

Learning and Teaching with AI tools

This guide is intended to introduce Artificial Intelligence (AI), specifically Generative Artificial Intelligence (GenAI) and its implications for teaching and learning. AI technologies are developing rapidly, and this guide will be updated occasionally to incorporate these developments.

[ChatGPT](#) dominated headlines with the release of ChatGPT 3.5 in November 2022 and has resulted in an explosion of GenAI services that create text, images, code, video and even voices during 2023. These will likely grow and continue to develop new capabilities during 2024.

This guide aims to answer the following:

- What is GenAI and how does it work?
- What are the current capacities and limitations?
- What are the current applications in teaching and



What is AI?

Artificial Intelligence (AI) is a technology that has been around since the 1950s, meaning that it is not as new as we think. Its aim is developing intelligent machines that mimic human behaviour and which can learn from its interaction with the world. This includes various technologies such as machine learning, natural language processing, data mining, neural networks and algorithms. It is used in many software solutions we use in devices, such as predictive text, location-based services, etc. [This article gives a good introduction](#) to what AI is and [this article gives some explanation of the key technologies](#).

What is Generative AI, and what is the fuss?

Generative Artificial Intelligence (GenAI) is a specific form of AI that rapidly generates text, images, audio or video. ChatGPT is one kind of GenAI, but there are a variety of other AI services. ChatGPT, in its current form, was released in November 2022 and disrupted the notion that writing was exclusively a human activity. The disruptive effect soon became a central concern for many in society, especially the education system, because GenAI can create texts and essays that can lead to academic dishonesty.

Apart from ChatGPT there are a variety of other AI services like [Google Bard](#) with its newly launched [Google Gemini](#) and [Claude](#). The rise of these GenAIs led to the development of other services like [Elicit](#), [Litmaps](#) and [SciSpace](#), which can find, read and summarise literature instantly. Most of these are free to use with advanced functionalities and models requiring a paid-for account. These GenAI models continuously evolve and develop, and the latest version of ChatGPT Plus (the paid version) can now “see, hear and talk” via the web service or the App. It can interpret graphs uploaded and understand physics in an image. ChatGPT’s abilities are further enhanced by plugins that, for example, connect to [academic databases](#) and aid in literature searches by searching for literature. Some plugins also offer ways to assist reading by explaining text or providing a way to use [data analytics using natural language prompts](#). For example, Google Bard can access [YouTube videos](#) and it can answer questions about the videos. The boundaries of what is possible will continuously shift as technologies evolve and develop new capabilities like ‘seeing, hearing and listening’ as well as completing more tasks. Many of the affordances and challenges these bring are only evident when enough time has passed or if we use them actively.




What is ChatGPT?

- ChatGPT is a GenAI
- GPT stands for 'Generative Pre-trained Transformer', meaning it is pre-trained to answer questions in a particular way based on a database of information (not always to the Internet) and not to answer harmful questions - something it does not always do well.
- [OpenAI](#) released ChatGPT 3.5 in November 2022 as a free-to-use research version but has an improved ChatGPT Plus, version 4, as a paid service.
- ChatGPT works like a chatbot powered by a Large Language Model (LLM) that performs natural language processing tasks, like answering questions, creating text or classifying text, and translating text in a conversational style. [This article explains this well.](#)

How does ChatGPT and other GenAIs work?

Most GenAI tools work in a similar way to ChatGPT. ChatGPT responds to prompts (questions or statements) using a natural language processing algorithm and the large language model database it is trained on. When ChatGPT is asked a question, the following happens:

1. The algorithm analyses the **prompt** (question) using the LLM database ChatGPT is trained on.
2. The algorithm then generates an **output** (response) using the database to construct a response.
3. The response is generated using **probability logic**. This means it creates a response based on the probability of the next word in a string of words to create a sentence that makes sense for a human reader. For example – if we ask ChatGPT to 'tell me a story about a cat'.
 - ChatGPT notes the word 'story' and will draw on its massive data set to generate a text that follows the most common structure used in texts identifiable as 'stories'.
 - ChatGPT notes the word 'cat' and will draw on its massive data set to generate a text that relates to the most common texts on 'cats'.
 - ChatGPT uses these almost instant searches to present a text that is a 'story' about a 'cat'.
 - This story can be refined with prompts like “Retell this same story but make it suitable for children under 5 years of age” and the output would be adapted.
4. If ChatGPT does not have any information about a question it is asked:
 - It will create a response to complete the sentence, which is known as a '**hallucination**'.

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- ChatGPT is trained to use its large data set to create texts that are meaningful, sound and convincing to humans rather than create texts that are true.
 - The database on which ChatGPT is trained may contain prejudices and inaccurate data used to create its responses.
 - For example, if you ask ChatGPT for literature, it may, in some instances, create fake references which do not exist.

GenAI and education

The disruptive effects of GenAIs is a concern for many in the education system as it allows students to use AI-generated text in essays or examinations. The ease of access to these powerful tools which can write human-like essays has led to a focus on academic dishonesty. For others, GenAI has the potential to change teaching and learning fundamentally in both positive and negative ways.


