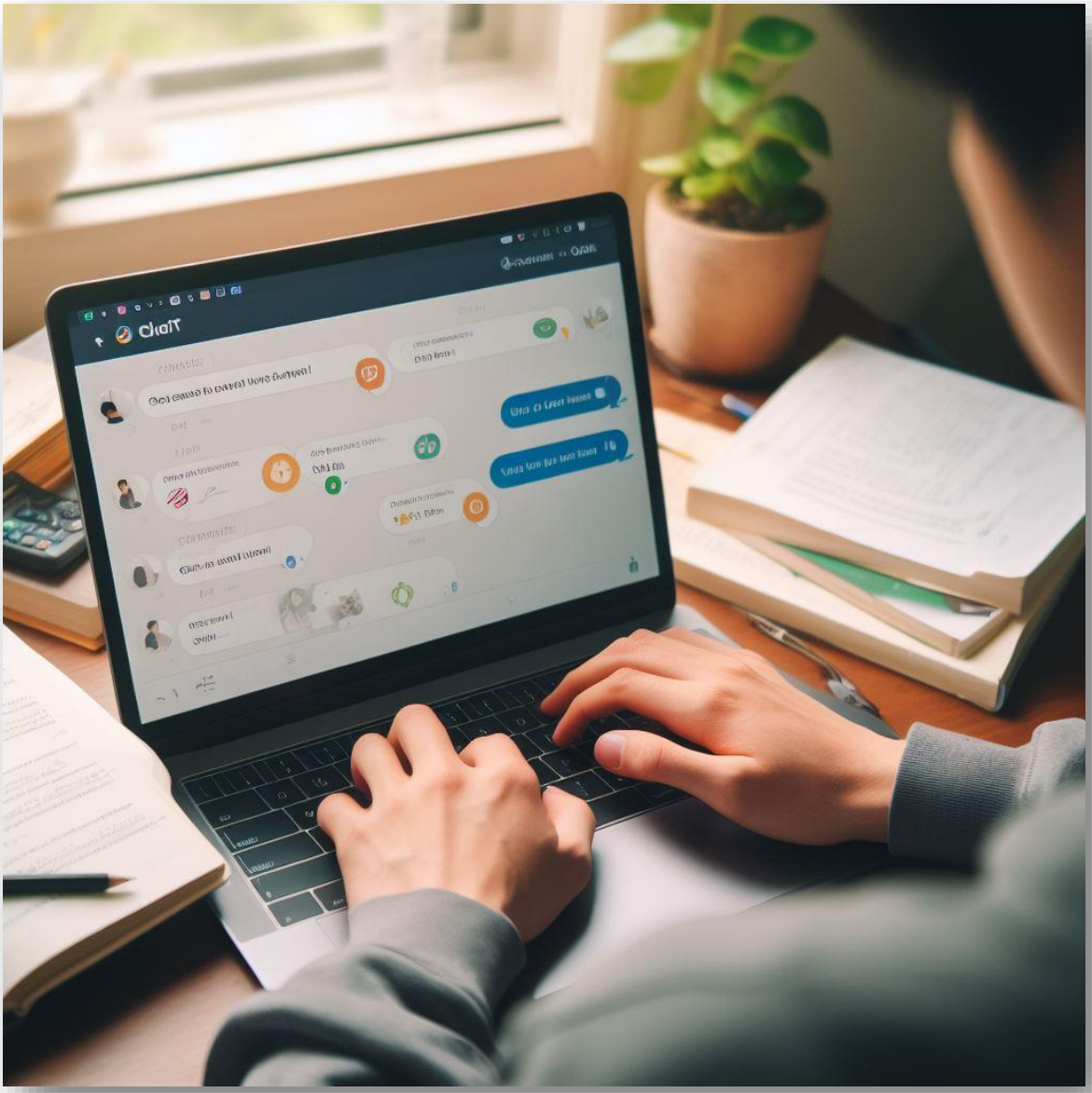


UCC
University College Cork, Ireland
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Skills Centre

NATIONAL FORUM
FOR THE ENHANCEMENT OF TEACHING
AND LEARNING IN HIGHER EDUCATION

# **Toolkit** for the **Ethical Use** of **Generative Artificial Intelligence** in **Learning & Teaching**


October 2023

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## Introduction to the Toolkit

This toolkit is designed to help staff consider the ethical integration of GenAI into their learning and teaching practices. The first few sections — ***What is Generative Artificial Intelligence?***, ***Lexicon of Common Terminology***, ***Critical AI Literacy***, ***Academic Integrity***, and ***Current Capabilities and Limitations*** — will help staff familiarise themselves with GenAI and its potential use and misuse in education. The content of these sections can also be used directly by staff to inform students about GenAI and ethical use.

The latter sections — ***Risk Assessment***, ***Case Studies: Evaluating the use of ChatGPT to Complete Assignments***, and ***Practice Examples – Integration of GenAI into Learning Activities*** — share examples from discipline specific case studies and research completed as part of the **(AI)²ed: Academic Integrity & Artificial Intelligence** research project. These case studies were conducted by student-staff project pairings, who considered ways to integrate and mitigate the use of GenAI in their disciplines.

## (AI)²ed: Academic Integrity & Artificial Intelligence:

### Project Introduction

Artificial intelligence (AI) writing tools that correct grammar or paraphrase content, such as QuillBot and Grammarly, have existed for some time. The launch, in November 2022, of ChatGPT, however, provoked urgent discussion in higher education about how best to deal with this new generation of AI technology, generative artificial intelligence (GenAI).

Though GenAI tools present a threat to academic integrity, they also provide an opportunity for digitally enhanced learning, teaching, and assessment. Current debates on how GenAI will affect higher education range from the belief that there will be no impact to the suggestion that assessment needs to be completely re-evaluated.

Our aim with the **(AI)²ed: Academic Integrity & Artificial Intelligence** research project was to demonstrate a middle ground, considering how GenAI can be used as an assistive tool in a comparable way to the calculator, without foregoing independent thought, critical thinking, analysis, and intended learning.

Together with students and staff from across the four colleges at UCC, we have developed this toolkit to serve as a guide on appropriate use of GenAI technology to enhance learning in higher education, advice on mitigating the risk of inappropriate use of this technology, as well as opportunities for new modes of teaching, learning, and assessment that incorporate these tools across numerous disciplinary contexts.

For the purposes of this project, ChatGPT was used as an exemplar of GenAI.

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# Part One

## What is Generative Artificial Intelligence?

**Generative artificial intelligence (GenAI)** technologies are a subset of **artificial intelligence (AI)** that use models based on patterns learned from large quantities of training data to generate new text, audio, or other media.

