



UNIVERSITY
OF
JOHANNESBURG



AI

STAFF GUIDE:

GENERATIVE ARTIFICIAL INTELLIGENCE IN TEACHING, LEARNING AND RESEARCH

INTRODUCTION

Rapid developments in generative artificial intelligence (AI)¹ technologies have led to an explosion of AI generators of text, code, images, and voice, of which ChatGPT is one example.² AI generators can, with varying degrees of effectiveness, generate answers to a question, produce text and content-based responses based on prompts, write code, or design objects. This is possible because these generators are based on Large Language Models (LLMs) which autonomously ‘learn’ through processing large datasets, refining connections and evolving through the sophistication of input data as well as prompts.

Because this means that generative AI can be used to respond to assignments or produce material for research and other academic publications, it is important that we keep pace with the developments of these new tools, harnessing them to improve the quality and depth of teaching, learning and research. Taking advantage of exciting opportunities to try out new tools and activities should be accompanied by careful consideration of current and future ethical, social and educational limitations to the use of generative AI.

¹ For basic explanations of what AI is – as well as machine learning, generative AI, and large language models – see [UNESCO’s recent quick start guide](#) (Sabzalieva & Valentini 2023), Mills (2023a) and Riedl (2023). UJ also offers a free course on AI in the Fourth Industrial Revolution – see free online courses via uLink.

² Other generative AI tools currently available include Bing’s Chat, Google’s Bard, Anthropic’s Claude, Alpha Code, DALLÉ-2, CoPilot, and MidJourney.

DEFINING AI

Artificial intelligence involves the development and capacitation of machines to perform complex tasks usually associated with human intellectual endeavour. A famous example is the defeat of world chess champion Gary Kasparov in 1997, by the IBM supercomputer Deep Blue. Through refining the program's parameters and feeding in large amounts of game-play data, the team behind Deep Blue was able to create a computer capable of out-processing the skill level of a chess master.

Contemporary AI furthers this early foundation. Machines, software and platforms exist that are able to correctly analyse, process, calculate and represent information, sometimes with greater accuracy than humans. The advent of 'Big Data' in the last two decades has increased the demand for more complex forms of AI, while also creating new challenges for higher education, the labour market, and societies.



LARGE LANGUAGE MODELS AND ChatGPT

ChatGPT is perhaps the most widely known generative AI platform at the moment. It is an AI generator based on what is called a 'large language model', which combines deep-learning algorithms with large data-sets to transform clusters of information into contextually and factually specific answers. This is based on human neural networks and the way that humans process, sequence, and transform information into knowledge.

The more the AI generator 'learns' from the grammatical rules, writing conventions, and thematic relationships embedded in the data, the better it gets at predicting the correct arrangement and combination of ideas required by the prompt. Both staff and students need to develop literacy in the use of generative AI tools in order to maximise the benefit and relevance of its responses. In the following prompt example, informed by Liu (2023), at least four components are required to strengthen the relevance of what ChatGPT can generate.

Role

Write as a Masters-level African Studies lecturer.

Task

Develop five essay questions for an MA semester course on diplomatic relations between sub-Saharan African countries and China since 2005.

Requirements

The essay response should be between 4000-5000 words. It should use the theoretical work of (x) and (y). At least two case study countries should be discussed.

Instructions

Produce two exemplar responses for each essay question with bullet-point feedback after the conclusion.





Upon receiving generated content in response to the prompt above, further possibilities are possible, such as asking the chatbot to provide further information, refine an exemplar, or produce a marking rubric based on the exemplars and a set of parameters identified by the user.

The example also demonstrates the time-saving possibilities evident in using ChatGPT as a teaching and assessment assistant. A notable trend in current generative AI usage in higher education, is the use of ChatGPT to produce template questions and quizzes that educators can further tailor to the course content, mode of assessment, and class features. However, users of this function must note the limitations of current generative AI, such as a lack of contextual nuance as well as factual inaccuracies, which require autonomous fact-checking and critical evaluation of generated content.

It also important to keep in mind that generative AI tools are only as valid as the information and data they are based on. Cases of gender or racial bias are not uncommon. In-built validation and filtering for bias is not part of current AI generators. It is likely that this may shift in future because these tools are constantly changing, so it is important to remain updated about changes to the tools being used at the University and the policies covering their appropriate usage.

