RESEARCH NOTE

Bracing for the Future: Student Usage of Generative Artificial Intelligence

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Introduction

Quickly on the heels of education restarting after the so called "end" of Covid19 pandemic came the popularized access of generative AI software. Even though other AI had been available in some form, notably the Microsoft Office edition of Co-Pilot and Google's Bard, seemingly out of nowhere in November 2022 the U.S. company OpenAI released ChatGPT, a generative artificial intelligence software. Almost globally, the media exploded with headlines both lauding ChatGPT's capabilities and raising alarm bells, including concerns related to academic integrity and student learning (Sullivan, Kelly, & McLaughlan, 2023).

Governments and universities remain slow and, in some cases, reticent to commit to informed, and descriptively detailed policy and training programs (UNESCO, 2023). This is concerning as it can be argued that "policy [is] one of the greatest levers a society has to promote its ethical worldview" and ethical concerns "should be understood to address fundamental societal goals like mitigating poverty, improving well-being, and safeguarding human rights" (Schiff, 2021, p. 530). Indeed, generative AI is spawning unprecedented ethical issues.

Adoption of generative AI is happening so quickly and pervasively that even in higher learning institutions that are presumably predicated on being state of the art, instructors are having difficulty keeping up with understanding how the technology works, its potential, as well as the implications. This was also evident with the difficulty that many educators and institutions had during the sudden move to online education due to the Covid19 pandemic. In the beginning of the pandemic, instructor workload increased due to a sudden necessary shift in the methods of instruction from face-to-face to OnDemand or synchronous. Many instructors experienced steep learning curves adapting to technology-assisted teaching and learning, and technological problems and evaluation (Kita, Yasuda, & Gherghel, 2022).

Generative AI puts demands on management, instructional techniques, and academic integrity in secondary and tertiary levels of education. While there are slow and indecisive reactions by governments and universities, student usage of generative AI is growing exponentially. Even before ChatGPT was launched, research was finding that students were more positive towards the potential of AI rather than concerned about risks (Holmes & Anastopoulou, 2019) and have basic knowledge about AI technologies and want training offered in university courses (Yüzbasioglu, 2020). About 32% of university students in Japan are using AI, with more men using it than women (Kyodo News, 2023). Preprints of studies and media outlets have discussed issues concerning AI usage in education including cheating, academic honesty, and the inaccuracy and bias of ChatGPT, as well as potential negative impacts on critical

thinking (Tlili, et al., 2023).

Among the G7 countries, the Japanese approach to AI policy is taking a "'sector-specific and soft-law-based' approach, which seeks to promote appropriate AI governance through nonbinding guidance (rather than through comprehensive AI regulation)" (Habuka, 2023, p. 9). On the other hand, Canada and the EU are taking a "holistic and hard-law based" approach (Ibid, p. 9). It seems the Japanese government is somewhat less definitive about the use of AI, including in education. Although the Japanese Ministry of Economy, Trade and Industry (METI) has published guidelines to allow limited usage up to and including secondary education, it does warn of possible negative effects on critical thinking and "other skills" ("Japan publishes guidelines", 2023). However, the EU, for example, has taken a much more cautious approach (Uetz, 2023) and has been discussing and developing regulations for the past couple of years calling for more transparency in the dataset that generative AI draws from, as well as more control over face recognition software and privacy.

This research note explores challenges and concerns in the advent of generative AI in the tertiary educational context, with attention to the relationship and challenges between academic integrity and bias. This note also draws from conversations with educators presently teaching in universities who are grappling with how to deal with the effects of impending student usage of generative AI software. What is of particular interest in this exploratory nascent research area is the future of human generated critical thought. This may sound slightly hyperbolic, especially to those who are not well informed about what generative AI does and is becoming increasingly capable of doing. However, AI software is not just a tool, as it is often described, rather it should be thought of at the very least as an "interactive tool" with quickly evolving levels of autonomy.

The purpose of this research note is to discuss some of the key areas of concern in the generative AI phenomenon in tertiary education. The note starts with a discussion of the emerging ethical concerns and challenges about AI, with a particular focus on the potential reproduction of biases and inequalities, then a discussion of policy reactions among universities globally, and some potential directions that this research will pursue. This will be followed by results of informal conversations with educators regarding shared thoughts and experiences in the classroom in this new generative AI era. This note draws more than usual from media reports and preprints of studies as there has been little related published peer-reviewed scholarship due to the relatively recent launching of generative AI.