A **large language model (LLM)** is a type of GenAI designed to understand and generate human language. It achieves this by processing and analysing large volumes of text data from diverse sources, such as books, articles, and websites. The model employs complex mathematical algorithms and neural network architectures to learn patterns, relationships, and structures within the language. LLMs often take the form of a chatbot like ChatGPT.

Here is a breakdown of its functioning:

- **Data Learning**: GenAI learns by processing large amounts of text and visual data from across the internet, including books, articles, and websites. This helps it grasp grammar and language nuances that it can use in its responses.

- **Pattern Recognition**: By analysing these large volumes of data, GenAI learns language patterns: how words fit together in sentences and the contextual meaning of different phrases. This enables it to understand user queries and generate relevant responses.

- **Response Generation**: When a user interacts with GenAI by asking a question or giving a prompt, the program employs its learned patterns to construct a response. It aims to provide coherent and informative answers, drawing from its extensive knowledge.

- **Creativity and Prediction**: Beyond factual responses, GenAI can display creativity. It can generate imaginative stories, anticipate likely outcomes based on context, and simulate human-like thinking to enhance interactions.

- **Bias & Hallucination:** Depending on the data it was trained on, GenAI can exhibit unintended favouritism or unfairness in its decisions or outputs. Also, GenAI can generate content that is unrealistic, inaccurate, or doesn't correspond to the patterns it has learned from the training data. This is hallucination.

- **Continuous Improvement**: GenAI is not static; it evolves over time. Its developers continually update it with fresh information and improved algorithms to enhance its comprehension and conversation capabilities.

- **User Feedback and Learning**: User interactions play a pivotal role in refining GenAI. It learns and updates from each user interaction.

## Lexicon of Terminology

- **AI (Artificial Intelligence)**: Computer systems that can perform tasks that usually require human intelligence, like understanding language, recognising images, and making decisions.

- **Algorithms:** In computer science and mathematics, an algorithm refers to a finite series of precise instructions, usually employed to address a particular set of problems or execute a computation.

- **Bias**: Unintended favouritism or unfairness in an AI's decisions or outputs due to the data it was trained on.

- **Data**: Information that the AI uses to learn and make decisions. In generative AI, this could be text, images, or other types of content.

- **Deep Learning**: A method of **machine learning** that imitates that way humans learn, using layers of artificial neural networks to model and solve complex problems. It can learn and improve its functions by examining data without human intervention.

- **Generative AI (GenAI)**: A subset of artificial intelligence that involves **algorithms** and **models** designed to generate new, original data, such as text, images, audio, and more.

- **Hallucination**: Hallucination refers to a situation where the AI model generates content that is unrealistic, inaccurate, or doesn't correspond to the **patterns** it has learned from the training data.

- **Image Generation**: Creating new images based on patterns learned from existing images. This can be used for art, design, or even creating realistic photographs.

- **Labelled Data**: Labelled data is data that has been categorised or "labelled" with the correct answers or outcomes. In **supervised learning**, each data point in labelled data is associated with a specific label or category. For example, in an image classification task, each image is labelled with the correct class it belongs to (e.g., "cat" or "dog"). Labelled data is essential for training **machine learning** models to make accurate predictions.

- **Large Language Model:** A large language model is a **deep learning algorithm** that can recognise, summarise, translate, predict, and generate text and other forms of content based on knowledge gained from massive datasets.

- **Machine Learning**: A type of AI that uses **algorithms** and **data** to learn, allowing systems to improve over time with experience without being specifically programmed.

- **Model**: A model is a computer program or **algorithm** designed to learn **patterns** from data and make predictions or generate new content based on those **patterns**. It is a tool that can recognise similarities, understand relationships between words and information, and generate new content.

- **Pattern**: Regularities or similarities in data that AI models learn to recognise.

- **Semi-Supervised Learning**: A learning paradigm where a **model** is trained on a combination of **labelled** and **unlabelled data**. Some generative models use semi-supervised learning to improve their performance.

- **Supervised Learning**: Supervised learning is a type of **machine learning** where a **model** is trained using **labelled data**. In this approach, the **algorithm** learns to map input data to the correct output by observing examples from the training dataset, teaching a computer by providing it with both the questions and the answers.

- **Text Generation**: Creating new text based on **patterns** learned from existing text. This can be anything from writing a story to answering questions.

- **Training Data**: Examples and information used to teach an AI **model** how to do a specific task.

- **Training**: The process of teaching an AI model by exposing it to examples and allowing it to adjust its parameters to learn from them.

- **Transfer Learning**: A **machine learning** technique where knowledge gained from one task or domain is applied to another related task or domain. Generative **models** can benefit from transfer learning to improve their performance on specific tasks.

- **Unlabelled Data**: Unlabelled data lacks predefined labels or categories. It consists of raw data without corresponding correct answers. **Unsupervised learning** and other techniques are often used to analyse unlabelled data to discover patterns, clusters, or structures within the data.

- **Unsupervised Learning**: A type of **machine learning** where the model learns **patterns** and features from data without explicit supervision. **GenAI** models often utilise unsupervised learning to capture the underlying distribution of the data.

- **Zero-Shot Learning**: A scenario where a **model** can perform a task without any specific **training** examples for that task.

## Critical AI Literacy

An important aspect of using GenAI tools ethically is developing critical AI literacy. This entails evaluating these tools and our use of them and understanding the existing and potential shortcomings and detrimental aspects of GenAI so that we use it responsibly. It will take time for educators and learners to develop in-depth critical AI literacy, but a good starting point is an awareness of the following:

### Privacy concerns & copyright infringement

As GenAI tools train, in part, off the data that users input into them, it is important that you do not enter any personal data (your own, or others) or any copyrighted material into them because this information is not secure and can possibly be output for another user. Beyond this, ethical concerns have been raised over the methods used for training these tools that include scraping internet data, as there is a lack of transparency around this in terms of use of copyrighted material, lack of consent, and the monetization of the work of others without proper credit/payment.

### Misinformation and amplification of dominant viewpoints/bias/stereotypes

The content that GenAI produces is not always accurate (hallucinations) and contains bias. Scraping large quantities of human-generated internet data in the training of these tools means that the tools often adopt biases found in this data, therefore further amplifying predominant viewpoints and stereotypes. Remember that these tools do not "think" for themselves and are not capable of critical analysis - it is important that we fill this role when using them and critically analyse their outputs. There is a possibility that these tools may be used (intentionally or not) to further spread misinformation and cause harm.

### Environmental impact

GenAI has a large environmental impact. The training of these tools is intensive, requiring large amounts of electricity and water. A study conducted by the University of Massachusetts found that training a single AI model emitted as the same amount of carbon that five cars would over the course of their lifetimes (more than 626,000 pounds of carbon dioxide equivalent).