This guide provides examples, activities and ideas for successfully navigating the use of generative AI in your teaching and assessment, as well as considerations for conducting research. More detail as well as an additional list of resources can be found in the Practice Note on Generative AI.



USING GENERATIVE AI TO ENHANCE TEACHING AND LEARNING

Because of the exponential growth of AI and machine learning technologies, a wealth of experimental work by academics and higher education leaders can be found on various institutional and special interest sites, alongside regular journal and other academic publications. This is important to note because these articles and quick guides are representative of the need for rapid responses in adapting to generative AI, and keeping abreast of how system updates affect existing institutional policies and practices. The resource list for this guide as well as the Practice Note is proof of the wider variety of sources available for insight into using generative AI, including crowd-sourced online collections of pedagogic and assessment strategies, shared by staff and students based on their experiences of using generative AI in institutions and faculties around the world³.

³ See <https://creativehecommunity.wordpress.com/2023/02/02/creating-a-collection-of-101-creative-ideas-to-use-ai-in-education/> for an example of this.

Communication, collaboration, and critical AI literacy

A key concern in current scholarship is that the use of generative AI may undermine the development of critical thinking, writing and comprehension skills in students. This is coupled with fears around academic integrity and plagiarism. These issues should be front of mind when considering when, how and under what conditions generative AI best supports and enhances the learning experience.

Appropriate use of generative AI should apply the following parameters:

1.

Clear **communication** of the institutional/ departmental/ course regulations on the use of generative AI, including referencing generated content, developing proficiency in prompt generation, and harnessing the benefits of generative AI for summarising and explaining complex ideas and theories in relevant ways.

2.

Using generative AI to expand opportunities for **collaboration**. This includes creating a supportive culture for shared exploration of generative AI tools, where staff and students learn from and with each other, as well as shifting towards teaching and assessment strategies that focus on depth, creativity and problem-solving over recall.

3.

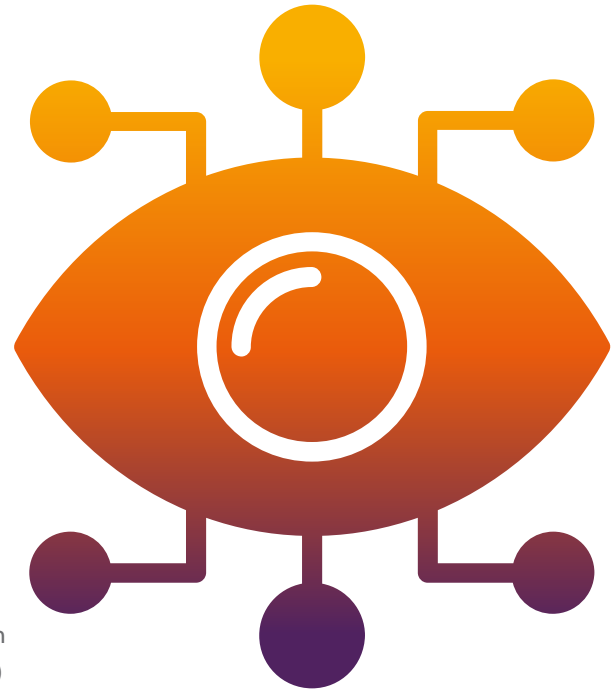
Building on a foundation of **critical AI literacy**. It is essential for staff to develop a well-rounded understanding of the generative AI tools available, especially to support the development of AI literacy in students. This includes making students aware of the limitations of these AI tools, developing activities that require students to evaluate and critique generated content, and ensuring robust coverage of ethical, professional and social issues emerging from the use of AI within and across disciplines.

Best practices from fellow institutions in SA, as well as leading global universities, point to the value of ‘AI orientation’ as part of student on-boarding alongside dedicated review and discussion of generative AI tools in course outlines and introduction, writing workshops, assessments and practical activities. This orientation should cover at least three dimensions: 1) AI literacy; 2) AI ethics; and 3) AI skills. Students should be required to use library and information systems support services as part of becoming familiar with the AI tools and services available at the institution.

