

AI and Online Education: A changing landscape or a sea change?

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Abstract

Distance learning has a long history in the United States starting with correspondence courses. These relied on the postal service to deliver material to students who then returned assignments similarly via mail. Now, distance education has morphed into online education. This is where students and teachers are physically separated but connected by technology. Initial advantages were the quick distribution and collection of educational material digitally.

Online materials have become more robust with links to videos, current news and all sorts of information available on the World Wide Web. Assignments can be more innovative: discussion posts and replies based on real-time events, zoom discussions, research assignments as well as quizzes and individualized problem sets. So, all may be good.

However, beyond understanding is the human socialization aspect. Schools and teachers help youngsters observe and experience relationships to integrate themselves into larger groups—whether positive or negative. They learn to adapt. They learn what is acceptable and they learn what is not. Was this what Hannah Arendt meant by the human condition? (Arendt, 1989).

Just knowing stuff is useless. Anyone can use technology to look up answers, but faculty should be training the brains of youngsters...like athletes train their muscles. Brain training is an exceptional skill. Students should be conversing and sharing ideas about a concept. That is the point of schooling: to think and to problem-solve. Knowledge without understanding is difficult to accomplish with AI unless personalizing education involves human interaction, too. How can real learning be confirmed with an AI-assisted education. Is this a changing landscape or a sea of change?

This paper will look at the trend of online education with the introduction of artificial intelligence so far through an analysis of online education statistics and learning integrity.

Keywords: Academic Integrity, Artificial Intelligence, Online Education, Plagiarism,

I. Enter Artificial Intelligence (AI)

Answers for stock questions are easily found on the web today. Even unusual questions can be answered by AI. Professors can address this by designing discussion prompts that require critical analysis of nuanced ideas as well as personal reflection to support the answer. Disturbingly, AI can address these prompts through sites such as ChatGPT. In response to an imaginative discussion prompt, ChatGPT may answer better than perhaps a professor could. Of course, this brings up the question of how professors know who actually is taking the course or turning in assignments: a relative, co-worker or paid respondent? Then we must ask also who is gaining credentials that may not reflect actual skills?

However, a lot of personalized learning touted as an advantage of AI has been lost. Researchers have criticized these aspects arguing that “when it comes to soft skills such as empathy, communication, collaboration, innovation, critical thinking, problem solving, and leadership, AI is not as robust as human cognitive ability” (Ma and Siau, 2018). Media Ecologist Neil Postman asked whether computers “carrying the banner of private learning...defeat communal speech and raise egocentrism to the status of a virtue” (1993).

II. Early Distance Learning Morphs Into Online Education

First established in the late 1800s at the University of Chicago, distance learning began as a correspondence course relying on the postal service to deliver a teacher’s material to students who similarly returned assignments via mail (“—History...”; Kentnor, 2015, p. 4 [22]). Over time, technological advancements like the radio and television were utilized to deliver educational content to remote learners. When educational radio failed to evolve, progressive educators turned to television, particularly since 99 percent of all U.S. households had at least one television set by 1985 indicated in Nielson

Reports (Moeller, 1996) However, distance education subsequently embraced computers to become what is termed online education.

In the late 20th century, the development of the World Wide Web in 1993 permitted public access to the internet (Ring, 2023). The additional proliferation of personal computers by the late 1980s, led to the widespread adoption of online distance learning. It made education accessible to a broader and even global audience. Education schools and colleges added technology components and specialized degrees not only to deliver their offerings, but also to promote technology in education. In 1998, wikis opened up the web—becoming mainstream and allowing a web page to be edited jointly by anyone (Weller, 2018). Shortly after, blogs were added subsequently to foster conversations.

III. Trends in Online Education

Today, distance learning continues to evolve with the integration of advanced technologies, such as virtual classrooms, video conferencing, and interactive online platforms. This shift has allowed for more engaging learning experiences, breaking down geographical barriers, and advancing education accessibility. “Delivering courses online has already lowered costs, reduced inequality and improved graduation rates. The AI revolution could, in turn, make online education smarter, faster, and cheaper still” (—“Artificial...,” 2024).

