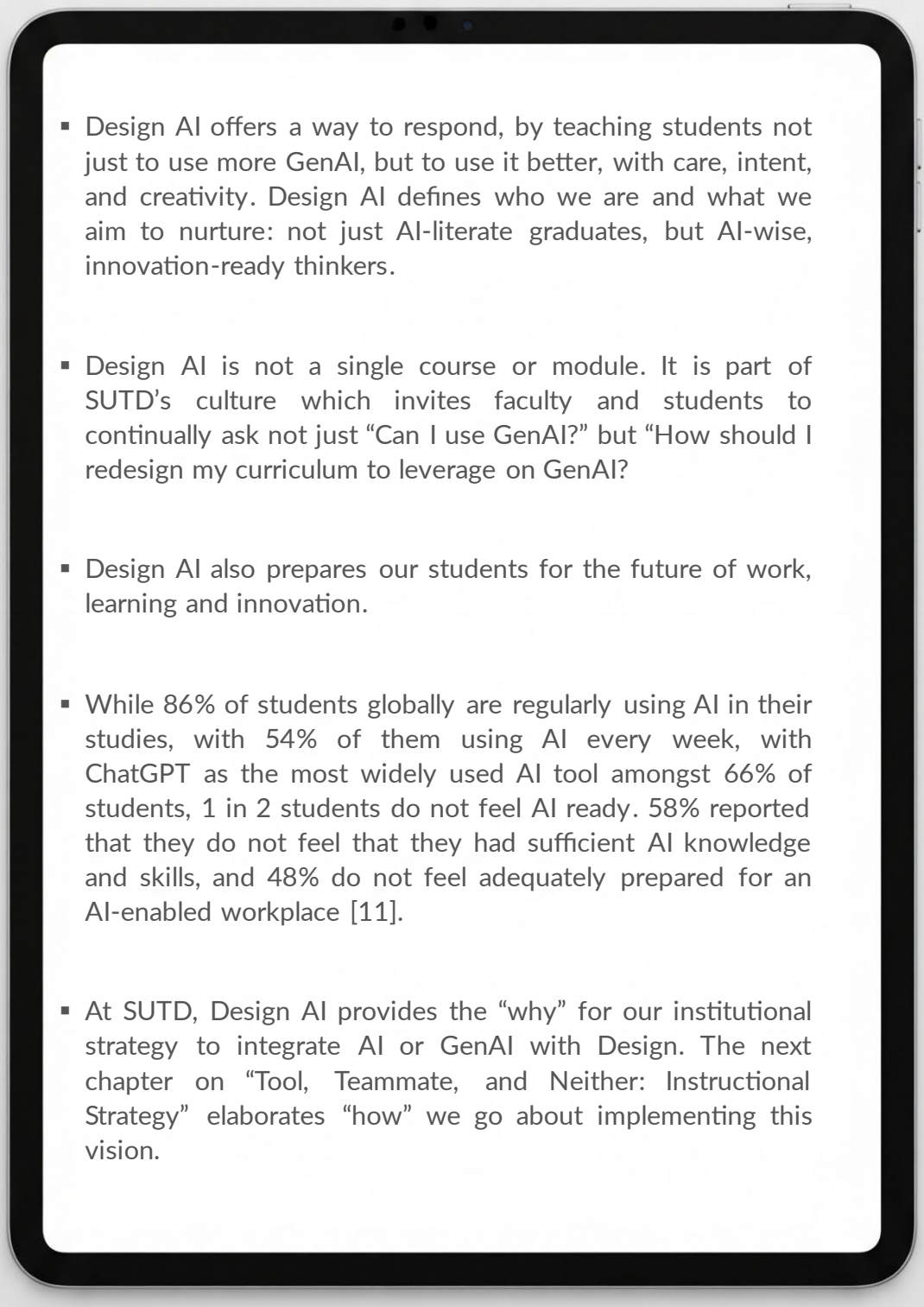
SUTD recognizes that the real transformation in education does not come from inserting AI or GenAI into existing tasks, but from redesigning the tasks, questions, and goals around what can be enhanced and enabled.

At SUTD, this ethos is seen everywhere, from courses and capstones to hackathons and research labs. It is not just about learning AI, but learning with AI. Students are encouraged not only to prompt an LLM or generate outputs, but to architect AI workflows, prototype human-AI systems, and reflect critically on when and why AI or GenAI should—or should not—be used.

Why This Emphasis on Design AI?

"AT SUTD, design is our language, and AI, as technology, is our amplifier."

SUTD's educational philosophy has always centered on human-centric design, interdisciplinary integration, and real-world impact. With AI, these commitments are elevated. But they also face new challenges—automation risks cognitive deskilling; efficiency can eclipse ethics; scale can drown out discernment.



- Design AI offers a way to respond, by teaching students not just to use more GenAI, but to use it better, with care, intent, and creativity. Design AI defines who we are and what we aim to nurture: not just AI-literate graduates, but AI-wise, innovation-ready thinkers.

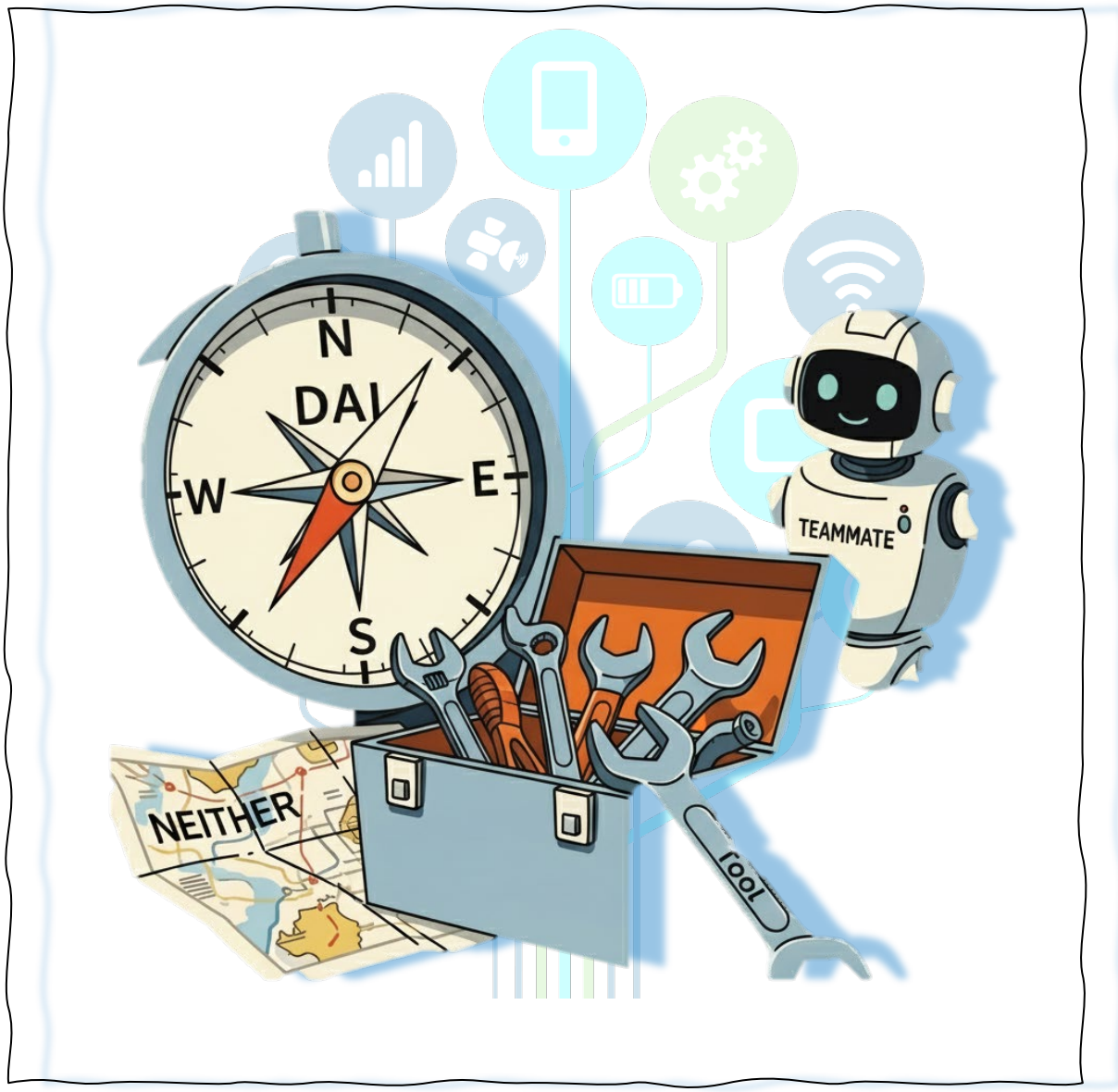
- Design AI is not a single course or module. It is part of SUTD's culture which invites faculty and students to continually ask not just "Can I use GenAI?" but "How should I redesign my curriculum to leverage on GenAI?

- Design AI also prepares our students for the future of work, learning and innovation.

- While 86% of students globally are regularly using AI in their studies, with 54% of them using AI every week, with ChatGPT as the most widely used AI tool amongst 66% of students, 1 in 2 students do not feel AI ready. 58% reported that they do not feel that they had sufficient AI knowledge and skills, and 48% do not feel adequately prepared for an AI-enabled workplace [11].

- At SUTD, Design AI provides the "why" for our institutional strategy to integrate AI or GenAI with Design. The next chapter on "Tool, Teammate, and Neither: Instructional Strategy" elaborates "how" we go about implementing this vision.

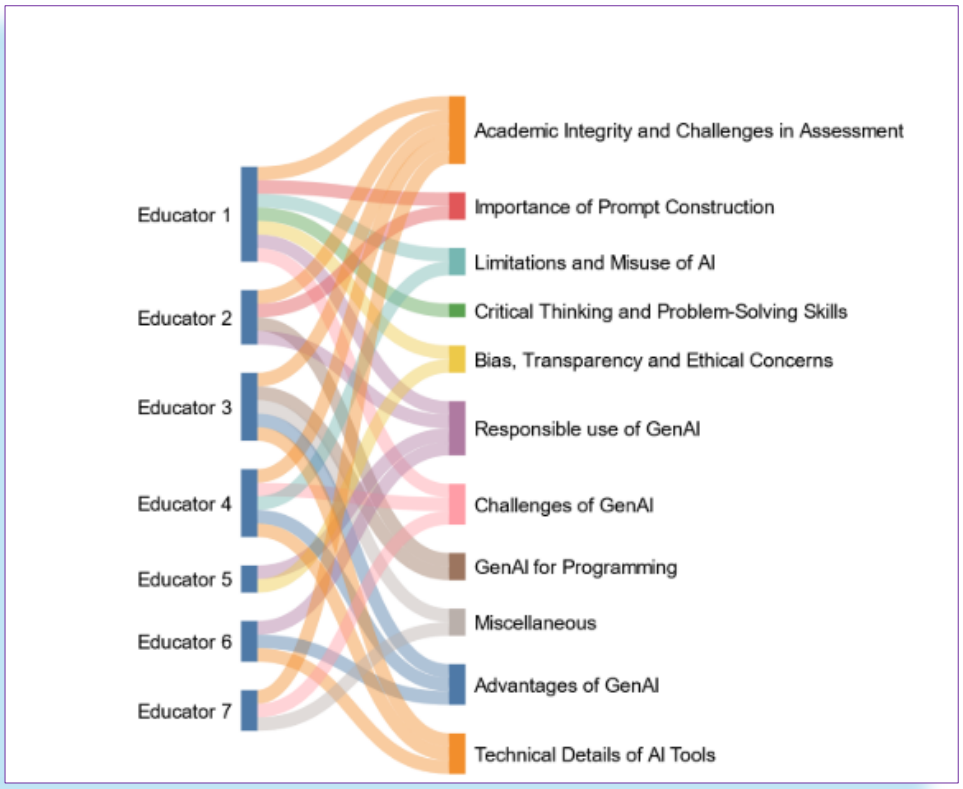
“While Design AI is the North Star that defines the institutional vision, the Tool, Teammate, and Neither (TTN) framework provides a practical map—an instructional model that helps both educators and learners make pedagogically sound decisions about GenAI use.”



TOOL, TEAMMATE, AND NEITHER: AN INSTRUCTIONAL STRATEGY

The proliferation of GenAI tools has enabled experimentation but also revealed inconsistencies in educational outcomes [27, 28]. Without a structured pedagogical model, AI use risks remaining superficial, focused on efficiency rather than transformation.

GenAI technologies offer new opportunities to increase access to creativity, speed up idea generation, and support complex problem-solving tasks [1, 2, 3, 8, 28]. However, their integration into teaching environments creates tensions between efficiency and educational integrity. For educators, the challenge involves adjusting teaching strategies to maintain the cognitive and ethical standards of learning while incorporating new tools [18,19]".



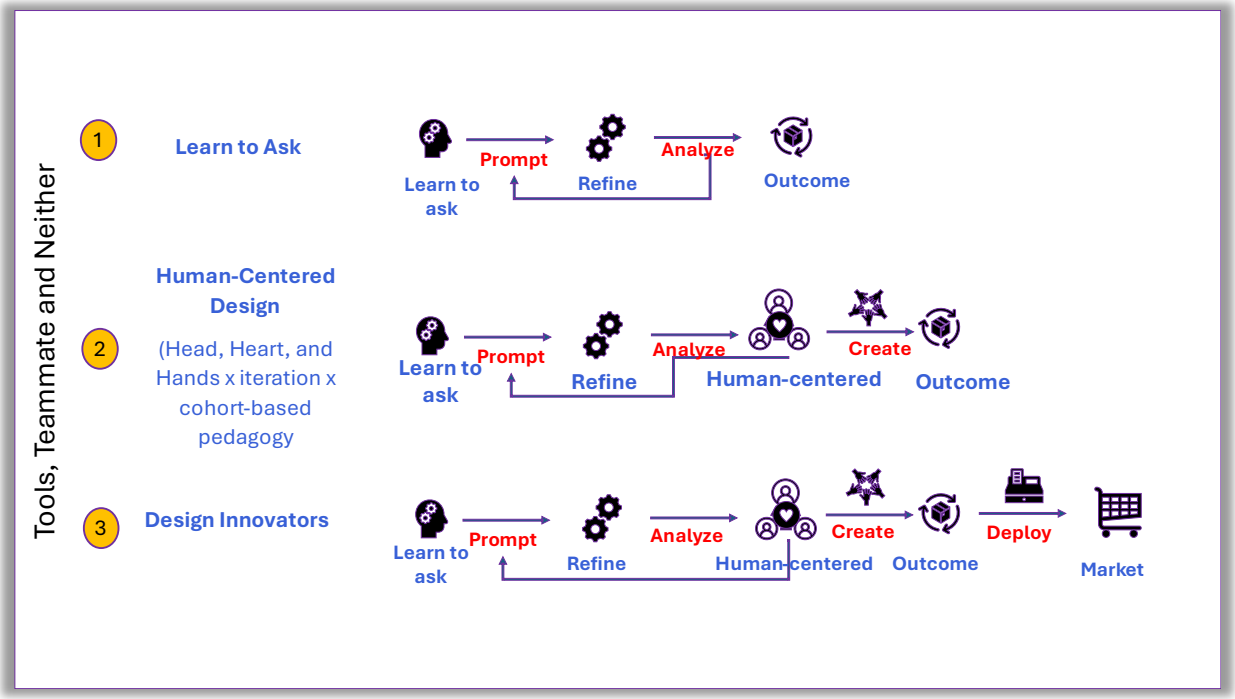
Educator's Perspectives on GenAI Use [17]

The question is, how can we use GenAI tools in teaching and learning meaningfully? At SUTD, we propose the Tool, Teammate, and Neither model to be one approach. Such approaches are meant to be guidelines and to be adapted to the given context.