### Exploitation of workers

While we think of AI as the work of technology, it requires a large amount of human intervention while training and developing. As we know, GenAI contains biases and misinformation. In an effort to improve this and the more general functioning of AI, people are employed to label images and text. This work is auctioned off globally in order to create a "race to the bottom" for wages, leaving workers, mostly in the global south, open to exploitation and with very little pay.

## Academic Integrity

While GenAI does pose a threat to academic integrity when used to bypass learning in the case of "unauthorised content generation"[i], it can also be used ethically to enhance the learning process where appropriate.

The European Network for Academic Integrity recommends that staff and students be guided on the benefits and limitations of AI tools and that students be provided the opportunity to develop the skills required to work with increasingly ubiquitous AI technology in an ethical way[ii]. One way to achieve this is to introduce emerging technologies, including GenAI, into student learning alongside academic integrity so that students will be more likely to associate the use of these with good practice.

Academic integrity is underpinned by six fundamental values: "honesty, trust, fairness, respect, responsibility, and courage"[iii]. Fostering academic integrity offers key motivating factors for student engagement, focusing on positive actions. Emphasising academic integrity in a developmental, educational approach also brings attention to the process of learning, the value in developing your skills, and the importance of being able to stand over your own work and take pride in it.

Introducing GenAI through a framework of academic integrity ensures that several key points are addressed before and during any potential use of these tools in the academic setting. It also means that the same standards or expectations around the ethical use of GenAI apply equally to staff and to students, ensuring transparency and fairness. We can see this by applying the values of academic integrity to ethical use of GenAI.

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**Honesty:** To maintain academic integrity, it is critical that individuals are honest about what is their own work and what is not. This means that use of GenAI should be acknowledged and made **transparent**.

**Trust:** GenAI is known to "hallucinate" and is not credible as a source. While it can produce accurate outputs that are useful in a variety of ways, we cannot automatically trust that the content it provides us is reliable. This means that we need to **critically analyse** outputs from GenAI before using them.

**Fairness:** To ensure fairness (at the classroom, programme, discipline, and/or university level), clear **guidelines** for how and when AI technology can and cannot be used (for both students and staff) should be available and applied consistently.

**Respect:** Respect for the learning process means that GenAI tools are not used in any way that bypasses intended learning, only in ways that enhance it. We respect our own potential by placing value in developing new knowledge and skills and recognising and taking pride in our own contributions. We respect others by being honest and transparent about our use of GenAI.

**Responsibility:** Individuals are responsible for the work they produce. This means that individuals using AI-generated content need to analyse it to ensure that it is accurate and unbiased. This is one of several ways AI and human-generated content differ; AI cannot take responsibility for what it produces. **Critically engaging** with AI tools, rather than accepting all content produced by them as accurate encourages learning and maintains the credibility of the individual producing the work.

**Courage:** It takes courage to learn how to use new and unfamiliar technologies, and to persevere in the ethical use of GenAI tools, staying true to the values of academic integrity, rather than taking shortcuts that may be easier but that bypass vital learning.

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**Several key themes emerge throughout this framework as requirements for using GenAI ethically in education.**

The first of these is **transparency**. University staff can **model** this for students by acknowledging their own use of GenAI and explaining how and why they used it for this purpose. This helps to illustrate and differentiate between what might be considered acceptable or unacceptable use of these tools. For example, an educator might use GenAI to produce a list of potential essay questions for their module and subsequently reviews this list, selects some of the best options and revises these to create the final assignment. This educator should be transparent about this with their students, explaining that using GenAI helped inspire some new ideas for them and describing their process of using it. This will model acceptable use for the students who may similarly use a GenAI tool to brainstorm some key points for their essay, going on to research these themselves to develop their response.

Further to this, **clear guidelines** that set expectations for how GenAI can and cannot be used (whether it is banned entirely or integrated into certain tasks) are important. It is possible that these may vary from module to module for students, so it is important that expectations are made clear in each module and that students are aware of these.

Finally, it is vitally important that **critical thinking/analysis** is paired with any use of GenAI tools in order to reduce potential harmful impacts resulting from the spread of misinformation and bias in the content these tools produce and to encourage learning. Students should be taught to critically engage with these tools. Content produced by GenAI can be usefully applied to exercises designed to help develop students' critical thinking skills by tasking them with evaluating this content for accuracy and relevance.

The **Academic Integrity Fundamentals** course, available to all UCC students in the Canvas Success Zone contains a module on the ethical vs. unethical use of GenAI that can help introduce students to critical AI literacy and GenAI in the context of academic integrity. It is recommended that all students engage with this course, which also covers principles of academic integrity, skills that support it, and various types of academic misconduct and associated risks.

## Acknowledging Use of GenAI

As GenAI is an evolving field, guidance varies in terms of how to best acknowledge use of it. How we use GenAI differs in several ways from how we use academic sources and, as it is not considered an "author", how we acknowledge this use can also differ. However, it is important that we do acknowledge when and how we use it in order to maintain transparency about our own work.

Generally, this can take the form of a statement that details how a GenAI tool, such as ChatGPT was used (potentially including information on the prompting process).

**An example of how this can be structured is as follows:**

I acknowledge the use of [insert AI system(s) and link] to [specific use of generative artificial intelligence].

The prompts used include [list of prompts].

The output from these prompts was used to [explain use].

## Current Capabilities and Limitations

GenAI tools are evolving and continuing to improve (in most cases) as they train which means that their capabilities and limitations will continue to change and may vary from tool to tool depending on how it was trained.

During this project, several key capabilities and limitations of ChatGPT emerged.

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### Capabilities

- Produces easy to understand text in plain English
- Produces grammatically correct and generally well-structured text
- Summarises or distils key points from a text
- Solves math problems
- Writes code
- With plug-ins, can generate graphs/charts/images
- Brainstorms ideas
- Converses with the user and answers questions

### Limitations

- Hallucinations (inaccurate or made-up information)
- Biases based on training data
- Produces surface-level or general information (not capable of critical analysis)
- Cannot provide citations or references (or produces fake ones)
- Struggles to respond to specific word count requests
- Does not always respond to prompts accurately and can require several specific prompts to refine to the desired output
- Limited to training data (many tools are only trained on data up to a certain date so are not aware of up-to-date or specific information)
- Code produced is accurate but is the most straightforward and basic version of the code so it is not robust or secure and would not stand up in many real-world applications

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Image created using DALL-E 3. Prompt: “AI algorithm image on a student’s laptop computer”.

# Part Two

## Risk Assessment

Through the course of this project, the various project pairings worked on a variety of discipline specific assessment styles. Before detailing individual case studies, here is a breakdown these assessment styles, including examples of their application, and associated risks of abuse through generative artificial intelligence.

A common risk across most types of assessment is repeating the same questions. It is recommended that you modify your assessment each year.

### Formative Assessment

**Characteristics**: Formative assessment is an ongoing, interactive process used to provide feedback and monitor student learning during the instructional process. It is typically not graded and aims to help students understand their strengths and weaknesses.