What is certain is that these new technologies are ever-evolving and will become ubiquitous. As academics, we need to experiment with these technologies in different disciplines to understand the implications. Incorporating AI technology into teaching and learning needs to be undertaken to:

1. Expose our students to emerging technologies in a controlled environment to build their critical understanding of the technologies in various disciplines.
2. Develop an understanding of the influence of AI technologies on knowledge-building in our disciplines.
3. Gain a clear understanding of the AI technologies available and the affordances and challenges these technologies bring.

Risks and ethics of using GenAI

ChatGPT is a useful tool that can be used for learning. But you have to know and be aware of the following:

- **Database inaccuracies** - ChatGPT creates convincing outputs/responses that sound reliable, convincing, and factually accurate. However, the software does not understand the content and cannot distinguish between correct or incorrect information. ChatGPT can ‘**hallucinate**’ and sound authoritative on many topics. Therefore, you need to **evaluate and verify all responses** from ChatGPT and other AIs to verify the information generated.
- **Bias** - AIs are trained from internet data. The information on the internet, at its core, is biased in explicit and implicit ways. The data favours Western knowledge and ignores localised knowledge with different forms of sexism, racism, ableism and other negative ideologies. This means ChatGPT has the potential to replicate the biases from the database it is trained on. This means we need to be aware of the potential for bias in the outputs/responses and evaluate all the information produced critically. [This article explains bias in AI well.](#)
- **Reliance on, and the use of GenAI** - In the future, GenAI, like ChatGPT, will likely play a significant role in how we learn and practice new skills and assist



with some routine tasks. However, it is still important we develop the critical thinking capabilities of our students and develop their cognitive capabilities and introduce them to the knowledge in our disciplines.

- **Privacy and ethical use** – We are bombarded with terms and conditions for every device, app and service. Most of us simply click accept and move on to use the service. ChatGPT and other GenAIs are no different. We need to know what information is used and shared and who owns the prompts and output from the different GenAIs. The content we contribute to these services holds significance, and we need to know how the information we upload on these platforms is handled. For example, using GenAI tools to transcribe audio files may result in inadvertently releasing confidential research materials to the public domain.

How could we approach the use of GenAI technologies in teaching and learning?

The use of GenAI has been debated frequently in academic literature, and research on how to integrate AI into teaching and learning is emerging. One approach is the RITE approach, which emphasises responsible, informed, transparent and ethical use of AI and provides a useful framework on how to incorporate AI in teaching and learning to foster positive use of AIs.

Be responsible: focus any teaching and learning activity on what responsible use of GenAIs should be. For example, to brainstorm ideas, overcome writer's block or make sense of content but importantly to critically evaluate all outputs. Responsible use is centred around how the tool can enhance understanding and learning and assist in developing a student's writing style, improve their thinking and knowledge.

Be informed: design teaching and learning activities to foster a deep understanding of the limitations and risks of using GenAIs. This includes issues like bias, hallucinations and other practical concerns around the quality of the outputs to foster AI literacies. Being informed means understanding who makes these models and for what purpose. It is being able to answer questions about the terms of use, including data and privacy concerns. Who owns the outputs of the AI, and who owns what is put in? What happens if any of the data is leaked? Being informed is also about knowing the ethical debates around how the models are built and the intellectual property infringements which may occur. For example, knowing that the Kenyan [labour was exploited](#) to build and train these models and the data. Lastly, these tools have an [environmental impact](#) that needs to be considered.

Be transparent: design teaching and learning activities that foster student abilities to acknowledge the use of AI by setting out the conditions and expectations of use clearly in course materials.

Be ethical: design teaching and learning activities that create a suitable environment for ethical use. If the use of AI is allowed, provide students with the tools and a framework to acknowledge use and ways to provide evidence of the use of AI. For example, provide a means of citation, acknowledgment, or space in the submission of the assignment for evidence of how AI has been used to produce the assignment.



Fostering critical AI literacies

GenAI will transform the world of work and education in unknown ways and will require different skills from academics and students for a world augmented by AI. This places a responsibility on higher education to respond to this shifting technological setting and the changing ways of engaging with knowledge. It will be imperative to incorporate AI literacies in our teaching and students' learning in the same way academic literacies are incorporated into teaching and learning.

AI literacies include:

- Knowledge about the functions of AI
- Ethical use of AI
- Ability to critically evaluate AI and its output
- Understanding what AI can and cannot be used for
- Understanding the limitations of AI
- Understanding prompt engineering - [OpenAI has released a guide](#)

AI literacies do not exist in a vacuum and require an integrated set of literacies including academic literacies, disciplinary literacies, information literacies and critical literacies. The ability to evaluate information and sources in a critical way using a disciplinary lens is a key outcome of the acquisition of AI literacies.

What can we use GenAIs, like ChatGPT, for in teaching and learning?

