

Provost's Office Working Group on the Educational Impact of Generative AI Tools

FINAL REPORT

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Table of contents

| | | |
|-----|--|----|
| 1 | Executive summary | 1 |
| 2 | Introduction | 3 |
| 3 | Fostering faculty awareness of GAI | 6 |
| 3.1 | Summary | 6 |
| 3.2 | Recommendations..... | 8 |
| 4 | Encouraging equitable classroom use of GAI | 11 |
| 4.1 | Summary | 11 |
| 4.2 | Recommendations..... | 12 |
| 5 | Leveraging growth opportunities of GAI | 17 |
| 5.1 | Summary | 17 |
| 5.2 | Recommendations..... | 17 |
| 6 | References | 20 |

1 Executive summary

Artificial Intelligence (AI) is one of the ten Areas of Excellence and Opportunity identified by the Drexel University Provost's Office¹. As a reflection on the university's prioritization of AI, this report outlines recommendations for the university to seize a unique opportunity for teaching excellence and higher education leadership by deliberate and thoughtful incorporation of AI into a wide variety of aspects of our curricula and pedagogy.

This is the final report of the Provost's Office Working Group on the Educational Impact of Generative AI Tools (hereafter, the Working Group). Working Group membership, timeline, and process are reviewed in §2. The Working Group's three charges, given by Provost Jensen, are:

- **Awareness:** develop a proposal for how to educate the Drexel community about modern AI/ML tools.

¹ Drexel University's Provost's Office Areas of Excellence and Opportunity:
<https://drexel.edu/provost/priorities/initiatives/areas-excellence-opportunity/definitions/>

- **Pedagogy:** develop advice and best practices for how educators at Drexel might adjust their instruction and assessment methods in light of these tools.
- **Opportunity:** consider how Drexel might leverage the opportunities presented by these tools to advance its educational mission.

The initialism GAI is used to denote Generative AI. The Working Group's comments and recommendations on these three charges comprise the bulk of the report: fostering faculty awareness of GAI in §3, encouraging equitable classroom use of GAI §4, and leveraging growth opportunities of GAI in §5.

Awareness. The Working Group's six (6) recommendations to university administrators for fostering faculty awareness of GAI (§3) are as follows. The university should:

1. Establish a standing committee tasked with updating guidelines and responding to new issues arising from the evolution of GAI.
2. Create a single website to serve as a central information source for university policies and guidance about GAI tools for instructors.
3. Establish an online repository for the use of GAI in Drexel classrooms that the Drexel faculty community can learn from and contribute to.
4. Expand the Academic Integrity policy to specifically include/reference the use of GAI for work/assignments.
5. Establish a regular workshop or symposium on AI-integrated teaching.
6. Develop communication channels to efficiently provide information to faculty as GAI evolves.

Pedagogy. The Working Group's six (6) recommendations to faculty for encouraging equitable classroom use of GAI (§4) are as follows. Faculty should:

1. Adjust their learning goals to those required in a GAI world.
2. Leverage GAI to personalize learning experiences for greater impact.
3. Consider explicitly teaching students how and when to use GAI in their coursework.
4. Adjust curricula to prepare students for the use of GAI in the workplace.
5. Create assignments leveraging GAI that bring all students to the table.
6. Incorporate GAI into courses in a manner that engages students in design thinking and co-design of systems that impact them.

Opportunity. The Working Group's three (3) recommendations to university administration for leveraging growth opportunities of GAI (§5) are as follows. The university should:

1. Create university-wide courses on GAI.
2. Charge the Teaching and Learning Center, the Office of Disability Resources, and the Writing Center with coordinating faculty, staff, and student training and resources for GAI.
3. Use the university's "Centers, Institutes, and Collaborations" process to evaluate the proposal to create a new Institute on Artificial Intelligence.

Conclusion. Taken as a whole, the Working Group's fifteen (15) recommendations to the university administration and faculty may be summarized thus: GAI will continue to rapidly transform our world in significant and unpredictable ways. **As such, it is recommended that the**



university put in place specific structures (committees, policies, processes, resources, the proposed AI Institute, etc.) capable of thoughtfully reacting to this changing landscape. Moreover, it is vital that the university regularly solicit faculty guidance on how it should adapt these structures to ensure that the students we graduate are positioned to lead in this new world and that the research and scholarship we produce are positioned to shape it.

2 Introduction

The purpose of this report is to offer Drexel University faculty and administrators guidance regarding the impact of generative artificial intelligence (AI) on higher education in general, and at Drexel in particular. The report is authored by the Provost's Office Working Group on the Educational Impact of Generative AI Tools (hereafter, the Working Group), consisting of nineteen faculty and administrators from across the university. The initialism GAI is used to denote Generative AI.

The acute and widespread interest in and focus on GAI in the media over the past six months may be understood in part by the fact that the capabilities of this technology are already impacting many diverse aspects of society and the economy, and it seems plausible that anticipated future capabilities of GAI will only widen and deepen this impact. Higher education is no exception, and the impact is already profound, as reported extensively in the popular and education press (e.g., (Metlukh, 2023) (Huang, 2023) (Pavich, 2023) (Metz, 2022) (Roose, 2022) (McMurtrie, 2022)). These references are but a small but representative sample of the voluminous coverage of GAI across the media over the past six months.

Drexel has long been at the forefront of incorporating emerging technologies into its curricula and pedagogy. It is in our DNA --- we were the Drexel Institute of Technology until becoming Drexel University in 1970. Three prime examples of early technology adoption include: *i*) in 1983, Drexel was the first major university to require all students to own a personal computer, the Apple Macintosh;² *ii*) in 2000, Drexel was the first major university to have wireless (WiFi) access across campus; and *iii*) in the early 2000s, Drexel was an early adopter of online classes and programs to broaden access to our educational offerings.³ These efforts were sometimes seen as unnecessary or even misguided at the time, but they are now viewed as prescient. Modern higher education without computers, wireless networking, and online learning would appear to most people as anachronistic (or even unviable).