INTRODUCING THE TOOL, TEAMMATE, AND NEITHER (TTN) FRAMEWORK

Drawing from SUTD's applied research at LKYCIC, the TTN framework offers intentional design choices grounded in constructivist and socio-participatory learning [4,29,30].

It empowers educators to move from passive use of GenAI to strategic integration and interaction between humans and GenAI, helping students develop not just skills, but also judgment, ethical awareness, design fluency, and traits essential for thriving in a human-machine collaborative world [31, 32, 33].



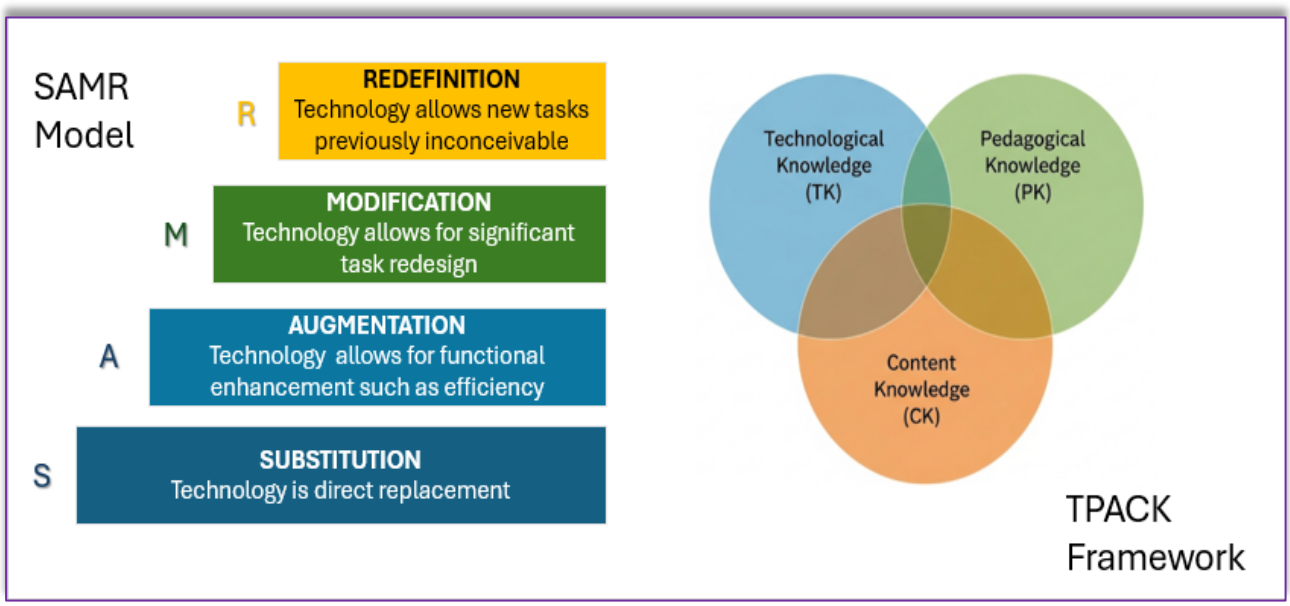
SUTD' s TTN Framework Applied in Design Thinking

APPLYING THE TTN FRAMEWORK

- The diagram illustrates a progression in how students can engage with GenAI in their learning and design work.
- At the most basic level, GenAI serves as a tool: students learn to ask effective questions and refine AI-generated answers to support their understanding or increase their productivity.
- As they advance, GenAI becomes a teammate, supporting a more human-centered, iterative process. Here, students combine their own judgment, creativity, and ethical reasoning with AI capabilities to brainstorm, prototype, and co-create, reflecting SUTD's emphasis on integrating head, heart, and hands.
- At the highest level, students evolve into design innovators who can strategically decide when to use GenAI as a tool, when to collaborate with it as a teammate, and—critically—when not to use AI at all, recognizing moments where human insight or ethical considerations take precedence.
- This full-spectrum approach empowers graduates to create unique value and lead in an AI-augmented world, fulfilling the growing demand for versatile, innovation-ready designers.

INNOVATIVENESS OF TTN FRAMEWORK

While several models, such as the Substitution, Augmentation, Modification, Redefinition (SAMR) or Technological Pedagogical Content Knowledge (TPACK), exist for integrating technology in education [34,35], these often focus on general technology use and overlook the unique affordances and risks of GenAI. They serve a different purpose.



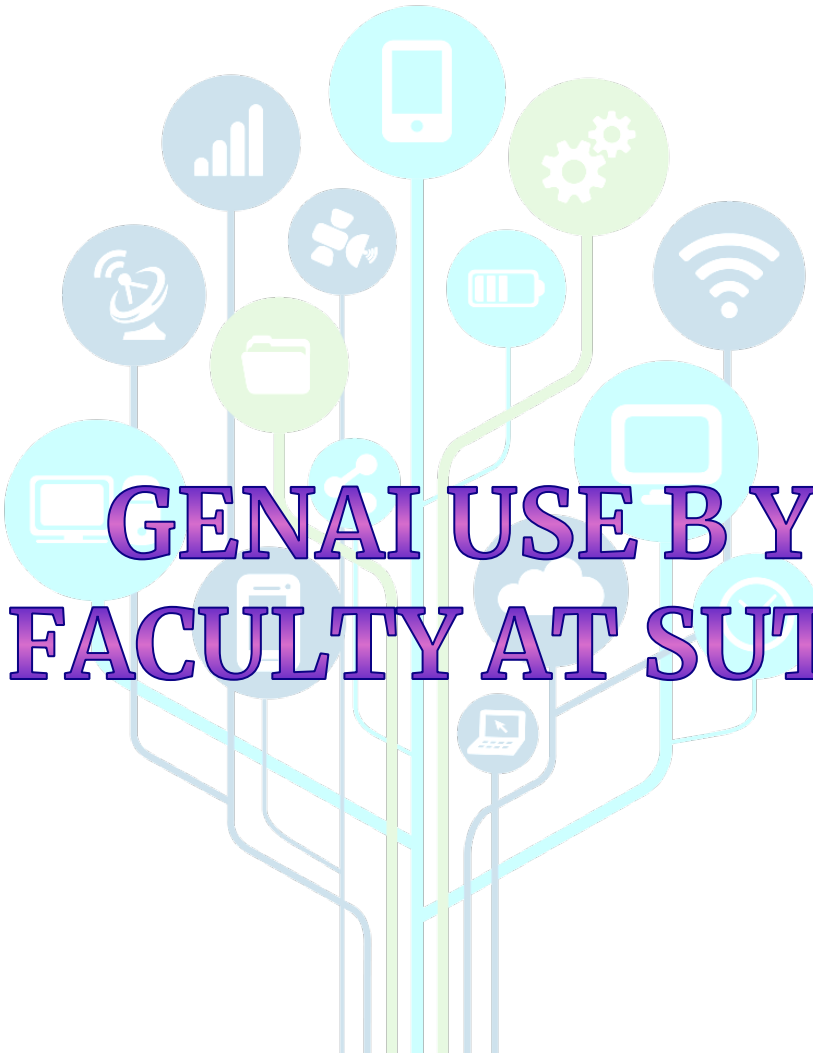
Technology Adoption in Education

SUTD's TTN framework implicitly addresses the cognitive, collaborative, and ethical dimensions of GenAI as the Neither component. It is designed not just to categorize AI use, but to help educators and learners make design judgments about when to scaffold, when to co-create, and when to pause or prohibit AI involvement.

The TTN framework reflects SUTD's DNA: integrating design, engineering, and human-centered thinking for future-ready learning.

Comparative Framework Analysis – TTN vs. SAMR vs. TPACK

Aspect	TTN (Tool, Teammate, Neither)	SAMR	TPACK
Purpose	Guide pedagogical decision-making for GenAI integration	Classify levels of tech enhancement in learning	Integrate tech with pedagogy and content knowledge
Focus	Intentional GenAI use across design, ethics, cognition	Degree of tech transformation (Substitute → Redefine)	Teacher's blended knowledge domains
Technology Role	Tool, co-creator, or excluded agent	Additive to transformative tech use	Enabler, but context-dependent
Pedagogical Lens	Constructivism, socio-participatory, critical pedagogy	Constructivism (implied)	Situated knowledge integration
Cognitive Framing	Explicit emphasis on student-AI judgment & reflection	Implicit cognitive load framing	Depends on educator's ability to balance three domains
Ethical Guidance	Core to "Neither" mode – when not to use AI	Not addressed	Not directly addressed
Applicability to GenAI	Designed specifically for GenAI and human-machine learning	Generic tech use framework	Applicable but needs reinterpretation for GenAI context
Actionability for Faculty	High – use case-driven; decision-oriented	Moderate – descriptive categories	Moderate – requires deep self-assessment and planning



GENAI USE B Y FACULTY AT SUTD

AN OVERVIEW OF FACULTY USE OF GENAI

Let us now consider how GenAI can be used as a Tool, Teammate and Neither by faculty members. Students can also mirror that.

GENAI AS A TOOL: COGNITIVE EXTENSION

Pedagogical Lens: Constructivism and Cognitive Load Theory

Overview: When GenAI is used as a tool, it functions to offload routine cognitive labour (e.g., summarization, proofreading, ideation support), allowing learners to focus on higher-order thinking.

Examples:

- Students using GPT for draft generation or for creating summaries.

Design Guidance for Faculty:

- Scaffold GenAI use with targeted prompts aligned to learning outcomes.
- Encourage learners to cross-check with authoritative sources.
- Get students to draft and use GenAI to critique.

GENAI AS A TEAMMATE: DISTRIBUTED MASTERY

Pedagogical Lens: Socio-Constructivism, Connectivism, and Participatory Learning

Overview: Inspired by ethnographic insights from SUTD [29,30], GenAI as a teammate operates in the space of "distributed seeing"—a concept where perception and decision-making are shared between human and AI. It enables inclusive classroom dialogue, simulates multiple stakeholder perspectives, augments peer learning, and dialogic interaction with GenAI.

Examples:

- Role-playing simulations where GenAI acts as user/client in design courses
- Student-developed GPTs for interdisciplinary synthesis and stakeholder modelling.

Design Guidance for Faculty:

- Embed GenAI in collaborative projects to prompt creative divergence.
- Use to simulate real-world dialogue and feedback loops.
- Combine with reflection and critique journals to anchor learning.

GENAI AS NEITHER: CRITICAL ENGAGEMENT AND ETHICAL HUMAN-CENTERED DESIGN

Pedagogical Lens: Critical Pedagogy, Ethics in Design, and Reflexive Practice

Overview: There are contexts in which GenAI may not aid and may hinder deep learning. When used superficially or without scaffolding, students can disengage or misuse AI (e.g., copy-pasting outputs without synthesis). The emphasis here is on intentional non-use or guarded integration.

Examples:

- Evaluation of AI-generated content through self or peer critique to promote judgment

Design Guidance for Faculty:

- Clarify when and why GenAI should not be used (e.g., final assessments, ethical reasoning)
- Train students to build on and validate AI-generated output.
- Redesign assessments and get students to reflect on their learning and use of GenAI.

FACULTY PIONEERS: HOW SUTD FACULTY ARE USING GENAI IN EDUCATION

SUTD's faculty are not just integrating GenAI into their courses to keep with the trends or policy requirements; they are reimagining what teaching and learning can be in a rapidly changing world. Their approaches are diverse, experimental, and deeply aligned with SUTD's design-driven ethos. From architecture studios and engineering labs to robotics workshops and ethics seminars, our faculty are turning GenAI into a true partner in innovation, reflection, and human growth. Here is how, and what we are learning from their work.

1. DESIGN INNOVATION AS OPEN-ENDED EXPLORATION (EPD: ASSOC. PROF. PABLO VALDIVIA Y ALVARADO)

Associate Professor Pablo Valdivia y Alvarado believes that creativity flourishes when students are encouraged to tinker, explore, and push boundaries. In his Engineering Product Development courses, AI tools like Midjourney and ChatGPT are integrated not as rigid modules, but as creative sparks for ideation and visual thinking [other examples: 36, 37]. Students use GenAI to sketch, benchmark, and iterate, but they are also challenged to critique GenAI outputs, compare against their ideas, and embrace collaborative, team-based learning. Importantly, assessment remains human and contextual; GenAI is a means for richer exploration, not a replacement for thoughtful judgment.

GenAI is most powerful when it enables rapid idea generation and collaborative critique, but it is essential to keep human judgment at the heart of assessment and feedback.

2. FLIPPED, AI-FIRST CLASSROOMS (ISTD: SENIOR LECTURER NATALIE AGUS)

Senior Lecturer Natalie Agus pioneered the use of AI-powered chatbots and online notes in her Information Systems courses, freeing up classroom time for deeper, more interactive learning. Students now arrive prepared, having already clarified basics with AI chatbots; class becomes a space for tackling complex problems and exchanging higher-order ideas. AI also supports efficient grading and feedback, but the final touch remains human and personal. She is also exploring GenAI for teaching coding.

GenAI is used in ISTD courses mainly for repetitive coding tasks, but students must still demonstrate their own reasoning. To ensure integrity, face-to-face checkoffs and exams verify individual understanding. Assignments are scaffolded with proposals, sketches, and incremental Git commits to show real development. These safeguards, though resource-intensive, are applied selectively to balance rigor with sustainability.

3. AI AS METACOGNITIVE PARTNER (ISTD: ASSOC. PROF. DORIEN HERREMANS)

For Associate Professor Dorien Herremans, GenAI is a thinking partner, not just a productivity boost. She models "co-prompting" with students—testing, probing, and critiquing AI outputs together. In coding labs and projects, students use multiple AI tools, but are graded on their process: how they validate, reason, and document their use of AI, not just the end results.

