



FACT²
Faculty Advisory Council
on Teaching & Technology

FACT² Guide to Optimizing AI in Higher Education

Submitted by the FACT² Task Group on Optimizing Artificial
Intelligence in Higher Education to the Faculty Council on
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To the Reader

The Faculty Advisory Council On Teaching and Technology (FACT2) charged a Task Group in May 2023 to research and explore how artificial intelligence (AI) can be optimized for teaching and learning. The committee received over 50 volunteers from 11 SUNY campuses, SUNY Online, and SUNY Administration. Faculty and staff from Southeastern University, University of Louisiana system, University of New Orleans, and Northwestern University also joined the committee to share their work in this area to enrich our efforts.

The committee's first goal was to produce a preliminary report for faculty and instructional support specialists. This report explores the potential benefits and challenges associated with AI-based technologies and serves as a guide to add insight and value to those who read it. The task group will continue to add content and updated information to the report. They will also focus on faculty training and professional development to provide resources to help faculty engage their students with AI in a constructive way and more. We are still in the early stages of our work, cautiously excited about the potential of AI to transform higher education.

We know we are aiming at a moving target, yet we hope to provide you with insight, practical knowledge, and resources about AI. The authors are your colleagues: faculty, instructional specialists, directors, and administrators who are deeply concerned about AI. We're seeking affirmative ways that we can adapt, adopt and share resources, experiences and strategies. This is dedicated to the spirit of collegiality in our community. We will continue to explore and share our efforts as the mission of this task group has just begun.

We'd like to hear about your experiences with products, strategies, assignments, and case studies that can be shared. Our future efforts will include a spring 2024 symposium and a presentation at the 2024 CIT Conference.

Task Group Co-chairs:

Billie Francini, SUNY Albany, and Jeffrey Riman SUNY FIT

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Thank you!

The task group is grateful for the contributions of their members and would like to express deep thanks to the subcommittee co-chairs for their leadership and dedication that made this document possible. A complete list of all contributors can be found in the appendix on page 49.

Definitions Subcommittee:

Lynn Aaron, SUNY Rockland Community College, and Meghanne Freivald, Alfred University

Pedagogy Subcommittee:

Stephanie Pritchard, SUNY Oswego, and Keith Landa, SUNY Purchase

Tools Subcommittee:

Jamie Heron, SUNY Online, and Shamika Mitchell, SUNY Rockland Community College

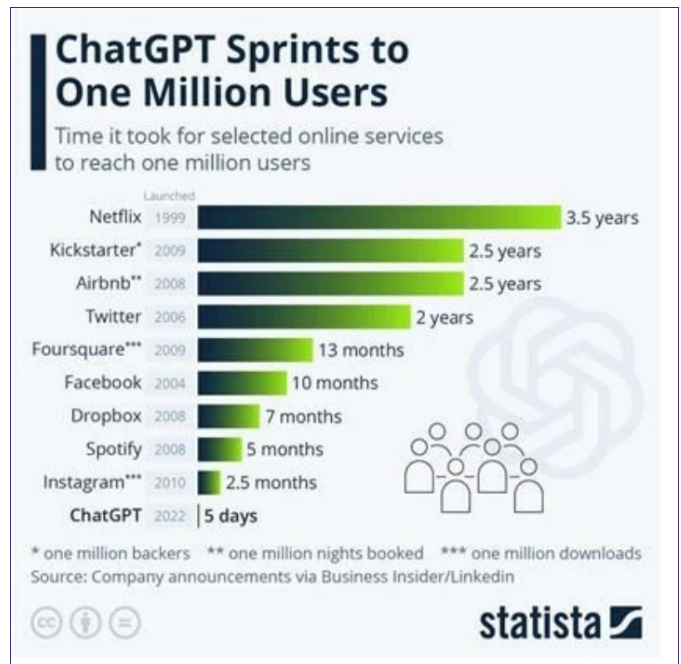
Editors:

Bridget Almas, SUNY System Administration; Dana Gavin, Dutchess Community College; Billie Francini, SUNY Albany; Jeffrey Riman, SUNY FIT

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Overview

Artificial intelligence (AI), generally thought of as using computers to accomplish tasks requiring human intelligence, is not a new concept. However, generative AI, a type of AI system that can generate text, images, or other media in response to prompts, has suddenly become an omnipresent part of the academic scene. In the form of ChatGPT and others, generative AI hit campuses with a bang that could be heard around academia in late 2022. The chart seen here shows the record-breaking speed with which ChatGPT came into popular use (Hawley, 2023): over the last several months, the academic community has watched and participated in the rapid progression and adoption of AI tools.



AI Capabilities

AI capabilities involve the recognition of patterns in a set of data, which is processed by algorithms. These patterns can then be used to make predictions or create content. Many of us have interacted with AI through the use of Siri, Alexa, and recommendations from Netflix and other services (Calhoun, 2023). Our behavior online (and the data we provide through clicks and views) allows certain sites and applications to customize our experience, including the ads we see. A great deal of attention is being paid to generative AI, such as ChatGPT and similar tools. It uses conversational prompts (provided by users) to generate text-based information. It is important to note that ChatGPT and other Large Language Models (LLMs) do not engage in any actual “thinking.” Rather, they are trained on large databases of information and have the ability to recognize patterns and to predict text (Shankland, 2023).

Likewise, LLMs are not capable of *intent*. Human communication relies upon our ability to interpret language as inherently conveying meaning and intent. But generative AI communication does not include intent on the part of the language model. As tools built on LLMs become increasingly fluent in using language to communicate, it becomes more difficult for human users of AI to remain aware that the interlocutor at the other

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end is just a machine that has been trained to predict the most likely words to use, and that any intent we assign to those communications is solely our own (Bender et al., 2021).

AI in Society: Ethical and Legal Issues

AI began to affect society and the employment landscape prior to the introduction of ChatGPT. Customer service chatbots and self-checkout have become commonplace. Some jobs, particularly in the customer service and manufacturing sectors, have been replaced by AI. Many resources, articles, and subject matter experts assert that AI is a powerful tool that is not a passing fad. Generative AI will continue to impact employment and the economy. Experts suggest that AI will continue to take on specific tasks, but it will not fully take the place of workers (Hawley, 2023). There are many concerns that AI will replace human work and interaction. While AI can perform some tasks well, it is not perfect and cannot replace the human-to-human experience required by fields such as teaching and nursing.

Although AI may be used to replace task-based, entry-level jobs, new jobs will likely be created to design and manage it. Individuals and businesses must plan for the growth of AI and anticipate the ways in which they will be affected (Marr, 2023). From a higher education standpoint, this creates an opportunity to re-evaluate educational pathways in order to prepare students for a world in which AI is prevalent (Abdous, 2023). How can we prepare students to use AI effectively, and to have the skills required to work with and manage AI at a higher level?

Artificial intelligence has been used in one way or another in education for years. For example, search engines, personal assistants on phones, assistive technology to increase accessibility, and other technology all use some form of applied artificial intelligence. However, the recent widespread availability of generative Artificial Intelligence tools across higher education gives rise to ethical concerns for teaching and learning, research, and instructional delivery. Implicit bias and representation (Chopra, 2023), equitable access to AI technologies (Zeide, 2019), AI literacy education (Calhoun, 2023), copyright and fair use issues (De Vynck, 2023), academic integrity, authenticity and fraud (Weiser & Schweber, 2023; Knight, 2022), environmental concerns (Ludvigsen, 2023; DeGeurin, 2023), and ensured development of students' cognitive abilities (UNESCO, 2022) all represent ethical challenges for higher education as AI integrates further into the curriculum, the classroom, and our work and personal lives.

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Data sets play a critical role in machine learning and are necessary for any AI that uses an Artificial Neural Network (including what runs ChatGPT) to be trained. The characteristics of these sets can critically mold the AI's behavior. As such, it is vital to maintain transparency about these sets and to use sets that can promote ideals that we value, such as mitigating unwanted biases that may promote lack of representation, or other harms (Gebru, et al. 2022). Biases have already been identified in AI systems used in healthcare (Adamson & Avery, 2018; Estreich, 2019) as well as in auto-captioning (Tatman, 2017). The [EEOC](#), [DOJ](#), [CFPB](#), and the [FTC](#) issued a joint statement warning how the use of AI “has the potential to perpetuate unlawful bias, automate unlawful discrimination, and produce other harmful outcomes” (Chopra et al., 2023). The FTC is investigating Open AI's potential misuse of people's private information in training their language models and violation of consumer protection laws (Zakrzewski, 2023). Industry leader Sam Altman, CEO of OpenAI (the developers of ChatGPT), recently testified at a Senate hearing on artificial intelligence expressing both concerns and hopes for AI. He warned about the need to be alert regarding the 2024 elections, and he suggested several categories for our attention, including privacy, child safety, accuracy, cybersecurity, disinformation and economic impacts ([Altman 2023](#)).

Furthermore, lawsuits have been filed alleging everything from violation of copyrights to data privacy to fair use issues (De Vynck, 2023). In addition to these legal challenges, labor concerns factor into this conversation as low-wage, uncontracted workers and labor from the global South have been used to train AI away from violent and disturbing content (Perrigo, 2023). Because AI is transforming labor and the economy through automation, higher education must respond to AI's potential to displace workers in many industries by fostering in our students the unique attributes and capabilities that humans bring to the labor market (Aoun, 2017).