The usage of AI tools available (as of early 2023) for higher education seems to have qualities in line with the adoption of these earlier technologies: an adoption that is disruptive, unpredictable, and frightening—but inevitable. With that in mind, the many individual recommendations of this report all fit into the following aspirational goal: **that the Drexel University community not only achieve greater campus-wide awareness of the potential uses and limitations of modern AI tools for instruction but that the university moreover foster greater faculty engagement in exploring and experimenting with these tools to develop and disseminate**

² As further evidence of how forward-thinking this initiative was, the University's commitment was made even before the computer was announced in 1984!

³ <https://drexel.edu/about/history/>



knowledge and experiences across the Drexel community. By stimulating awareness, we aim to establish a university environment in which a vibrant faculty community may question, share, discuss, deploy, and iterate upon the integration of AI for instruction, in the best traditions of academic scholarship. Doing so will ensure that the students we educate will continue to have knowledge and skills well-aligned with the needs of the modern world and that the research we generate will continue to have positive and practical impact in shaping that world.

As mentioned in the Executive Summary (§1), AI is one of the ten Areas of Excellence and Opportunity identified by the Drexel University Provost's Office⁴; and as such the unique opportunity for achieving teaching excellence and providing leadership in higher education by deliberate and thoughtful incorporation of AI into a wide variety of aspects of our curriculum is in line with the university's strategic goals.

The remainder of this section outlines the Working Group's charge, membership, timeline, and process.

Working Group charge. Drexel University Provost Paul Jensen issued three charges to the Working Group at the kickoff meeting on January 31, 2023:

- **Charge #1 (Awareness):** develop a proposal for how to educate the Drexel community about modern AI/ML tools.
- **Charge #2 (Pedagogy):** develop advice and best practices for how educators at Drexel might adjust their instruction and assessment methods in light of these tools.
- **Charge #3 (Opportunity):** consider how Drexel might leverage the opportunities presented by these tools to advance its educational mission.

These three charges directly informed the Working Group's process, as described below.

Working Group membership. The Working Group consists of nineteen (19) faculty and professional staff, listed alphabetically below:

1. Leslie Ashburn-Nardo, Ph.D. *Vice Provost for Diversity, Equity and Inclusion, Provost's Office*
2. William Dampier, Ph.D. *Associate Professor, Dept. of Microbiology and Immunology, College of Medicine and Senator in Faculty Senate*
3. Anna Devlin, Ph.D. *Associate Clinical Professor, Dept. of Decision Sciences and MIS, LeBow College of Business and Senator in Faculty Senate*
4. Andrea Forte, Ph.D. *Professor and Head, Dept. of Information Science, College of Computing and Informatics*
5. Aroutis Foster, Ph.D. *Professor and Associate Dean of Academic Affairs and Graduate Studies, School of Education*
6. Johanna Inman, Ed.D. *Inaugural Director, Teaching and Learning Center*
7. Edward Kim, Ph.D. *Associate Professor, Dept. of Computer Science, College of Computing and Informatics and Senator in Faculty Senate*

⁴ Drexel University's Provost's Office Areas of Excellence and Opportunity: <https://drexel.edu/provost/priorities/initiatives/areas-excellence-opportunity/definitions/>

8. Youngmoo Kim, Ph.D. *Vice Provost for University Community Partnerships, Provost's Office and Professor, Dept. of Electrical and Computer Engineering, College of Engineering*
9. John Kounios, Ph.D. *Professor, Dept. of Psychological and Brain Sciences, College of Arts and Sciences*
10. Hualou Liang, Ph.D. *Professor, School of Biomedical Engineering, Science & Health Systems and Senator in Faculty Senate*
11. Edward Nelling, Ph.D. *Professor and Head, Dept. of Finance, LeBow College of Business*
12. Shadi Rezapour, Ph.D. *Assistant Professor, Dept. of Information Science, College of Computing and Informatics*
13. Rebecca Rich, J.D., MLIS *Assistant Dean for the Law Library and Technology Services and Assistant Teaching Professor, Kline School of Law and Senator in Faculty Senate*
14. Matthew Stamm, Ph.D. *Associate Professor, Dept. of Electrical and Computer Engineering, College of Engineering*
15. Kristene Unsworth, Ph.D. *Director, Center for Science, Technology and Society, College of Arts and Sciences and Assistant Teaching Professor, Dept. of Criminology and Justice Studies, College of Arts and Sciences*
16. Michael Wagner, Ph.D. *Professor and Head, Dept. of Digital Media, Westphal College of Media Arts and Design*
17. Scott Warnock, Ph.D. *Associate Dean of Undergraduate Education, College of Arts and Sciences and Professor of English, Dept. of English and Philosophy, College of Arts and Sciences*
18. Steven Weber, Ph.D. *Vice Provost for Undergraduate Curriculum and Education, Provost's Office and Professor, Dept. of Electrical and Computer Engineering, College of Engineering*
19. Jake Williams, Ph.D. *Assistant Professor, Dept. of Information Science, College of Computing and Informatics*

In addition, the Working Group gratefully acknowledges the administrative support of Ms. Grisette Coverdale.