The table on the next page provides some examples:

Role	Description	Example of implementation
Possibility engine	AI generates alternative ways of expressing an idea	Students write queries in ChatGPT and use the <i>regenerate response</i> function to examine alternative responses.
Socratic opponent	AI acts as an opponent to develop an argument	Students enter prompts into ChatGPT following the structure of a conversation or debate. Teachers can ask students to use ChatGPT to prepare for discussions.
Collaboration coach	AI helps groups research and solve problems together	Working in groups, students use ChatGPT to find information to complete tasks and assignments.
Guide on the side	AI acts as a guide to navigate physical and conceptual spaces	Lecturers use ChatGPT to generate content for classes/courses (e.g., discussion questions) and advice on how to support students in learning specific concepts.
Personal tutor	AI acts as a tutor for students by providing immediate feedback on progress	ChatGPT provides personalized feedback to students based on information provided by students or lecturers (e.g., test scores).
Co-designer	AI assists throughout the design process	Lecturers ask ChatGPT for ideas about designing or updating a curriculum (e.g., rubrics for assessment) and/or to focus on specific goals (e.g., how to make the curriculum more accessible).
Exploratorium	AI provides tools to play with, explore and interpret data	Lecturers provide basic information to students who write different queries in ChatGPT to find out more. ChatGPT can be used to support language learning.
Study buddy	AI helps the student reflect on learning material	Students explain their current level of understanding to ChatGPT and ask for ways to help them study the material. ChatGPT could also help students prepare for other tasks (e.g., job interviews).
Motivator	AI offers games and challenges to extend learning	Lecturers or students ask ChatGPT for ideas about extending students' learning after providing a summary of the current level of knowledge (e.g., quizzes, exercises).
Dynamic assessor	AI provides educators with a profile of each student's current knowledge	Students interact with ChatGPT in a tutorial-type dialogue and then ask ChatGPT to produce a summary of their current state of knowledge to share with their teacher/for assessment.

Adapted from the [UNESCO guides on Artificial Intelligence](#)




Provide your students with the following guidelines for using AI:

1. **Understand the basics:** Familiarize yourself with the fundamental concepts of AI to make informed decisions about its usage.
2. **Academic integrity:** Use AI tools ethically and responsibly. Don't plagiarize or use AI to generate content without proper attribution.
3. **Supplement learning:** Utilize AI for research, data analysis, and complex problem-solving, but remember that it's a tool to enhance your learning, not replace it.
4. **Critical thinking:** Always critically evaluate AI-generated results. Cross-reference information from reliable sources before drawing conclusions.
5. **Privacy awareness:** Be cautious about sharing personal information with AI platforms and review their privacy policies.
6. **Bias awareness:** Recognize that AI systems can carry biases from their training data. Be mindful of potential bias in AI-generated content.
7. **Credible sources:** Rely on reputable AI tools and resources. Check reviews and recommendations before using new platforms.
8. **Learn and experiment:** Take time to understand how AI tools work. Experimenting and learning about their capabilities can enhance your skills.
9. **Stay updated:** AI technology evolves rapidly. Stay up to date with the latest advancements and trends in the field.
10. **Ethical AI use:** Consider the broader societal implications of AI. Think about how AI can impact various aspects of society and strive to use it responsibly.

Recommendations/Examples

Lecturers can sign up for a free version of ChatGPT (or GPT-4) on Open AI's platform. A first step in exploring the tool may be to enter some of your assignment prompts and assess the accuracy of the output. Then reflect on how you might embrace the tool or implement assessment strategies that make use of the tool unnecessary or undesirable.

TIP: Including your students in the reflective process is also a learning opportunity to help them understand the benefits and limitations of the tool.



A few things to try:

- **Ask ChatGPT a question** – it could be a homework assignment or in-class question.
 - How would you evaluate the response provided by ChatGPT?
 - Try modifying the prompt and see how that changes the response.
- **Ask ChatGPT to synthesize text from large documents.** For example, enter a 3500-word paper as a prompt and ask ChatGPT to create an 18-slide PowerPoint presentation with headings and bullet points, making a persuasive case for action.
- **Prompt for writing samples specific to your area of expertise.** For example, ask ChatGPT to generate advice a pharmacist might give to a 53-year-old male who is seeking pain medication for chest pain. Another example is to ask for an email introducing your upcoming course to enrolled students.
- **Ask ChatGPT to translate a piece of text into another language.** Together with your students examine the translation to see how well it did. Ask for improvements, or consider when such translation capabilities might be limited.
- **If you teach students how to code,** ask ChatGPT to correct incorrect code (debug code). Consider ways this might help students who are learning to code in your course.
- **If you teach a writing intensive course,** try asking ChatGPT to respond to a writing prompt in a specific style (like a popular author) or create a poem on a specific topic.
 - Reflect on the potential of ChatGPT to support student writing. Which writing practices do you feel are fundamental for students' appropriate use of artificial intelligence? How might ChatGPT facilitate the development of writing or problem-solving skills?
 - Have students use ChatGPT to write a draft of an assignment and then have them edit what it produces or check for errors