The ubiquity of online learning was captured by the following statistic back in 2012. About 6.7 million of the 20.6 million U.S. students in higher education had enrolled in online courses. That represented roughly one-third or 32.5 percent according to Allen and Seaman (2013). Some of these students may have taken only a course or two, but others may have taken a fully online degree. The University of Phoenix in 1989 was one of the first institutions to present fully online degree offerings (Kentnor, 2015, p. 10 [28]).

Those numbers dramatically increased with the Covid-19 pandemic in Fall 2020, when about 75 percent of students enrolled in an online course, almost doubling the number from Fall 2019 (Hamilton, 31 May 2024). However, by 2022, only half of college students enrolled in an online class. This added up to around 10 million college students, with most students noted as undergraduates. Slightly less than half of these took all their courses online (Hamilton). It appears that in the post-Covid 19 timeframe many students returned to in-class learning directly with professors and other students.

Nonetheless, distance learning still continues to grow, with the proliferation of massive open online courses (MOOCS) using online learning management systems like Moodle, Blackboard, Canvas, and others. Institutions and organizations worldwide are leveraging technology to offer a diverse range of courses and programs to learners of all ages and backgrounds. This helps offset institutional costs and technology investments. Additionally, the flexibility, convenience, and scalability of distance learning have contributed to its far-reaching adoption and continual growth in the field of education.

IV. Pros and Cons of Distance Learning

One of the benefits of distance learning is flexibility. Students can determine where and when to study. This allows individuals to balance their education with work, family, or other commitments. Geographical barriers are removed. Students from different locations can access high-quality education without the need to travel. An example is a student, who graduated in Philadelphia, Pa., but then moved to North Carolina for employment and immediately started his M.B.A. online. When he was transferred to China, he did not miss a beat. He continued his courses online from there.

Distance learning can be more affordable than traditional on-campus programs. This is true when it eliminates costs associated with commuting and housing. In the past 20 years, “tuition and fees increased an average of 144 percent at private universities and 212 percent at public in-state universities” (Venable, 23 March 2023). Online courses require robust learning management systems, help desks, IT support, academic advising and career counseling. Public colleges offered online degrees at \$31,165 less than their in-person ones (Venable). While private schools do not mark up their online courses as much as public schools, the costs to attend private colleges in 2019 were significantly higher. Their online offerings were significantly less than their in-person courses on average at \$60,593 versus \$185,252. Private institutions offered fewer online programs as well (Venable).

Other than cost differences, there is the advantage that students online often can proceed through materials at their own pace. This somewhat personalizes the learning experience by accommodating different student learning capabilities or lifestyles. Online courses particularly benefit working adults with families. This may describe many students and working professionals either with families or who seek career advancement or change. Online platforms can provide a wealth of multimedia resources, interactive tools, and virtual simulations to enhance learning. These can enrich a course, but also can introduce disconcerting gaps when some sites close down or when others become outdated.

Some of the disadvantages of distance learning include the lack of real face-to-face interaction with instructors and peers. This minimizes social and communication skills, even though a hand raised icon can be implemented. Questions or comments may be queued, when learners often are on mute to reduce noise interference. On the other hand, one of the benefits of in-person learning is the social interaction. Sometimes there is unexpected laughter, folly or silly comments from peers who may become friends. Faculty enjoy seeing faces and finding the uniqueness of each student and their individual response to discussions.

Lack of interaction often occurs when courses are asynchronous. This instruction uses “indirect methods like prerecorded lessons, email, and computer-based evaluations, such as multiple-choice AI quizzes” (van Heerden, 23 February 2023). Similar to a large lecture hall, these courses can accommodate many students. However, even for live or synchronous instruction, like group seminars or discussion boards, “students find online learning dissatisfying with its lack of community” (van Heerden).