Environmental factors add to the list of ethical concerns, especially in terms of energy and water consumption. For instance, ChatGPT uses as much electricity as 175,000 people (Ludvigsen, 2023) and the ChatGPT engine (GPT3) used 185,000 gallons (700,000 liters) of water to train. Each use of ChatGPT uses roughly a one-liter bottle of water (DeGeurin, 2023). In November 2022, New York became the first state to enact a temporary ban on crypto mining permits at fossil fuel plants (Ferré-Sadurní & Ashford, 2022). The New York state legislature is attempting to lead the way on addressing the environmental costs of new technologies, and academia must be cognizant of the environmental costs of generative AI.

Pros and Cons in Higher Education

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There are many pros and cons related to generative AI, and both must be weighed as we move forward with policy development. Given the magnitude and variable nature of AI, there will not likely be a one-size-fits-all solution to the application and adaptation of generative AI in higher education instruction (Piscia et al., 2023). However, there are still many important points to consider concerning generative AI.

It seems impossible and inadvisable to not consider the interoperability of ethics and equity across domains of higher education (Currie, 2023; Hutson et al., 2022; Nguyen et al., 2023). One cannot underestimate the significance of privacy, security, safety, surveillance, or accountability whatsoever. The integration of AI into medicine and healthcare, financial systems, security systems, and smart city technologies represent very real-world situations in which machine malfunction or bad actors can result in loss of life, access to essential services, or loss of resources (Ayling & Chapman, 2022; Currie, 2023). However, many of the challenges surrounding higher education involve barriers to equitable access to higher education and educational services and resources. Therefore, any way in which AI may undermine equity should be treated as a significant ethical concern. It is worth noting, however, that AI also has the potential to improve or enhance accessibility and inclusivity (Çerasi & Balcioğlu, 2023). AI also has the potential to enhance teaching and learning (du Boulay, 2022; Perkins, 2023; Sabzalieva & Valentini, 2023; Sullivan et al., 2023) in ways that can improve or increase equity, which suggests that perhaps higher education has an obligation to integrate AI into its operations as much from an equity and ethics perspective as it does an experiential learning/workforce development or industry obligation to adequately prepare its students for real world work.

In considering the ethics of AI in higher education, it may be most useful to approach this situation through different stakeholder groups, namely students, instructors, and the institutions themselves (du Boulay, 2022; Holmes et al., 2023; Irfan et al. 2023; Miron et al., 2023; Ungerer & Slade, 2022), as well as through external groups such as industry collaborators and the communities in which those institutions operate. Within the institution, as noted above, AI has the potential to affect non-academic elements which cannot be ignored. Furthermore, the impact on the educational elements can vary in terms of programs, disciplines, and modalities, such as in-person instruction versus distance-based education (Holmes et al., 2023). Some researchers have expressed concern around how AI may or can compromise the autonomy of both students and instructors (du Boulay, 2022).

What does this all mean for educators? If we are to believe the experts as well as our own recent experiences, many issues need to be addressed. The current version of artificial intelligence seems to be just the beginning. The emergence of AI has been

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described as the dawn of a new era, a virtual big bang if you will. That is the world for which our students need to be prepared.

It is important to acknowledge and consider the positive aspects of the learner's experience regarding the use of generative AI in higher education. In many cases, generative AI may improve the experiences of our students both in the classroom and in their assigned work by introducing new methods of teaching and assessment (Piscia et al., 2023). As learners experience these tools in the classroom, students are learning and strengthening skills for their future endeavors and new realities within the classroom and in the workforce.

The inclusion of current and up-and-coming technology is imperative in education in the same way it drives progress and change in society. Fluency with generative AI tools will increase digital literacy and technology application for learners (Piscia et al., 2023). Additionally, students may be drawn to the inclusion of this tool in instruction, increasing the sense of relevancy of classwork and participation for students (Piscia et al., 2023).

The application of generative AI by instructors can also strengthen instruction, personalize learning opportunities, increase adaptability of instruction and learning, and strengthen accessibility for all learners (Piscia et al., 2023 and Shonubi, 2023). Each of these opportunities together increases inclusion in the classroom for all learners. AI tools can also be applied to the creation and/or modification of instructional objectives, pedagogy, and assignments and assessments.

Further, generative AI can be used to automate administrative tasks to improve workflows, decrease human transcription errors, and decrease processing times in many areas. Additionally, the application of generative AI in this way has the potential to decrease administrative costs and streamline administrative tasks (Parasuraman & Manzey, 2010, Piscia et al., 2023, and Shonubi, 2023). Generative AI has significant potential across a variety of higher education settings, instructional and learning environments in particular.

Additionally, institutions could be preparing students now for professions that are reduced or eliminated by generative AI presence in the workforce in the future. And the human aspect of interacting with generative AI must be not only considered, but studied as we move forward with this new tool at our disposal (Piscia et al., 2023 and Shonubi, 2023).

Congruently, it is imperative to consider the negative aspects of generative AI as well. The current lack of regulation and inconsistent accuracy of output are shortcomings that

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cannot be ignored. Generative AI is an evolving tool that needs to be carefully considered prior to its use.

In terms of academic integrity, educators will need to adapt teaching practices to ensure AI supports the learning process without reducing students' cognitive abilities and preserving their access to prerequisite skills and the social aspects of teacher-student and peer learning relationships (UNESCO, 2022). In addition to concerns about cheating and fraud, other ethical concerns for academic integrity include the reliability of AI to produce trustworthy and accurate results. For instance, ChatGPT has already been documented to fabricate information and to adamantly defend these fabrications (Knight, 2022). Often these cases are referred to as hallucinations, as the chatbot produces responses as though they are correct. Because ChatGPT produces approximately 4.5 billion words a day (Vincent, 2021), a steady flow of questionable information has the potential to degrade the quality of information available on the web. Celeste Kidd and Abeba Birhane (2023) argue that repeated exposure to AI (in daily life, like chat-bots and search engines, in addition to engaging deliberately with ChatGPT for example) conditions people to believe in the efficacy and "honesty" of AI. They contend that AI's method of using declarative statements without expressions, nuance, and caveat continues the process of convincing people to "trust" the AI. Use of unmonitored AI tools may result in a decline of critical thinking and may negatively impact content area learning, retention, writing development, creativity, and application (Miller, 2023).

Artificial Intelligence is rich in potential but cannot be counted on to be accurate or representative. Both of these are of concern for our students. We do not want students to believe and/or use misinformation, and we do not want the information presented to them to be based on misleading data. There's also a potential mental health concern that arises when dealing with chatbots. Chatbots have come closer to sounding as if they are human, which can have a psychological impact on students as they build relationships with bots that may not respond humanely and with the student's best interest in mind (D'Agostino, 2023). Despite these challenges for academic integrity and student learning, students will need to use these tools and educators have an obligation to instruct them on AI literacy, ethics, and awareness. Part of higher education's obligation in this regard is that we can include disciplines outside of the STEM fields to research and contribute to our knowledge on AI development and capabilities (UNESCO, 2022).

Interacting with generative AI tools may increase anxiety, addiction, social isolation, depression, and paranoia (Piscia et al., 2023). Although the studies of the impact of interacting with AI systems are in progress and shaping our understanding of the

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potential impacts of the tool on individuals and on society, a deeper, more complete understanding is yet to come and will develop in the coming years.

While it is critical to consider the ethical impact of AI like ChatGPT on academic integrity and academic dishonesty, there are other aspects of higher education that will be impacted that have ethical components. AI has been integrated into processes in human resources, financial aid, the student experience, diversity, equity, inclusion and belonging (DEIB), and institutional effectiveness. In many cases, AI integration in these domains is meant to enhance decision-making and assist in data analysis (du Boulay, 2022; Holmes et al., 2023; Naik et al., 2022; Nguyen et al., 2023). One must also consider the ethical impacts of integrating AI into educational platforms, like expert systems, intelligent tutors/agents, and personalized learning systems/environments (PLS/E), from teaching and learning perspectives (du Boulay, 2022; Hutson et al., 2022; Ungerer & Slade, 2022).

These applications necessitate that we consider how a variety of unsurfaced biases: — language bias, culture bias, implicit bias — can potentially affect the AI outputs we may obtain and utilize within these various departments (Ayling & Chapman, 2021; Hutson et al., 2022; Nguyen et al., 2023; Ungerer & Slade, 2022). Consequently, some of the previously mentioned concerns around data privacy and security, consent, accessibility, and labor and economy will be reflected in the microcosm of higher education (Irfan et al., 2023; Nguyen et al., 2023; Ungerer & Slade, 2022).

Information security is a crucial factor to consider when adopting generative AI tools (Piscia et al., 2023). It is important to evaluate the information required to use generative AI tools, the confidentiality of completed queries and potential for data hacking. Additionally, data sharing between the tool and private entities must also be evaluated.

Other potential cons related to generative AI concern the ethics of the tool itself and the role it might play in education settings. It is important to determine whether the application of generative AI is considered plagiarism or cheating, and what the requirements for modification of outputs and citation of the tool will be. Institutions will have to develop strong course policies to mitigate the potential for misuse (Piscia et al., 2023 and Shonubi, 2023).

Unfortunately, there is no correct answer, as we move forward considering the future of generative AI in higher education. However, it is important to consider the potential aspects of the tool, both positive and negative, as we work together to determine the policies to guide the tool application for students and professionals for years to come.