Education in the era of AI and ChatGPT

In recent years, well before the launching of ChatGPT, AI has become more and more integrated in education institutions in several ways including: adaptive learning, for example, to record student learning behaviours to design individualized learning paths; speech recognition in language learning; teaching evaluation, for example: generating exam questions and aiding in paper correction to reduce working time; virtual learning, in some cases creating multi-dimensional learning environments; smart campuses, using, for example, face recognition software to enhance campus security; and intelligent tutoring robots, to aid in learning and skills development. There has been much enthusiasm about the usage of AI in education, notably in predictive analytics and AI led data-driven guidance for students (see Chen, Chen & Lin, 2020; Huang et al., 2021).

Although AI is thought of by many as a positive tool to enhance education and learning, there are concerns whether (most) teachers would have the statistical knowledge to deal with large datasets (or the willingness), and that this technology will most likely increase the burden on teachers (Alam, 2021). Furthermore, this next wave of generative AI is more dynamic and is potentially a more disruptive and powerful application of AI as it is now freely available to the public, and more pertinently, currently utilized by students.

ChatGPT is a large language model (LLM) which produces, or generates, natural language prompted by words and

visuals. It is a subset of AI that generates new content and human-like text, rather than most previous versions of AI that analyzed and interpreted existing data. To date, even the latest upgrade of ChatGPT-4 (released on March 14, 2023) cannot adequately distinguish between what is factual versus fictional information. Also, the software does not base its answers on real experiences, so it is notorious for producing or referencing incorrect information. These large language models (LLMs) use algorithms to search the internet and use "deep learning techniques to understand, summarize, generate, and predict new content" (Kearner, 2023, para. 1). ChatGPT is drawing from previously human-generated or documented information and draws heavily from social media. In this way, generative AI is thought to reproduce the biases that have been expressed by societies. Data sources for ChatGPT-3 included websites, ebooks, social media platforms, and conversational data from, for example, comment sections of news, social media, and basically most sources on the internet. Social media as a source is worrisome as comment sections are notoriously riddled with bigotry; this is especially true if the article has anything to do with inequality around gender (globally) or race (in multicultural contexts).

Impact on education: Present and future

Whether viewed as positive or negative, it is clear that generative AI is becoming a routinely accepted and widely used technology in all areas of higher education, used by all stakeholders from student usage in report writing, to instructor usage in syllabus creation, to administrative usage in management. Given the nature and power of AI it can be safely assumed that university students will be using AI to complete assigned tasks and thus they need to be given clear direction. The three main areas of concern that will be discussed below are: bias in generated content; academic integrity; and critical thinking and learning.

Bias

As LLMs such as ChatGPT access almost all forms of data on the internet as input materials and have difficulty distinguishing fact from fiction, the generated content has been found to contain concerning biases (Heikkilä, 2023). This is not surprising as OpenAI's CEO Sam Altman even admitted by tweeting that ChatGPT has "shortcomings around bias" (Altman, 2023). Ferrara (2023) defines bias as a "multifaceted phenomenon that can be defined as the presence of systematic misrepresentations, attribution errors, or factual distortions that result in favoring certain groups or ideas, perpetuating stereotypes, or making incorrect assumptions based on learned patterns" (p. 2). Ferrara (2023) identifies six types of bias in generative LLM: demographic, cultural, linguistic, temporal, confirmation, and ideological and political.

Other research is exposing more specific types of bias, namely gender bias For example, Li and Bamman (2021) used Generative Pre-trained Transformer 3 (GPT-3), which was released by OpenAI in 2020, and found that the AI generated gender stereotypes when creating stories. In another study, through a series of questions such as "what does an economics professor look like?", "[what] does a CEO dress like?", or "tell a story about girls and boys choosing a career," Gross (2023, pp. 434-435) found that ChatGPT (re)produced both implicit and explicit gender-biased stereotypes, and argued "these biases have performative effects, amplifying inequalities and putting women, men and gender-diverse people at a further disadvantage in society" (p. 12). Ghosh and Caliskan (2023) found that in language translation, ChatGPT changed gender-neutral pronouns to gendered specific pronouns and also ChatGPT perpetuated gender stereotypes in certain occupations. Other biases have been found by testing ChatGPT's responses based on race, religious affiliation, and political ideology (Singh & Ramakrishnan, n.d., preprint). For example, research has revealed ChatGPT and ChatGPT-4 tend to be more ideologically left-leaning versus other models developed by Google that were more socially conservative (Feng, et al., 2023).