**Methods**: Formative assessments can take various forms, including quizzes, class discussions, peer reviews, observations by the teacher, and self-assessment.

**Considerations**:

> **Feedback**: Formative assessments emphasise timely and constructive feedback to guide students' learning.
> **Improvement**: They focus on improvement and are used to make instructional adjustments.
> **Low Stakes**: Because they are typically not graded, they reduce stress and encourage risk-taking in learning.

**Associated Risk of GenAI:** While formative assessments are less susceptible to academic misconduct due to their emphasis on feedback and learning improvement, there could still be instances of students using GenAI to generate responses for formative quizzes or discussions. This would undermine the purpose of formative assessment, which is to help students learn.

**Example:** In a history module, a formative assessment might involve weekly quizzes to check students' understanding of the material. These quizzes are typically low-stakes and are designed to provide feedback for both the students and the lecturer. Formative assessments can include elements like draft essays or presentation outlines. These can help students refine their ideas and receive feedback before completing the final essay or presentation for summative assessment.

## Summative Assessment

**Characteristics**: Summative assessment occurs at the end of an instructional period of a module and is used to evaluate students' overall learning and mastery of specific learning outcomes. It is usually graded and used for accountability purposes.

**Methods**: Summative assessments commonly include final exams, essays, standardised tests, and projects.

**Considerations**:

> **Accountability**: Summative assessments help determine whether students have met specific learning outcomes.
> **High Stakes**: They are often high-stakes assessments and contribute significantly to students' grades.
> **Feedback**: While they are not primarily intended for feedback, they can still offer insights into areas where students may need improvement.

**Associated Risk of GenAI:** There is a higher potential for academic misconduct in summative assessments through the use of GenAI. Students may attempt to use the GenAI to generate complete or partially plagiarised responses for exams, papers, or projects. This would lead to unfair grading and undermine the integrity of the assessment process.

**Example:** At the end of an English literature module, a summative assessment might consist of a final exam that covers all the topics and texts studied throughout the semester. This exam is graded and contributes significantly to the final course grade. Summative assessments may include a final research paper or a culminating presentation in which students demonstrate their comprehensive understanding of the course material.

## Diagnostic Assessment

**Characteristics**: Diagnostic assessment is used to identify students' prior knowledge, skills, and misconceptions before beginning a new unit or course. It helps educators tailor instruction to students' needs.

**Methods**: Diagnostic assessments can include pre-tests, concept maps, interviews, or informal discussions.

**Considerations**:

**Individualisation**: They allow instructors to differentiate instruction based on students' starting points.
**Curriculum Alignment**: Diagnostic assessments ensure that the curriculum aligns with students' readiness levels.
**Baseline Data**: They provide baseline data for measuring growth and improvement.

**Associated Risk of GenAI:** While the primary purpose of diagnostic assessments is to determine students' readiness and inform instruction, there is a limited potential for academic misconduct through the use of GenAI. Students may use it to provide incorrect information on pre-tests or diagnostic quizzes.

**Example:** In a mathematics course, a diagnostic assessment may begin with a pre-test that assesses students' prior knowledge of algebra concepts. This helps the lecturer identify areas where students need additional support. Diagnostic assessments can include short quizzes or tests focused on fundamental concepts.

## Authentic Assessment

**Characteristics**: Authentic assessment aims to measure students' abilities in real-world contexts and tasks. It emphasises the application of knowledge and skills rather than rote memorization.

**Methods**: Examples include case studies, simulations, performance tasks, and portfolio assessments.

**Considerations**:

**Real-world Relevance**: Authentic assessments promote skills that are applicable in real-life situations.
**Complexity**: They often involve complex, open-ended problems or projects.
**Subjectivity**: Scoring can be subjective, requiring clear rubrics and assessment criteria.

**Associated Risk of GenAI:** The potential for academic misconduct in authentic assessments depends on the task. If the assessment requires students to demonstrate practical skills or creativity, the risk is significantly lower. However, in tasks like written reflections or reports, students could misuse GenAI to generate content that lacks authenticity and originality.

**Example**: In the fields of Medicine, Nursing, and Pharmacy, assessment is carried out through Objective Structured Clinical Examinations, (OSCE's), where students are assessed in a structured, controlled, clinical environment on diagnosis, prognosis, and treatment planning.

## Criterion-Referenced Assessment

**Characteristics**: In criterion-referenced assessment, students' performance is measured against specific criteria or standards. The focus is on whether students have achieved predefined learning objectives.

**Methods**: Criterion-referenced assessments involve setting clear criteria or rubrics to evaluate student work.

**Considerations**:

> **Objective**: This type of assessment is objective, as it measures mastery of specific learning outcomes.
> **Accountability**: It is often used for accountability in education, ensuring that students meet established standards.
> **Individual Progress**: It allows educators to track individual student progress toward objectives.

**Associated Risk of GenAI:** The potential for academic misconduct using GenAI in criterion-referenced assessments exists if students use it to generate responses that do not align with the established criteria or standards. This can lead to artificially inflated scores.

**Example:** In a language course, a criterion-referenced assessment might involve an oral examination where students are evaluated based on their pronunciation, vocabulary usage, and grammatical accuracy, using predefined criteria. These assessments can also include essays or presentations in which students are explicitly graded against established criteria related to language proficiency.

## Case Studies: Evaluating the use of ChatGPT to Complete Assignments

### College of Business & Law

*Law*

**Module:**
The student-staff pairing for Law worked on assessment design for post-graduate law students. This example is from a Criminology module.

**Learning Outcomes:**

The learning outcomes for this module included the following:

*On successful completion of this module, students should be able to:*

- *Outline and trace changes in criminological theories over time*
- *Link these changes to shifts in societal concerns over criminality*
- *Evaluate the applicability of criminological theories to high profile Irish and international cases.*

**Current Assessment Design:**

**Summative assessment**, in the form of a 4000-word **take-home essay**, that accounts for 70% of the overall grade, and an **oral exam**, that accounts for 20%. **Formative assessment**, in the form of **attendance and participation**, that accounts for 10%.
For the purposes of this research, the student-staff pairing focused on the **take-home essay.**

**Assignment Task:**

The essay question was as follows:

*A number of the theories covered in this module have situated criminal behaviour in its social, cultural, political and/or economic context in order to understand it. Do you think that this wider context is useful?*

*Discuss with reference to **at least one** of the theories that you have encountered in this course.*

**Associated Risk of GenAI:**

The take-home essay is one of the more high-risk assessment styles. Students may attempt to use the GenAI to generate complete or partially plagiarised responses to the essay question.

**Breakdown of process, completed by student participant:**

In the first instance, the student pasted the essay question directly into ChatGPT and was provided with a brief, two-paragraph answer.