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AI Capabilities at the Institutional Level

AI has already begun having an impact on higher education. At an institutional level, AI can be used in admissions and marketing to identify and target potential students, enhance retention, and automate routine tasks. It can also be a powerful tool for student support and retention, through the use of early alerts which can identify students who require additional assistance (Abdous, 2023). Institutional student support capabilities include student guidance tasks involving course selection and scheduling, just-in-time financial aid assistance, and predictive analytics which help to identify at-risk students (Zeide, 2019). These tools can quickly analyze information and save time, ultimately benefiting institutions and students. However, as noted under the Ethical and Legal Issues section above, they may also introduce bias and their use is not without risks.

AI Capabilities for Students

Many institutions of higher education are scrambling to both mitigate challenges ChatGPT can bring, like plagiarism, while simultaneously trying to harness its capabilities for student learning. As ChatGPT has become widely available, it is clear that students have begun experimenting with it and similar tools. In a professional development presentation given in the spring of 2023 at SUNY Morrisville, Kira Brady and Laura Pierie did a presentation titled “What Does AI Look Like in Your Discipline? The Changing Landscape of Higher Education.” In the presentation, Kira identified markers of essays written by ChatGPT, and she also spoke to how lengthy the process can be to provide evidence that an essay was written by ChatGPT.

An opinion piece from the Chronicle of Higher Education provided this quote from a student, “I’m a student. You have no idea how much we are using ChatGPT. No professor or software could ever pick up on it.” The author concludes that institutions must teach students to use AI, as it is a tool which is helpful and readily available. The author also suggests that faculty incorporate assignments that truly assess and promote skill development, including those which incorporate the use of AI tools (Terry, 2023).

How can professors help students harness the power of ChatGPT and other AI tools? As an example, Laura Pierie from SUNY Morrisville has encouraged her students to use generative AI for writing resumes and cover letters in a professional writing class. Students completed a cover letter and resume without the help of AI, and then used ChatGPT. The class then discussed if they felt the changes helped their resume and cover letter, and why or why not. During this process, they were able to utilize their

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voice, employ scientific reasoning, and demonstrate their understanding of the technology. Uses of AI tools are going to continue to evolve and grow. When considering these uses, it's important also to remember the limitations of AI and LLMs and the associated risks.

AI Capabilities for Faculty

AI has the potential to support faculty during the teaching process. Simulated students can be created by AI language models. Faculty can seek real-time feedback from generative AI, as well as post-teaching feedback. AI can provide metrics on student participation and identify faculty-initiated questions which provoked the most engagement during class. Faculty may also use AI to remain updated in their fields and create curricula (Chen, 2023).

Generative AI tools, particularly ChatGPT, may be used to speed up time-consuming tasks that educators perform routinely, such as updating unit outlines, lesson plans, and drafting prompts for writing or discussion. Instructors can also generate materials such as assignment instructions, flash cards, posters, rubrics, and assessment materials (Finley, 2023).

The Learning Management System Brightspace offers an AI-based help tool, [Virtual Assistant](#), which can be integrated directly into its learning environment. This chat box tool allows users to type a question in the chat, and receive relevant documentation available in [Brightspace Community](#).

If educators understand the pros and cons of generative AI writ large and want to use generative AI in their classrooms, the following section gives practical applications for types of activities and their implementation in classrooms and for online classes.

Guide to Pedagogical Uses of AI

Introduction

AI is going to present teachers with incredible opportunities, but they will have to consider carefully how they are teaching and assessing students now that free platforms like ChatGPT are widely available. While AI can serve as a tool to help both teachers and students learn, it can *not* replace what is often the best part about higher education: the discussion, critical thinking, and mentorship that occurs in and out of a classroom. There is a history of tools that initially seemed threatening to education, but were later incorporated into instruction (e.g.,

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calculators, Wikipedia, etc), and faculty would be well-served by approaching generative AI in a similar manner ([Hicks, 2023](#)).

While there is still debate about the extent that generative AI will transform education ([Marcus, 2023](#); [NeJame, et al., 2023](#); [Office of Educational Technology, 2023](#)), faculty will need to encourage students to learn how to balance the information they get from AI with their own perspectives or creative expressions. Students will need to learn how to use these tools because they might be required to master them in their jobs when they graduate. However, it is important to stress that using artificial intelligence is not the same as thinking, which is why this technology should not control curriculum or content. Instead, faculty should set expectations and policies about the use of AI so students have clear guidance.

It's worth mentioning that AI tools can be incredibly helpful for faculty and staff - these changes don't just affect our students. We can use this technology to create examples, quizzes, sample essays, in-class activities, discussion questions, study guides, or other resources for students. AI can be used for plagiarism detection, research assistance, or help give feedback on student work. However, just because you can use it doesn't mean you always should. *The Guide to Identifying and Evaluating AI Tools for Higher Education* later in this document provides additional detail on some of the considerations to keep in mind when deciding if and when to use AI.

This chapter is divided into the following sections: how to help educators set expectations in their courses, how to include assessment and evaluation practices, how educators can use AI to promote learning and success, ways to incorporate AI literacy (and why that's important), and how AI tools can help educators .

Other institutions are exploring the impact of AI in education. One useful resource is Cornell University's [CU Committee Report: Generative Artificial Intelligence for Education and Pedagogy](#) which offers concrete examples of AI usage and policies.

Setting Expectations in Your Classes

It is essential to be transparent with students when it comes to using AI, including when the educator is using generative AI to draft educational materials. Faculty should choose carefully the extent to which they adopt AI in the coming year. For faculty who are uncertain about developing an AI policy for their courses, [Gannon \(2023\)](#) provides factors to consider as well as additional resources.

Setting clear guidelines will be essential to maintaining a fair and constructive learning environment. When faculty clearly define their expectations (at the beginning of the semester and as it progresses) students will begin to understand how to use AI tools responsibly, ethically, and appropriately. We should continually emphasize the value of critical thinking – to

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encourage our students to use AI as a resource instead of as a substitute for independent thought.

Below are some examples of syllabus statements that faculty might consider adopting in their classes.

Syllabus Statement Examples

Because this is such a rapidly developing situation, there are no standard, widely agreed upon “best practices” for addressing AI in our syllabi and class policies. However, general best pedagogical practices suggest that both the nature and the wording of policies should closely reflect instructors’ pedagogical values and align with other course policies (See, for example, [Gannon, 2023](#)). The subject matter, academic discipline, and content of a course will have a large impact on AI usage and policies.

Several teaching and learning centers have developed sample statements for faculty to adapt to their own contexts. For example, the University of Alberta’s Centre for Teaching and Learning has published [Statements of Expectations \(Syllabus\)](#), which gives an overview of writing a syllabus statement and examples of four different approaches: “AI Use Integrated into Course”; “Community of Learners Agreement AI Use”; “Instructor-Specified AI-Use”; and “No AI Use Allowed.”

Here are some more examples from university centers for teaching and learning:

Colorado State University, [What should a syllabus statement on AI look like?](#)
University of Minnesota, [ChatGPT Syllabus Statements](#)
Oregon State University, [AI Sample Syllabus Statements and Assignment Language](#)
Pennsylvania State University, [Syllabus Statements](#)
Texas A & M University, [Generative AI Syllabus Statement Considerations](#)
University of Vermont, [Examples of AI & ChatGPT Syllabi Statements](#)
Utah State University, [Teaching and AI Tools](#)

There are other sources of information about syllabus statements outside of teaching and learning centers as well. Instructional Designer Lance Eaton has developed “[Classroom Policies for AI Generative Tools](#)”, a crowd-sourced list of more than 40 syllabus statements from a variety of institutions and disciplines.

Boston University’s Faculty of Computing and Data Sciences provides a specific example of a program-level policy to guide students’ use of AI in [Using Generative AI in Coursework](#)

Finally, here is an example of a syllabus statement on AI usage from Jessamyn Neuhaus (SUNY Plattsburgh Professor of History and Director of the Center for Teaching Excellence) that fosters inclusivity, student growth mindset, and works to build rapport and trust with students:

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One of my favorite parts about teaching is helping students build their writing skills. Nobody will ever be more interested in your writing than I am! Writing clearly and effectively is necessary for your academic and professional success but it isn't easy to do. However, in over twenty years of teaching, I've found that every single student—with effort, practice, feedback, and support—can improve their writing. While AI tools can generate written statements and even whole assignments, I am here as an expert writer to help you develop the ability to express your own unique and individual ideas in written form. That's what your tuition dollars are paying for! As part of our co-created class values statement, I hope we will decide together to limit the use of ChatGPT and other AI in this class so everyone in our learning community will have the maximum opportunity to develop their writing voice. (2023)

Student Evaluation Practices and Assessment Strategies

AI is going to drastically change how faculty perceive assessment and grading ([Young, 2023](#)), requiring them to rethink learning outcomes, redesign assignments ([Stanford, 2023](#)), and also consider more progressive approaches to student learning instead of more traditional methods.