Bias in LLMs and other generative language models “can have far-reaching consequences that extend beyond the immediate context of their applications” (Ferrara, 2023, p. 10). In cautioning about the “far-reaching consequences,” Ferrara (2023) gives examples of areas where AI is being increasingly used for aiding in management and in decision-making such as hiring, financial lending, content moderation, healthcare, and education. If there is bias in these areas, access to resources or opportunities would impact vulnerable or marginalized groups. Ferrara (2003) cautions, “In some cases, the biases present in these models may even be representative of the real-world context in which they are being used, providing valuable insights in surfacing societal inequalities that need to be tackled at their root” (p. 8).

Academic integrity: Ethical considerations

Pressures on academic integrity have been increasing with the rise of technology both inside and outside of the classroom for several decades now. With the ability of software such as ChatGPT to generate original information in natural sounding language, how plagiarism and copying have been conceptualized is quickly becoming insufficient in dealing with the capabilities of generative AI and students’ usage. Using content analysis to examine news articles from Australia, New Zealand, the US, and the UK contexts, regarding “how ChatGPT is disrupting higher education”, Sullivan, Kelly and McLaughlan (2023) found that the focus was mainly on concerns about academic integrity and the necessity for inventive assessment design that can mitigate inappropriate student use of AI. They further found that most articles had general discussions of “cheating, academic dishonesty, or misuse” (p. 3). Other studies are confirming these concerns (Chan, 2023). For example, a US study in January 2023 of 1000 university students found that, 75% of students (n=1000) believed that using ChatGPT is wrong but still do it anyway and that 30 percent believed their professors were unaware that they used ChatGPT on their written assignments (Intelligent.com, 2023). A Tohoku University-led survey found that an overwhelming majority of students (n=4000) relied on ChatGPT to check and correct their answers in assignments, for editing, and generating text to better express their own ideas (Kakuchi, 2023).

Anti-plagiarism tools such as Turnitin have integrated AI detection features, but some universities have been slow to enable those features. Free online software such as Zero ChatGPT and other free online platforms allow instructors to check for evidence of AI generated texts but those are not usually as robust, and presumably as reliable, as paid platforms. Even OpenAI is exploring the possibility of producing “watermark” technology that will stamp or identify when something has been generated by the software, although it is not clear what kind of watermark they mean—direct (can be seen) or indirect disclosure (technical signals).

Relying on controlling or banning student usage of AI in assessed learning using policing approaches to catch students “cheating” will no longer be effective. Traditional cheating techniques abound such as looking over another student’s shoulder to copy during a test, hiding an answer-filled note up one’s sleeve, texting answers using a cell phone held out of sight, or plagiarizing from the internet will quickly become passé as students start asking AI to answer test questions or to write entire assignments, and these are virtually indiscernible. More importantly though, training in ethics is going to become more complex, time-consuming, and essential with generative AI.

Training in critical thinking and ethical practices

Another concern discussed in the media and early scholarship is the need to offer more training in strategies specifically designed to use LLMs in informed ways. Also mentioned is the impact that generative AI could potentially have on critical thinking skills (see Small, 2023; Sullivan et al., 2023; “Japan publishes guidelines,” 2023). Students now have grown up being immersed in social media, false information, images created using deep fake

techniques, and memes with famous quotes or images taken out of context and not referenced or explained. It is common social media practice for users to post and repost information and images out of context without any citation. This practice makes it that much harder for students to be aware of the ethical issues involved in not only verifying information but also copyright.

The attention to and practice of academic citation is, of course, integral to academic integrity. Additionally, critical thinking skills are essential to this process as citation involves verifying the source of information, as well as evaluating whether that source is reliable or not. In order to perform these two steps, students need to be trained not only in the strategies to retrieve the original source and discern its reliability, but also to be able to understand the biases and synthesize the information into logical explanations and arguments. Students also need an appreciation of the critical importance of accessing multiple perspectives and being able to articulate why they have chosen to include what they do. Especially in secondary education and higher, students need to be trained in academic ethics and rigorous citation and referencing.