Faculty can foster critical AI literacy by openly using, critiquing, and even exposing GenAI's flaws together with students. Ethical reasoning and prompt engineering become core competencies, not afterthoughts.

4. EXPERIENTIAL ROBOTICS WITH GENAI (EPD: ASSOC. PROF. FOONG SHAOHUI)

In Associate Professor Foong Shaohui's EPD classes, drones and robots are both playground and testbed for AI-powered learning. Students use GenAI for code generation, flight path optimization, and real-world problem-solving. By comparing AI-supported and human-only solutions, they develop critical systems thinking and learn when to trust, adapt, or override AI advice. Hands-on coding—from visual blocks for beginners to advanced scripting—ensures accessibility for all backgrounds.

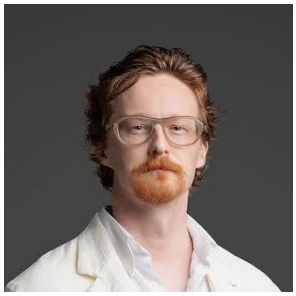
GenAI can turn abstract theory into lived experience, but teachers must scaffold reflection, so students know when and how much to trust GenAI—and when to rely on their own judgment.

5. ETHICS AT THE CENTER: DESIGNING WITH AND FOR AI IN SOCIETY (HASS: ASST. PROF. NILANJAN RAGHUNATH)

Assistant Professor Nilanjan Raghunath's approach puts ethics and social impact at the center of GenAI teaching. In her "Shaping Futures" course, students engage with AI not just as a technical tool, but as a social and ethical actor. Projects include designing custom AI collaborators with explicit ethical, cultural, and organizational values, and assignments require students to map out the societal consequences of AI systems. Classroom discussions delve into bias, power dynamics, and equity, challenging students to reflect on who benefits, who may be harmed, and how to design responsibly.

GenAI integration is most powerful when paired with structured ethical reflection and debate. Faculty can empower students to go beyond technical skills—cultivating the critical mindset needed to question, redesign, and lead the responsible use of GenAI in society.

6. PROMPT LITERACY AND CREATIVE VISUAL OUTCOMES (ASD: GRAD STUDENT JUAN DAVID SALAZAR AND ASSOC. PROF. SAM CONRAD JOYCE)



In ASD, the ArchiPrompt project by a graduate student under the supervision of Associate Professor Sam Conrad Joyce gives students structured support to master AI prompt engineering for architectural design. Through custom GPT tools and AI personas, students get immediate feedback on their prompts and iterate until their vision matches the output. Faculty guide students to reflect

critically on the process, building not only technical skill but creative confidence.

With the right scaffolding, GenAI can boost creativity and design literacy—but prompt engineering itself must be taught, not assumed. Faculty support is essential for students to move beyond trial-and-error to strategic, expressive AI use. The question is whether the prompt engineering is structured and directed or taught as a reflective and metacognitive exercise.

7. CRITICAL ADOPTION, CAUTIOUS EXPERIMENTATION (SMT/EPD: SENIOR LECTURER LEE CHEE HUEI)

Senior Lecturer Lee Chee Huei's approach is pragmatic and project-based. He experiments with GenAI as a coding assistant and as a feedback generator for ideas. He uses free GenAI tools and is proactive in advocating for accessible, licensed resources. He asks students to evaluate, compare, and justify the GenAI's suggestions, and he emphasizes learning the fundamentals.

Adoption depends on accessibility and institutional support. Even in resource-constrained settings, free tools can make lesson prep and coding more efficient. However, education leaders and faculty must persist in cultivating foundational knowledge and caution students against over-reliance on GenAI "shortcuts" for answers without real understanding – using GenAI to inspire, not to bypass real learning.

8. DESIGN THINKING WITH AI: FROM BRAINSTORMING TO SYSTEM INTEGRATION (EPD: DR. BRADLEY ADAM CAMBURN)

Senior Lecturer Bradley Adam Camburn uses a progression model for GenAI in engineering design, guiding students from using AI as a brainstorming partner to integrating it into advanced system development. In his classes, students initially use GPT to generate and critique design ideas. As they progress, they develop and test custom AI tools and APIs. Bradley's approach emphasizes prompt engineering, model understanding, and collaborative problem-solving. Assessment moves from focusing on product output to evaluating how students synthesize, analyze, and critique both AI and their own design choices.

Effective GenAI integration requires flexible frameworks, tool-agnostic skills, and a strong emphasis on process over product. Faculty innovation is essential for helping students become adaptive creators who are able to use, question, and shape AI/GenAI in design and engineering.

TEACHING WITH GENAI

The collective experience of SUTD's faculty pioneers reveals that integrating GenAI in higher education is not a one-size-fits-all journey.

The TTN framework offers a practical lens for both teachers and students to navigate the use of GenAI with confidence, creativity and clarity.

Whether GenAI is used as a Tool, Teammate, and Neither, it is essential that the learner is actively engaged.

One of the fears of both faculty and students about using GenAI for learning is cognitive deskilling [21].

It is well-established in educational literature that active learning leads to deeper and longer-lasting learning, leading to expertise [38].

This concept of active learning applies to GenAI integration as well, and will mitigate cognitive deskilling as well as over-reliance of GenAI [38,39, 40].

Faculty members integrating GenAI in their teaching need to evaluate if and how the use of GenAI in their teaching enables the learning process and enhances attainment of learning outcomes using the TTN framework [17,18]. Teaching activities and assessments must be redesigned if necessary.

Given that introduction of GenAI in teaching and learning is new to both faculty and students, a ground-up and evidence-based approach to understand what is working and not to fine-tune is recommended.

Active engagement of learners, teachers, and GenAI can lead to improved learning. See examples of Active Human-GenAI interaction in Learning (Examples 1 and 2).

GenAI Active	**GenAI Active, Human Passive** A student uses GenAI to search for articles and summarize long documents. The student passively uses the information, and pastes it in an assignment. **Minimal or Mistaken Learning**	**Both Active** **A student uses GenAI to source articles and drafts a presentation.** **The student uses GenAI to critique their own presentation and enhance it iteratively.** **The student reflects on their engagement with learning materials and GenAI, focusing on learning.** **GenAI-enhanced Learning**
GenAI Passive	**Both Passive** Faculty uploads lecture video and learning resources for flipped learning. Students are given free choice to use materials, but the student does not use given resources nor seeks. **No Learning**	**Human Active, GenAI Passive** A student prefers to learn using faculty-given resources or self-searched resources without the use of GenAI. **Learner-limited Learning**
	Learner Passive	**Learner Active**

Example 1 of Human and GenAI Interaction in Learning

GenAI Active	**GenAI Active, Human Passive** A student uses GenAI to design products. The student chooses one of the design images generated by GenAI and works on it without much evaluation and critical thinking. **Minimal or Mistaken Learning**	**Both Active** **A student uses GenAI to build their knowledge, design products, and also uses own ideas to compare and collaborate together with one or multiple GenAI.** **The student validates GenAI generated designs from different perspectives, possibly using GenAI (which may not have been possible without GenAI).** **The student also conducts needs analysis and user-testing.** **GenAI-enhanced Learning**
GenAI Passive	**Both Passive** A student comes up with one idea and designs a product. Not applying design thinking principles nor search engines effectively. **Very Minimal or No Learning**	**Human Active, GenAI Passive** A student prefers to design based on one's own ideas or google search engine without the use of GenAI. **Learner-limited Learning**
	Learner Passive	**Learner Active**

Example 2 of Human and GenAI Interaction in Learning

COMMUNIQUÉ FOR FACULTY ON GENERATIVE AI TOOLS

Office of Education &Innovation | 30 May 2025

The emergence of Generative Artificial Intelligence (AI) based technologies and tools that can generate content including written text, chain-of-thought reasoning, software code and images (e.g., ChatGPT, DALLE2, Midjourney), has generated much interest in higher education while concerns have also been raised about possible misuse, plagiarism, stifling creatively/originality and etc.

SUTD's stance on Generative AI Tools is as follows: the use of Generative AI tools is acceptable when used ethically and responsibly to enhance teaching and learning.

SUTD educators have embraced these new technologies and are already applying Generative AI tools in their respective courses to transform teaching, learning, and assessment in innovative ways while being cognizant of the need to:

- prepare students to use these tools ethically and critically; and
- enable students to acquire critical technical knowledge, skills and core competencies needed in their domains.

While noting that courses in different domains/ disciplines may require different approaches on the selection and use of Generative AI tools, the general guidelines / advisories listed below aim to help SUTD faculty address the challenges of teaching as these tools continue to evolve.

1. The use of Generative AI tools is allowed in situations where it can enhance and augment learning and help students to achieve higher level thinking.
2. SUTD educators should carefully assess the capabilities and limitations of Generative AI tools in the context of their courses and determine if using them would assist in meeting the learning objectives or measurable outcomes more effectively while not impeding students from acquiring the critical technical knowledge or core competencies they will need in their domains.

3. SUTD educators should continually review and re-design class assignments and assessments with the purpose of enabling students to demonstrate capacity for critical thinking, innovation, and originality as the Generative AI tools they use in their courses are also continually evolving. For example, SUTD educators can require students to provide a reflection detailing how they utilized AI in completing their assignment, highlighting their critical thinking and original contributions, or provide a reflection on the ethical considerations when creating their own AI systems.
4. SUTD educators should ensure that AI is not used in ways that could give certain students an unfair advantage over others, such as access to premium AI tools and resources.
5. SUTD educators should be explicit with students on whether the use of such Generative AI tools is permitted in their course and if so, they should educate students on:
    - how to use the tools ethically but not as a replacement for their own original / intellectual contributions
    - what constitutes unauthorised use of such tools and therefore academic misconduct
    - the need to acknowledge the use of Generative AI tools (how they were used etc.)
    - being aware of the limitations of Generative AI tools
    - being able to question the validity of the results produced by the AI tools
6. SUTD has clear and established rules on plagiarism, including breaches of academic integrity with the use of AI-assisted tools and apps. Students are bound by the tenets of the SUTD Honour Code* to always conduct themselves with integrity and accountability. The use of AI-assisted tools and apps for all SUTD courses whether in course work or projects (including UROP and Capstone) to generate content to pass off as one's own work constitutes plagiarism and therefore a breach of academic integrity. Students who are found guilty of plagiarism will be subject to disciplinary action in accordance with the Student Disciplinary Framework.

* Refer to policies on upholding academic integrity at **MyPortal** (via > Student Matters and Policies > Student Matters > University Policies > Academic Integrity / Student Discipline).

7. SUTD educators should establish mechanisms and rubrics to measure effective learning in courses where Generative AI tools are permitted e.g., conducting key assessments in closed-room settings, including an oral/demonstration component, etc.
8. While Generative AI detection tools (e.g., Turnitin AI Detector) can be used to initiate an internal investigation into suspected academic misconduct cases, it **cannot be used as evidence against students**. SUTD educators need to provide evidence other than those produced by Generative AI detection tools, before lodging the case with the Office of Student Administration. SUTD educators should allow the student to clarify how they used AI and examine any supporting materials (such as drafts, outlines or preliminary work) before determining that AI was used without permission or proper disclosure.
9. SUTD educators and researchers must embody the principles of responsible and ethical use of AI and its tools in all aspects of their work, including the need to be cautious with the data they share with Generative AI Tools as the providers of these tools may have the legal rights to collect your data and use it to their benefit. It is prohibited to share or input confidential information or data into Generative AI Tools which include:
    - personal data whether true or not about an individual which can be identified from the data and other information to which SUTD has or is likely to have access.
    - any information/data in whatever form which SUTD receives from third parties under obligations of confidentiality. Such confidentiality obligations may be set out in contracts such as non-disclosure agreements, collaboration agreements, funding agency's grant terms etc.
    - any information/data in whatever form which is classified as 'Confidential' or 'Restricted' under the Data Classification Policy.

- research data as defined under the Research Data Management Policy.

10. An AI Generative Content (AIGC) resource centre is being set up to provide advice, support, and generate awareness on how to use Generative AI tools appropriately for learning and teaching. Details will be announced in due course. In the meantime, to help support students to use Generative AI tools ethically and appropriately while understanding their benefits and limitations, an info-guide titled '**ChatGPT – An Introduction**' is now available (**view info-guide**).

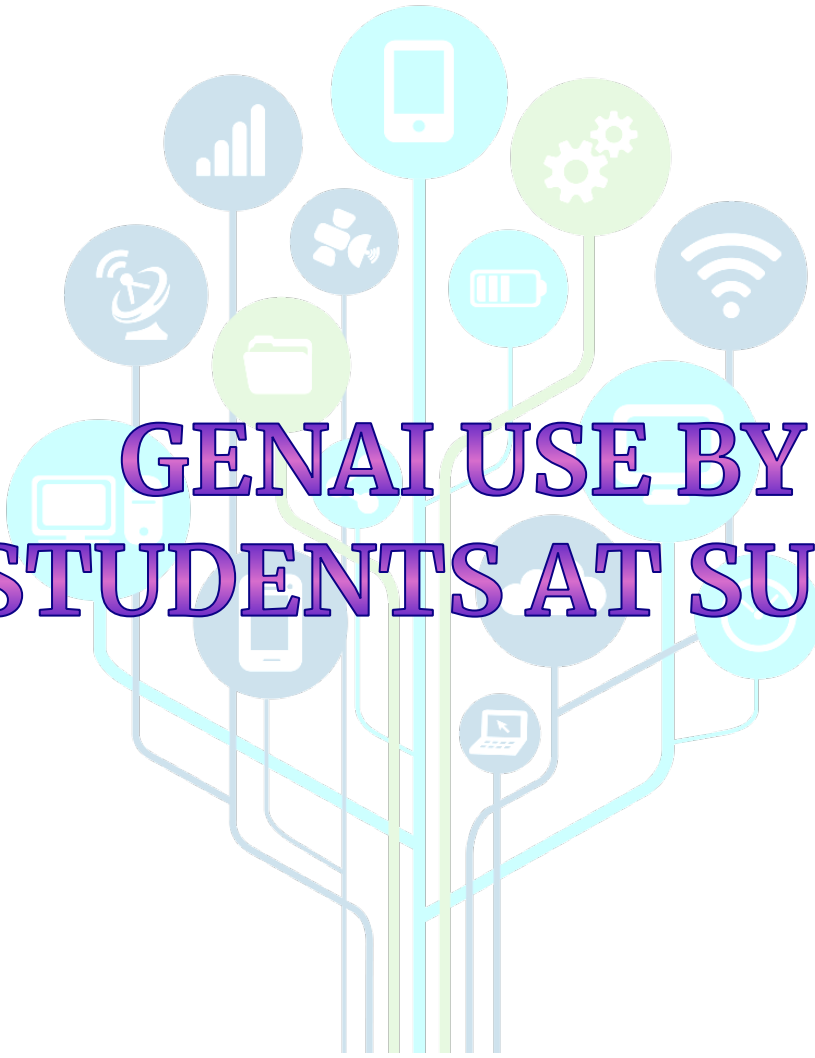
Concluding Statement

This is a living document which will be updated alongside developments in the field of Generative AI. Students will be encouraged to reach out to Faculty for more clarity on the use of generative AI tools in their courses and should be made aware of the benefits, pitfalls and policies governing the use of such AI tools.