This statement from CJ Yeh (Fashion Institute of Technology Professor of Communication Design Foundation) and Christie Shin (Fashion Institute of Technology Associate Professor of Communication Design Foundation) describes some of the changes that will need to be made within the field of design education:

We will need a greater focus on interdisciplinary collaboration. In order to solve the increasingly complex problems that contemporary society is facing today, it is critical for aspiring designers to learn how to collaborate effectively with developers, engineers, and other stakeholders. This means students will need to communicate effectively, share ideas, and work together to achieve common goals. Some key learning objectives would include the following:

1. Critical thinking and problem framing: AI can accomplish many tasks, but it cannot replace creativity, critical thinking, and (most importantly!) empathy. Students need to learn how to use these skills to accurately define problems and come up with new solutions.
2. Cloud-based remote collaboration: These tools are essential for designers who want to work efficiently and effectively with team members who are located in different places and other fields. Designers can share files, communicate in real time, and track progress on projects from the comfort of their own homes or offices.

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3. AI-assisted design process: Students need to learn how to use AI technologies, including using AI to automate tasks, generate ideas, and test designs.
4. Ethics and social responsibility: We must stop focusing on simply teaching students how to create the most persuasive ads, seductive designs, addictive games, etc. The next generation of designers needs to learn about the ethical implications of design and social responsibility. This includes learning about privacy, accessibility, and sustainability.

AI's Impact on Summative Assessment: An Example

In an Alchemy webinar titled [“Harnessing the Power of AI: Transforming Assignments and Assessments in Higher Education”](#), Dr. Danny Liu (University of Sydney) discussed the importance of designing authentic assessments ([Villarroel et al., 2017](#)) and the importance of feedback ([Carless & Boud, 2018](#)).

The Villarroel et al. study suggests that faculty make assessment more like real-world tasks students might encounter in a future job. Students tend to learn better, feel more motivated, and feel like they are managing their own learning. The study suggests a step-by-step model to help faculty create their own authentic assessments in higher education.

Carless and Boud discuss student feedback literacy, which is how students are able to understand and use feedback to improve their work and learning. The paper focuses on how students respond to feedback and some challenges they face when applying feedback. Carless & Boud offer two activities that can help students improve their feedback literacy: giving feedback to each other and analyzing examples of good work.

Dr. Liu suggests a Two-Lane Approach in regard to assessment strategies with all of this in mind: how it's important to have some kind of “Lane 1” (read: traditional assessment to ensure learning outcomes are being met) approach, but how “Lane 2” would factor in the authentic assessment that students would be more motivated to complete. He uses this example in his presentation to demonstrate the approach:

Table 1

Lane 1: Assurance of Learning Outcomes	Lane 2: Human-AI Collaboration
Short term: <ul style="list-style-type: none"> ● In-person exams/tests ● Viva voces [oral exams] 	Short term: <ul style="list-style-type: none"> ● Students use AI to brainstorm, draft outlines, summarize resources, perform research ● Students critique AI responses
Longer term:	Longer term:

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<ul style="list-style-type: none"> • In-class contemporaneous assessment • Interactive oral assessments • In-person exams/tests (sparingly) 	<ul style="list-style-type: none"> • Students collaborate with AI and document this process; the process is graded more heavily than the product
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The idea is to try to find balance between traditional assessment methods and new ways to assess student learning by encouraging their collaboration with AI. Dr. Liu provided an example from a marketing class.

Table 2

Example of a Two-Lane Approach

Learning outcomes: apply marketing strategy concepts in real-world scenarios; demonstrate communication skills; evaluate effectiveness of different strategies.

Lane 1: Assurance of Learning Outcomes

Lane 2: Human-AI Collaboration

<p>Live Q&A after in-class presentation (defend research/analysis, etc.)</p> <p>Giving students unseen case study in a live unsupervised setting</p>	<p>Bing Chat for market research and competitor analysis</p> <p>Adobe Firefly for campaign design</p> <p>Collaboration process is documented (fact-checking, improving, critiquing)</p> <p>In-class presentation</p> <p><i>Process heavily weighted</i></p>
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In this example, the Lane 2 approach has more components as well as several opportunities for interaction with AI technology. Bing Chat is an AI-powered search engine, Adobe Firefly is an AI that can generate images, and students would have the opportunity to use other AI tools that could help generate text.

Process plays a big role in Dr. Liu’s scenario (see the [process book assignment](#) in the next section), and there’s more at stake for students in the Lane 1 assessment.

Alternative Grading Strategies

Alternative grading strategies that have become more popular over the last several years may help faculty think about evaluation in new ways and can reduce students’ perceived need to use generative AI tools inappropriately. These include specifications grading, contract or labor-based grading, and ungrading. Each method is summarized below, along with links to additional information.

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[Specifications grading](#)

Instructors create assignments with clearly specified requirements and assignments either meet the criteria or they don't. Revision opportunities are built in.

[Contract grading/labor-based grading](#)

Students and instructors agree to a contract in which each grade is tied to a set of criteria like allowed absences, the number of drafts or assignments completed in a satisfactory manner, and the number of reading responses submitted over the semester.

[Ungrading](#)

The instructor specifies learning objectives, and self-reflection is used regularly for students to self-assess their progress (in reflective journals, blogs, etc.). Instructors provide students with regular feedback, and midterm or final grades are determined by consultation between the instructor and the students.

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Challenges with AI Detection Products

When AI turned into a buzzword earlier this year (2023), there was a lot of discussion about different AI detectors and their effectiveness, including one called [GPTZero](#). Some of these tools claim to be up to 99% accurate, but AI has also suggested that human-generated text is the result of chatbots when it is not. In June, [Turnitin publicly acknowledged that its software has a higher false positive rate](#) than the company originally stated. In July, [Open AI pulled its detection tool, AI Classifier](#), because of its “low rate of accuracy” (Nelson 2023). False positive results can have negative impacts for students, as seen in the example of [a Texas A&M professor](#) who suspected his students were using AI to cheat on their final essays. He copied essays into ChatGPT to determine whether or not his students were cheating and gave out incomplete grades to students in his class, which caused serious problems for graduating seniors, including many who had in fact not used AI on their assignments.

In addition to the false positives, many AI detectors are biased against non-native writers, [as discussed in this paper by Liang et al.](#) (2023). The book *AI for Diversity*, by Roger Søraa discusses a wide range of bias in varied ways, including gender, age, sexuality, etc.

There are also some opinions that it will be easy to “catch” students who use AI tools because AI technology doesn’t sound human. While that may have been the case early on, these language models improve each time someone plugs in a new prompt. [This article in the Chronicle](#) got a lot of attention a few months ago when a student described how many of their peers were using this technology and challenging the notion about academic integrity policies. Consider how the story begins: “Submit work that reflects your own thinking or face discipline. A year ago, this was just about the most common-sense rule of Earth. Today, it’s laughably naive” (Terry, 2023). Faculty need to assume that at least some students are going to seek out this technology.

Some faculty may choose a more hands-on approach to AI-generated work. For example, if they suspect a student has used AI to produce work for an assignment, they might invite that student to have a one-on-one conversation and ask the student to explain their paper. In any case, it is especially important for faculty not to accuse students outright, as that will result in a lack of trust and will cause students to lose confidence and motivation to complete the course.

So what does this mean for AI detection software at this point? It means faculty can’t rely on detectors. Given all of this, it is even more important to design assignments with AI in mind – by integrating these tools into assignments, faculty can teach students how to use them ethically.

Using AI Tools to Promote Student Learning and Success

This section offers a variety of examples of how AI tools can offer valuable learning opportunities in both the humanities and in STEM, including in-class activities and sample

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assignments that can be used across the disciplines. It also considers accessibility and how AI tools like speech recognition or closed captioning can help diverse learners. These developments are not fully inclusive yet (for example, there are some free platforms, but they're limited) but that will likely change as the technology continues to advance.

Some general uses of AI include having students evaluate AI-generated content in small group discussions or use AI to help them organize their own ideas. AI can be used for brainstorming and for proofreading. AI can also be used to create practice exercises, quizzes, or study guides, which give students the opportunity to reinforce their own learning. Consider a major like computer science, for example. Xin Ye (Assistant Professor, Rockland Community College) plans to integrate AI into her courses in the fall 2023 semester. Students can use AI to receive feedback or corrections while they are coding.

In-Class Activities

Here are two sample in-class activities created by Racheal Fest (SUNY Oneonta; The Faculty Center for Teaching, Learning, and Scholarship Specialist in Pedagogy) that would introduce students to AI literacy in a variety of disciplines:

Example 1: Prompt Engineering

This activity invites students to experiment and evaluate a range of prompting strategies with a particular output in mind. Students begin by prompting ChatGPT or Bing to generate a scholarly or popular essay on an assigned topic, likely one derived from shared course content (say, an example of panopticism inspired by Michel Foucault's well-known chapter).

Students should ask the AI tool to modify, correct, revise, or take a different approach to its output (for instance, *give me a different example*, or *simplify your explanation*, or *break this down into steps*. Online resources, including [Wikipedia](#), list prompt intervention strategies). After students elicit several rounds of changes from the AI tool, they print a record of their engagement.

Finally, students can reflect on their process by assessing the efficacy of their own prompts and the quality of AI outputs. Did they manage to produce desired results? How? What strategies did they employ? How did they struggle? What does AI do well? What does AI do poorly?

Students could begin this work collectively, guided by an instructor who might elicit prompts and enter them into ChatGPT, Bing, etc., on a projector. After modeling this process and discussing prompting strategies, students could go on to complete individual assignments.