Working Group timeline. Key dates for the Working Group and this report include:

- **January 31, 2023:** Kickoff meeting
- **April 4, 2023:** Initial draft report completed
- **June 2, 2023:** Final report shared with Provost Jensen and Senate Chair Owens

Working Group process. The Working Group agreed to form three subcommittees, one for each of the three charges listed above, where each subcommittee was led by two Co-Chairs:

- **Awareness Subcommittee:** Devlin (Co-Chair) E. Kim, Y. Kim (Co-Chair), Liang, Unsworth, Warnock.
- **Pedagogy Subcommittee:** Ashburn-Nardo, Forte, Foster, Inman, Rich (Co-Chair), Wagner (Co-Chair).
- **Opportunity Subcommittee:** Dampier, Kounios, Nelling (Co-Chair), Rezapour, Stamm (Co-Chair), Williams.

The three subcommittees each worked on their assigned charge, and the six Co-Chairs met to discuss alignment, scope, and approach. The main body of the report is in the following three sections: fostering faculty awareness of GAI in §3, encouraging equitable classroom use of GAI in §4, and leveraging growth opportunities of GAI in §5.

3 Fostering faculty awareness of GAI

Faculty and administrators will benefit from a working knowledge of the nature of GAI and its relevance in higher education; these and other topics are discussed in §3.1. Six (6) recommendations to university administrators to foster this awareness are provided in §3.2.

3.1 Summary

This section provides a roadmap about GAI for university faculty and administrators by addressing the following five (5) topics:

- What is GAI?
- The rapidly evolving landscape of GAI
- Relevance of GAI to teaching and research
- Incorporation of GAI into teaching and scholarship
- Pedagogical labor implications of GAI

What is GAI? We believe all faculty and administrators should have a basic understanding of what modern AI is. AI is developed through machine learning in which models are trained to *learn* from data patterns without human direction. Initially, AI was predictive (e.g., able to *perceive* and *classify*). More recently, breakthroughs were made with *GAI*, i.e., AI that is able to *create*. Therefore, a GAI system is AI that uses algorithms to create new content (McKinsey & Company, 2023). These algorithms are entirely data-driven, are based on specially trained deep neural networks, and require large amounts of computations.

Some GAI falls into a class of general-purpose chat and knowledge systems (e.g., ChatGPT) that can produce text, computer code, and even music notation. Others are text-to-image creation systems (e.g., DALL-E, Midjourney, Stable Diffusion) that can produce artwork, graphics and photorealistic images based on text prompts. Additional systems, not yet widely available, use text prompts to create videos (e.g., Google Imagen), 3D models for printing (e.g., OpenAI Point-E) and music (e.g., Google MusicML).

The rapidly evolving landscape of GAI. GAI is constantly evolving, so our approaches to incorporating GAI into the university mission must also evolve. GAI is a tool to be utilized: we should adjust to incorporate this tool rather than ignore it. In the past, some teachers forbid students from using calculators or computers, but classrooms today have adjusted to use these technologies. Not adjusting to incorporate GAI may appear similarly antiquated in the near future. This is a period of experimentation and discovery, and as an institution at the leading edge of technology and learning, we should be at the forefront. To meet this goal, our faculty

should know where to look for more information and guidance, especially since the tools and technology are changing rapidly.

Over the past year, we have seen GAI systems' capabilities advance from suggesting (auto-completing) computer code (GitHub Copilot, early 2022) to creating high-quality photorealistic images from unstructured text prompts (DALL-E 2, Midjourney, and Stable Diffusion, Summer 2022), to longer-form text and code generation and general knowledge synthesis in (ChatGPT, based on GPT-3, released in late 2022), to internet-aware chat and search with multiple "personalities" (Bing search, February 2023), to the recent release of GPT-4 in mid-March 2023. These are but a few examples within a whirlwind of advances that even experts in AI and computing have difficulty in staying current with. Therefore, it does not make sense to establish guidelines based only on existing systems but instead to develop ongoing processes to track such advances and respond by adapting the University's guidelines and resources or developing new ones.

Relevance of GAI to teaching and research. Faculty and administrators need to be aware of the capabilities and limitations of GAI that are relevant to both teaching and research. The best way to understand the capabilities and limitations of GAI is for faculty to gain some experience with using these tools in their teaching and scholarly activities. While we cannot provide an exhaustive list, we can summarize some capabilities and limitations that are relevant to faculty as both instructors and researchers.

The systems can respond to quantitative and qualitative questions. For example, they can solve "word problems" (i.e., read, understand, and solve a given question, whether from math, accounting, or physics), or they can generate poems, essays, artwork, code, etc. Users can even specify that output mimic a style (e.g., "draw a poster for Star Wars in the style of Picasso"). Instructors may use GAI to create exam questions and draft solutions to those questions. For example, GAI can create essay prompts or multiple-choice questions and these questions can be drawn from specific content provided by the user. These systems can even be used to create grading rubrics and lesson plans while incorporating specific instructions from the user. As a researcher, a user can ask a system to organize or rewrite text as part of their own editing process.

While GAI can be a useful tool for faculty members (and students), its limitations must be noted. These systems are not perfect. They are limited to using only information from their training sets, sometimes provide incorrect information, and have been known to generate fictitious references and fake quotes (i.e., AI "hallucinations"). There is also no perfect way to determine if GAI has been used, although detection tools exist, including tools in existing campus subscriptions such as TurnItIn (O'Brien, 2023). For these reasons, it is important to note that GAI cannot yet be used as a primary source of reference—by students or researchers. These limitations have also prompted several journals to announce policies requiring the disclosure of AI usage (e.g., *Springer Nature Journals*, *the JAMA network*) or a ban on the use of generated text (e.g., *Science*).

In addition to the more tactical implications of GAI limitations, there are broader concerns of which to be aware. GAI is built in closed, controlled systems that have no open academic

counterweight, and since the systems are limited to using the data they are provided, there is the demonstrated potential for bias in the output that it generates.