Useful Resources/References

- Bruff, Derek (2023).Teaching in the Artificial Intelligence Age of ChatGPT. **https://tll.mit.edu/teaching-in-the-artificial-intelligence-age-of-chatgpt/** .
- Bubeck, Sebastien (2023). Sparks of AGI: Early Experiments with GPT-4. **https://www.youtube.com/watch?v=qbIk7-JPB2c**
- Elsevier: The use of AI and AI-assisted writing technologies in scientific writing: **https://www.elsevier.com/about/policies/publishing-ethics/the-use-of-ai-and-ai-assisted-writing-technologies-in-scientific-writing**
- Center for Education Innovation HKUST (2023). Higher Education in the AI Era: The Impact of ChatGPT. **https://www.youtube.com/watch?v=9ZW98LeOGNs**
- Center for Teaching & Learning, University of Pennsylvania (2023). ChatGPT and Its Implications for Your Teaching. **https://ctl.upenn.edu/resources/tech/chatgpt/**

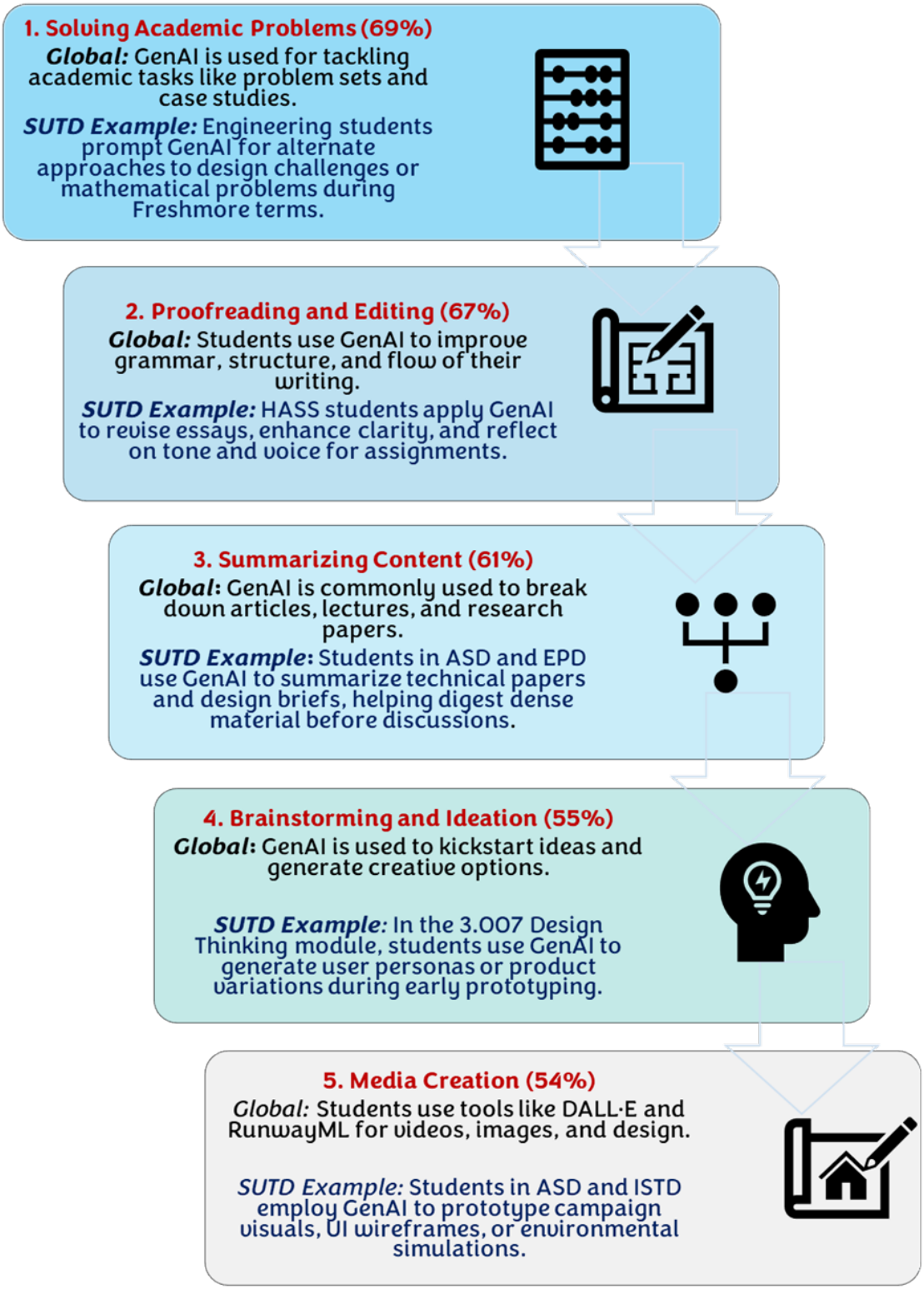
- Harvard On-Line: Benefits and Limitations of Generative AI: Harvard Experts Answer Your Questions: https://www.harvardonline.harvard.edu/blog/benefits-limitations-generative-ai
- Heaven, William D. (2023). ChatGPT is going to change education, not destroy it. https://www.technologyreview.com/2023/04/06/1071059/chatgpt-change-not-destroy-education-openai/
- Khan, Sal (2023). How AI Could Save (Not Destroy) Education | TED. https://www.youtube.com/watch?v=hJP5GqnTrNo
- McKinsey (2023). What is generative AI? https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai
- McMinn, Sean (2023). A Guide to Generative AI Tools Use in Higher Education. https://docs.google.com/document/d/1Z3vwC58sVdK9NKITUEHA7uGncH23bkhc6SLwQR8P-LE/edit?usp=sharing
- OpenAI (2023). Educator considerations for ChatGPT. https://platform.openai.com/docs/chatgpt-education
- UC San Diego (2023). Academic Integrity Office Statement on Artificial Intelligence. https://ucsdcloud-my.sharepoint.com/:w:/g/personal/tbertramgallant_ucsd_edu/EX29uhn0M9pJsWu4GlHC6TIBuT4gFkHCueQnGT5RXJir5w?rtime=w2dub6pZ20g



GENAI USE BY STUDENTS AT SUTD

AN OVERVIEW OF STUDENT USE OF GENAI

This chapter explores how students use GenAI as a tool and teammate and neither, globally [31-33, 41-43], and at SUTD to enhance learning.



HOW SUTD STUDENTS ARE USING GENAI

At SUTD, students are not just using GenAI, they are *remixing* it, *testing* its boundaries, and co-designing a future where AI is part of every learning journey. Whether it is creating personalised GPT professors, designing marathons, or real-world engineering challenges, GenAI is showing up as a tool, a teammate, and sometimes, a critic. What does this look like in practice? Here's how SUTD students are making AI work for them.

A DIGITAL PROFESSOR IN YOUR POCKET: GPTBERNIE

When Anieyrudh, an SUTD undergraduate, found himself stuck on math proofs before finals, he did not just wait for his professor's email reply; he built his own. By uploading lecture notes and slides to a Custom GPT, and training it to "teach like Prof. Bernie," he created GPTBernie: a 24/7 mentor that explained concepts in simple terms, generated practice questions, and which nudged him with hints instead of answers.

Result: Fewer panicked emails, more focused meetings with the real professor, and learning unparalleled. Anieyrudh's experiment opened a door: What if every student could build their own digital professor, tailored to their needs and learning style?

How to Build Your Own "GPTProf":

1. Gather: Syllabuses, slides, problem sets, instructor's bio
2. Curate: Pick your preferred teaching "vibes"
3. Upload & Tag: Build a custom GPT knowledge base
4. Prompt & Iterate: Give instructions, refine through use
5. Track Success: Fewer help emails, more targeted questions, better quiz results

Suggested prompt:

Role: You are [CourseName]GPTProf, a virtual tutor for [Topic/Subject] students at [School/Dept].

Knowledge Base: You draw from [syllabus name], [slides], [problem sets], and [instructor name]'s teaching style.

Teaching Vibe: Use a [Socratic | visual | step-by-step | intuitive-first] approach. Ask clarifying questions if needed.

Depth: Provide [conceptual | computational | real-world] depth as appropriate. Connect ideas to first principles when possible.

Example Task: "When a student asks: [insert typical student question], respond with [preferred response style – e.g., a 3-step breakdown, analogy + derivation, or diagram description]."

Tone: Be [encouraging | precise | patient | rigorous].

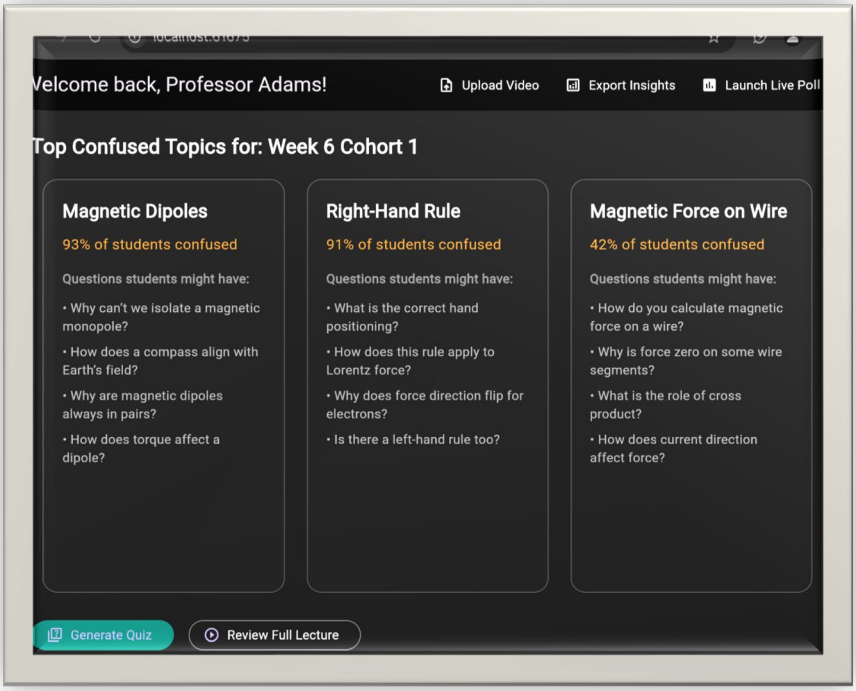
Prompt to Create your Own Custom Professor

DESIGN THINKING AND INNOVATION PROJECTS USING THE TTN FRAMEWORK

In SUTD's Design Thinking and Innovation course, over 500 students experimented with AI (not just GenAI) in team projects. A contest challenged them to go beyond using AI for efficiency, inviting them to co-design with it, critique it, and even ignore it when needed. The top three winners are presented here. We can see that the TTN framework applies to AI use as well, not just GenAI.

Example 1: Verbasense (1st place winner)

Final Prototype: A sentiment-monitoring system that tracks classroom confusion through audio cues and visual dashboards.



Verbasense Dashboard

The AI-powered classroom insight tool was collaboratively created by Berving Bek Jun, Chin Fu Jie, Jaryl Low Jia Wei, Lo Khye He, and Ramanathan Meyyappan Santhoshram. This team applied AI across design

ideation, user persona analysis, and real-time classroom sentiment tracking.

AI Helped: By combining OpenAI Whisper for transcription and Hugging Face sentiment models, they built a dashboard that flagged confusion hotspots and suggested quiz questions. The team also used AI to cut industrial design time from 3 days to just 1 hour, rapidly transforming concepts into high-fidelity visuals.

Tool: AI processed audio and visual data, generating real-time dashboards of classroom sentiment.

Teammate: Co-analyzed student feedback, helping the team pivot designs and spot emotional trends.

Neither: for in-class user testing, AI was excluded to preserve authentic teacher-student interactions.

"AI functioned as a teammate in analyzing feedback and was excluded (neither) during live testing to maintain authentic classroom dynamics."

~Team Verbasense

Example 2: Wavelet (2nd place)

Final Prototype: A smart bracelet ("Wavelet") that lets educators control slides and classroom tech through hand gestures.

User-Testing of Wavelet

The smart, gesture-controlled bracelet project, “Wavelet,” was developed by Alvin Teo Xi Hao, Ho Li Lian, Andrew Leng Chi Yeong, and Muhammad Zahid B Mohamad Dali.

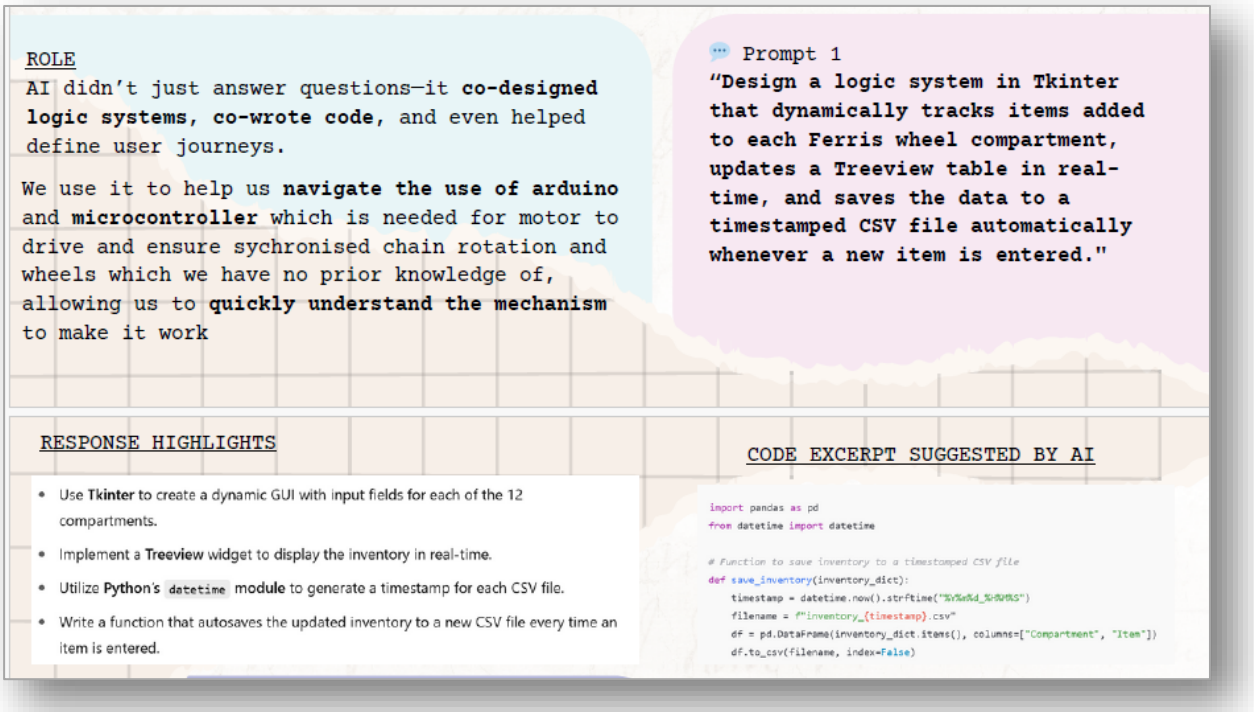
AI Helped: The team trained a machine learning model to detect muscle and motion signals (EMG, gyroscope, accelerometer) using a Random Forest classifier.