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Example 2: Evaluating Form and Content of AI Outputs

This activity invites students to think critically about the strengths and challenges of content generated by both AI and other humans. First, students respond to a writing prompt relevant to course content without engaging generative AI.

Once they have completed the exercise, students enter the same writing prompt into ChatGPT, Bing, or another generative AI tool. Students then evaluate the texts, comparing and contrasting their formal features, their approaches to content, and more. What are the strengths and areas of growth for each? What differences and similarities do students notice? How does AI write? How do humans write? How could each improve their compositions and outputs?

Utah Tech University's Center for Teaching and Learning provides additional examples of rethinking learning outcomes with AI. Their [drop-down on Integrating AI in Teaching](#) offers several good suggestions. For example, instead of asking nursing students to summarize research on evidence-based practice, they might compare an AI-generated summary and a summary written by a human to see what the differences are (and therefore, how that could change the outcomes of that scenario).

Example 3: Using AI for Brainstorming and Idea Development

AI can be used as a brainstorming tool to help undergraduates narrow down their ideas for research or to come up with initial ideas.. In a recent Alchemy webinar, "Harnessing the Power of AI: Transforming Assignments and Assessments in Higher Education", Dr. Danny Liu (University of Sydney) suggested using ChatGPT this way have the students encourage the chatbot to ask them questions and generate text based on their responses. The following example comes from a direct exchange with ChatGPT:

Prompt: I have to write a research paper about a community I belong to and how it uses literacy for my English composition college class. Can you ask me some questions to help me brainstorm for the assignment?

AI: Certainly! Brainstorming is a crucial step in the research process. Here are some questions to help you explore how your community uses literacy and generate ideas for your research paper:

1. What is the specific community you belong to, and how would you define it?
2. How does your community value literacy, and what role does it play in daily life?
3. What are the various forms of literacy within your community? (e.g., reading, writing, digital literacy, cultural literacy)
4. Are there particular literacy practices or traditions unique to your community?

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5. How does literacy impact communication within your community? Does it influence how members interact and express themselves?
6. Are there any challenges or barriers related to literacy in your community? (e.g., access to education, language differences, technological limitations)

The AI created 13 additional questions that we did not include here. Students can request that the AI ask one question at a time so they can respond to each one or provide a list so they can consider their options. And with more practice with prompt engineering, students can refine their questions and get even better at asking the AI for help.

Example 5: Using AI for Proofreading

Proofreading often gets neglected by students because it is time-consuming, boring, or they feel that there is not enough time to do it before an assignment is due. In addition to built-in spell checkers in programs like Microsoft and Google, many students also use [Grammarly](#) to help them with sentence structure, tone, etc. Students can use ChatGPT for proofreading as well.

For example, pasting a text into the chatbot and simply asking “Can you proofread this for me?” will yield different results than pasting in text with more specific requests like, “Can you identify the analysis in this history paper?” or “Please describe the counterclaim in this argumentative essay.” Students can then compare what the generative AI tool noted and see if they are achieving what they mean to in their writing.

AI can help students in other ways as well: for example, if students are writing in the sciences, they may be required to use passive voice. Asking ChatGPT to specifically check a text for active voice would be a helpful activity. Students can also ask ChatGPT to check their citations or to evaluate their introductory or conclusion paragraphs. However, they should be advised and reminded that generative AI can and does make errors and suggest erroneous information. Students must use their judgment before accepting generative AI suggestions.

Many of the major citation styles have adopted policies around citation and generative chatbots:

[Citing generative AI in MLA Style](#)

[Citing generative AI in APA Style](#)

[Citing generative AI in Chicago Style](#)

Writing Assignments

Here are two sample writing assignments created by Stephanie Pritchard (SUNY Oswego; Visiting Assistant Professor, English and Creative Writing Department) that can be incorporated into a variety of disciplines:

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Example 1: Reflective Process Book

While it will be very challenging now (read: almost impossible) to create out of class assignments that are “AI-proof”, some assignments might be easier for students to complete without assistance from AI. One example would be a [semester-long reflective process book](#), which is an assignment that can be used alongside research. The sample process book assignment that’s linked here has a few notable features: it is graded mostly based on completion (this assessment strategy might lessen some of the grade anxiety faced by many undergraduate students), it is meant to be completed in stages (students will also have some time to work on this in class), and it is meant to be reflective (so students can describe what they learned but, more importantly, *how* they learned it). The process book asks students to think critically about their own research, discussions in class, and the steps they took to complete their research assignment. This assignment can be a strong addition to classes that require critical thinking, writing, and discussion. The process book assignment linked here is from an English composition class.

Example 2: Annotated Bibliography

There are also ways to integrate AI into research-based assignments, like an annotated bibliography. This [annotated bibliography example](#), from an English composition class, asks students to find and evaluate six different credible sources for their research project. For every source, students must provide bibliographic information, a short summary, an evaluation of the source, and a brief discussion of how the source is relevant to their topic. There is a note at the bottom of this assignment which outlines what parts of the annotated bibliography can receive help from AI: to create appropriate citations, to help look for sources, and to help students understand the content of the sources they’re considering. Since annotated bibliographies are popular assignments, there are various ways generative AI tools can be used to simplify the process for students as they begin to learn how to conduct research, especially in introductory classes.

What we’ve learned from AI so far is that it can write reflectively – and convincingly – about experiences that it can absorb from the data on which it was trained but cannot actually have first-hand. The process book is meant to help students critically think about *how* they learned. It’s worth mentioning, too, that both of these assignments are part of a larger, semester-long scaffolded writing project.

Some additional out-of-class examples include rethinking [reading response papers](#) and other [essay assignments](#).

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AI Tools for Research Assignments

As generative AI tools proliferate, more special-purpose tools are being released for use. One such tool for annotated bibliography and research-related assignments is elicit.org. Asking a question such as “What is the current interpretation of the cause of mid-latitude glaciers on Mars?” returns a list of relevant papers with bibliographic information and short summaries, along with a summary of the top papers which provides a snapshot of the field of research. Clicking on the title of any of the papers opens a new window with the full text of the paper, summary information, factors reflecting the trustworthiness of the paper, critiques listed in other sources, and related citations. The research landscape is likely to change rapidly with the further development of specialized generative AI tools.

Lab Reports

A typical college-level lab report structure includes an abstract, introduction, procedure, analysis, results, discussion, and conclusion. Some high school students may have experience with lab reports, but college-level writing is often more complex.

Dr. Trevor Johnson-Steigelman (Associate Professor, Finger Lakes Community College) suggests an activity you can introduce early in the semester by providing your students with a model lab report (this example can also be used to demonstrate your expectations and serve as a guide for your students).

Students can use generative AI to write abstracts or conclusions for lab reports by inputting their lab report’s main body into the generator. As we mentioned earlier, it can be a helpful activity for students to compare their own abstracts or conclusions to what the AI produces. AI can summarize key findings and AI-generated results may offer valuable insights by helping students see what they may have missed.

As with many of the assignments and activities suggested here, it is important to encourage your students to continue to think for themselves instead of copying results into a final report: to focus on the process of evaluation and quality of sources, rather than the outcome alone.

Accessibility

The Accessibility Resources offices on many college campuses have seen a huge increase in numbers over the last couple of years. In addition to offering accommodations like extended time on exams, preferred classroom seating, and food allergy or dietary restrictions, many offices also have technology for students as well. Some examples of assistive technology include smart pens, recording devices, and speech to text software.

AI tools have begun to make big impacts on digital accessibility (the practice of designing and developing digital content that people with disabilities can use). This means that people with visual, hearing, cognitive, or motor impairments can have access to these tools, which promotes

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inclusivity and more equal opportunities. However, concerns about student use of AI tools to cheat and the policies that result could restrict the ability of disabled students to use AI tools to support their learning ([McMurtrie, 2023](#)).

Here are some examples of what AI tools can do ([Alston, 2023](#)):

- Create captions for videos
- Use speech to text or text to speech
- Test accessibility of various websites
- Offer language translation or transcription

More information on AI and accessibility is available [here](#). Some of these tools are free (like [Google's Speech-to-text API](#) and also [Microsoft's Azure Speech to Text](#)) but many are still quite limited unless users choose to upgrade to a paid version.

Considerations for Online Classes

Teaching online, whether synchronously or asynchronously, involves many of the same issues concerning student use of generative AI as are found when teaching in-person classes. Syllabus statements are important to clarify acceptable uses of generative AI, and faculty should anticipate questions such as:

- What constitutes plagiarism?
- What is the policy on the use of AI tools like [ChatGPT](#) , [Grammarly](#), [GitHub Copilot](#), [DALL-E](#), [Google translate](#), etc.?
- How do you cite ChatGPT?

Rethinking the online course learning objectives and the related online assignments and assessments in the age of ChatGPT is now an essential aspect of preparing to teach online.

To best support online learners' success, assignments should be designed to make critical thinking and the process of learning visible to the online course instructor and online classmates. Scaffolded assignments with feedback are more effective than just asking for a paper, or essay, as a completed final product in one step. These considerations will be especially important for asynchronous online classes. Synchronous online classes have the option to include Lane 1 activities (as described above) to assure student attainment of course learning outcomes through real-time activities and interactions. Asynchronous online courses have no built-in option for such Lane 1 activities and must rely more heavily on scaffolded learning activities that focus on the learning process more than the learning product.