Incorporation of GAI into teaching and scholarship. Faculty are encouraged to thoughtfully incorporate GAI into their teaching and scholarship. To best prepare our students and faculty for an AI-enabled future, we hope to foster a vibrant faculty community that is continually exploring and experimenting with using AI tools. Faculty and students should be encouraged to incorporate GAI into coursework and projects to gain quality hands-on experience with AI tools (e.g., (Trust, 2023)). Interdisciplinary projects that incorporate AI technologies that bridge disciplines that would not normally be using AI tools would foster a culture of collaboration. Faculty should utilize AI-related research and projects to foster creative and critical thinking. For example, they could create an assignment or project that utilizes GAI tools first, then asks students to analyze what the AI does well and where the deficiencies are. Faculty might consider teaching students how to perform “prompt engineering.” (The primary interface available between the human and current GAI tools is called a prompt.) Advising students on how to create better prompts for a specific objective will enable them to obtain more accurate responses. A thorough discussion of pedagogical implications of GAI is found in §4.

Pedagogical labor implications of GAI. Academic units should consider the labor implications accompanying the emergence of GAI, especially with regard to pedagogy. Instructors in certain courses (e.g., writing-intensive courses) will likely need to rely more on innovative assignment design and assessment of writing *process*. While a wholesale upheaval of teaching is unlikely, the university should reconsider the material conditions of teaching certain courses (e.g., class size, course preparation time).

3.2 Recommendations

The Working Group provides the following six (6) recommendations to the university administration regarding fostering faculty awareness of GAI:

Administration recommendation #1: the university should establish a standing committee tasked with updating guidelines and responding to new issues arising from the evolution of GAI.

The university should create a standing committee focused on the use of GAI in higher education. This group would:

- Identify broadly useful applications of GAI across the university
- Investigate the use of GAI at other universities and organizations
- Identify current workflow processes that can be enhanced using GAI
- Monitor this rapidly evolving technology to identify likely longer-term trends
- Curate a collection of instructional videos (possibly using a Kaltura media hashtag)
- Periodically review the utility of GAI's uses across university processes
- Inform organizational uses of GAI that advance growth before efficiency

The charge of this working group would be to identify not just the possibilities of GAI, but also its limitations, and recognize when the costs of development and implementation are likely to



exceed the benefits. The efforts of this group should be coordinated with other AI initiatives on campus and possibly be “housed” within the proposed AI Institute described in §5. The positive results could include the whole university knowing how to use AI better, possible synergies with the undergraduate curriculum, and the development of micro-courses or credentials, which could be produced for an external audience.

Administration recommendation #2: the university should create a single website to serve as a central information source for university policies and guidance about GAI tools for instructors.

The university should aim to have a single website where university-level policies and guidance on GAI for instructors will be posted. Having a single website will help to reduce conflicting guidance. Policies and guidance that are specific to an academic unit or department should be linked from this website.

Administration recommendation #3: the university should establish an online repository for the use of GAI in Drexel classrooms that the Drexel faculty community can learn from and contribute to.

This repository should have a low barrier to entry with accessibility for all Drexel faculty. It should encourage the growth of a wide-ranging community of AI-engaged educators. Researchers and practitioners in technology-centered fields use platforms like GitHub⁵ to efficiently share and evolve code and other types of projects. A primary goal of the proposed repository is to enable contributions and collaboration across instructors in many more (potentially all) disciplines.

This forum/repository could start with a university-wide Teams group. Members of the standing University committee should be active members/moderators of this forum. The forum could employ a “Reddit-style” model, in which the most popular items/responses could be the basis for future workshops/events. Drexel University Libraries could be a key partner for this initiative.

Administration recommendation #4: the university should expand the Academic Integrity policy to specifically include/reference the use of GAI for work/assignments.

Initially, there may be a need for boiler-plate text for instructors to include in syllabi. This could evolve into a separate statement that is more specific to the uses and constraints around AI systems for particular courses. As an example which may serve as the basis for such a policy, the LeBow College of Business has created three complementary resources along this line.

First, they have created a short video called "ChatGPT at LeBow" which succinctly instructs students on the proper and improper use of GAI in their coursework.⁶

⁵ <https://github.com>

⁶ https://1513041.mediaspace.kaltura.com/media/1_cnexgnhm

Second, they have created a policy called "Plagiarism, Academic Integrity, and Artificial Intelligence":

Recent advances in “generative” artificial intelligence (AI) (such as ChatGPT) make it possible to generate text, visual, and other content. This technology offers many opportunities for innovative teaching and learning, but it must also be used responsibly. For the purposes of academic integrity, any sources of material that informed the student’s work must be cited as external sources -- even if those sources were responding to a student-written prompt (citations help link1 and link2). Editing such content after the fact does not mean it is solely the student's work and should still be cited as paraphrased text. Failure to cite such sources will be considered plagiarism and reported in accordance with Drexel's Academic Integrity policy. Students should be sure to understand any rules the instructor has on using such AI sources in assignments and papers as stated by the instructor or in the course syllabus.

Note that these (AI) systems are not perfect, and the responses and content they generate are sometimes incorrect and potentially biased. Students are responsible for any content they submit on an assignment. Instructors reserve the right to use AI-detection tools to analyze assignment submissions, just as they can use tools such as TurnItIn to check written assignments for non-original content.

The use of AI technology to answer questions – either as an assignment or on a quiz/exam – is considered a violation of academic integrity, unless explicitly permitted by the instructor. This includes, but is not limited to, solving math problems, writing computer code, answering objective questions, and answering open-ended questions.

Third, they have communicated this policy to their undergraduate students in an email containing the following message (hyperlinks in blue):

Title: Responsible Use of Artificial Intelligence in Your Courses is Required

Don’t fail a course because of using ChatGPT or other artificial intelligence (AI) tools without citations. You should know that Turnitin now detects AI-generated content in addition to content taken from known online and journal sources.