The student clarified that the task was intended for an assignment within the context of law school in Ireland, expanding the response to three paragraphs accordingly.

Subsequently, the student emphasised that the assignment was intended student studying at a postgraduate level, requiring both depth and critical analysis. The response incorporated more critical terminology and phrases but retained a predominantly informative tone.

The student then requested the inclusion of legal sources in the answers. The sources provided were primarily secondary, consisting of journals and books. While some sources appeared genuine, others lacked verifiability through search results.

It was conveyed by the student that the answer must be at least 1200-words. However, the provided response fell short, only amounting to 500 words.

Following a critique of this initial response, the user reiterated the need for a 1200-word assignment. In response, a 600-word assignment was delivered.

Subsequently, the student instructed the AI to compose the first half of the assignment within 600 words. The AI initially produced 400-500 words for the first half and then indicated readiness to proceed with the second half, ultimately delivering 330 words, with a maximum word count limit of 750 for the entire assignment.

The student then copied the content into another ChatGPT window and sought the AI's opinion, providing context. ChatGPT assessed the response as a 1.1 standard answer, noting its nuanced approach.

**Observations:**

The answer provided by ChatGPT initially appeared to be quite insightful and to be quite specific to Irish law, incorporating relevant authors.

However, on closer inspection, it was quite repetitive in its phraseology and showed no real depth in its critical analysis. Also, many of the authors referenced by ChatGPT appear to be fabrications.

The essay was well-structured, each aspect of the answer was clearly broken down in indefinable ways.

The language and style are formal in tone consistent with legal writing however, ChatGPT had significant issues creating an answer of a suitable length.
Despite being asked, it did not seem capable of being able to provide the critical element required to bring this answer up to the required standard.

In this essay, ChatGPT was poor at providing reputable references, and appears to have randomly generated a referencing style.

ChatGPT unquestionably possesses the skill to craft a strong law assignment. The way it constructs sentences and presents an argument is of a high standard. However, the issue lies with its depth of knowledge. The arguments, while well-articulated, lack any real substance.

*Cork University Business School*

**Module:**

The student-staff pairing for Business Information Systems worked on assessment for undergraduates, focusing, in this example, on a module concerning co-operative banking.

**Learning Outcomes:**

The learning outcomes for this module include the following:

*On successful completion of this module, students should be able to:*

- *Define the variety of different types of co-operative savings and credit institutions*
- *Evaluate the importance of co-operative finance for sustainable local development and for meeting the financial needs of consumers, particularly low-income consumers*
- *Illustrate the practice of co-operative banking through field observation.*

**Current Assessment Design:**

The current assessment design for this module is graded **formative assessment**, in the form of a 2000 word written assignment and a blog entry of between 700 and 1000 words.

**Associated Risk of GenAI:**

Assessment for this module comprises of take-home written assignments, one of the more high-risk assessment styles. Students may attempt to use the GenAI to generate complete or partially plagiarised responses to the essay question.

**Assignment Task:**

The assignment task used for this case study was as follows:

*You are asked to critique the business model of your choice of a credit union in Ireland or in another country. (In other words, pick <u>one</u> named credit union you want to study.) Include the following in your discussion:*

- *Description of the business model employed by this credit union (500 words)*
- *Analysis of what this credit union does well. You must give examples to evidence your claims (500 words)*
- *Analysis of what this credit union needs to change. You must give examples to evidence your claims (500 words)*.

**Mitigation:**

The above question required the student to apply their learning to real world examples, lessening the likelihood that GenAI could be used.

The lecturer also included new elements in the assessment design to further mitigate against the unethical use of GenAI.

*Share what you have learned with a classmate verbally. Discuss what your chosen credit union could learn from the business model of your classmate's chosen credit union. Present your findings by way of a video presentation (3-5 minutes max) (give a link to the file location) or in written form (500 words).*

The requirement of a documented discussion between students and the verbal presentation strengthens the assignment against risk of academic misconduct through the use of GenAI.

**Integration:**

ChatGPT produced a well-structured answer, but not a convincing argument with concrete evidence. Students would thus benefit from using the structure produced by ChatGPT as an exemplar while still needing to do the work of building academic arguments and sourcing evidence to back up their claims.

**Observations:**

The answer produced by ChatGPT was acceptable but demonstrates the importance of building in the need for specific, real-world examples and rewarding more marks for that part of the assignment.

## College of Arts, Celtic Studies & Social Science

### *Philosophy*

**Module:**

The student-staff pairing from Philosophy worked on a third-year module that focuses on the philosophy of artificial intelligence in our culture.

**Learning Outcomes:**

Some of the learning outcomes for this module are as follows:

*On successful completion of this module, students should be able to:*

- *Describe and explain the major philosophical approaches to AI*
- *Evaluate the major objections to AI in general, and also to specific examples*
- *Integrate considerations about AI with major questions in other branches of philosophy, including philosophy of mind, philosophy of science and ethics.*

**Current Assessment Design:**

The assessment design for this module is **summative assessment** in the form of a 2500-word **take-home essay.**

**Assignment Task:**

The student-staff pairing compared two styles of essay question: one "traditional" essay question from the 2021-22 academic year and one updated question from the 2022-23 academic year when the use of ChatGPT was required for the assignment. One question addressed the topic of the Turing Test, and the other addressed René Descartes' views about the nature of the mind.

***Essay questions 2021-22***

*Write an essay of approximately 2500 words on one of the following:*

1. *Explain and evaluate the "Imitation Game" as described in Turing's (1950) paper 'Computing Machinery and Intelligence.' What exactly does Turing think it is for? Is it appropriate to call it the 'Turing Test'? What, in your view, is the most significant objection to it, and what is the best response to that objection?*
2. *Explain and evaluate Descartes's contention (from his 1637 Discourse on the Method) that it is 'inconceivable' that a machine could use language in the way that humans can, and that therefore a machine could never have a mind. Is he right or wrong? Of all the AI models we have looked at, which would have impressed him the most, and why?*

***Essay questions 2022-23***

*Write an essay of approximately 2500 words on one of the following:*

1. *Conduct a Turing Test (i.e., play the 'imitation game') with ChatGPT. Does it pass or fail? How, and why? What kinds of conversations would make it more likely to pass, or more likely to fail? What does this show about the Turing Test? What does this show about ChatGPT?*

2. *Descartes thought that the ability to use language was an 'irreducible' feature of the mind, that it was the marker of human mentality, and that it was 'not conceivable' that a machine could do so. Does ChatGPT prove that he was wrong?*

*Have a conversation with ChatGPT about the topic to back up your view (you could even ask it to role-play the 'voice' of Descartes) and see whether there are features of your conversation that support your view, or Descartes's. Does your conversation suggest any better candidates for an irreducible mark of human mentality (i.e., that you have, but ChatGPT lacks)?*

### Associated Risk of GenAI:

As is the case with all take-home essays, the risk of academic misconduct through the use of GenAI is high.