The table below presents Tangen’s (2023) suggestions for using generative AI as an effective teaching tool. Tangen (2023) emphasises that ‘the human touch’ in the educational encounter cannot be easily replicated by generative AI, and that the suggestions below be accompanied by informed and critical engagement with AI tools.

Generative AI use

Syllabus generation	ChatGPT saves time in developing high-quality, structured syllabi through clear and detailed prompts. This saves time and allows lecturers to focus on tailoring the syllabus through contextual resources or practical activities.
AI-proof assessments	Emphasising application, synthesis and analysis of what is learned; continuous assessments such as pop quizzes and exit polls, as well as debates or oral viva exams.
Aligning learning objectives	Lecturers can use ChatGPT to define core learning objectives and align these to specific activities and outcomes, creating greater coherence in programme design.
Developing rubrics	Generative AI can be used to develop assessment rubrics that effectively articulate performance criteria, weighting, key outcomes and achievement level.
Class activities	‘flipping’ the classroom so students prepare with AI assistance before class, which is more interactive; using ChatGPT to develop interesting learning resources and activities, such as class debate topics, presentations and games based on course content
AI tutor	Students can ask for explanations, clarify concepts, and have Socratic conversations with AI chatbots; allows for personalised learning and feedback, including addressing knowledge gaps
Quiz creation	Continuous assessment is a time-consuming task that can be eased through generative AI, which can develop tailored quizzes, polls and multiple choice tests to check students’ progress in meeting course objectives.
Tailored feedback	ChatGPT can be used to convert feedback notes for assessments into detailed feedback reports based on assessment brief and marking rubric.



It is vital to balance the use of generative AI as an educational tool with awareness of its drawbacks and limitations. While LLM-based chatbots such as ChatGPT can be effective in personalising tutoring, the challenge of unverified and factually inaccurate information requires careful handling if students are to be encouraged to work with an AI tutor as part of their learning programme. Mollick (2023) provides further discussion on how to use AI effectively for tutoring and other teaching and learning support functions. Critical to this process is lecturers modelling the use of generative AI in each of these functions, showing where misinformation creeps in or the chatbot lapses into hallucination⁴ in the process of responding to successive prompts.

Staff and students should also be careful not to share personal information with chatbots, and using ChatGPT to mark written and reflective essays runs the real risk of private information being released into the LLM. The potential shortcuts offered by generative AI may have future repercussions for the intellectual property and confidentiality policies of universities, as well as set limits on what staff and students can share with institutionally-linked AI tools.

⁴ Generative AI such as ChatGPT is known to 'hallucinate' – authoritatively presenting false information as fact, in response to prompts

ASSESSMENT

Generative AI can be seen as an opportunity or a threat to the established modes of teaching, learning and assessment at universities, but its place can be clarified based on a number of core factors.

1.

What is the purpose of assessment in the course? What is being assessed and why is it important?

2.

How can learning be assessed in the context of generative AI proliferation?

3.

What are the implications for existing policies on assessment, academic integrity, plagiarism and ethics?

Some examples of 'AI-proof' assessments include:

- Empirical research reports
- Reflective assignments blending theory and experience
- Creative work, e.g. performance, art installations
- Portfolio-based assessments based on work developed over time
- Oral exams, debates, speeches
- Video and photography assessments
- Content analysis

Other useful assessment strategies include experiential learning, community or expert feedback (especially in health sciences and related social service fields), and pomodoro-style writing sessions. Traditional written exams may not be totally done away with, but the COVID-19 experience has shown that a broader selection of assessment modalities is a necessary component of effective teaching and learning, and that combining these modalities in interesting ways can support the diverse ways that students learn. The spectrum below provides some indication of how assessment difficulty can be pitched in the context of generative AI use (adapted from UCT-CILT, 2023b).

MCQs and
short written
submissions

Scaffolded
completion/
portfolio

Reflective and
contextual
responses

Projects fusing
theory with
practice or
research

Viva voce, panel
presentations,
oral Q&A

Troubleshooting: Plagiarism and academic integrity

While tools like Turnitin are developing AI-responsive plagiarism detection, concerns about plagiarism and academic integrity remain given that AI capability is rapidly outpacing existing detection functionality.