- **Tool:** AI classified gesture data for a wearable classroom controller.
- **Teammate:** teams used four different AI/GenAIs to cross-check prompts and surface blind spots.
- **Neither:** user interface and aesthetic testing were kept human-driven for empathy and authenticity.

"Validating through contradiction, we did not dismiss the outlier when AI disagreed, but rather used discrepancies to probe deeper, often surfacing blind spots that we hadn't considered."
~Team Wavelet

Example 3: Ferris Wheel storage (3rd place)

Final Prototype: A computer vision-powered rotating "Ferris Wheel" storage system that auto-tracks inventory and rotates items into view.



Use of AI as a Teammate in the Ferris Wheel Project

The Ferris Wheel Storage System project was by Ayushi Kalmath, Kaviya Babu, Khong Puey Kee, and Nerissa Kho Wei Na.

AI Helped: GenAI provided mechanical design advice to Tkinter-based GUI coding and Arduino motor syncing, AI was a constant collaborator.

- **Tool:** AI helped troubleshoot mechanical design and coding.
- **Teammate:** Collaborated on inventory logic and interface design.
- **Neither:** user personas were built via real interviews, not AI, to capture true needs and emotions

"AI was not always helpful, especially when empathy, aesthetics, or emotional context were crucial."

~Team Ferris Wheel

LEARNING WITH GENAI

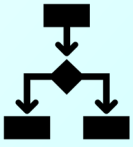
From these projects and experiments, SUTD students discovered:

GenAI can speed up the learning process. GenAI accelerates, but does not replace human-centered aspects such as creativity and empathy.

GenAI can help students manage and master new technical skills like coding and iterate designs quickly [1-3].

GenAI is best as a collaborator: Using multiple GenAIs or "teammates" and human judgment helps validate results and expose blind spots [31-33, 45].

Prompt engineering is key: Clear communication and instructions make all the difference in using GenAI [22].



Empathy and decision-making still belong to humans: As skilful GenAI users, we need to know what GenAI to use, when to "lean in", and when to "step back" [40].

COMMUNIQUÉ FOR STUDENTS ON GENERATIVE AI TOOLS

Office of Education & Innovation| 30 May 2025

The emergence of Generative Artificial Intelligence (AI) based technologies and tools that can generate content including written text, chain-of-thought reasoning, software code and images (e.g., ChatGPT, DALLE2, Midjourney), has generated much interest in higher education while concerns have also been raised about possible misuse, plagiarism, stifling creatively/originality and etc.

SUTD's stance on Generative AI Tools is as follows: the use of Generative AI tools is acceptable when used ethically and responsibly to enhance teaching and learning.

SUTD educators have embraced these new technologies and are already applying Generative AI tools in their respective courses to transform teaching and learning in innovative ways. This includes continually reviewing and re-designing class assignments and assessments with the purpose of enabling students to demonstrate capacity for critical thinking, innovation, and originality.

While these developments are taking place, SUTD educators are cognizant of the need to:

- prepare students to use these AI tools ethically and critically; and
- enable students to acquire critical technical knowledge, skills and core competencies needed in their domains.

Here are some guidelines / advisories to help students better navigate in the era of these developments:

1. Students can use Generative AI tools to enhance their learning but not as a replacement for their intellectual contribution.
2. Students can use Generative AI tools in class, assignments, assessments, examinations, etc. only when explicitly permitted by the instructor. Students should adhere strictly to the guidelines provided by the instructor on the usage of such tools.

3. Where permitted by the instructor, students shall disclose and declare how and when Generative AI tools are used in assignments and projects. The format for citation and disclosure of the use of AI tools will be advised by the instructor. Not disclosing or declaring when Generative AI is used is a breach of academic integrity. When in doubt, students can approach their instructors for guidance.
4. SUTD has clear and established rules on plagiarism, including breaches of academic integrity with the use of AI-assisted tools and apps. Students are bound by the tenets of the SUTD Honour Code* to always conduct themselves with integrity and accountability. The use of AI-assisted tools and apps for all SUTD courses whether in course work or projects (including UROP and Capstone for undergraduate students) to generate content to pass off as one's own work constitutes plagiarism and therefore a breach of academic integrity. Students who are found guilty of plagiarism will be subject to disciplinary action in accordance with the Student Disciplinary Framework.

   * Refer to policies on upholding academic integrity at MyPortal (via > Student Matters and Policies > Student Matters > University Policies > Academic Integrity / Student Discipline).
5. Where students have been expressly informed in their courses or projects that they are accessing confidential information or personal data, students are prohibited from sharing or inputting such confidential information or personal data into Generative AI Tools.
6. Where students have been expressly informed, by the instructor or mentor, in their courses or projects that they are accessing SUTD confidential information or personal data, students must seek approval from the University before sharing or inputting such confidential information or personal data into Generative AI Tools by emailing to dpo@sutd.edu.sg.

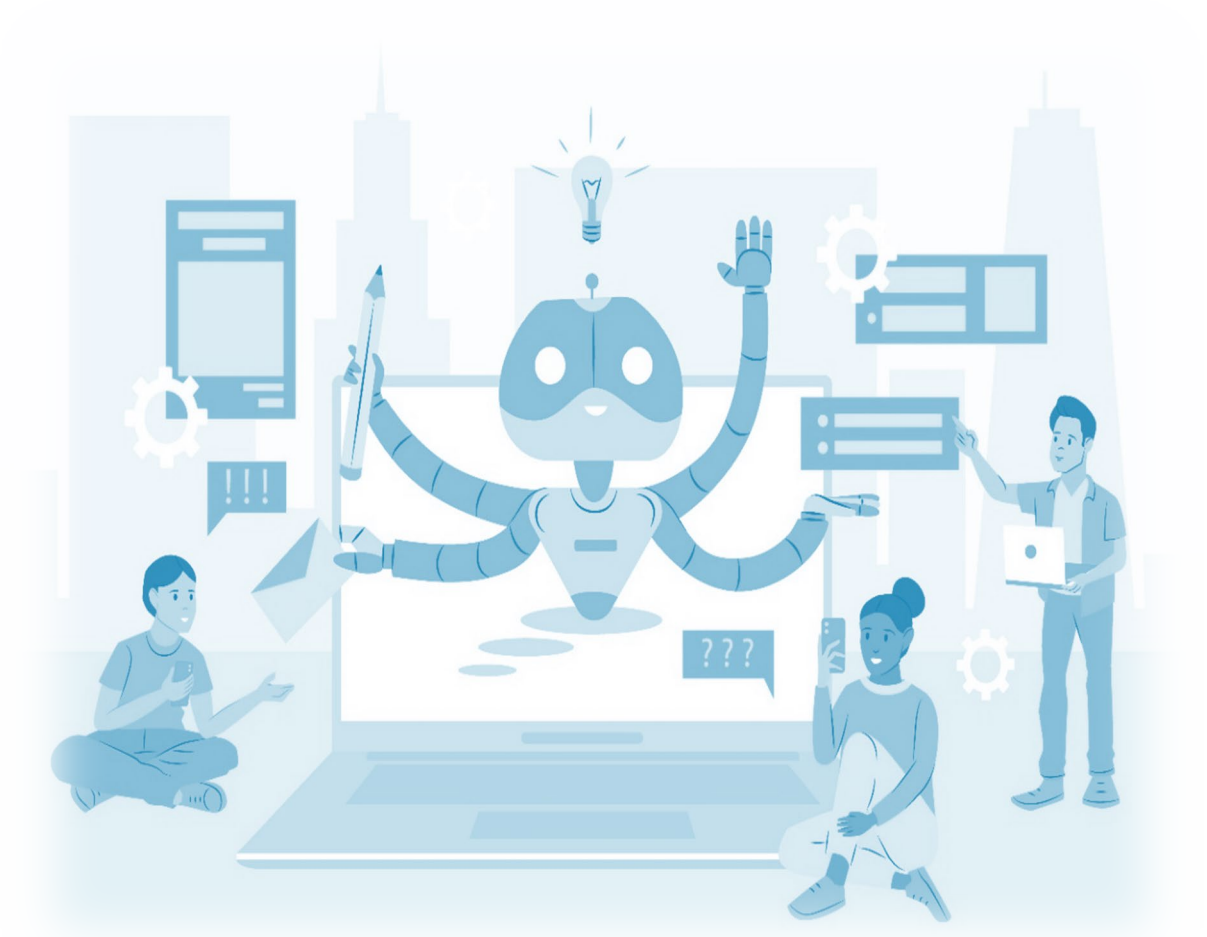
Concluding Statement

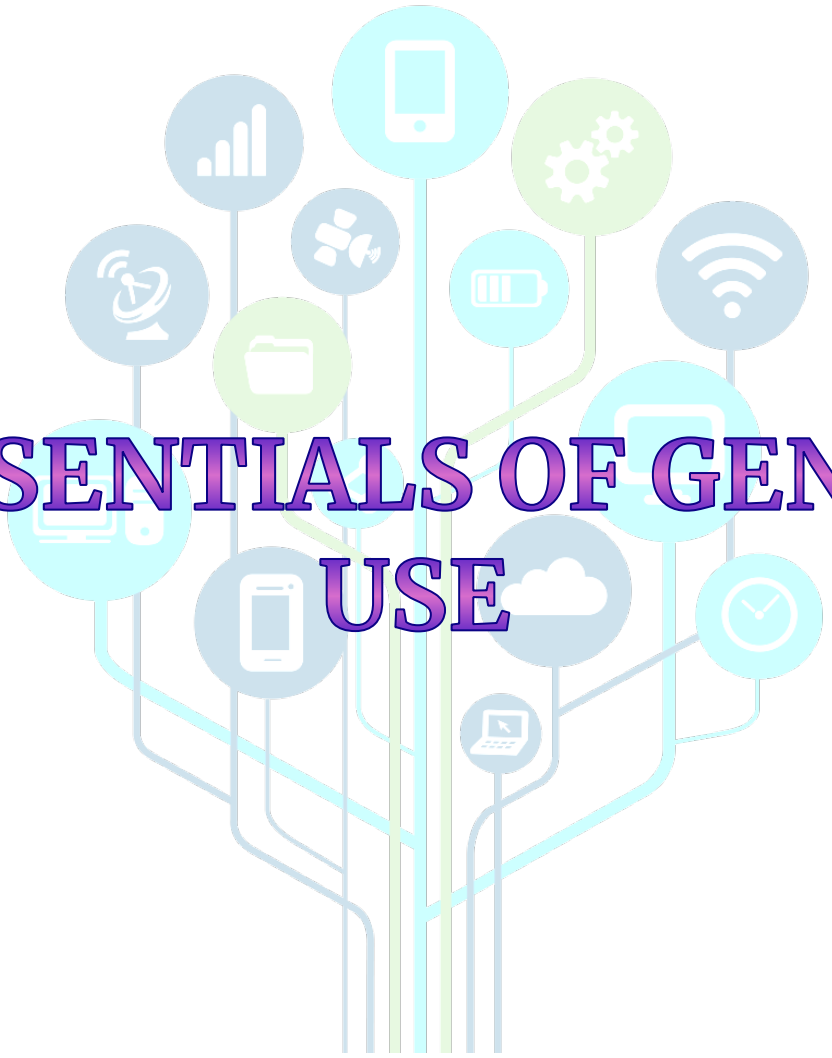
This is a living document which will be updated alongside developments in the field of Generative AI. Students are encouraged to reach out to instructors for more clarity on the use of generative AI tools in their

courses and to be made aware of the benefits, pitfalls and policies governing the use of such AI tools.

Useful Resources:

- Introducing ChatGPT: https://openai.com/blog/chatgpt
- ChatGPT FAQ: https://help.openai.com/en/articles/6783457-chatgpt-general-faq
- What Is Generative AI (and How to Use It) by Coursera: https://www.coursera.org/articles/chatgpt
- Dall-E 2 OpenAI's image generator: https://openai.com/product/dall-e-2
- Benefits and Limitations of Generative AI: https://www.harvardonline.harvard.edu/blog/benefits-limitations-generative-ai





ESSENTIALS OF GENAI USE

PROMPT ENGINEERING

Prompt engineering is the science of communicating with GenAI systems like ChatGPT[22,23]. It is like programming or coding but in natural human language. It involves designing queries or instructions to yield useful, creative, or accurate outputs. This requires clarity, context, specificity, and iteration. As with GenAI, prompt engineering is also evolving very quickly and there are several techniques such as Chain of thought prompting, zero-shot prompting and few-shot prompting. There is no one-size-fits-all. The key is about being adaptable.

Prompt Engineering 101: Essential Tips

https://www.promptingguide.ai/

1. Be specific and goal-oriented: Clearly state what you want the GenAI to produce or assist with and give the context.
2. Set the role or persona e.g., "You are a writing coach" helps align tone and content.
3. Use structured prompts: Break prompts into steps or bullets for complex tasks. Break it down and build it up.
4. Anchor with examples: Provide a format, tone, or reference sample.
5. Test edge cases: Try variations to see how GenAI handles ambiguity.
6. Iterate based on output: Reflect and revise for improved results.
7. Prompt for reflection: Ask GenAI to critique, compare, or question assumptions.
8. Cross-validate with multiple prompts or even GenAIs: Use more than one phrasing to test consistency. Use more than one GenAI to validate.
9. Ask GenAI to self-check: Request GenAI to verify its own response or list assumptions made. Ask GenAI to be the critique.
10. Prompt for feedback or clarification: Ask GenAI how the prompt could be improved, and to ask questions to better understand your needs. Ask GenAI to help with the prompting and fine-tuning.