### Mitigation:

In this instance, the lecturer chose to integrate the use of GenAI in their assessment design in an attempt to prevent or discourage the use of GenAI in a way that would be academically dishonest. This integration also provided students with a guided introduction to the technology, enabling them to learn best practice in using GenAI technology.
Students were specifically told to include screenshots and transcripts of their interaction with ChatGPT, as well as provide a rationale for the prompts that they used with respect to the philosophical issues and texts discussed in class.

### Breakdown of process:

The student partner was asked to compare and contrast 2021-22 assignments with the updated 2022-23 versions. Of particular interest to the lecturer was whether the student would adopt different approaches, whether they thought they had still learned the material, whether they were less likely or tempted to engage in academic misconduct, and whether either approach was more enjoyable.
The updated assignments, those that ethically integrated the use of GenAI in their design, enabled the student not only to learn about the topic of the assignment, but also about the technology itself (e.g., its limitations, uses to which it could be put in other contexts).
It was found that the student was still able to demonstrate their mastery of the intended learning outcomes.

### Observations:

This is a good example of the ethical integration of GenAI into assessment design. The lecturer felt that both approaches aligned with the learning outcomes, but in slightly different ways. Their previous approach was a standard explain-and-evaluate type of essay, which assessed the student's grasp of the material by asking them to report on it. The newer approach is somewhat more practical — since they demonstrate their understanding of the approach by including screenshots of their interaction with ChatGPT and explaining why they chose the prompts that they did, based on the material studied. However, both approaches can fulfil the learning outcomes.

## *Applied Psychology*

### Module:

Our psychology project pairing focused on three connected modules from the doctoral course in Clinical Psychology, a full-time, three-year postgraduate professional course, designed to train psychologists to be eligible for appointment as Clinical Psychologists in health services.

### Learning Outcomes:

Some of the learning outcomes for these modules are as follows:

- *Have consolidated knowledge of the aetiological processes relevant to understanding the clinical presentations of (adulthood / intellectual disability and autism spectrum disorder / childhood).*
- *Develop skill and competency in psychological assessment (clinical interviews, psychometrics, observation, staff consultation), formulation (in collaboration with service users, families, and staff) and intervention with (adults / children and adults with Intellectual Disabilities and Autism Spectrum Disorder / children and families).*
- *Further develop an understanding of, and demonstrate practice implications of, ethics and codes of conduct in relation to clinical practice.*

### Current Assessment Design:

These modules are assessed through a combination of **summative** and graded **formative assessment.** Here are some examples:

- Case studies, giving the student a knowledge of local services.
- Evaluation by the clinical supervisor of the student's competencies.
- Reflective practice assignments.
- Service-related research project.

### Associated Risk of GenAI:

The lecturer identified several ways their assessment was at risk from GenAI:

- It can provide an overview of the evidence-base on a topic, thus undermining intended learning outcomes.
- It can produce some relevant structure/overview of components required in service-related research.
- It can provide components of a psychological formulation to be incorporated into a diagram.
- It can provide a reformulation of a clinical presentation.

### Mitigation:

The lecturer identified a number of ways the unethical use of GenAI can be mitigated against.

- Keep context for clinical scenarios local.
- An increased emphasis on oral and clinical examinations.
- More groupwork and paired presentations.
- A journal club, where students come together to critique a key paper.

- Continue to invite feedback from students on what best supports their learning and consider partnering with students on assessment review/redesign.
- Place an increased emphasis on critical synthesis and reflection at the end of assignments.

**Integration:**

It was noted by the Applied Psychology student-staff pairing that GenAI software, such as ChatGPT is not consistent in following best-practice guidelines, vital in clinical settings.

With this in mind, it was suggested that students could input hypothetical vignettes as prompts in ChatGPT, with students critically analysing the responses generated. Students can compare their own work with the outputs from GenAI software throughout, identifying gaps in GenAI responses based on analysis of evidence-base and reflective practice.

This would encourage students to think critically about what is safe for service users. Answers generated for scenarios such as reformulating a treatment plan for anxiety often do not map onto the existing evidence base. Our natural caution with using ChatGPT could foreground safety and ethical concerns when giving ChatGPT a clinical problem to solve.

**Observations:**

An emerging debate, which requires further research, is that GenAI that appears in theory to be able to predict behaviour patterns among patients, following the inputting of anonymised case notes. This could provide great assistance to clinical practitioners as well as students, though it must be stressed that significant research is required in this area.

## College of Science, Engineering & Food Science

### *Computer Science*

**Module:**

Computer Science students working on the project focused on foundational undergraduate modules.

**Learning Outcomes:**

Learning outcomes for these modules included:

- *Demonstrate an understanding of core programming constructs*
- *Write computer programs of moderate complexity*
- *Demonstrate an understanding of some of the principles of good program design.*

**Current Assessment Design:**

These modules are assessed through a combination of **summative** and **formative assessment**. A written examinations can account for 70% of the total grades, with the other 30% being made up of in-class tests.

**Associated Risk of GenAI:**

GenAI, such as ChatGPT, is highly proficient in producing code, when prompted adequately. The purpose of these foundational modules is to familiarise first year Computer Science students with the basics of programming in Python, a high-level general-purpose programming language. Python is used in numerous real-world applications and is currently the most popular programming language in the world. The use of GenAI to generate code will stunt a student's development. The student will not proficiently learn the language and will perform poorly when examined.

**Mitigation:**

This module is assessed through in-person examination, which naturally mitigates against the unethical use of GenAI.

**Breakdown of Process:**

ChatGPT was used to complete assessment tasks, as presented in the written examination. ChatGPT easily completed the assignment and would score reasonably well. It was previously thought that that AI tools such as ChatGPT were unable to compete with students in this regard but as evidenced through the answers produced, this is incorrect.

Due to ChatGPT easily completing the assignment to a high standard, the concern is that students will not build the necessary foundational knowledge of coding required to progress in their learning journey. By utilising this tool, it could be argued that students could theoretically pass assignments and the course appropriately learning programming skills.

**Integration:**

The integration of GenAI, particularly at an early stage in a Computer Science student's development, is vital. Students need to be made aware of the downsides of its use. While ChatGPT can write code well when prompted, it tends to answer in a very straightforward and basic manner which could lead to numerous problems as a student moves through their studies and into the professional realm.

## *Physics*

### Module:

Physics students working on the project focused on foundational undergraduate modules.