Another challenge is that students require strong self-motivation and time management skills to stay organized and on track with their online studies. Connectivity problems, software glitches, and other technical issues not only can disrupt the learning experience, but also can sour the student completely if frustrations persist. Some students may feel isolated or disconnected from the learning community without the physical presence of classmates and instructors.

Conscientious instructors will try to keep up a personal correspondence with their individual students. However, they cannot know to what extent students read such comments and internalize the communication, rather than simply registering the grade. Immediate feedback and clarification on concepts certainly is challenging in a distance learning environment. Just as students have various demands on their time, so do instructors. Professors present at academic conferences which entail travel and perhaps different time zones. There are professional demands with scholastic publication deadlines as well as personal events. Work with online courses often is intensive for communicative and conscientious professors.

On the one hand, online learning has continued to promise individualized learning and assessments. However, with Covid 19 lockdowns beginning in March 2020, many college professors did not use their university learning shelves to post their artifacts or did not even collect artifacts or were not adept at online skills or options. Only 46 percent of U.S. professors in 2019 had taught an online course according to a survey published jointly by Inside Higher Ed and Gallup (reported in Irvine, 1 November 2019). Faculty were resistant to learning management systems and online teaching, preferring in-class modes.

While the pandemic pushed many students into online learning, “public attention [in the U.S.] largely focused on the learning losses of K-12 students...” (Cellini, 13 Augst 2021). However, virtual learning impacted student outcomes in college as well. “Online coursework generally yielded worse student performance than in-person coursework” (Cellini), according to some studies. The negatives affected less-academically prepared students and course completion also was an issue. A compelling study conducted at West Point by economic professors, who randomly assigned students to in-person and online courses taught by the same professors, saw final grades lower by about 0.2 standard deviations (Cellini).

Additionally, some students suggested that they had trouble concentrating when they were online and that they were less connected to both their peers and instructors compared to their in-person experiences (Cellini). Online can be a lonely experience. This can negatively affect students, who can become less engaged or motivated. “The lack of interaction,” according to van Heerden, “can increase vulnerability to mental issues, such as depression, anxiety and stress” (23 February 2024).

These are some of the reasons why both the pros and cons must be weighed when considering distance learning as an option for education and why there is considerable discussion around how artificial intelligence or AI can support distance learning.

V. AI in Education

How can Artificial Intelligence support distance learning? AI can analyze student strengths and weaknesses, then tailor course content to specific needs. This means AI can create personalized study schedules based on pace of learning, availability, and deadlines. Tools like chatbots and virtual tutors can provide instant help and clarification on topics that are challenging. Unlike human tutors, AI-based systems are available around the clock, providing support when needed (ChatGPT). “The ultimate goal of AI is to great machines that can think, learn and act autonomously, with capabilities approaching or exceeding human-level intelligence in specific domains” (Meyers, 19 March 2024).

To reinforce learning, AI can recommend articles, videos, and other resources and can suggest practice problems and add quizzes. AI can track performance throughout a course, providing insights and highlighting areas that need more focus. Automated grading systems can provide instant feedback on assignments and quizzes, helping students learn from mistakes quickly. AI can send reminders about upcoming deadlines, scheduled study sessions, and important milestones, to stay on track. AI can suggest ways to optimize study time, such as focusing on high-impact activities and minimizing distractions (ChatGPT). All good.

AI can facilitate interactive and immersive learning experiences through simulations and virtual labs. It draws from “good training data for it to learn from,” according to Stephen Shankland at CNET (19 February 2023). This can make complex concepts easier to understand. Incorporating game-like elements, AI can make learning more engaging and motivating (ChatGPT). In many ways, AI can be thought of as a readily available and an “endless offering of information” (Meyers, 12 March 2024).