Although critical thinking appears frequently on tertiary syllabi, the teaching and learning practice of the skills, and importantly the ethical discussions necessary to fully appreciate their import is often marginalized in academic skills courses. Writing about critical thinking and feminism, Warren (1998) reminds us that critical thinking "always occurs within a conceptual framework" (p. 31) and we must be aware of the potentially biased frameworks that we operate in. Willingham (2007) notes that educators often conceptualize critical thinking as a skill and thus instruct their students to "think about [an issue] from multiple perspectives" but he argues that,

> You can teach students maxims about how they ought to think, but without background knowledge and practice, they probably will not be able to implement the advice they memorize. Just as it makes no sense to try to teach factual content without giving students opportunities to practice using it, it also makes no sense to try to teach critical thinking devoid of factual content. (p. 10)

Halpern (1999) writes that "the ability to judge the credibility of an information source has become an indispensable critical thinking skill that needs to be deliberately and repeatedly taught in college and earlier" (p. 71). Back in the early 2000s when the use of the internet was becoming widely used by students, Heisserer (2006) wrote in an editorial,

> The existence of these electronic tools heightens the importance of critical thinking while also providing new challenges and opportunities for teaching and learning critical thinking skills. (p. 6)

With the advent of generative AI and its (at least present) propensity to incorrectly cite information or to not cite its sources at all, basing critical thinking on factual information is becoming more and more challenging for us all. It has always taken time to research and verify information, and with fake news and information often being widely circulated but being separated from its author, it is taking even more valuable instructor time and adding to the teaching workload as well as being potentially frustrating for students. Thus, training students to the point that they inherently believe in the necessity of academic integrity, despite the burdens, will be even more challenging in the generative AI era. Small (2023) optimistically argues that although there are concerns associated with generative AI, educators can consider it "as an opportunity to reshape their class assignments in feminist ways" (p. 1) focusing on self-reflexivity in classrooms and has insisted that curricula must become more connected to lived experiences.

AI policy in tertiary education

Government and institutional responses to the availability of ChatGPT have been varied globally and in general have been underdeveloped, reactive, and in many cases not very beneficial or instructive to either faculty or students. The emerging issues underpinning AI generative content that can be produced not only by individuals using AI but also autonomously by AI itself demands proactive policy and training responses. Holmes and Anastopoulou (2019) have observed in the context of AI in education (AIED),

> Around the world, virtually no research has been undertaken, no guidelines have been provided, no policies have been developed, and no regulations have been enacted to address the specific ethical issues raised by the use of Artificial Intelligence in Education. (cited in Schiff, 2021, p. 529)

This is further outlined by Sobhi Tawil, the UNESCO Director for the Future of Learning and Innovation:

> Without institutional guidance of any sort, these technologies are likely to get welded into education systems in unplanned ways with uncertain implications and possible unintended consequences. Ideally, there will be serious reflection about their place and role, and then action to realize this vision. We cannot simply ignore the short- and medium-term implications of these technologies for safety, knowledge diversity, equity, and inclusion. (UNESCO, 2023, para 8).

In a study of 24 national AI policy strategies, Schiff (2021), found that AI in education was largely "absent" from policy discussions, "while the instrumental value of education in supporting an AI-ready workforce and training more AI experts is overwhelmingly prioritized" (p. 527). In another study of 100 elite universities (Caulfield, 2023), almost a third were found to have no clear guidance or policies; half allowed individual instructors to decide their own policy; almost 20 percent banned generative AI unless an individual instructor had a different policy; and a very small minority allowed the tools as long as there was adequate citation, unless the individual instructor prohibited its use. Several elite universities in the UK, including Oxford and Cambridge, have decided to ban the use of generative AI in their academic programs. However, universities are frequently revising their policies or warning they will be doing so at some point.

Generative AI is something that is only going to get more pervasive in education, as well as utilized more by students. Much of the literature and media discussion calls for policy design that involves all stakeholders in education, including students (Sullivan et al., 2023). Some researchers and scholars take a positive attitude toward the inevitable utilization of generative AI. Ferrara (2023) cautions that users need to be "aware of [AI] limitations and take them into account when making decisions" (p. 8). Schiff (2021) argues that "effective policy and careful consideration of ethics are inextricably linked" (p. 527).