### Learning outcomes:

Learning outcomes for these modules can include:

- *Solve elementary problems in mechanics and heat*
- *Design and execute experiments to measure mechanical properties*
- *Use conservation principles to constrain the solution of physical systems*
- *Present experimental data clearly in tabular form*

### Current Assessment Design:

In physics, as is the case across the sciences, students are assessed by graded **formative assessment** which includes the completion of practical laboratory work, followed by the assemblage of data collected into lab reports. Laboratory work varies in content depending on the theoretical subject matter being covered at the time. This laboratory work can also be classed as **authentic assessment**, given the nature of the experiments conducted.
There is also a **summative assessment** element, in the form of written examinations.

### Associated Risk of GenAI:

In general, the hands-on nature of assessment design in the sciences has a low risk of academic misconduct through the use of GenAI.

### Assessment Task:

Laboratory reports were focused on for the purpose of this project as the form of assessment most open to the use of GenAI.

After completing the practical laboratory, students are usually instructed to write a laboratory report.

A laboratory report consists of:

- A procedure, where the steps taken to complete the lab are comprehensively detailed
- The results obtained by practical work during the lab.
- A discussion, where the theory behind the lab and all the theoretical information that may be relevant to that lab is provided
- An error analysis section, that includes any errors found in measurements etc.
- A conclusion that sums up the experiment.

### Breakdown of Process:

Given the fact that a laboratory report is written based on experiments conducted by students, the only step in the process that is open influence by GenAI, in terms of its assessment, is the discussion section. This is usually the most substantive section of a laboratory report, where students address the theory informing their hands-on laboratory work and discuss their processes and observations.

The laboratory report used for this case study was based on an experiment into the interference of ultrasound light and to determine the wavelength of sodium yellow light.

The student used ChatGPT as a study aid and research tool in the writing of the discussion section of their laboratory report. It was specifically used to help clarify certain theoretical elements concerning sound waves, longitudinal waves, and light waves.

**Mitigation:**

The nature of laboratory reports requires students to weave in the various theoretical elements covered in class to their practical work laboratory work.

The student noted that, while ChatGPT provided reasonably comprehensive answers to theoretical questions, students would still need to adequately interpret these answers, to appropriately relate them back to their practical laboratory work.

Therefore, ChatGPT can be used as a study aid in science subjects, like physics without undermining the intended learning outcomes, given the need for continued critical engagement with ChatGPT outputs.

## College of Medicine & Health

### *Dentistry*

**Module:**

The student-staff pairing from Dentistry focused on an undergraduate module on dental morphology. This module covers the anatomical features of the teeth, their anatomical variations and helps the students learn the identifying features of each tooth.

**Learning Outcomes:**

The learning outcomes for this module included the following:

- *Identify anatomical structures in the orofacial region.*
- *Describe the components of teeth and oral tissues at histological level.*
- *Identify native teeth and radiographs of teeth including age changes.*
- *Outline growth mechanisms, role of bone remodelling and selected developmental abnormalities in the orofacial region.*

**Current Assessment Design:**

A combination of graded **formative assessment**, in the form of an in-class test, **summative assessment**, in the form of a written examination, and **authentic assessment** in the form of a practical examination on tooth morphology.

**Associated risk of GenAI:**

There is a potential for academic misconduct in both summative and formative assessment. Students may use GenAI to generate complete or partially plagiarised responses for exams, papers, or projects.

**Mitigation:**

The risk of GenAI in **authentic assessments,** such as the practical examination mentioned above, is almost non-existent. Examining students on the practical, real work applications of their leaning is an excellent way to bypass the risk of academic misconduct through the use of GenAI.

**Assignment Task:**

The student-staff pairing decided to look at the tooth variations seen in each tooth type (incisors, canines, premolars, and molars).

Both short-answer questions and essays were assigned to the students. They were provided with recommended textbooks, lecture notes, and online resources to conduct research on the given topic. Following this, the student utilised ChatGPT to further explore the subject. The aim was for students to consider if both learning approaches are equally beneficial in achieving their educational objectives.

**Breakdown of Process:**

The student initially utilised the recommended textbook, lecture notes, and online resources to delve into the topic. Subsequently, the student turned to ChatGPT for assistance.

At first, the student employed broad and general prompts when interacting with ChatGPT, resulting in general information. However, as she fine-tuned her prompts, she received more precise and succinct information from ChatGPT. It was suggested to the student that she should maintain a record of her prompts and the corresponding information provided by ChatGPT.

The student's feedback indicated that ChatGPT did provide information but in a superficial manner, lacking detailed anatomical insights. The information given often included redundant content.

In essence, the student considered ChatGPT a valuable supplementary tool for achieving learning objectives but not a replacement for textbooks and lecture notes. Additionally, the student expressed concerns about the ethical implications, reliability of information from ChatGPT, and the absence of proper references.

Given the highly specialised nature of the task, focusing on tooth morphology and its variations, the student discovered that ChatGPT fell short in delivering the necessary information to meet the learning objectives. The recommended textbooks and lecture notes, on the other hand, contained more comprehensive and detailed information regarding the subject matter.

**Observations:**

The student had no prior experience using ChatGPT and felt that a tutorial or workshop would be beneficial.

Following some assistance, the student found that ChatGPT could tailor the answer according to their specific needs. It provided information in an easy-to-read manner and language, yet still lacked the depth required for this level of study.

**Integration:**

ChatGPT proved a great tool to the student as a study aid. Its ability to simplify and summarise complex blocks of text is highly beneficial, speeding up the study process.

## *Neuroanatomy*

### Module:

The project pairing from Neuroanatomy focused a number of related modules concerning neuroscience and the nervous system.

### Learning Outcomes:

A learning outcome common across these modules was:

- *Identify key anatomy components that should be described. Cranial nerves, attachment point, function, innervation, branches, modality, cranial nerve nuclei, lesions.*

### Current Assessment Design:

A combination of graded **formative assessment**, the form of an in-class test, **authentic assessment** in the form of a practical examination, and **summative assessment**, in the form if a written examination.

### Associated Risk of GenAI:

The risk of academic misconduct through the use of GenAI is relatively low in Neuroanatomy, given the hands-on nature of much of the assessment.

**Mitigation:**

The risk of GenAI in **authentic assessments,** such as the practical examination mentioned above, is almost non-existent. Examining students on the practical, real work applications of their leaning is an excellent way to bypass the risk of academic misconduct through the use of GenAI.

### Integration:

The lecturer created two new learning objectives to integrate the use of ChatGPT. The full list of learning outcomes is as follows:

- *Identify key anatomy components that should be described. Cranial nerves, attachment point, function, innervation, branches, modality, cranial nerve nuclei, lesions.*
- *How should prompts to ChatGPT be formulated to get this level of detail*
- *Comment on the ability and usefulness of ChatGPT as a study aid.*

The lecturer tasked the students with developing prompts for ChatGPT that would produce a detailed and comprehensive summary on the cranial nerves. This exercise allowed the student to work with ChatGPT as a study-buddy. They were required to conduct traditional research that contributed to their informed and detail prompts for ChatGPT, which in turn produced a detailed response from the software, matching the level and standard of their traditional research.