This potential to augment learning through artificial intelligence is an area where traditional professors may find inspiration and assistance. Unfortunately, there is tremendous potential to enter a prompt and have AI complete assignments. A recent study found that cheating during Covid increased “because there was an opportunity to do so” (Newton & Essex, 2023). However, recent studies of how much students leaned on AI to complete their assignments showed that “the number remained flat since the advent of ChatGPT” (Prothero, 25 April 2024). “Before ChatGPT, about 60 to 70 percent of students admitted to cheating, but that number is still the same” (Prothero).

VI. AI Detection

Tools like Turnitin and Grammarly check for copied content and also identify patterns indicative of AI-generated text. These tools compare student submissions against a vast database of existing work. Specialized software, such as GPTZero, was designed to detect AI-generated content by analyzing writing style, syntax, and other markers that differentiated human writing from AI-produced text.

Since AI writing lacks the minor errors or idiosyncrasies typical in human writing, professors familiar with a student's writing style often can spot inconsistencies. Sudden changes in vocabulary, tone, or complexity also raised suspicions. To establish a baseline, professors could ask students to introduce themselves and write about goals, hobbies and interests. Rarely would a student use AI to write about their likes and dislikes. This way, professors can get a sense of who writes with sophistication, conjugates verbs or when English may be a second language. These initial communications certainly could indicate a level of competency that subsequently could be compared with later submissions that present dissimilar flawless prose and when AI may be the suspected writer.

Discussion prompts should request that students reflect on personal experience related to the academic concept. AI can do this but perhaps not well. It is challenging but important to design assignments that require personal reflection, creative problem-solving, or application of concepts in ways that are challenging for AI to reproduce accurately. Some institutions may use digital forensics to examine the metadata of submitted documents, looking for signs of AI tool usage or unusual editing patterns however this may require costly software.

For an in-person class, professors could ask students to explain or elaborate on their submitted work. If a student cannot confidently discuss or defend their work, it may indicate reliance on AI. Alternatively, professors can request iterations of written work from outlines, early drafts and editing interventions. While AI can be a helpful tool for studying and generating ideas, this technology should be employed ethically and ensure that the work submitted is genuine.

VII. Challenges and Concerns

It is key to design assignments that require personal reflection, creative problem-solving, or application of concepts in ways that are challenging for AI to reproduce accurately. Use of digital forensics to examine the metadata of submitted documents, looking for signs of AI tool usage or unusual editing patterns if available from the teaching institution are important. While AI can be a helpful tool for studying and generating ideas, it is important to use it ethically and ensure that the work submitted is appropriate.

AI can make cheating easier in several ways, primarily by providing tools that can generate or complete academic work quickly and convincingly. Here are some ways AI facilitates cheating. AI-powered tools like GPT-3 and ChatGPT can produce essays on a wide range of topics with minimal input from the user. This makes it easy for students to submit assignments that they did not write themselves. AI-driven paraphrasing tools can rewrite existing text to avoid plagiarism detection, making it harder for educators to identify copied content.

AI apps like Photomath and WolframAlpha can solve complex equations and provide step-by-step solutions. Students can use these tools to complete assignments without understanding the math. Tools like GitHub Copilot can generate code snippets or entire programs, which students might submit as their own work in computer science courses.

AI translation tools like Google Translate can help students quickly translate and rephrase foreign language assignments. This potentially bypasses language learning objectives. AI chatbots can provide instant answers to questions, allowing students to complete assignments or exams without putting in the necessary study time.

Educating students about the ethical use of AI and the consequences of academic dishonesty can discourage misuse. In the United States, there is ample education on information literacy and what constitutes plagiarism. Not all students have the same background. Faced with language hurdles, some may fall prey to AI assistance that is not appropriate. Clear guidance must be delivered by instructors. In addition, some programs or courses require signed declarations from students that they present their own work. Evidence suggests that this is ignored. Perhaps, the strongest argument is to “critically engage students with the broader conversation about educational fairness to develop them as critical thinkers and future leaders in their chosen field” (Lee and Fanguy, 2022).