To use AI responsibly, you should:

- Be aware that [Turnitin](#) can now detect AI-generated content.
- Cite all sources, including AI-generated content. See these links for examples:
 - [ChatGPT Citations - Formats & Examples](#)
 - [How do I cite generative AI in MLA style?](#)
- Understand that AI can be helpful to gather information but is sometimes inaccurate or biased.
- Be aware of any limitations your instructor has on using AI-generated content.
- Review [Drexel’s Academic Integrity Policy](#).
- Read the [LeBow Syllabus Statement](#).



Note, the LeBow Syllabus Statement mentioned in the last bullet item is the "Plagiarism, Academic Integrity, and Artificial Intelligence" given above.

Administration recommendation #5: the university should establish a regular workshop or symposium on AI-integrated teaching.

This could begin with an announcement event for the release of the initial report/guidelines. The university should aim to establish regular events, such as: *i)* ongoing professional development around AI pedagogy, research, etc., and *ii)* opportunities to develop new AI-themed courses for undergraduates.

Administration recommendation #6: the university should develop communication channels to efficiently provide information to faculty as GAI evolves.

In partnership with the Office of University Communications, a standing university AI committee (or the Provost's Office) should identify and prioritize the development of communication channels to efficiently provide information to faculty as this area evolves, e.g., *i)* email (infrequent announcements, perhaps an opt-in newsletter), *ii)* short videos, or *iii)* podcasts.

While some guidelines on effective use of GAI in higher education are common across academic disciplines, many others will be strongly individualized at the college, department, or even the course level. As such, the university should develop GAI guidelines and materials in a manner that encourages departments to create their own communication channel that is tailored to their needs.

Accordingly, it is recommended that the university aim to make it easier for departments/units to add value to the core university channels. Three examples of ways in which this may be done include: *i)* design university events with additional time for department/program-specific breakouts; *ii)* design university materials (e.g., email templates and graphics) to accommodate additions or customizations by colleges and schools; and *iii)* encourage unit- or program-specific efforts to establish a liaison to the university standing committee in order to maintain consistency and ongoing communication.

4 Encouraging equitable classroom use of GAI

Whereas the previous section provided recommendations to the university administration to foster faculty awareness of GAI, this section provides recommendations to the faculty on how to meaningfully and equitably integrate the use of GAI into the classroom. The historical role of technology in the classroom as a context for the current and anticipated pedagogical impact of GAI is given in §4.1. Six (6) recommendations to the faculty on how to integrate GAI into the classroom in ways that advance equity are provided in §4.2.

4.1 Summary

Over the past six months GAI tools such as ChatGPT have been featured prominently in the media and have been the focus of many conversations in academia regarding the future of education. At the center of these conversations is the concern of how GAI appears to have upended, or at least threatened, what it means to write, how we should teach, how students will learn, and how their learning may be assessed. It should be noted that the history of technology in education is replete with emerging technologies whose ability to transform and change the academic landscape was overestimated (Devereux, 1933) (Reiser, 2007) (Mishra, 2009). In this sense, then, what is currently happening with GAI is not new, however the arrival of GAI is too recent to allow any meaningful assessment of its long-term pedagogical impact.

The history of educational technology has shown that what is needed are ways to support teaching and learning with innovative and inclusive pedagogical approaches. This is especially important given the ubiquity and proliferation of GAI over a brief period. The proliferation in the volume of data in academia in sectors such as health and education highlights that AI may be impactful for teaching and learning in these areas. The need for inclusive pedagogy is especially urgent regarding equity. Namely, the lack of diversity in *i)* the data used to train many AI models and *ii)* among AI researchers and developers is a cause for concern because of the risk of creating and perpetuating harmful biases and stereotypes as it relates to minoritized people in issues such as health disparities, admission inequities, grading and other assessments, and academic biases and inequities.

As such, it is important to use research in the learning sciences and educational technology that may provide novel and more inclusive and equitable pedagogies. We suggest that instructors think about the following approach when teaching with AI: *i)* the type of experience they want their students to have, *ii)* the mode of delivery in which they want their students to have that experience, and *iii)* how a technology can facilitate that type of experience. This approach can be used in thinking about how to advance teaching and assessment about and with AI in equitable ways. In considering their teaching and assessment approach, we suggest that faculty consider the diverse previous experiences and abilities of students, so that all students are able to equitably participate in learning in ways that are inclusive and personalized.

4.2 Recommendations

As with countless past (and future) technological innovations, GAI is bound to fundamentally disrupt the way we teach and learn. As with the way the widespread availability first of electronic calculators and then of personal computers required educators to rethink how we teach mathematics or the way the Internet changed the scope of the role of libraries in colleges, GAI will likewise have a substantial impact in higher education. The rapid advancements in GAI challenge us as educators to think out of the box and to reevaluate our current understanding of teaching, learning, and assessment.

Although it is not to be expected that GAI will or even can replace the pedagogical value of student – teacher interactions, it is also clear that the teacher who is able to utilize GAI for teaching may eventually become more effective than the teacher who cannot. Likewise, the higher education institutions that will successfully integrate GAI tools into their pedagogical and assessment strategies will likely eventually offer better education and market preparation than

the institutions that will not. It is therefore of utmost importance to approach GAI as a pedagogical opportunity rather than a threat.

Furthermore, the changing landscape of GAI provides opportunities for faculty and administrators to engage a broader and more diverse range of students through inclusive and equitable decisions around pedagogical practices. Inclusive pedagogies require that instructors approach all aspects of their courses (e.g., syllabus and course policies, assignments, mode of content delivery, assessments) by proactively considering the experiences of their students, asking which students might be left out when any given method is used, and building structures within the course to support student learning (Sathy, 2019). Digital equity is a critical consideration in inclusive pedagogy; that is, do all students within a course have equitable access to technology and all its benefits? Given the concerns about GAI, it is especially important that inclusive pedagogy, with a focus on digital equity for minoritized, disabled, and/or first-generation students, is at the forefront of instructors' minds and administrators' decisions about support for such pedagogy.