A DRAFT TO CREATE SEQUENTIAL PROMPTS USING "ROLE-CONTEXT-TASK-OUTPUT-VALIDATION" FRAMEWORK

Give the context and assign clear role to GPT

"You are an experienced engineering professor, specializing in mechanical systems and thermodynamics. I am your first-year undergraduate student, with no physics background in O-levels. Teach me the fundamental principles of heat transfer, specifically conduction, convection, and radiation.

Ask one at a time- or give detailed list

Experiment: Sometimes short, specific and sequential questions are better

Please provide a structured learning module on these three concepts. For each concept (conduction, convection, radiation), I need:
A concise, easy-to-understand definition.
What is the significance of learning this topic
A common, real-world example (e.g., how heat transfers in a frying pan, or how a thermos works).
The relevant governing equation(s) with a brief explanation of each variable (e.g., Fourier's Law for conduction).
A simple problem or scenario that applies the concept, along with a step-by-step solution.
Example format for each concept

Validate

Once you have completed the module, please:

Critique your own explanation of the real-world examples. Are they clear and intuitive enough for someone with no prior engineering background?

Use Socrative Questioning to test my understanding.

VIBE CODING

The term “Vibe coding” was coined by Andrej Karpathy, a well-known AI researcher, to describe a way of building software using AI agents and natural language instead of traditional code [46]. It is used in applications like designing websites, apps or tools with GenAI doing most of the heavy lifting, and users acting more like the director, shaping how things work and feel. In a sense, the user’s role is to continuously check if the ‘vibe’ is right, if AI is doing what was intended and correcting it where it missed the instruction or style.

“If prompt engineering is the science of communicating with AI in terms of structured instruction, vibe coding is the art of communicating with AI in terms of the right vibe, particularly as a replacement for coding.”

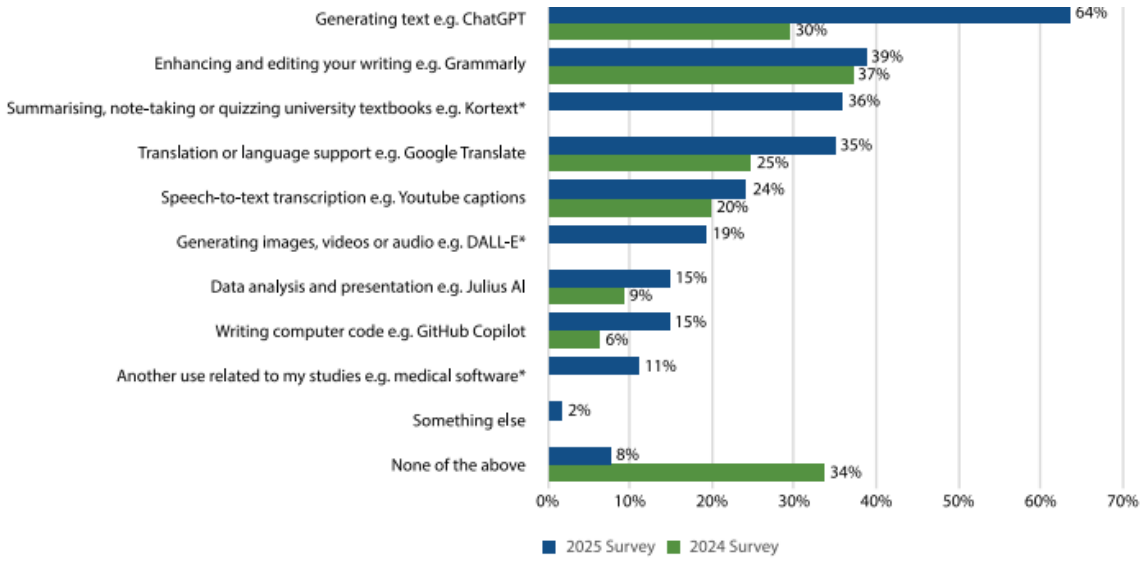
The user describes or prompts what they want. The AI builds it. The user is not exactly coding. But giving the thoughts and logic behind the code. Some may call it “coding by conversation.” Others say it’s “building with vibes.”

Some pointers to take note of

- Not everyone may want to learn deep coding. Vibe coding lets users accomplish what was once not possible for non-coders in building websites, applications, etc.
- Prompting is only the first layer—vibe coding is about designing the vibe of what one is creating.
- One still needs good logic, ethics, tone, edge cases, and design sense in creating the final product.
- And yes: sometimes the GenAI does strange things, which is why reflection, validation, and iteration matter just as much as output.

LISTS OF USEFUL GENAI FOR TEACHING AND LEARNING

Here are some examples of GenAI tools for teaching and learning at SUTD. One can select the appropriate GenAI depending on the purpose (e.g., Fit-for-purpose framework [47, 45]. Most GenAIs or advanced features are subscription-based. As GenAI evolution is fast-paced, it is prudent not to subscribe to any tool for a prolonged period. Instead, faculty and students are encouraged to experiment with the free tools as well as identify relevant tools for their courses to subscribe to for the required period. Justified usage of AI tools can be supported at the pillar/cluster levels. Faculty, staff, and students are to check with their department heads.



GenAI Use in Higher Education [10]

WRITING AND EDITING

Tool Name	Function	Website
ChatGPT	Conversational assistant for academic tasks.	https://chat.openai.com
GrammarlyGO	AI-powered grammar and tone suggestions.	https://www.grammarly.com/grammarlygo
QuillBot	Paraphrasing and summarizing text.	https://quillbot.com
Jasper AI	Content creation for marketing and writing.	https://www.jasper.ai
Writesonic	AI content generation and copywriting.	https://writesonic.com
Sudowrite	Creative writing and storytelling support.	https://www.sudowrite.com
Copy.ai	Automated copywriting for marketing.	https://www.copy.ai
Rytr	Efficient content writing across formats.	https://rytr.me
HyperWrite	Contextual writing assistance.	https://www.hyperwriteai.com
Sapling AI	Business writing assistant with grammar tools.	https://www.sapling.ai
INK Editor	SEO-optimized content writing tool.	https://inkforall.com
ParagraphAI	AI writer for emails and documents.	https://paragraphai.com

CODING AND PROGRAMMING SUPPORT

Tool Name	Function	Website
ChatGPT	Coding assistant	https://chat.openai.com
Claude	Coding collaborator	https://claude.ai/
Grok	Real-time web integration	https://grok.com
GitHub Copilot	AI-powered code suggestions	https://github.com/features/copilot
Replit Ghostwriter	Code generation and explanation	https://replit.com/site/ghostwriter
Codeium	Free AI-powered code completion tool	https://codeium.com
Tabnine	Predictive code completions	https://www.tabnine.com
Amazon CodeWhisperer	Real-time code suggestions	https://aws.amazon.com/codewhisperer
AskCodi	AI coding assistant for multiple languages	https://askcodi.com
Sourcery	Automates Python code improvements	https://sourcery.ai
DeepCode	Real-time code review and recommendations	https://www.deepcode.ai
AI2sql	Converts natural language into SQL queries	https://ai2sql.io
Codex by OpenAI	Natural language to code generation	https://openai.com
Polycoder	Open-source model for code generation	https://github.com/VHellendoorn/Code-LMs

RESEARCH AND SUMMARIZATION

Tool Name	Function	Website
Elicit	AI research assistant for literature reviews	https://elicit.org
Consensus	Search engine based on academic consensus	https://consensus.app
Scite.ai	Citation-aware academic search tool	https://scite.ai
Paperpile AI	AI-organized citation manager	https://paperpile.com
TLDR This	Article summarizer and keyword extractor	https://tldrthis.com
Scribe	Meeting and document summarizer	https://scribehow.com
Scholarcy	AI summarization of scholarly content	https://www.scholarcy.com
Iris.ai	Maps research questions to papers	https://iris.ai
Typeset.io	Typeset academic papers and references	https://typeset.io
Genei	AI summarizer and explainer of papers	https://www.genei.io
Explainpaper	Explains academic papers in simple terms	https://explainpaper.com
Glasp	Highlighting and summarization tool	https://glasp.co

VISUALIZATION AND PRESENTATION

Tool Name	Function	Website
DALL·E	Image generation from text prompts	https://openai.com/dall-e
Runway ML	Video editing and generative visuals	https://runwayml.com
Canva Magic Write	AI-assisted design content	https://www.canva.com
Lumen5	Create video content from text	https://lumen5.com
Adobe Firefly	Creative tools from Adobe using AI	https://adobe.com
Animaker	Animated video creation	https://animaker.com
Steve AI	AI-powered video generation	https://www.steve.ai
Powtoon	Create animated presentations	https://www.powtoon.com
Synthesia	AI avatar video generation	https://www.synthesia.io
Pictory	Video summarization and editing	https://pictory.ai
Descript	Audio/video editing with text	https://www.descript.com
Kaiber	AI video creation platform	https://www.kaiber.ai

PERSONALISED AND ADAPTIVE LEARNING

Tool Name	Function	Website
Khanmigo	AI tutor by Khan Academy	https://khanacademy.org
Socratic	Google AI homework helper	https://socratic.org
Quizlet Q-Chat	AI tutoring via flashcards	https://quizlet.com
Squirrel AI	Adaptive learning platform	https://squirrelai.com
Century Tech	Data-driven personalized learning	https://century.tech
Knewton Alta	Adaptive courseware	https://knewton.com
DreamBox	Adaptive math software	https://dreambox.com
Smart Sparrow	Adaptive e-learning platform	https://smartsparrow.com
Knowji	Spaced repetition vocabulary app	https://www.knowji.com
Querium	STEM tutoring with AI	https://www.querium.com
Fishtree	Personalized learning resources	https://fishtree.com
Learnosity	Assessment and learning tools	https://learnosity.com

DESIGN THINKING AND IDEATION

Tool Name	Function	Website
Ideanote	Idea generation platform	https://www.ideanote.io
Miro AI	Collaborative whiteboard with AI	https://miro.com
FigJam AI	Design and feedback tool	https://figma.com/figjam
Stormboard	Brainstorming and planning	https://stormboard.com
Cogram	AI meeting and project notes	https://cogram.com
AI Dungeon	Interactive story generation	https://play.aidungeon.io
ChatGPT Scenario Builder	Design interactive dialogue	https://chat.openai.com
Whimsical	Diagramming and mindmaps	https://whimsical.com
PopAi	Visual storytelling with AI	https://popai.pro
Metaphor Systems	Metaphor generator	https://writingmate.ai/
Vizcom	AI design visualization	https://www.vizcom.ai

COLLABORATIVE LEARNING

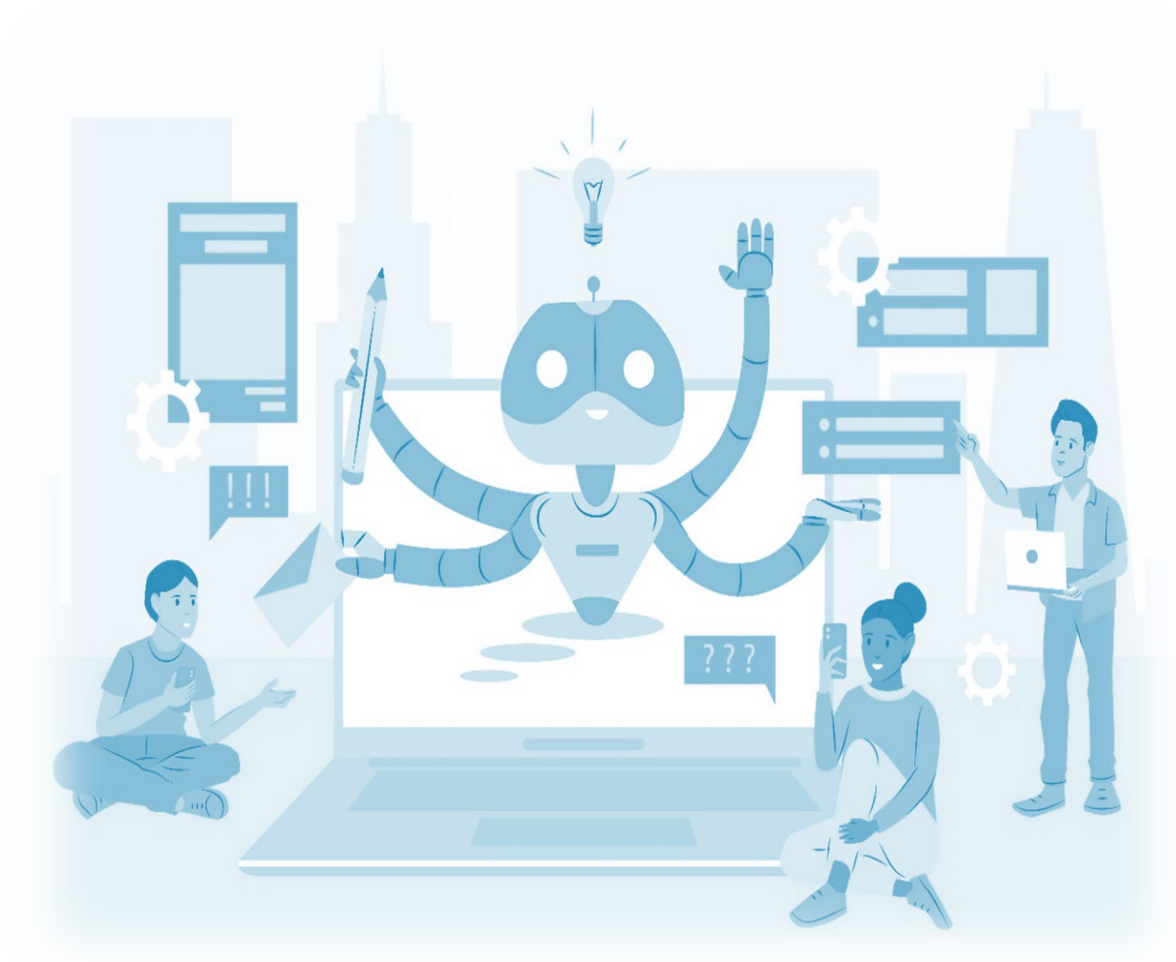
Tool Name	Function	Website
Notion AI	Note-taking and task collaboration	https://notion.so
Slack GPT	AI assistant in team messaging	https://slack.com
Microsoft Copilot	AI productivity for Office	https://microsoft.com
Google Duet AI	AI assistant in Google Workspace	https://workspace.google.com
Zoom AI Companion	AI features for virtual meetings	https://zoom.us
Fireflies.ai	Meeting transcription and insights	https://fireflies.ai
OtterPilot	AI meeting assistant	https://otter.ai
Fathom	Meeting summarizer	https://fathom.video
Airgram	Meeting collaboration notes	https://airgram.io
Tactiq	Transcription for Google Meet	https://tactiq.io
Krisp AI	Noise cancellation with transcripts	https://krisp.ai
Transkriptor	Audio-to-text service	https://transkriptor.com