Conversations on the front: Instructor response in the era of ChatGPT

The following section reports on informal conversations with 12 educators regarding the use of generative AI in the university context. All are presently teaching in universities in Canada, the US, the UK, or in Japan. Many of their concerns mirrored the concerns being raised in media and scholarship, especially academic integrity and increased workload.

In our conversations, everyone was convinced they would have to adjust their pedagogy, especially the assignments and assessment methods. Written reports and research papers were viewed as no longer being a viable

form of assessment in the generative AI era. More in-class assessment using off-line methods such as quizzes, tests, and timed-exercises were being considered; the key being off-line since generative AI can produce targeted, sophisticated language in seconds with adequate prompts. It was mentioned by a Canadian colleague that re-conceptualizing assignments now requires skills from professors that most have yet to acquire, that is, designing unique features that would not be easily understood or answered by generative AI. One colleague designs what they consider to be feminist assignments that incorporate self-reflection. They felt that this might make it more difficult for students to use AI in those assignments; however, they were not entirely sure this would work since the capabilities of ChatGPT were not fully understood and the software was developing extremely quickly. It was generally anticipated that students will increasingly utilize ChatGPT, especially when they realize it is difficult for instructors to detect it.

They all felt their workload was going to increase because of having to adjust their pedagogy and evaluation methods, designing new types of learning assignments and testing, as well as having to check whether a student had used AI to produce their own work. One educator mentioned that they have already suspected AI usage in student assignments and decided not to confront the students because they were not confident in the suspicion, but also because of the lack of direction from the university on their AI policy, so they not sure how to proceed.

One educator doubted whether plagiarism detectors would be able to detect AI generated text. They said that even Turnitin was not totally reliable; the "originality score" was created by comparing student writing to a large database of existing work by searching for identical words and phrases. However, because ChatGPT creates "original" text, they were not confident it would be helpful as the AIs become increasingly more sophisticated.

All of them said they were going to discourage students from using AI and have in-class discussions about academic integrity; however, they were concerned about the time that it would take away from the time needed to teach the actual course materials. Even though they were all teaching at different universities, they said their university had published a very general statement to encourage students to use AI "wisely". It was felt that most students would agree with this in principle but resort to using AI "unethically" at least some of the time, especially when feeling under pressure.

This concern was more strongly expressed by the colleagues teaching in Japanese universities. Their experience has been that in general, citation and referencing are not strictly taught or required in many courses. The use of plagiarism detectors by students is not mandatory in any of their workplaces, nor do students have to sign any pledge of originality. In one of the conversations, the colleague lamented that although their university did have policy to discourage plagiarism, there was no mechanism to deal with students who did plagiarize other than with warnings. Educators teaching in the Canadian context felt that plagiarism was adequately dealt with in their institutions but were not confident that AI detection was going to be as reliable and as easy to use. They also mentioned that their universities were starting discussions with student committees to gain more insight into viable strategies beyond policing. As one educator said, in talking about ethical usage of AI in the classroom, you'll have the students who look perplexed, those who find it amusing, and those who nod their heads in agreement.

One educator felt concerns about generative AI were out of touch with the new reality and that sourcing and assessing validity of information was something that would soon be unnecessary. New skills would have to be developed and taught and old ideas of ethics and integrity would have to be reassessed.

Conclusion and future research

This note advances a methodological approach to academic instruction that addresses bias detection, as well as how

generative AI influences both critical thinking skill acquisition and the need for enhanced skills in internet and information literacy. In support of faculty and students, university curricula can offer credited courses dedicated to best practices of AI, ethical issues, and other potential impacts of generative AI, rather than offloading the responsibility and decision-making to individual instructors.

This research note has introduced some of the concerns associated with the availability of generative AI used in universities, especially in relation to the use of it by students and the impact on teaching. The note also reported on conversations with colleagues to shed some light on how educators are responding to the advent of student usage of generative AI and LLMs. Issues of most concern presently are bias in generative AI and academic integrity. Conversations also revealed concerns about the lack of both direction and support by universities as well as the anticipated increased workload due to the necessary pedagogical changes to deal with academic integrity. All in all, there was much skepticism and worry expressed in these conversations, with more questions raised than answers; questions that need to be researched. The attention to bias in AI and the necessity of training in how to ethically use it as well as the need for increased and robust training and practice in critical thinking are becoming more evident.

Endnote: As of Sept. 2023, OpenAI has announced that ChatGPT can now access and draw from all content, including current content, on the internet.

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