The Working Group offers the following six (6) recommendations to the faculty on how to use GAI as a tool for learning, assessment, and fostering student belonging and success.

Faculty recommendation #1: faculty should adjust learning goals where appropriate to those required in a GAI world.

As GAI becomes increasingly prevalent, certain skills and ways of thinking are even more essential for our students. Critical thinking, adaptability, creativity, data literacy, emotional intelligence, and collaboration are just a few commonly identified essential skills. Students will need to be able to analyze and evaluate data, algorithms, and predictions made by GAI systems. As GAI continues to evolve and change rapidly, both students and faculty will need to be adaptable and agile learners of new skills and technologies.

Ask yourself: if GAI took my course, could it pass? If the answer is yes, consider why, as well as if this is a problem. In many cases incorporating learning goals that engage students in higher-level thinking and learning are needed. You might also consider incorporating more hands-on or experiential learning activities (see FR#4), e.g., those available through the Sentient Syllabus Project⁷.

Example: GAI calls into question the utility of essay assignments as GAI tools have become effective in producing, in some instances, high-quality text at the push of a button. Instead of focusing on the creation of text itself as a learning activity teacher might instead consider using GAI-generated texts as a starting point for nuanced and in-depth discussions, as well as a tool to teach critical thinking. A history teacher could, for example, ask students to work with a GAI tool to tell stories of alternate histories which could then be used as an anchor for critical discussion and analysis.

Faculty recommendation #2: faculty should leverage GAI to personalize learning experiences for greater impact.

⁷ <http://sentientsyllabus.org>

Learning is often effective as a social endeavor; GAI will not change this aspect of learning. Rather than simply automating the teaching and learning process, GAI tools may allow an instructor to provide more individualized instruction that is ultimately more humanistic at its core. This can manifest as more personal and effective assessments that impact feedback, helping students to identify and address their individual learning gaps and challenges, or quickly identifying students who need additional support or intervention (Swiecki, 2022). In essence, GAI may be used to help each learner progress in their own zone of proximal development (Vygotsky, 1978). GAI tools will likely to introduce gamification elements like individualized challenges to make learning more valued, interesting, and engaging. An essential component of learning is affect, which is often ignored, but can never be replaced as a critical ingredient in what is needed to support human development and learning (Shah, 2015).

Ask yourself: how could I use GAI tools to incorporate more adaptive and more personalized learning paths and options tailored to my students' needs and interests?

Example: Students can utilize GAI tools as personalized learning assistants. By promoting the use of GAI tools as part of the learning process, a teacher can motivate students to broaden their understanding about a topic. In a course about climate change, for example, a teacher could ask students to engage with a GAI agent in a discourse discussing potential future developments based on proposed governmental policies and actions. In doing so, students could benefit from the generalist viewpoints provided by the GAI and therefore gain a better understanding of the broader impact of climate change.

Faculty recommendation #3: faculty should consider explicitly teaching students how and when to use GAI in their coursework.

Students have access to GAI and will certainly use it. Consequently, students can benefit from instructors intentionally assigning them to use GAI tools in transparent and appropriate ways. GAI can be used by students to learn anything from basic computational skills to higher order thinking. Faculty have been incorporating AI into assignments in classes that range from first year writing, to engineering design, to research methods. Some examples of this include: *i)* incorporating DALL-E 2 into classes in game design to assist students with creation reference artwork, *ii)* teaching students how to use ChatGPT as a way to assist clients with asylum or victim narratives in law, or *iii)* having GitHub Co-Pilot assist computer science students with debugging code.

Ask yourself: what are the guidelines for GAI use in work for this course? At the very least, GAI contributions should be attributed, and the use of GAI tools should be open, fact checked, and documented.

Ask yourself: how will GAI influence professional practice within your specific discipline and how should this be incorporated into this class or, more general, into this program? At the very least, students need to be prepared for how they will encounter GAI tools in their future careers.

Example: GAI tools have proven to be very effective in collecting and preparing material used to formulate marketing plans in business development. A teacher designing a course in strategic marketing might consider teaching students how to properly utilize GAI tools during the planning phase of the strategic marketing process. This particularly includes instructions on how to properly disclose the use of GAI tools both as professional practice, but also within the context of a student completing an assignment.

Faculty recommendation #4: faculty should adjust curricula to prepare students for the use of GAI in the workplace.

Experiential learning means preparing for the use of AI tools in the workplace. For Drexel students, experiential learning and the co-op program is a central part of their preparation to enter the workplace as skilled professionals. Faculty should consider what it means for students to have workforce readiness in an economy that increasingly leverages GAI and should adjust their coursework accordingly. Faculty should endeavor to understand how GAI is being leveraged to transform workplace practices to better prepare students for their careers. This might require rethinking entire program curricula starting at the program-level outcomes all the way down to course sequence and curricular structure.

Ask yourself: is my assessment inauthentic or authentic, that is, is it adhering to the culture of schooling rather than the cultures schooling is designed to prepare students to enter? (Swiecki, 2022). Designing more authentic assessments that allow students to use AI tools that they may be expected to use in their co-ops or future professions can help them learn to use those tools in ethical and professional ways (see FR #3).

Ask yourself: is this course curriculum still able to provide students with the knowledge and skills necessary to succeed in the workplace? Certain elements of the course might lose relevance in a world supported through GAI. Treat this as an opportunity to bring in new topics that teach advanced skills for the workplace of the future.