Here are some recommendations for effective online teaching practices:

- Design assignments that must reference weekly course readings, content, and online interactions/discussions.
- If applicable, incorporate or ask online learners to incorporate very recent news and current events into assignments (there will be a lag in between the time a news event

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occurs and when it is added to AI language models, although how long is likely to decrease as time goes on).

- Prompt learners to incorporate their own personal views, experiences, examples, or aspirations into their assignments.
- Design assignments that build toward a final product a step at a time.
- Allow online learners options in how they make their thinking and learning visible to you. For example, design activities where learners can create a multimedia response to an assignment.

Preparing Students for the Future: Teaching AI Literacy

As AI tools and models become increasingly available, students will likely be expected to make use of them in a range of academic and professional settings. AI will also likely become a core part of common tools with the line between non-AI and AI features becoming increasingly blurred. Faculty can develop courses to help students build the digital literacy skills that will be required to engage technology of every kind. In-class and independent assignments can guide students to master (and think critically about) prompt engineering, as well as the quality of the content that AI tools generate.

The University of Florida has developed an [“AI Across the Curriculum”](#) initiative to provide all students the opportunity to develop their AI skills for future workforce participation. This will be accomplished through a combination of foundational courses, including “Fundamentals of AI” and “Ethics, Data, and Technology”. They’re also offering disciplinary courses such as:

- “AI in Agricultural and Life Sciences”
- “AI in Social Sciences”
- “AI in the Built Environment”
- “AI in Media and Society”

This means students have the ability to earn a certificate in AI to complement their degree. This approach does have the downside of requiring adding on several stand-alone courses to a student’s degree. However, consideration of the learning outcomes identified in the [University of Florida’s program](#) or other similar models might help institutions or programs find opportunities to infuse AI across the curriculum in existing courses

However, even without AI directly integrated into the curriculum, there are already some resources that are available to students. For example, the University of Sydney has created a great website called [AI in Education](#), which is a guide for students (created by students!) with information like creating resumes, understanding content, and overcoming writer’s block. There will certainly be more information like this for students in the future, which is one of the reasons it’s so important to be transparent about these tools now.

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Case Study: AI in Design

One example of a field that has already seen the impact of AI is the field of design, which is rapidly evolving. While generative AI tools such as [Midjourney](#) and [DALL-E](#) (AI that generates images from prompts) have only begun to grab the attention of the general public recently, AI design tools have been used in the industry for some time. For example, Netflix's AVA (aesthetic visual analysis) is a collection of tools and algorithms which encapsulate the key intersections of computer vision combined with the core principles of filmmaking and photo editing. This AI is being used to create the thumbnails and trailers based on users' interactions with the content on the platform. Similarly, Alibaba's AI tool, Luban, is capable of creating eight thousand customized banner ads in one second. Even before the hype AI is currently receiving, many everyday interactions were created by a small design team using AI tools (or, in many cases, created *entirely* by AI).

In addition, AI is being used to automate many tasks that were traditionally done by designers, such as generating layouts, creating color schemes, and even coming up with new ideas. Here are three examples of different AI tools in design and what they can do:

- Adobe Photoshop's Content-Aware Fill uses AI technology to select and blend the best replacement pixels.
- Figma's AI Designer plugin can streamline and enhance the user experience design process.
- Topaz Gigapixel AI can upscale and enhance image detail and resolution by 600%.

Now designers have more flexibility to tackle even more important tasks beyond design production. AI will not replace designers, but it will change the role of designers in the future. Designers will need to bring creativity, critical thinking, and problem-solving skills to the creative process, but they will also need to be proficient with AI tools and technologies.

How AI Tools Can Support Teaching

AI tools are useful for faculty as well as for students. One use of these tools is to generate ideas and content for our courses. Below are examples from Dr. Keith Landa (SUNY Purchase, Director of the Teaching, Learning, and Technology Center) and Stephanie Pritchard (SUNY Oswego).

Example 1: Course Design

Dr. Landa wanted to use Claude, an generative AI generator, to see what course learning objectives he might consider for a new class on AI Literacy. Here's his exchange:

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Prompt: “As a higher education faculty member designing a course on AI Literacy, what would be the top learning outcomes that you would list in your syllabus?”

AI: Here are some potential key learning outcomes I would aim for in a course focused on AI literacy:

- Understand fundamental concepts of artificial intelligence – e.g. machine learning, neural networks, data dependence, training vs. inference.
- Recognize common applications of AI – such as computer vision, natural language processing, recommender systems, robotics.
- Evaluate societal impacts of AI – economic, legal, ethical issues surrounding use cases.
- Detect misinformation about AI capabilities – critically assess claims in media/marketing vs reality.
- Analyze AI risks and mitigation strategies – e.g. data bias, job automation, legal liability, superintelligence.
- Discuss governance challenges – privacy, accountability, transparency, oversight.
- Consider philosophical questions – machine consciousness, human-AI relationships, AI existential risk.
- Empower learners as citizens – understand basics to follow policy issues, separate hype from reality, advocate responsibly.
- Hands-on experience – interact with AI models, experiment with sample projects, complete risk assessment.

AI: The goal would be to not just impart technical knowledge but also develop students’ critical thinking on the real-world impacts of AI. Focusing on risks and responsible innovation priorities would equip learners to participate ethically and intelligently in our AI-integrated world.

There are too many more learning outcomes here for a single course, so this list would need to be focused and refined to settle on the appropriate learning objectives for an AI Literacy course. But this is a good start, and faculty can ask the AI for more details to begin brainstorming class activities to these outcomes (i.e. – “What learning activities and assessments would you map onto the learning outcomes listed above?”). AI could also help faculty begin to assemble a list of course resources (i.e. – “What textbooks, articles, web videos, and other learning resources would you assign for this class?”). Of course, faculty will still need to carefully vet the AI’s response to ensure the AI is providing reliable information. This article from [The New York Times provides additional information about generative AI and its hallucinations.](#)

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Example 2: Developing Question Banks for Formative Testing

This LinkedIn post [“Yes, ChatGPT can answer exam questions. But can it write them too?”](#) provides an interesting example of how ChatGPT integrates different levels of Bloom’s taxonomy to write multiple choice questions on natural selection. However, this sort of one-off question generation is not an efficient approach to generating a large test bank of questions for use in repeated formative testing.

Here’s an example of the kind of prompt Dr. Landa has used to create test bank questions for a class he’s offered previously:

Please write 10 multiple choice questions based on the content at this web page, <https://astrobiology.com/1998/04/what-is-astrobiology.htm>, targeted at the remembering level of Bloom’s taxonomy, and provide the correct answer for each.

Dr. Landa has used this prompt in the [free version of ChatGPT](#) and also in [Claude](#); both chatbots recognize and can correctly reference the different levels of Bloom’s taxonomy and both are able to access the content using the external URL.

Dr. Landa also altered the prompt to generate questions at the “analyzing” level of Bloom’s taxonomy. While it is still necessary to review the questions that are produced by the chatbots, this approach makes it much easier for us to set up learning activities to promote ongoing retrieval practice by our students.

To use AI for generating sample questions for PDF articles that are used in class, faculty can use tools that allow file uploads (like Claude) or that allow them to copy and paste in large source texts.

Example 3: Creating Rubrics

Some course-related material, like rubrics, can be extremely time-consuming to create, and generative AI can help faculty speed up that process. While AI won’t be able to create a perfect rubric on the first try, users can modify prompts to get a better template. Here’s an example based on an assignment that Stephanie Pritchard (SUNY Oswego) created to assess student writing at the end of a summer Educational Opportunity Program (EOP). The assignment has been condensed to save space:

Prompt: Create a rubric to assess the following writing assignment: The purpose of writing persuasively is to get your reader to agree with your opinion. You have more freedom to make claims without always using research to back up what you’re saying.

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What grade do you think you should receive for the summer program? You can use any examples from the program to make your point, but you should choose at least two reasons from your EOP experience to answer this question. Here are some options for you to consider (you are not limited to this list):

your class attendance and class participation (including reading workshops, writing workshops, etc.)

grades you received on major assignments

your attendance and participation at social events as well as your general attitude during the program

what you've learned (or not learned) from this experience

How you approach this is totally up to you – your tone can be formal or informal, funny or serious, creative or more traditional. Effective persuasive writing always has a purpose in mind.

AI: Criteria | Excellent (5) | Good (4) | Satisfactory (3) | Needs Improvement (2) | Inadequate (1)

Claim | The writer clearly | The writer's | The writer's claim | The writer's claim | The writer's claim | states their | claim states | is somewhat clear | lacks clarity or | lacks clarity and | position on the | their position| but may require | specificity, making it | specificity, and | grade they should | on the grade | further elaboration | challenging to | does not take a | receive and is | they should | or additional | understand their | clear stance on | persuasive with | receive, but | examples to | intended grade or | the grade they | compelling | might benefit | strengthen the | reasons for it. | should receive. | arguments. | from more | argument. | | | elaboration.

The AI's first attempt at the rubric was hard to follow (it generated six additional paragraphs that looked like different versions of this on the following topics: use of examples, organization, persuasiveness, tone and style, and overall impact). Professor Pritchard decided to refine the prompt a little more:

Prompt: I find the formatting of your response confusing. Can you answer the same prompt but format your response differently?