ENTREPRENEURSHIP

Tool Name	Function	Website
Copy.ai	Marketing content generation	https://www.copy.ai
Jasper AI	Brand-specific AI content	https://www.jasper.ai
Bizplan AI	Business plan creation	https://www.bizplan.com
MarketMuse	Content research and optimization	https://www.marketmuse.com
Beautiful.ai	AI-enhanced presentation tool	https://www.beautiful.ai
VWO Insights	User behavior analytics	https://vwo.com/insights
Productboard	Product development insights	https://www.productboard.com
Pitch AI	AI-based pitch creation	https://pitch.com
Writesonic	Sales copywriting with AI	https://writesonic.com
Canva AI	AI tools for visual marketing	https://www.canva.com
B12 AI	AI-driven websites for startups	https://www.b12.io

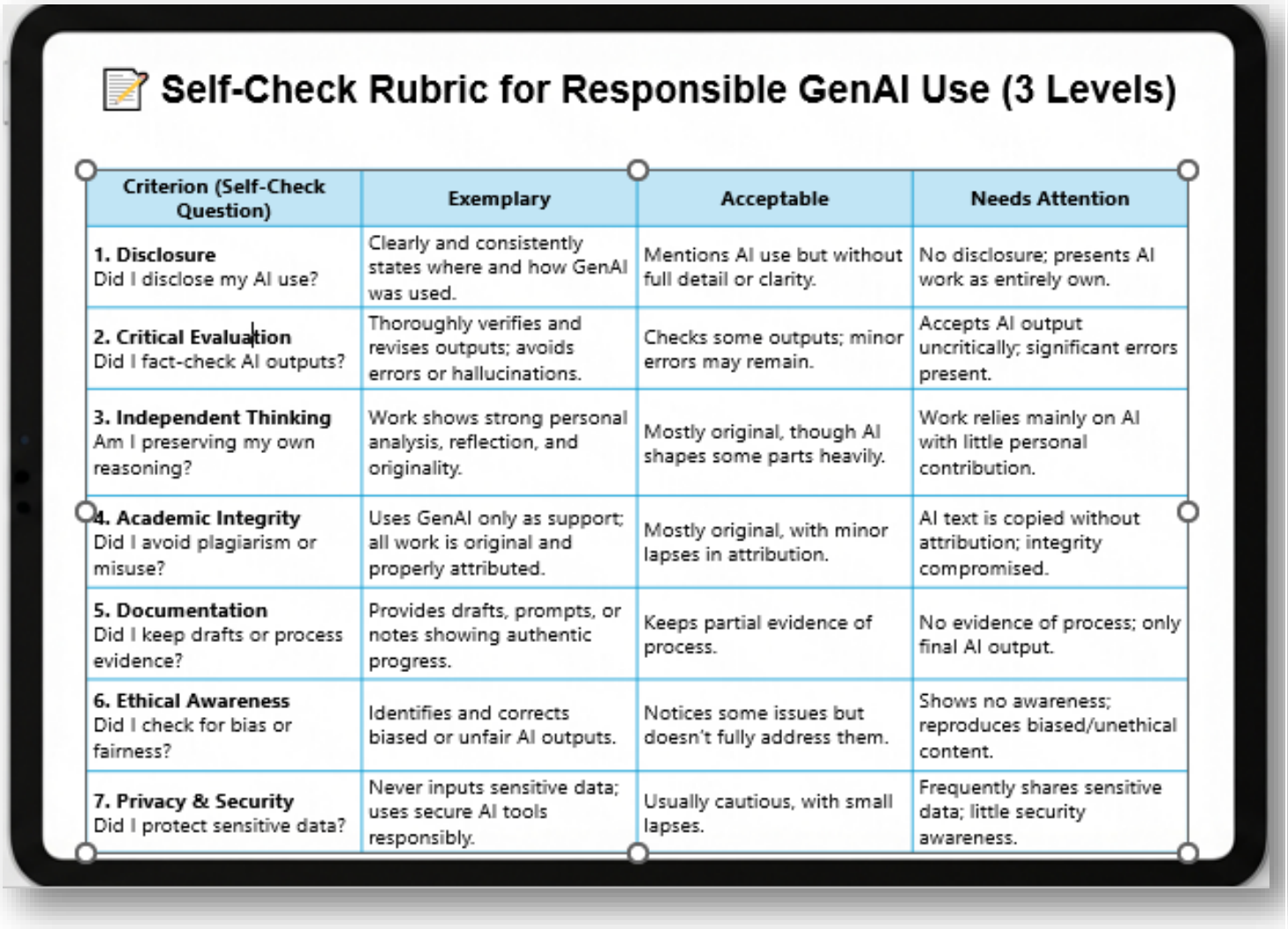
ASSESSMENT AND FEEDBACK

Tool Name	Function	Website
Gradescope AI	Automated grading tool	https://gradescope.com
ChatGPT Rubric Generator	Rubric creation via AI	https://chat.openai.com
Peergrade	Peer review and feedback	https://peergrade.io
FeedbackFruits	Interactive assessment and feedback	https://feedbackfruits.com
Loopy	Concept learning visualizations	https://ncase.me/loopy/
Formative	Real-time student responses	https://goformative.com
Parlay Ideas	Online discussions with feedback	https://parlayideas.com
Eduflow	Learning experience platform	https://eduflow.com
GoReact	Video-based feedback	https://goreact.com
Otter.ai	Meeting transcription and summaries	https://otter.ai
Recap	Video reflection tool	https://letsrecap.com
Kialo Edu	Debate-based critical thinking	https://www.kialo-edu.com



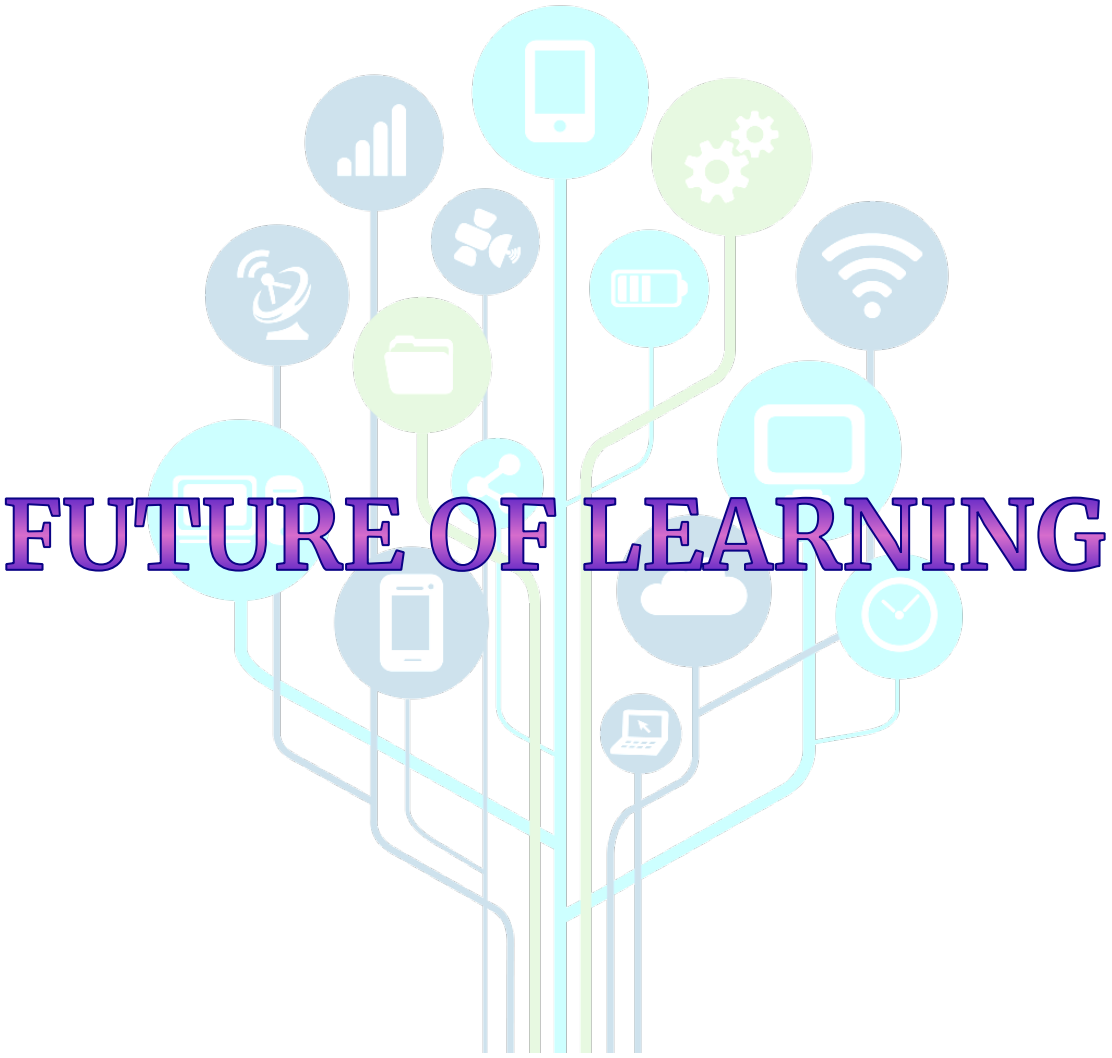
GATEWAYS AND GUARDRAILS IN USING GENAI

GenAI tools can be powerful supports for learning and creativity. To use GenAI effectively, students need to follow guardrails (ethical boundaries that keep your work fair and safe) and meet gateways (standards that show genuine learning and accountability). These ensure that AI is a partner in your work, not a replacement for your effort. This **Self-Check Rubric** is designed to help you reflect on your use of GenAI based on existing frameworks [48-50]. By reviewing your work against its seven principles, you can confirm that you are using AI responsibly, protecting your own learning, and maintaining integrity in all academic tasks.



Self-Check Rubric for Responsible GenAI Use (3 Levels)

Criterion (Self-Check Question)	Exemplary	Acceptable	Needs Attention
1. Disclosure Did I disclose my AI use?	Clearly and consistently states where and how GenAI was used.	Mentions AI use but without full detail or clarity.	No disclosure; presents AI work as entirely own.
2. Critical Evaluation Did I fact-check AI outputs?	Thoroughly verifies and revises outputs; avoids errors or hallucinations.	Checks some outputs; minor errors may remain.	Accepts AI output uncritically; significant errors present.
3. Independent Thinking Am I preserving my own reasoning?	Work shows strong personal analysis, reflection, and originality.	Mostly original, though AI shapes some parts heavily.	Work relies mainly on AI with little personal contribution.
4. Academic Integrity Did I avoid plagiarism or misuse?	Uses GenAI only as support; all work is original and properly attributed.	Mostly original, with minor lapses in attribution.	AI text is copied without attribution; integrity compromised.
5. Documentation Did I keep drafts or process evidence?	Provides drafts, prompts, or notes showing authentic progress.	Keeps partial evidence of process.	No evidence of process; only final AI output.
6. Ethical Awareness Did I check for bias or fairness?	Identifies and corrects biased or unfair AI outputs.	Notices some issues but doesn't fully address them.	Shows no awareness; reproduces biased/unethical content.
7. Privacy & Security Did I protect sensitive data?	Never inputs sensitive data; uses secure AI tools responsibly.	Usually cautious, with small lapses.	Frequently shares sensitive data; little security awareness.



FUTURE OF LEARNING

KEY TAKEAWAYS

- Clarity on institutional direction and alignment of pedagogy are essential [4, 25].
- Faculty and students benefit when there is a clear institutional vision for GenAI and a shared commitment to pedagogical approaches that support responsible, innovative, and human-centered AI adoption [4].
- The TTN framework gives both students and teachers language and structure to decide not just how to use GenAI, but when and why [4, 30-33].
- GenAI must be purposefully integrated—not just added on—through intentional course design and reflection [19,51].
- Prompt literacy, validation, and ethical reasoning are now essential skills, regardless of discipline [21-23].
- Institutional support—access to tools, training, and time for exploration—is vital for innovation and equity [15].
- Human-in-the-loop is necessary. Instructional design and assessment should be modified to integrate GenAI tools meaningfully [37-40].

REINVENTING HIGHER EDUCATION FOR THE HUMAN∞AI ERA

The real-life inspiring practices and innovations from SUTD faculty and students show that the Human∞AI-powered classroom is not a distant ideal. It is taking shape today, one project at a time.

Yet as GenAI and related technologies accelerate, universities everywhere face a fundamental choice: Will we continue to adapt incrementally, or will we rethink the very purpose and structure of higher education for a world remade by GenAI?

Unlike the slow-moving revolutions of the past, the rise of GenAI is rapid, pervasive, and unmistakable. From ChatGPT's meteoric ascent to the daily presence of smart systems in our homes, workplaces, and classrooms, GenAI is no longer confined to the lab. It augments how we perceive, reason, and create—and it impacts and influences our daily lives.

Where earlier technological shifts made knowledge easier to access, GenAI transforms who can generate, interpret, and apply knowledge. If anyone can summon content, build skills, or solve problems instantly, what unique role should the university now play?

Much of higher education's early response to GenAI has been tactical—new guidelines, GenAI task forces, pilot workshops, or plug-in tools added to existing systems. These are important first steps, but they risk missing the moment.

The real challenge—and opportunity—is to reimagine the university as an integrated, intelligent ecosystem: one that adapts continuously to changing knowledge, evolving learner needs, and the demands of society and industry [52-54].

STRATEGIES FOR TRANSFORMING HIGHER EDUCATION AND SUTD

1. HUMAN-AI COLLABORATION AS THE HEART OF LEARNING

Content mastery is no longer enough. The new age university cultivates capacities that GenAI cannot automate, such as critical thinking, creativity, collaboration, empathy, ethics, and adaptive resilience. Teachers are facilitators. GenAI is a partner. Learning is inquiry-driven, active, interactive, collaborative, and reflective.

2. BREAKING DOWN SILOS

The university enterprise—teaching, research, and administration—must operate as a unified, intelligent system. GenAI helps connect learning, discovery, and operations, turning disconnected departments into a living, responsive knowledge ecosystem.

3. THE LIVING CURRICULUM MODEL

Universities must go beyond occasional industry partnerships to true co-creation: sharing governance, integrating real-world skills and AI literacy into every program, co-teaching with industry experts, and issuing dynamic credentials that evolve with the workforce.