Further to this, the student found that ChatGPT can be used to generate a detailed study schedule based on the content that needs to be covered in the time available before an exam.

They also found that it can generate sample examination questions and answers to aid in a student's study.

Also, the student found ChatGPT very helpful in explaining and summarising complicated topics in simpler terms.


Image created using DALL-E 3. Prompt: “AI algorithm image on a student’s laptop computer”

# Part Three

## Practice Examples – Integration of GenAI into Learning Activities

Incorporating GenAI software, such as ChatGPT, into higher education must be guided by a commitment to enhancing the learning experience, improving efficiency, and upholding ethical standards.

A thoughtful and transparent approach, with ongoing monitoring and evaluation, is essential to ensure that the integration of GenAI benefits all stakeholders while safeguarding ethical
Through this research project we have encountered numerous ways that GenAI can be integrated ethically in higher education settings, alongside appropriate training (critical engagement) and acknowledgement of use.

### Using ChatGPT produced answers as templates

As was noted in several of the project case studies, GenAI software is capable of producing essay-style answers of a reasonable standard.

However, a common thread across the case studies, was that these answers lack any real depth or critical engagement with course content.

While these AI generated answers lacked critical engagement, their overall structure was deemed acceptable, and therefore could serve as a template or exemplar for students (on structure, flow of writing, clarity of language, grammar, etc.) as they begin their work on a particular assignment.

### ChatGPT as integral part of the assessment design

In one of our case studies, Philosophy from CACSSS, the lecturer decided to fully integrate the use of ChatGPT into their assessment design, making its use a requirement for the assignment task.

Positioning ChatGPT front and centre in the assessment design acted to prevent or discourage the use of GenAI in an unethical way. This also provided students with a guided introduction to the technology, enabling them to learn best practice in using GenAI technology.

Students were specifically told to include screenshots and transcripts of their interaction with ChatGPT, as well as providing a rationale for the prompts that they used with respect to the issues and texts discussed throughout the module.

## Task students with identifying gaps in ChatGPT responses, based on analysis of evidence-base and reflective practice

Several of our staff-student pairings noted that using content produced by ChatGPT in a compare-and-contrast type exercise proved useful. Comparing ChatGPT outputs on a given topic with their own ideas/research on that topic generally lead to either:

- New points raised that they hadn't considered and could now explore further
- Discovery of the limitations of ChatGPT when compared with their own work

With this in mind, students can be asked to compare their own work with outputs from GenAI software and reflect on and critically analyse these. This can help develop students' understanding of how these tools work and encourage them to engage with them critically.

## Make students aware of the downsides of GenAI

It is widely acknowledged that GenAI, and software like ChatGPT, is highly proficient at writing code. However, the Computer Science students working on this research project found that while ChatGPT is indeed capable of producing code to a decent standard, it has its limitations.

They found that code generated through ChatGPT does not adhere to best practice in a number of ways. The most pressing of these is the code's robustness from a security perspective. ChatGPT tends to give the simplest, and most straightforward answer to prompts, which potentially could leave the code produced open to hacking and other forms of cyber-attacks.

Also, code produced by ChatGPT lacks maintainability. Maintainability refers to the practice of organisation-wide coordination on coding, that allows multiple software engineers to work on a single project because of consistency in formatting, functioning, and coding methods. Code produced by ChatGPT tends not to be consistent in these terms, even when appropriately prompted.

Students who rely on code produced by ChatGPT, that is sometimes suboptimal and ignores best practices, will not learn the necessary foundations to program effectively as they continue through their studies and move into the professional world. For this reason, it is vital that students are aware of the downsides of GenAI from an early stage.

This principal can be applied across the disciplines. As was noted previously, while ChatGPT can produce essays to a certain standard, they lack depth and proper engagement with subject matter. Highlighting this to students, making them fully aware of the superficiality of ChatGPT's answers and the need for rigorous critical engagement, is vital.

## ChatGPT as a study aid

ChatGPT can be used as a study aid in a number of ways:

- ChatGPT can be utilised in the same way a student might use a search engine or other such online resource. A student can engage ChatGPT in a conversation, helping them to clarify concepts. As is the case with any research or study aid, a student's capacity to critically engage with and analyse these outputs is vital.
- ChatGPT can also be used to brainstorm ideas for research projects or essays, but again, students must ensure the content generated is reputable and legitimate.
- Literature Review: GenAI can assist researchers by summarising and highlighting key information in academic papers. For example, a student can input a block of text from a journal, from which ChatGPT can pull the key points and present them in simple bullet points.
- Data Analysis: ChatGPT can help process and analyse research data, generating visualisations and insights that aid in research projects.
- Grammar and Proofreading: Depending on the requirements of the course or module, ChatGPT can be used to help identify grammatical and punctuation errors in a student's writing.

## Accessibility

More research is required into the impact GenAI can have in terms of accessibility and access to higher education for students with learning difficulties.

Some preliminary examples:

- Text-to-Speech and Speech-to-Text: GenAI can be integrated with accessibility tools to assist students with visual or hearing impairments.
- Language Translation: GenAI can help break language barriers by offering translation services for international students. It should not be used for this purpose to bypass learning in a language course where the students' ability to speak/write the language is being evaluated.

## Challenge ChatGPT

A student could be tasked with challenging ChatGPT to deliver answers of a certain standard.

In the case study from Neuroanatomy, the lecturer tasked the students with developing prompts for ChatGPT that would produce a detailed and comprehensive summary of a given topic.

The students were required to conduct traditional research, which would then inform their detailed prompts to ChatGPT, which in turn produced a detailed response from the software, matching the level and standard of their traditional research.

This act of challenging ChatGPT does not undermine intended learning outcomes, as the student has already completed the necessary research.

Also, this serves as a good example of developing a student's AI literacy, woven into traditional teaching and learning.

## Additional Resources

- Ireland's National Academic Integrity Network (NAIN) Generative Artificial Intelligence (GenAI) Guidelines for Educators (includes guidance on what everyone should know, what students should know, what educators should know and what programme managers and institutional leaders should know)

- European Network for Academic Integrity (ENAI) Recommendations on the ethical use of Artificial Intelligence in Education

- Russell Group principles on the use of generative AI tools in education (supporting students and staff to become AI-literate, incorporating ethical use of tools).

- Jisc (national centre for AI, UK) Generative AI Primer

- Australian Academic Integrity Network Generative Artificial Intelligence Guidelines

- University of Sydney Canvas resource site for students AI in Education (guidance on what GenAI is and how to use it responsibly)

- TEQSA Assessment reform in the age of artificial intelligence guidance

- UNESCO Guidance for generative AI in education and research

- CIRTL Short Guide: Assessment in the Age of AI

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