VIII. How AI Detection Tools Work

AI-generated content often follows certain patterns in syntax and grammar that differ from human writing. Detection tools analyze these patterns to identify anomalies. AI text may use a more uniform vocabulary and lack the idiosyncrasies of human writing. Tools examine the consistency and variety of word choice and sentence structure (ChatGPT).

N-grams is a statistical test that involves breaking down text into sequences of words or characters (n-grams) and analyzing the frequency and distribution. AI-generated text often shows different n-gram patterns compared to human text. AI detection tools can measure the entropy or unpredictability of text. AI-generated content tends to have lower entropy due to more predictable patterns (ChatGPT).

Detection tools use machine learning models trained on large datasets of human-written and AI-generated text. These models learn to distinguish between the two based on various features. Advanced detection tools may use neural networks to analyze text at a deeper level, identifying subtle differences that simpler models might miss. Some tools monitor how users interact with writing aids, such as how quickly text is generated or edited. Rapid production of polished text can be a red flag (ChatGPT).

IX. Popular AI Detection Tools

Turnitin is a widely used plagiarism detection tool that has incorporated AI detection capabilities. It analyzes submissions for signs of AI-generated content by examining writing patterns and comparing them to known AI outputs. Used by educational institutions to ensure academic integrity in student submissions. (ChatGPT). Over the past year, Turnitin’s AI detection tool found that 11 percent of assignments had at least 20 percent AI use while 3 percent were generated by mostly AI or at least 80 percent (Prothero, 2024). These numbers are fairly consistent with earlier studies and do not indicate a rise in cheating. “For years before the release of ChatGPT, between 60 and 70 percent of students admitted to cheating, and that has remained the same in the 2023 surveys” (Prothero, 2024).

GPTZero is specifically designed to detect text generated by AI models like GPT-3. It uses various linguistic and statistical methods to identify non-human writing. Other detection programs include Copyleaks, Originality.ai, Sapling, Winston AI, Copyleaks, Crossplag, Scribbr, quetext, DupliChecker and more. While these detection programs are proliferating so are anti-detection programs such as HIX Bypass that claims to make AI undetectable “for free” (Bypass, 2024)

No tool is perfect. There can be false positives, which are human text flagged as AI-generated. Then there are the false negatives, which are AI-generated text not detected. As AI models become more sophisticated, detection tools must be continuously updated to keep up with new capabilities. Most tools found “three types of plagiarism: word for word, paraphrased passages and lifted ideas without citing sources” (Shankland, 19 February 2023).

X. AI is a Big Business

AI is truly a big business that already has attracted the likes of Google, Microsoft and Apple. Since its public launch in 2022 (Unlu, 20 March 2024), popular Chatbots include GPT-3, Google’s, Facebook’s, Microsoft’s, Amazon’s Lex, IBM Watson, and open-source ones (Meyers, 12 March 2024). Investments in the billions of dollars are betting that AI will pilot digital lives in the future (Shankland, 19 February 2023). However, according to different sources noted Shankland, “it

[AI] has been plagued with problems like factual errors and unhinged conversations” (19 February 2023). In fact, Software developers on StackOverflow are banned from using ChatGPT because of its low correct answer rate.

While AI essays sound more and more student-like, its use and results in proficiency exams for licensing and certifications have been quite poor. Google programmer Kenneth Goodman tried ChatGPT on a number of exams:

It scored 70 percent on the U.S. Medical Licensing Examination, ...70 percent on a bar exam for lawyers, ...78 percent on N.Y. state’s high school chemistry exam’s multiple-choice section, and ranked in the 40th percentile on the Law School Admission Test. (Shankland)

XI. Conclusion

AI detection tools play a crucial role in maintaining academic integrity by identifying AI-generated content. While these tools are improving continually, it is essential to use them in conjunction with other strategies to ensure comprehensive detection and maintain academic standards. It still cannot handle observability data (Unlu, 20 March 2024). Additionally, though an AI bot “can answer questions, write essays, summarize documents and write software, it does not know what is true” (Shankland, 19 February 2023). This is a major flaw, however, that should concern us all.

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