Example: The use of reference artwork plays an important role in many creative industries. In the past, reference artwork was collected by searching the Web and various databases. With the emergence of GAI tools, creative industry professionals are now able to create targeted reference artwork through prompt engineering. This substantially changes creative industry practices, which in turn requires educational programs in the creative fields to adjust their curricula, for example by teaching prompt engineering as a fundamental skill in their program.

Faculty recommendation #5: faculty should create assignments leveraging GAI that bring all students to the table.

Give students “big picture” projects (Aguilar, 2020) that cut across disciplines and are inclusive of multiple perspectives. Inclusive pedagogy scholarship supports the assignment of projects connected to real-world issues of concern to students. Furthermore, providing students with choices in project focus and design enhances student agency, which is critical to their engagement and well-being. GAI has the ability to “level the playing field” which can empower students with highly diverse backgrounds or skillsets to collaborate effectively in a fully

inclusive manner. Using GAI as assistive technology can be an important life-long learning strategy.

Ask yourself: does this assignment use AI to help address real-world concerns shared by the broadest range of students, does it give students agency in shaping their own learning experience? Does it support a truly inclusive and diverse learning experience?

Example: International students who do not have English as their primary language can use GAI tools as a low-cost copy editor for written assignments, in courses where the instructor would explicitly permit such submissions as academic support. Similarly, students with special needs can use GAI systems as assistive technology tools. For example, they might use video to text systems to translate visual information into text or spoken words. Teachers need to adjust their instructional strategies to enable students to take advantage of these opportunities.

Digital equity research demonstrates the benefits of giving students opportunities to “play” with technology in low-stakes ways that foster creative ways of using these tools in learning (Aguilar, 2020). Making such opportunities collaborative helps students build connections with and learn from their peers, which is key to their sense of belonging and helps dispel stereotypes about “who is good at what.” Digital equity also extends to considerations of access and affordability of digital tools such as AI. Instructors will need to recognize that some students may have the funds to access more sophisticated tools or versions of tools which could potentially give them an advantage over other students.

Faculty recommendation #6: faculty should incorporate GAI into a course in a manner that engages students in design thinking and co-design of systems that impact them.

Professional codes of ethics remind us to consider whether members of a given community have participated in the design of systems that will affect them; all too often, that has not happened with AI technology (Landers, 2023). Rather than providing prompts for students to input in ChatGPT, instructors might ask students to design their own prompts in ways that will yield more sophisticated and inclusive responses. Such engagement is not only a way of helping students think critically about the use of technology, but it also simultaneously shapes the system that affects them by diversifying the information on which algorithms are built. Students need to develop system thinking skills that allow them to anticipate emergent properties of AI systems.

Ask yourself: have I helped students to critically think about what content and perspectives are represented in the training and programming of AI tools and those that are not? Does my course support the development of skills related to system and design thinking?

Example: Particularly in programs that use GAI tools, it is important that AI ethics and responsible social use of computing systems are represented in learning objectives. Topics like fairness, bias, and equity must be understood from a sociotechnical systems perspective that helps students think critically about unintended consequences and emergent behaviors of AI and why such systems function the way they do.

5 Leveraging growth opportunities of GAI

While §3 offered recommendations to the university administration to foster faculty awareness of GAI and §4 offered recommendations to the faculty on incorporation of GAI into the classroom to aid learning and equity, this section offers recommendations to the university administration on how to leverage the unique strategic opportunities for growth provided by GAI.

5.1 Summary

The development and widespread adoption of GAI tools such as ChatGPT provide opportunities for the university to enhance its reputation as a leader in experiential education. Courses in AI literacy and applications will prepare students in all disciplines to live and work in a world in which AI plays an increasingly important role. In addition, AI can transform the way the university operates, by increasing efficiency and improving workflow. Most importantly, the proposed creation of an Institute on AI merits consideration, as it would serve as a focal point for initiatives related to AI, contribute to the university's long-term strategic plan, and help establish the university as a thought leader in this area.

5.2 Recommendations

The Working Group offers the following three (3) recommendations to the university administration regarding strategic opportunities in the area of GAI.

Administration recommendation #7: the university should create university-wide courses on GAI.

These courses would be intended for undergraduate students across all academic units. A modest proposal is to possibly start with two courses: one focusing on AI literacy and impact and the other focusing on applications of AI, as described below. Additional courses may follow, based on instructor insight and experience from the initial offerings. If multiple courses are developed, the university may consider “stacking” them into a certificate or micro-credential.

Since AI is a broad field, there may be some overlap in content between discipline-specific courses across departments. While it may be desirable to minimize such overlap, this should not preclude the development of new courses while the field rapidly evolves. The broader goal should be to encourage innovation and thought leadership in AI. The university could house multidisciplinary courses within the proposed Institute, described below.

The two proposed possible courses mentioned above are:

First Course – AI & Society (non-technical). The goal of this course is to enhance AI literacy, and understand its impact on issues such as trust, ethics, communication and writing, technology, business, and society. Topics could include “the use of AI in the media” or “AI and misinformation.” It could be offered in a seminar format, with multiple instructors from different

academic units. The pilot section(s) could run in the Pennoni Honors College or as special topics courses under the UNIV rubric.

Second Course – Applications of AI (technical or non-technical). This course could differ in content and orientation, depending on the target audience. Individual academic units should have the latitude to consider the potential of discipline-specific uses of GAI, as they deem appropriate. Course content will evolve over time and strive to stay current with technological innovation.

Administration recommendation #8: the university should empower the Center for Teaching and Learning, the Office of Disability Resources, and the Writing Center to coordinate faculty, staff, and student training and resources for GAI.