AI: Sure! Let's break down the rubric in a more straightforward and easy-to-read format:

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Claim:

- Excellent (5): The writer's claim is clear, persuasive, and well-defined, taking a strong stance on the grade they should receive. Compelling arguments are presented.
- Good (4): The writer's claim is clear, but may benefit from further elaboration or more compelling arguments.
- Satisfactory (3): The writer's claim is somewhat clear, but lacks specificity and may require additional examples to strengthen the argument.
- Needs Improvement (2): The writer's claim lacks clarity and specificity, making it challenging to understand their intended grade or reasons for it.
- Inadequate (1): The writer fails to take a clear stance on the grade they should receive.

Use of Examples:

- Excellent (5): The writer effectively uses specific examples from the EOP program to support their claim, making their persuasive writing more convincing.
- Good (4): The writer incorporates relevant examples from the EOP program to support their claim, but might benefit from stronger connections between examples and arguments.
- Satisfactory (3): The writer includes some relevant examples from the EOP program, but their connection to the claim may be somewhat unclear or disjointed.
- Needs Improvement (2): The writer provides limited or irrelevant examples to support their claim, weakening the persuasiveness of their writing.
- Inadequate (1): The writer does not include any examples to support their claim, significantly weakening their persuasive writing.

While these two examples aren't perfect, the chatbot was able to establish some general parameters and provided ideas about what parts of the assignment could be assessed. The AI initially suggested assessing based on the following criteria: claim, use of examples, organization, persuasiveness, tone and style, and overall impact. Professor Pritchard decided to ask the chatbot for some additional suggestions:

Prompt: I like the claim, use of examples, and organization points, but found persuasiveness and tone/style to not be as necessary. Can you come up with a few other points that we might consider when assessing student writing for this assignment?

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AI: Certainly! Here are a few additional points that you might consider when assessing student writing for this assignment:

Engagement:

- Excellent (5): Keeps the reader engaged throughout the writing with a compelling introduction, thought-provoking points, and an effective conclusion.
- Good (4): Maintains reader's interest but might benefit from a more captivating introduction or stronger conclusion.
- Satisfactory (3): Some engagement, but the writing may lack a consistent flow and reader interest.
- Needs Improvement (2): Fails to engage the reader effectively due to disjointed points or weak conclusion.
- Inadequate (1): Lacks any form of engagement.

Clarity:

- Excellent (5): Ideas are expressed clearly and concisely, making the writing easy to follow.
- Good (4): Generally clear, but some points could use further clarification.
- Satisfactory (3): Ideas are somewhat clear, but the writing might be confusing or overly verbose in places.
- Needs Improvement (2): Lack of clarity, reader struggles to understand key points due to poor expression.
- Inadequate (1): Extremely unclear, ideas are virtually impossible to comprehend.

Creativity:

- Excellent (5): Demonstrates a high level of creativity in approach, examples, and presentation.
- Good (4): Shows creativity, but could benefit from more original ideas or approaches.
- Satisfactory (3): Some attempt at creativity, but the writing may feel somewhat predictable.
- Needs Improvement (2): Lacks creativity and originality, ideas are mundane and unremarkable.
- Inadequate (1): Completely devoid of creativity.

Using Additional Resources to Develop Course Materials

More generative AI sites designed to assist faculty in developing course learning objectives and other course design tasks are being made available. One example is [almanack.ai](#), where faculty can create courses based on subject area and level and get recommendations for units

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and lessons that would be appropriate for the course. For example, when creating a course on “Astrobiology” as the subject with “Freshman level college non-science majors”, Almanack produced units on: ‘Introduction to Astrobiology’, ‘Origin of Life’, ‘The Habitable Zone’, ‘Extreme Life Forms’, ‘The Drake Equation and Fermi Paradox’, ‘Astrobiology and Exoplanets’, ‘SETI: The Search for Extraterrestrial Intelligence’, ‘Astrobiology and Space Exploration’, ‘Ethical and Philosophical Implications of Astrobiology’, ‘Astrobiology in Popular Culture’, and ‘Astrobiology and the Future’. Each unit came with lesson plans and drilled down into the individual lesson plans within a chapter resulted in specific learning outcomes for each lesson. Almanack.ai will also recommend discussion questions, group activities, research project ideas, web video resources, concept map prompts, and other resources, based on the learning outcomes for each lesson plan within a unit. As with student assignments, tools like almanack.ai should be viewed as a brainstorming aid, and instructors should delete and revise the recommendations and generate their own content in order to ensure that the course design reflects the targeted learning outcomes.

Guide To Identifying and Evaluating AI Tools for Higher Education

The number of AI tools that could be used in higher education prohibits a full exploration of each tool in this report. However, there are a number of excellent sites that make it easy for faculty to identify AI tools that would work well for a particular course or activity. Below are three helpful sites.

- [There’s An AI for That - The Biggest AI Aggregator](#)
 - Large database to find the best tools for a wide variety of use cases.
- [Futurepedia](#)
 - Collection of 35,000+ AIs. Updated daily and sortable by curated communities for specific fields/topics.
- [Wondertools Collection](#)
 - List of AIs with articles on uses and features.

Once a potential tool has been identified for use in courses or programs, faculty should evaluate the tool prior to implementation. Evaluating an artificial intelligence tool for use in a higher education course requires a systematic approach to ensure its effectiveness and suitability for the educational context. Here’s a step-by-step guide to evaluating such a tool:

Strategies for Pedagogical Evaluation

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1. **Define Learning Objectives:** Determine how the AI tool can complement or enhance the achievement of course learning objectives.
2. **Trial and Pilot Testing:** Conduct a trial or pilot test of the AI tool with a small group of students or colleagues. Gather feedback on its effectiveness and usability.
3. **Learning Analytics:** Assess the tool's ability to provide valuable learning analytics and insights for instructors and students. Analytics can help identify areas for improvement and measure learning outcomes.
4. **Feedback and Assessment:** Collect feedback from students who used the AI tool and assess its impact on their learning experience and outcomes.
5. **Integration with Curriculum:** Ensure the AI tool can be integrated seamlessly into the course curriculum without disrupting the overall flow of the course.
6. **Comparison with Traditional Methods:** Compare the AI tool's effectiveness with traditional teaching methods to gauge its added value.
7. **Support for Multimodal Learning:** Verify if the AI tool supports multimodal learning, allowing students to engage with content using various formats, such as text, audio, video, and interactive elements.
8. **Long-Term Viability:** Assess the long-term viability of the AI tool, considering its potential for future updates and scalability.

Strategies for Technology Evaluation:

1. **Research and Identify AI Tools:** Conduct thorough research to identify various AI tools that align with course goals. Look for tools with good reviews, user feedback, and proven track records in education.
2. **Assess Features and Functionality:** Review the features and functionalities of each AI tool. Ensure that they align with your specific learning objective(s) and enhance the learning experience.
3. **User Interface and Experience:** Test the user interface of the AI tool to ensure it is intuitive and user-friendly. A complicated interface can hinder student engagement and learning.
4. **Data Privacy and Security:** Evaluate the AI tool's data privacy and security measures. Ensure that student data is protected and that the tool complies with relevant privacy regulations.
 - a. **Data Collection and Storage:** Determine what data the AI tool collects from students and how it is stored. Ensure that personally identifiable information (PII) and sensitive data are handled securely and that data retention policies comply with relevant regulations.
 - i. Determine if the data collected is used to train the tool and the potential impacts this may have on your teaching practice or students.
 - b. **Vendor Policies and Agreements:** Carefully review the privacy policy and terms of service of the AI tool provider to understand how they handle student data and what responsibilities they hold.

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- c. **Data Sharing:** Check if the AI tool shares student data with third parties or if it aggregates data across institutions. Be cautious about tools that may share data without explicit consent or for purposes beyond the scope of the educational context.
 - d. **Data Anonymization and De-identification:** Verify if the AI tool anonymizes or de-identifies student data to protect their privacy. This is essential to prevent data breaches and unauthorized access.
 - e. **Access Controls:** Check the access controls and permissions for the AI tool. Instructors should only have access to the data necessary for teaching, while students should have appropriate control over their personal information.
 - f. **GDPR and Compliance:** If the AI tool operates in or collects data from users in the European Union, ensure that it complies with the General Data Protection Regulation (GDPR) and other relevant data protection laws.
 - g. **Security Audits and Certifications:** Inquire whether the AI tool provider undergoes regular security audits and holds relevant certifications to ensure that their data protection practices meet industry standards.
 - h. **Incident Response and Data Breach Policies:** Understand the AI tool provider's incident response plan and data breach policies. Be confident that they have processes in place to handle any potential security breaches promptly and responsibly.
 - i. **Data Ownership and Portability:** Clarify who owns the data generated through the AI tool and ensure that students have the right to access and export their data if needed.
5. **Compatibility and Integration:** Check if the AI tool can integrate seamlessly with the existing learning management system or that it can be easily accessed.
 6. **Vendor Reputation and Support:** Research the reputation of the AI tool's vendor. Consider factors like customer support, ongoing updates, and responsiveness to issues or concerns.
 7. **Instructor Training and Support:** Consider the training and support provided to instructors in using the AI tool effectively.
 8. **Institutional Approval and Policy Compliance:** Ensure that the AI tool meets institutional policies and guidelines for educational technology adoption.