Process should become an integral part of evaluating student progress, through, for example:

- Requiring draft or written note submission prior to final hand-in, or working in track changes
- Second-source validation when using generated content (e.g. finding the correct reference for a data point; looking up scholarly inputs to validate generated claims)
- Declaring the use of generative AI tools and for what purpose; this may also include sharing the 'prompt tree' or sequence of prompts used by the student.
- Peer evaluations of contribution to group assignments alongside assignment grading

It is also necessary to consider issues of data privacy in how assessment data is managed and processed. While it is true that generative AI can improve feedback to students, as well as analyse performance data, care must be taken not to process sensitive information through AI tools at the risk of data leakage and loss of control over written work, which may fall under institutional intellectual property. The same is true for running early drafts of scientific publications through generative AI tools for the purposes of style improvement or translation.




Plagiarism declarations

The format of plagiarism declarations will also require adaptation in terms of outlining appropriate use of generative AI, recognition of risks and penalties incurred through the use of generative AI tools, and institutional and departmental policy on referencing, annotating and verifying generated content.

RESEARCH

AI tools can enhance research capacity by reducing the administrative burden and speeding up key processes such as instrument development and calculating sample population features and size. Their use in research requires critical shifts in institutional and professional ethical standards, given the increased risk of data leakage, intellectual property violation, and privacy breaches.

Some uses for generative AI in research include:

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- Bibliometric analysis of a particular scope of literature
 - Distilling trends, summarising collections of scientific articles
 - Data simulations
 - Troubleshooting research design and data analysis models
 - Data visualisation
 - Qualitative data analysis

Dedicated AI research assistants are also emerging – one example is [Elicit](#).

ACKNOWLEDGING THE USE OF AI RESOURCES

Whilst there are no conventions as yet for referencing, there is a suggested approach from the [University of Queensland, Australia](#). In brief, these are based on the APA guidelines for personal communication and correspondence as the content is generally not recoverable.

In-text references:

Author of generative AI model, Year of version used

Example: (OpenAI, 2022) or OpenAI (2022)

In the Reference list:

Author of AI model used. (Year of AI model used). *Name of AI model used* (Version of AI model used) [Type or description of AI model used]. Web address of AI model used

Example: OpenAI. (2022). *ChatGPT* (Dec 20 version) [Large language model]. <https://chat.openai.com/>

Note that the complete transcript of the response obtained to a prompt can be included as an appendix.

Always indicate where you have used generative AI resources and to what extent. Use the **plagiarism declaration** as a checklist to ensure that your work meets the necessary standards for **academic integrity**.

ADDITIONAL RESOURCES:

Crowdsourced collection: Creative Ideas to use AI in Education

Liu, D. 2023. Prompt engineering for educators – making generative AI work for you. Teaching@Sydney blog, University of Sydney. Accessed at: <https://educational-innovation.sydney.edu.au/teaching@sydney/prompt-engineering-for-educators-making-generative-ai-work-for-you/>

Lodge, JM, Howard, S & Broadbent, J. 2023. Assessment redesign for generative AI: A taxonomy of options and their viability. LinkedIn Pulse, 1 May 2023. Accessed at: <https://www.linkedin.com/pulse/assessment-redesign-generative-ai-taxonomy-options-viability-lodge/>

Mollick, E. 2023. Assigning AI: Seven Ways of Using AI in Class. OneUsefulThing blog, 12 June 2023. Accessed at: <https://www.oneusefulthing.org/p/assigning-ai-seven-ways-of-using>

North-West University: Implications of AI for Teaching & Learning in Higher Education and Guidelines for the Utilisation of AI in Teaching and Learning at NWU [pdf]

Queen's University Belfast: Guidance on the use of AI in Assessments 2022-23 [pdf]

Tangen, J. 2023. *Academic AI: A collection of tools and prompts for higher education*. Accessed at: https://www.psy.uq.edu.au/~uqjtange/academic_ai/

UCLA AI tools and resources – Google Document

UCT-CILT. (2023b). Artificial Intelligence for Teaching & Learning. Accessed at: <https://cilt.uct.ac.za/teaching-resources/artificial-intelligence-teaching-learning>

Utah Tech University. 2023. 'Generative AI tools: Guidelines for teaching and learning'. UTU-Centre for Teaching and Learning. Accessed at: <https://ctl.utahtech.edu/aitools/>