To best leverage the power of AI/ML for student learning and success, we suggest the university increase resources to support equitable and inclusive pedagogies for online and face-to-face learning environments (Resta, 2018). This triad of offices could increase digital equity through their support for teaching, research, and scholarship in areas such as the following:

- Aid faculty with ways to incorporate GAI as a tool for increased equity
- Aid researchers with practices that can reduce bias and stereotypes in AI/ML data
- Educate instructors on how to use AI/ML technology

Developing creative and impactful pedagogy that uses GAI tools will require university-wide efforts. Although pedagogic transformation is realized on the center stage in classrooms and in our online courses, much of the work of training faculty, staff, and students in this pedagogy will happen in the wings. The university administration is encouraged to empower, resource, and coordinate efforts among the Center for Teaching and Learning, the Office of Disability Resources, and the Writing Center to lead this transformation.

As an example, these units may be tasked with developing and managing internal training courses on the use of GAI. Since the potential applications of GAI will differ across units, the university should develop short (e.g., five-to-ten-minute) training modules targeted to specific applications. A module such as “How to use ChatGPT to address your grammar and mechanics” could serve a wide audience, while others, such as “How to use ChatGPT to add documentation to code” or “How to use DALL-E to make clip-art for presentations” may serve a narrower one. A first course, which should be required, would focus on ethics, safety, and inherent bias in the use of AI. Courses could be delivered via a BBLearn Administrative Module, or possibly via the Career Pathway maintained by Human Resources.

Administration recommendation #9: Use the university's "Centers, Institutes, and Collaborations" process to evaluate the proposal to create a new Institute on Artificial Intelligence.

Examining the many current facets of AI in society and at Drexel has motivated a third recommendation: create a process by which to evaluate the proposal to *form an AI Institute*. The opportunities such an institute might facilitate would complement the above educational and operational recommendations and may be designed to elevate Drexel's leadership in emerging AI-centered topics. The proposed institute would draw on the expertise across the colleges and

schools and serve as a mechanism to drive cutting-edge research, teaching, and outreach efforts. As AI is one of the Drexel University Provost's Office Areas of Excellence and Opportunity, an AI Institute would be in alignment with the university's broader strategic objectives. The proposed institute would be distinct from and complementary to the existing AI research already being conducted at Drexel. Four *Pillars* of this recommendation are as follows:

- **Pillar #1: prioritize emerging AI-centered topics.** The institute's focus should be on emerging areas that have significant growth potential and few established competitors. By establishing itself as a thought leader in these areas, Drexel can benefit from increased external visibility and reputation, as well as improved student and faculty recruitment, and increased donations to fund the institute's activities.
- **Pillar #2: build on existing strengths and expertise.** To minimize startup costs in terms of time, capital, and effort, the institute's focus should grow from Drexel's existing areas of strength. This includes explicit alignment with multiple Areas of Excellence & Opportunity.
- **Pillar #3: avoid well-established topics.** The institute should avoid areas within AI research dominated by well-established and well-resourced competing institutions. It will be extremely challenging and costly to outcompete established institutions in these spaces.
- **Pillar #4: foster a multidisciplinary approach.** Given that emerging AI-related topics span a wide range of fields, the institute should involve scholars from diverse disciplines across the university's colleges and schools, and should include faculty, researchers, and students. In addition to longer-term research initiatives, the institute could organize and host discussion panels and workshops involving academic units and industry partners.

Working from Pillar #2, bringing together Drexel's expertise on GAI, detecting GAI-generated content (like text, images, videos, and speech), and understanding its social implications could catalyze the university's leadership in the safe, ethical, sustainable, and productive integration of AI advances into society. Moreover, bringing together research on AI-based business-to-customer interactions in product design and consumer behavior will allow businesses to make better product designs and advertising decisions. The many combinations of these areas at Drexel span diverse interests and could draw on expertise from many academic units, including the College of Engineering, the College of Computing and Informatics, the Kline School of Law, the College of Arts and Sciences, the LeBow College of Business, the Westphal College of Media Arts & Design, and others. Moreover, these examples prioritize a number of Drexel's AEOs, including *i*) Computing, AI, & Cybersecurity Frontiers; *ii*) Human-Centered Design; *iii*) Leadership, Learning, & Organizational Innovation; *iv*) Entertainment & Culture; *v*) Neuroscience; and *vi*) Sustainability & Climate Resilience. Areas of research coverage and an overall Institutional focus should be surveyed more broadly—both internally at Drexel, and externally at the current AI environment—as a part of acting on this recommendation.

An AI institute would potentially bring significant benefits to the university, including:

- **Benefit #1: competitive advantage for large-scale funding.** Such an institute would make the university competitive when applying for large-scale funding opportunities, such as NSF AI Institutes. These bring in significant funding (millions of dollars per year) as well as significant prestige. Furthermore, it is extremely difficult for the university to be competitive for such large-scale funding without an internal institute already in place.

- **Benefit #2: national visibility.** By being a national leader in an emerging topic, the university would likely attract attention from the media, government, and business. This would, in turn, enhance our national name recognition, and may help recruit new students and boost enrollment.
- **Benefit #3: increased opportunities for institutional donations.** Potential donors are interested in impactful philanthropy. By aligning with an emerging problem and taking a leadership position, the university would offer potential donors an important opportunity for significant impact. Institutional donations would support the institute's financial sustainability.

While establishing an AI institute may be initially costly, it is also possible that failure to act on this opportunity may pose significant institutional risks. Namely, attractive AI-related activities, such as coursework, programs, and research, are likely to draw students to other institutions, and the university may risk a decline in future enrollment if it lacks competitive offerings. Moreover, there is a timely aspect to deciding upon an institute because competing universities could quickly move into this space, leaving the university with a narrow window to establish itself as a leader. It is recommended that the administration use its existing "Centers, Institutes, and Collaborations" process⁸ as a basis from which to evaluate this proposal.

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⁸ <https://drexel.edu/provost/offices/research/centers-institutes/>

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