Strategies for Accessibility and DEI Evaluation

1. **Cost-Benefit Analysis:** Evaluate the cost of the AI tool against its potential benefits and impact on student learning outcomes. Consider long-term costs and the value it adds to the course. Consider what an achievable cost to a student is.
2. **Accessibility and Inclusivity:** Check if the AI tool is accessible to all students, including those with disabilities. Consider its usability for diverse learning styles and needs.
 - a. **Accessibility Features:** Assess the AI tool's accessibility features, such as support for different languages, text-to-speech options, closed captioning, and

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- adjustable font sizes. These features are essential for accommodating diverse learning needs.
- b. **User Interface Design:** Ensure that the AI tool's user interface is designed with inclusivity in mind. It should be intuitive and easy to navigate for all students, including those with disabilities.
 3. **Representation and Bias:** Due to the inherent biases in much of the training data used by LLMs (Bender, et al., 2021) most AI tools will have some bias. The following are some steps you might take to mitigate the associated risks:
 - a. **Transparency of Sources:** Evaluate the degree to which the tool makes the sources of its training data known, and whether they are properly attributed in its results
 - b. **Inclusive Content:** Check if the AI tool offers content that reflects diverse cultures, experiences, and identities. It should cater to students from various backgrounds and not exclude or marginalize any group.
 - c. **Language and Communication:** Verify that the AI tool can accurately understand and respond to diverse accents and communication styles to avoid excluding certain students.
 - d. **Cultural Sensitivity:** Assess whether the AI tool demonstrates cultural sensitivity and avoids using content or examples that might be offensive or inappropriate for certain cultural groups.
 4. **Alignment with DEI Initiatives:** Ensure that the adoption of the AI tool aligns with the institution's broader DEI initiatives and commitment to creating an inclusive learning environment.

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Appendices

Appendix A: Timeline

AI has been used in focused ways for decades. AI was involved in solving the Enigma machine in 1942, but it was not given a name until 1955? The [timeline](#) below provides an overview of important events in the development of AI(Singh, 2022).

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Appendix B: AI Tool Evaluation Examples

Examples of evaluating potential AI tools for implementation in higher education

Example A: [Midjourney](#)

A review of Midjourney, a generative AI text-to-picture program that will allow users to create images based off of prompts. This AI tool was evaluated using all three considerations lists (e.g., pedagogy, technology, and accessibility & DEI).

[Midjourney Draft Review](#)

Example B: [Almanack.ai](#)

A review of Almanack.ai, a “smart course material generator and lesson planner for educators” (Almanack.ai, 2023). This AI tool was evaluated using all three consideration lists (e.g., pedagogy, technology, and accessibility & DEI).

[Almanack AI.docx](#)

Example C: [Learnt.ai](#)

A review of Learnt.ai, which can help save time and effort by automating the creation of lesson plans, learning objectives, assessment questions, and a range of other resources. Learnt.ai is designed to augment not replace; inspiring instructors to create engaging content that aligns with best practices in education, making it easier to deliver effective and impactful lessons to students (Learnt.ai, 2023).

[Learnt.AI Draft Review](#)

Appendix C: Glossary

The glossary below is a living document meant to inform a nuanced, evolving understanding as AI usage grows and new tools are developed. It should reflect and support the interests and usage within the SUNY System. All members of the community are invited to suggest new entries.

For suggestions, changes, or additions, please contact Lynn Aaron at lynn.aaron@sunyrockland.edu or Abby Adams at aadams5@albany.edu.

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- [AI](#)
- [AI Forensics](#)
- [Algorithm](#)
- [Deep Learning](#)
- [Generative AI](#)
- [General AI \(AGI\)](#)
- [Hallucinations](#)
- [Large Language Models \(LLM\)](#)
- [Machine Learning](#)
- [Neural Network](#)
- [Prompt](#)
- [Prompt Injection Attack](#)
- [Puppeteering](#)

AI

Artificial intelligence leverages computers and machines to attempt to mimic the problem-solving and decision-making capabilities of the human mind.

Tasks may require human abilities such as perception, reasoning, problem solving, and understanding natural language. Large collections of data as well as new experiences are used by algorithms to find patterns and use them to take actions or make predictions/provide insights (IBM, 2023).

AI Forensics

This refers to the use of forensic techniques to identify if text was AI-generated and then the source of the AI product. Once the source is known, it can be checked for accuracy and credits. This can ultimately reveal the bias in the training data set (Martineau, 2023).

Algorithm

A set of step-by-step directions for solving a problem or accomplishing a specific task (Berkman Klein Center, 2019).

As an example, here's a simple computer algorithm for finding the highest number in a list:

1. Start with the first number in the list and remember it as the current most significant number.

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2. Compare the current largest number with the next number in the list.
3. If the next number is larger than the current most significant number, update the current largest number to be the next number.
4. Repeat steps 2 and 3 for all the numbers in the list.
5. When you reach the end of the list, the current largest number will be the largest number in the list.

Deep Learning

A subset of machine learning using a neural network with at least three layers “Deep learning distinguishes itself from classical machine learning by the type of data that it works with and the methods in which it learns.

Machine learning algorithms leverage structured, labeled data to make predictions—meaning that specific features are defined from the input data for the model and organized into tables... it generally goes through some pre-processing to organize it into a structured format.

Deep learning eliminates some of data pre-processing that is typically involved with machine learning. These algorithms can ingest and process unstructured data, like text and images, and it automates feature extraction, removing some of the dependency on human experts. For example, let’s say that we had a set of photos of different pets, and we wanted to categorize them by “cat”, “dog”, “hamster”, et cetera. Deep learning algorithms can determine which features (e.g. ears) are most important to distinguish each animal from another. In machine learning, this hierarchy of features is established manually by a human expert” (IBM, n.d.-b).

Generative AI

Generative AI is a type of AI system capable of generating text, images, or other media in response to prompts. It uses its collection of data and experiences to generate new content. Generative AI is different from General AI (see below) (Benefits and Limitations, 2023).

General AI / Artificial General Intelligence (AGI)

General AI refers to the development of AI systems that possess human-level intelligence across a broad range of tasks and domains. AGI aims to create machines that can understand, learn, and perform complex cognitive functions that mimic human intelligence. This is in comparison to the specific, task-focused output of Generative AI (Mock, 2023).

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Hallucinations

Since generative AI is based on statistical patterns, it may not always produce accurate or meaningful results. "Hallucinations" refers to computer-generated information that does not correspond to objective reality (Mair, 2023)(Alkasissi & McFarlane, 2023).

Large Language Model (LLM)

A deep learning algorithm that can recognize, summarize, translate, predict and generate text and other forms of content based on knowledge gained from massive datasets (Lee, 2023)

Machine Learning

A subfield of AI where a computer imitates human learning using data and algorithms to gradually improve its accuracy without additional programming changes or corrections (IBM, n.d.-a)(Brown, 2021)

Neural Network

Mathematical models for programming inspired by the human brain, primarily for problem solving and pattern recognition. These can be fairly simple or include multiple internal layers meant to increase learning capacity, efficiency, and accuracy (Zwass, 2023)

Prompt

Prompts are the requests/information we provide to AI to let it know what we're looking for. They may be snippets of text, streams of speech, or blocks of pixels in a still image or video. The importance of an effective prompt has generated a new job - **Prompt Engineer**. (Martineau, 2023)(Popli, 2023)(Shieh, 2023).

Prompt Injection Attack

A prompt injection attack crafts a prompt that causes the AI tool to provide output that has been forbidden by its training (Selvi, 2022).

Puppeteering

Puppeteering refers to the manipulation of full-body images to perform actions and behaviors determined by AI (like a puppeteer). It is also known as full body deepfakes. For example, the image of someone who has two left feet when it comes to dancing could be made to perform as if they were a talented dancer (Jaiman, 2022).

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Appendix D: Contributors

Overview, Glossary Definitions

Lynn Aaron, Rockland Community College
Santina Abbate, Stony Brook University
Abby Adams, University at Albany
Brian Fallon, SUNY FIT
Meghanne Freivald, Alfred University (NYS College of Ceramics)
Dana Gavin, Dutchess Community College
Judie Littlejohn, Genesee Community College
Megan Lowe, Northwestern State University of Louisiana
Janet Nepkie, SUNY Oneonta
Laura Pierie, SUNY Morrisville
Kate Robinson, Monroe Community College
Gina Solano, Monroe Community College
David Wolf, SUNY Schenectady
Yunkai Xu, SUNY Morrisville

Guide To Pedagogical Uses

Stephanie Pritchard, Co-chair, SUNY Oswego
Keith Landa, Co-chair, SUNY Purchase
Racheal Fest, SUNY Oneonta
Trevor Johnson-Steigelman, Finger Lakes Community College
John Kane, SUNY Oswego
Jessamyn Neuhaus, SUNY Plattsburgh
Alexandra M. Pickett, SUNY Online
Laura Pierie, SUNY Morrisville
Christie Shin, Fashion Institute of Technology
Xin Ye, Rockland Community College
CJ Yeh, Fashion Institute of Technology

Guide To Evaluating AI Tools for Use In Higher Education

Michele Forte, SUNY Empire
Robin Sullivan, University at Buffalo
Chrisie Mitchell, Dutchess Community College
Robert Becker, SUNY System Admin
Jamie Heron, SUNY Online
Jim Hubbard, SUNY Potsdam
Shamika Mitchell, Rockland Community College