THE TTN FRAMEWORK IN SUTD

The Human∞AI future is not about letting technology dictate every move. The TTN (Tool, Teammate, Neither) framework gives students and educators a common guideline to intentionally decide when to use AI as a tool, when to collaborate with it as a teammate, and when to rely solely on human judgment and empathy. This mindset helps ensure that the reinvention of higher education remains centered on human agency, ethics, and societal good [4,31–33, 51].

GenAI will automate many tasks, but it cannot replace the university's higher purpose: cultivating wisdom, inclusion, and resilience for a changing world [58-60]. At this crossroads, universities can choose to tinker with old models, or they can boldly embrace their new role as living platforms for lifelong learning. The Human∞AI powered university is not just a vision for SUTD, but a call to action for higher education everywhere.

"Using GenAI in education is both a responsibility and an opportunity. Let us reimagine, redesign, and innovate education together "

ADDITIONAL RESOURCES

APPENDIX

GLOBAL COMPARISON:SUTD PRIMER VS. KEY INTERNATIONAL FRAMEWORKS [51]

Dimension	SUTD GenAI Primer(2025) [This primer]	EDUCAUSE (2025) [15]	JISC (2023/2024) [55,56]	Australia's AI in Schools (2024) [57]
Strategic Positioning	First Design AI university; pedagogy-led	Learning design with AI is an emerging priority	Institutional readiness and policy frameworks	Ethical and future-focused learning goals
Pedagogical Framework	DAI + TTN (Tool, Teammate, Neither)	Human-centered design and digital equity	No unifying framework, more tool-based guidance	General design principles, limited instructional guidance
Use Case Depth	Deep SUTD-specific student and faculty cases	Select case highlights from US institutions	Scenarios from UK colleges, mostly STEM-heavy	Limited classroom examples; more policy-oriented
Ethics and Critical Use	Embedded in “Neither” mode and design critique	Framed in digital ethics and learner agency	Strong focus on bias, privacy, and academic integrity	High-level emphasis, light on pedagogical implementation
Prompting & Literacy	Practical prompting guidance for students/faculty	Recognized as a key skill to teach	Promoting prompt fluency, an emerging area	Not deeply developed
Assessment Redesign	Integrated through feedback loops, peer review	Mentioned in future challenges	Case examples, e.g., AI use in formative tasks	Identified as a challenge, not yet implemented
Institutional Alignment	Fully tied to SUTD vision, mission, and curriculum	Encouraged but flexible	Variable uptake across institutions	Centralized guidance to schools

REFERENCES

1. Rana V, Verhoeven B, Sharma M. Generative AI in design thinking pedagogy: Enhancing creativity, critical thinking, and ethical reasoning in higher education. Journal of University Teaching and Learning Practice. 2025;22(4). https://doi.org/10.53761/tjse2f36.
2. Chiu TKF, Papamitsiou Z, Lim CP, Holton D, Lan Y-J. Future research recommendations for transforming higher education in the era of generative AI. Discover Education. 2024;2:100141.
3. Wang F, Feng L, Liu H, et al. Artificial intelligence in education: A systematic literature review. Expert Systems With Applications, 2024;Advance online publication.
4. Singapore University of Technology and Design. Executive Intelligence: A Design AI Primer for Decision Makers. *X-Intelligence*. Issue 1, May 2025. Available from: https://www.sutd.edu.sg/wp-content/uploads/2025/06/X-Intelligence-Issue-1.pdf.
5. Tillmanns T, Salomão Filho A, Rudra S, Weber P, Dawitz J, Wiersma E, Dudenaite D, Reynolds S. Mapping tomorrow's teaching and learning spaces: A systematic review on GenAI in higher education. Trends High Educ. 2025;4(1):2.https://www.nvidia.com/en-sg/solutions/ai/generative-ai/.
6. Stryker C, Scapicchio M. What is generative AI? *IBM Think*. 2024 Mar 22 [cited 2025 Aug 26]. Available from: https://www.ibm.com/think/topics/generative-ai.
7. Das T. Understanding Generative AI: Capabilities, Applications, and Future Impact [Internet]. Karmick Institute; 2025 May 7 [cited 2025 Aug 26]. Available from: Karmick Institute.
8. McKinsey & Company. What Is Generative AI?. McKinsey & Company. 2024. Available from: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai.
9. The Intersection of Design Thinking and AI: Enhancing Innovation [Internet]. IDEO U. 2024. Available from: https://www.ideou.com/blogs/inspiration/ai-and-design-thinking.
10. Freeman, J. (2025). Student generative AI survey 2025. Higher Education Policy Institute: London, UK.
11. Chegg Global Student Survey 2025:, accessed March 6, 2025, https://investor.chegg.com/Press-Releases/press-release-details/2025/Chegg-Global-Student-Survey-2025-80-of-

Undergraduates-Worldwide-Have-Used-GenAI-to-Support-their-Studies–But-Accuracy-a-Top-Concern/default.aspx.
12. What Faculty Want: Key Results from the Global AI Faculty Survey, accessed March 6, 2025, https://www.digitaleducationcouncil.com/post/what-faculty-want-key-results-from-the-global-ai-faculty-survey-2025.
13. Ellucian, Inc. Ellucian's AI survey of higher education professionals reveals surge in AI adoption despite concerns around privacy and bias [Internet]. Reston (VA): Ellucian; 2024 Oct 22 [cited 2025 Aug 26]. Available from: https://www.ellucian.com/news/ellucians-ai-survey-higher-education-professionals-reveals-surge-ai-adoption-despite-concerns.
14. The Chronicle of Higher Education (Inside Higher Ed). Roughly half of institutions represented do not offer student access to generative AI tools [Internet]. Inside Higher Ed; 21 Apr 2025 [cited 2025 Aug 26].
15. EDUCAUSE. Key Insights from the 2025 EDUCAUSE Survey [Internet]. 2025 Apr 28 [cited 2025 Aug 26].
16. Digital Education Council. What Students Want: Key Results from DEC *Global AI Student Survey 2024* [Internet]. August 7, 2024 [cited 2025 Aug 26].
17. Kaushik A, Yadav S, Browne A, Lillis D, Williams D, Donnell JM, Grant P, Kernan SC, Sharma S, Arora M. Exploring the impact of generative artificial intelligence in education: A thematic analysis. arXiv preprint arXiv:2501.10134. 2025 Jan 17.
18. Nevárez Montes J, Elizondo-Garcia J. Faculty acceptance and use of generative artificial intelligence in their practice. In Frontiers in Education 2025 Feb 3 (Vol. 10, p. 1427450). Frontiers Media SA.
19. Bower M, Torrington J, Lai JW, Petocz P, Alfano M. How should we change teaching and assessment in response to increasingly powerful generative Artificial Intelligence? Outcomes of the ChatGPT teacher survey. Education and Information Technologies. 2024 Aug;29(12):15403-39.
20. Yingzhe LI. Addressing "Hallucinations" in AI-Generated Content: Strategies for Developing Student Fact-Checking and Information Evaluation Skills. Artificial Intelligence Education Studies. 2025 Jun 30;1(2):48-62.
21. Zhai C, Wibowo S, Li LD. The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. Smart Learning Environments. 2024 Jun 18;11(1):28.

22. Lee D, Palmer E. Prompt engineering in higher education: a systematic review to help inform curricula. International Journal of Educational Technology in Higher Education. 2025 Feb 10;22(1):7.
23. Knoth N, Tolzin A, Janson A, Leimeister JM. AI literacy and its implications for prompt engineering strategies. Computers and Education: Artificial Intelligence. 2024 Jun 1;6:100225.
24. Prather J, Leinonen J, Kiesler N, Gorson Benario J, Lau S, MacNeil S, Norouzi N, Opel S, Pettit V, Porter L, Reeves BN. Beyond the hype: A comprehensive review of current trends in generative AI research, teaching practices, and tools. 2024 Working Group Reports on Innovation and Technology in Computer Science Education. 2025 Jan 22:300-38.
25. Berg JM, Raj M, Seamans R. Capturing value from artificial intelligence. Academy of Management Discoveries. 2023 Dec;9(4):424-8.
26. Teo TH, Chew D. A comprehensive review of strategies and policies toward AI-resistant education. Available at SSRN 5355928. 2025 Jun 18.
27. Giannakos M, Azevedo R, Brusilovsky P, Cukurova M, Dimitriadis Y, Hernandez-Leo D, Järvelä S, Mavrikis M, Rienties B. The promise and challenges of generative AI in education. Behaviour & Information Technology. 2025 Jul 3;44(11):2518-44.
28. Pallant, J.L., Blijlevens, J., Campbell, A. and Jopp, R., 2025. Mastering knowledge: the impact of generative AI on student learning outcomes. Studies in Higher Education, pp.1-22.
29. Poon KW, Willems T, Liu WS. The future of expertise: From stepwise domain upskilling to multifaceted mastery. In International Handbook on Education Development in the Asia-Pacific 2023 Nov 16 (pp. 379-397). Singapore: Springer Nature Singapore.
30. Willems T, Hafermalz E. Distributed seeing: Algorithms and the reconfiguration of the workplace, a case of 'automated' trading. Information and Organization. 2021 Dec 1;31(4):100376.
31. Sockalingam N, Huang Q, Willems T, Poon KW. Innovative “Tool-to-Teammate” instructional strategy for using ChatGPT in higher Education. In EDULEARN25 Proceedings 2025 (pp. 7891-7900). IATED.
32. Huang, Q., Willems, T. and Poon, K.W., 2025. The application of GPT-4 in grading design university students’ assignment: an exploratory study. International Journal of Technology and Design Education, pp.1-25.

33. Huang Q, Willems T. Empowering Educators in the Age of AI: An Empirical Study on Creating custom GPTs in Qualitative Research Method education. arXiv preprint arXiv:2507.21074. 2025 Jun 10.
34. Puentedura RR. Transformation, technology, and education [Internet]. 2013 [cited 2025 Aug 26]. Available from: http://hippasus.com/rrpweblog/.
35. Mishra P, Koehler MJ. Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*. 2006. *108*(6), 1017-1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x.
36. Chulvi V, Ruiz-Pastor L, Royo M, García-García C. Design creativity in AI: Using the SCAMPER method. AI EDAM. 2025 Jan;39:e13.
37. Berg T. The Effects of Generative Artificial Intelligence on Ideation Quality.
38. Lombardi D, Shipley TF, Astronomy Team, Biology Team, Chemistry Team, Engineering Team, Geography Team, Geoscience Team, and Physics Team. The curious construct of active learning. Psychological Science in the Public Interest. 2021 Apr;22(1):8-43.
39. Elsayary A. Integrating generative AI in active learning environments: enhancing metacognition and technological skills. Journal of Systemics, Cybernetics and Informatics. 2024 Jun 1;22(3):34-7.
40. Natarajan S, Mathur S, Sidheekh S, Stammer W, Kersting K. Human-in-the-loop or AI-in-the-loop? Automate or Collaborate? In Proceedings of the AAAI Conference on Artificial Intelligence 2025 Apr 11 (Vol. 39, No. 27, pp. 28594-28600).
41. Perifanou M, Economides AA. Collaborative uses of GenAI tools in project-based learning. Education Sciences. 2025 Mar 12;15(3):354.
42. Wood D, Moss SH. Evaluating the impact of students' generative AI use in educational contexts. Journal of Research in Innovative Teaching & Learning. 2024 Aug 22;17(2):152-67.
43. Daher W, Hussein A. higher education students' perceptions of GenAI tools for learning. Information (2078-2489). 2024 Jul 1;15(7).
44. Dai Y. Why students use or not use generative AI: Student conceptions, concerns, and implications for engineering education. Digital Engineering. 2025 Mar 1;4:100019.
45. Palani S, Ramos G. Evolving roles and workflows of creative practitioners in the age of generative AI. In Proceedings of the 16th Conference on Creativity & Cognition 2024 Jun 23 (pp. 170-184).
46. Sarkar A, Drosos I. Vibe coding: programming through conversation with artificial intelligence. arXiv preprint arXiv:2506.23253. 2025 Jun 29.

47. Sockalingam N, Liu J. Designing learning experiences for online teaching and learning. arXiv preprint arXiv:2010.15602. 2020 Oct 26.
48. Cacciamani GE, Eppler MB, Ganjavi C, Pekan A, Biedermann B, Collins GS, Gill IS. Development of the ChatGPT, generative artificial intelligence and natural large language models for accountable reporting and use (CANGARU) guidelines. arXiv preprint arXiv:2307.08974. 2023 Jul 18.
49. EacersallA D, PretoriusB L, SmirnovC I, SprayD E, IllingworthE S, ChughF R, StrydomG S, Stratton-MaherH D, SimmonsI J, JenningsJ I, RouxK R. Journal of Applied Learning & Teaching. Journal of Applied Learning & Teaching. 2025;8(2).
50. Zhang C, Magerko B. Generative AI Literacy: A Comprehensive Framework for Literacy and Responsible Use. arXiv preprint arXiv:2504.19038. 2025 Apr.
51. Belkina M, Daniel S, Nikolic S, Haque R, Lyden S, Neal P, Grundy S, Hassan GM. Implementing generative AI (GenAI) in higher education: A systematic review of case studies. Computers and Education: Artificial Intelligence. 2025 Apr 10:100407.
52. Vidal Q, Vincent-Lancrin S, Yun H. Emerging governance of generative AI in education.
53. Liu D, Bates S. Generative AI in higher education: Current practices and ways forward.
54. Parikh DV, Deka MJ. Unlocking Potential: Systematic Review of Generative AI in Higher Education. International Journal of Research and Innovation in Social Science. 2025;9(5):5513-25.
55. JISC (2023) Artificial intelligence (AI) in tertiary education: A summary of the current state of play. Available at: https://repository.jisc.ac.uk/9232/1/ai-in-tertiary-education-a-summary-of-the-current-state-of-play-september-2023.pdf.
56. JISC (2024) Student perceptions of generative AI. Available at: https://www.jisc.ac.uk/reports/student-perceptions-of-generative-ai.
57. Department of Education. (2024). Australian Framework for Generative Artificial Intelligence (AI) in Schools. https://www.education.gov.au/schooling/resources/australian-framework-generative-artificial-intelligence-ai-schools.
58. Lassébie J. Skill needs and policies in the age of artificial intelligence. OECD Employment Outlook. 2023:155.

59. Moldoveanu, M. C., & Siemens, G. (2025). Interactionalism: Re-Designing Higher Learning for the Large Language Agent Era. *arXiv preprint arXiv:2501.0086*.
60. Chee YM. What AI can't replace: Rethinking human skills and intelligence [Internet]. The Straits Times; 2025. Available from: https://www.sutd.edu.sg/news-listing/what-ai-cant-replace-rethinking-human-skills-and-intelligence/.


AI
SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN