Artificial Intelligence in Higher Education and Academic Libraries: A Literature Review

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Abstract

This literature review explores the benefits and challenges of using AI in academic libraries. AI has the potential to make library operations more efficient and assist students with writing but can also wreak havoc in the academic library setting, leading to plagiarism and the spread of misinformation. The author describes three types of AI; how AI can assist librarians now and in the near future; AI as a disruptor in higher education; and how to mitigate some of the negative aspects of AI. There is often resistance or fear when new tools are introduced to society; however, it is important for academic librarians to understand and learn how to use these systems to their benefit.

Article Type: Literature review

Introduction

According to the Association of College and Research Libraries' (ACRL) *2023 Environmental Scan*, one of the key themes and trends for higher education is "emerging technologies," which include artificial intelligence (AI). The *2023 Environmental Scan* notes the rapid growth and increased investment in AI technologies, such as ChatGPT and Dall-E, and cites an estimate contained in a report from *The Digital News Project* that "automated or semi-automated media will produce '25% of all internet data' in the next few years" (Newman, 2023, as cited in ACRL, pp. 37, 39). Any new learning technology or technological product, from the printing press to the e-book, has been met with a mix of excitement, optimism, fear, and suspicion. AI has the power to make academic library operations more efficient and can assist students in content creation. At the same time, AI has the power to severely disrupt the work of a university, leading to plagiarism and potentially the dissemination of disinformation. The *2023 Environmental Scan* cites a positive example of ChatGPT being used to improve students' writing but also raises the disturbing prospect of the tool providing incorrect information or completely inventing citations and statistics (p. 38). Academic librarians are in a unique position to mitigate the dangers of the use of AI in higher education. AI has already made itself comfortable in our homes in the form of virtual assistants—every day, for example, Amazon's Alexa tells users the weather, turns their TVs on and off, and organizes their grocery shopping lists, and that just scratches the surface of "her" abilities. Artificial intelligence is here to stay, but are we prepared to coexist with it?

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What is Artificial Intelligence?

When we discuss AI, some people may be thinking about the virtual assistants on our phones who tell us where the nearest ice cream shop is or sweet, sentient robots, as seen in Steven Spielberg's film *A.I. Artificial Intelligence,* or killer machines bent on human destruction, as seen in the *Terminator* films. Pop culture and science fiction inform our attitudes towards AI as well as our everyday use of the technology. But what are the capabilities of the AI that exists today versus philosophical speculation about what *could* happen in the future?

In "AI and Libraries: Trends and Projections," A. A. Oyelude (2021) describes three types of artificial intelligence:

> 1) Artificial Narrow Intelligence (ANI), which is "weak AI with a narrow range of abilities," used in facial recognition, speech recognition, virtual assistants, and driving. This is the only AI extant at the time of writing (p. 1).
>
> 2) Artificial General Intelligence (AGI), which is "strong AI with the ability to mimic human intelligence or behaviors to solve any problem." Researchers are currently working to improve AI systems to better mimic a human's ability to learn (p. 1).
>
> 3) Artificial Superintelligence (ASI), which is "the hypothetical AI that surpasses human intelligence and abilities" (p. 1). ASI does not yet exist but is feared by many, including the late theoretical physicist, Professor Stephen Hawking, who believed that ASI has the potential to destroy humanity because we would be unable to compete with it or control it (Cellan-Jones, 2014).

Artificial Narrow Intelligence (ANI)

ANI is well-entrenched in society, and we may not even recognize this AI when we encounter it. Even a simple Google search involves sending data to an AI system called RankBrain, which helps to sort the search results (Johnson, 2018, p. 15). Hawking himself found a basic form of AI useful when communicating due to his motor neurone disease, amyotrophic lateral sclerosis (ALS) (Cellan-Jones, 2014).

Artificial General Intelligence (AGI)

In "AGI is Ready to Emerge (Along with the Risks It Will Bring)," Charles Simon (2022) claims that AGI will emerge in the next decade, bringing with it AI systems that can "understand, learn, and respond as humans do" (para. 1). Simon describes both short-term consequences of this development (e.g., job displacement) and long-term risks, such as the impact of AGI on our economy, military weapons, and competition for resources. Simon declares that "AGI is inevitable because people want its capabilities" (para. 12).

In "One Small Step for Generative AI, One Giant Leap for AGI: A Complete Survey on ChatGPT in AIGC Era," Zhang et. al. (2023) discuss how ChatGPT, a generative AI system that is currently the focus of much media attention, is bringing us closer to the age of AGI. The authors believe that pairing ChatGPT with other AI-generated content (AIGC) tools or evolving ChatGPT to the point where it can produce AIGC without any other external tools will significantly contribute to the development of AGI. The authors note that due to the existential risks to humanity posed by advanced AI,

> the Future of Life Institute has called on all AI labs to pause giant AI experiments on the training of AI systems more powerful than GPT-4. and the number of [sic] signing this public letter has exceeded a thousand, including Yoshua Bengio, Stuart Russel, Elon Musk, etc. (p. 21)

Artificial Super Intelligence (ASI)

In "Countering Superintelligence Misinformation," S. D. Baum (2018) cautions against the proliferation of misinformation on the topic of artificial superintelligence (ASI) that may be disseminated by individuals or groups with a particular agenda because our speculation on this technology influences decision-makers now.

Baum (2018) points out the difficulty of identifying superintelligence misinformation because it is a "possible future technology that may be substantially different from anything that currently exists, and because it is the subject of a relatively small amount of study" (p. 3).

Although the most advanced forms of AI do not yet exist, some believe that the evolution of AI towards AGI or ASI is inevitable with possibly catastrophic consequences. However, even without sentient robots taking over the world, the AI systems we currently have are powerful tools that could be used for good or ill in higher education, and their abilities are advancing rapidly.

Current Uses of AI in Academic Libraries

AI systems are already widely used in academic libraries, and we likely take them for granted as administrative or research tools. How can we further adapt our use of this technology to assist librarians, students, faculty, and researchers and thus meet the mission, vision, and goals of the library and the wider university community?

Oyelude (2021) noted that AI systems such as speech and face recognition, virtual assistants, and image analysis are frequently used in libraries. AI has proven useful for "content indexing, document mapping, content mapping in paper citation, and content summarization"; some libraries have also implemented robots for shelving tasks (pp. 1–2). Oyelude (2021) claims that other library functions, such as cataloging, reference work, collection development, etc., could be handled effectively by AI.

In "Libraries in the Age of Artificial Intelligence," B. Johnson (2018) compares the birth of AI to the invention of light bulbs and photography—at first the applications of these technologies may have seemed novel or crude, but eventually they fundamentally changed society. Johnson maintains that the effects of AI will be equally profound but does not believe that the technology spells doom for libraries or universities. Although these systems are privately owned and proprietary, public institutions can help "provide open source AI applications that allow for more transparency and more control" (p. 15). Open-source AI, unlike Alexa or Siri, will allow researchers to access information without the inherent corporate bias.

In "Future of Artificial Intelligence in Libraries," H. E. Pence (2022) emphasizes the use of AI to allow library patrons to use library sources without entering the physical space (p. 133). Pence argues that artificial intelligence agents, as a complement to "Big Data," can help users identify the most relevant data for their needs. AI can create more accurate reference lists by searching across large databases of relevant literature, although the AI system is subject to the same biases that affect the scientific literature itself (Pence, 2022).

In June of 2023, OCLC announced that it was beta testing AI-generated book recommendations on WorldCat.org and WorldCat Find, the mobile app extension for WorldCat.org (Murphy, 2023). Users can obtain print and e-book recommendations and learn where these items can be found in nearby libraries. At the time of writing, these recommendations were available in English for U.S. and Canadian users with a WorldCat.org account. Bob Murphy writes,

> The new feature uses artificial intelligence to help WorldCat.org users identify books in library collections represented in WorldCat related to the author and title of a known book. Users of the WorldCat Find app can also find books based on subject. In both cases, no personal information, including search history, is used to determine recommendations. (para. 5)

Attendees at the 2023 Annual ALA Conference in Chicago were encouraged to visit the OCLC booth to see a demonstration of this new feature.

Chatbots in the Academic Library

Several articles emphasize the benefits of using chatbots in academic libraries. In "Chatbot: An Intelligent Tool for Libraries," Sanji et al. (2022) advocate for the use of chatbots as reference

tools. Chatbots that can improve their conversational skills provide "a convenient and anxiety-free environment for interacting and searching for information, especially for undergraduate students" (p. 18). The purpose of the use of reference chatbots is not to replace reference librarians but to make library operations more effective and efficient. By providing answers to ready reference questions and offering general guidance before referring a user to a reference librarian, the reference librarian's time is freed up. An added benefit is that chatbots are not frustrated by rude users (Sanji et al., 2022)!

In "Imagining the Use of Intelligent Agents and Artificial Intelligence in Academic Law Libraries," N. B. Talley (2016) advocates for the use of intelligent technology in law school libraries. Libraries employ intelligent agents that use components of artificial intelligence (i.e., automated reasoning and logical searching) to assist users. Talley also discusses the implementation of chatbots, which use natural language processing (NLP) to communicate with users. Talley (2016) recommends that academic law libraries incorporate intelligent agents and artificial intelligence for reference, information literacy instruction, and circulation.

An interesting positive consequence of the use of library chatbots is noted by L. M. Brown in "Gendered Artificial Intelligence in Libraries: Opportunities to Deconstruct Sexism and Gender Binarism" (2022). Brown examines how digital assistants (often given feminine names, voices, and "personalities") reflect a patriarchal ideology. Brown studied the presence of chatbots within the websites of academic libraries of the largest 160 colleges and universities in the United States (with an undergraduate enrollment of at least 20,000). Brown notes the relatively small number of digital assistants used in libraries and observes that the majority of these chatbots are genderless or gender-ambiguous, such as "Bizzy" of the University of Oklahoma Libraries. This finding is presented as a positive sign that future AI systems will be more feminist and gender inclusive. Librarians who implement virtual assistants or chatbots can intentionally buck the trend of feminizing these AI systems and therefore subvert the perception of "assistants" as exclusively feminine.

As Pence (2002) observes, library patrons encounter artificial intelligence every time they use a search engine. AI has the potential to assist librarians with many major job responsibilities—from cataloging to literacy instruction to reshelving misplaced books. By implementing chatbots to answer patrons' simpler reference questions, librarians are free to tackle more complicated research queries. Chatbots also present libraries with the opportunity to demonstrate gender inclusivity by giving chatbots gender-neutral names and "personalities"; this practice avoids relegating feminine characteristics to a subordinate "assistant" role. Students with library anxiety may also find chatbots more approachable. Just as librarians embraced Online Public Access Catalogs (OPACs) over card catalog cabinets, so too will staff and users enjoy the conveniences of AI systems in their libraries.

AI Opportunities

AI Systems as Research Assistants and Writing Tutors

ChatGPT, created by OpenAI, debuted in late November 2022, and researchers, faculty, and journalists are only beginning to grapple with its implications—from its effects on academic integrity to the unnervingly human quality of some of its responses. Microsoft and Google are also developing their own generative chatbots (CoPilot and Gemini, respectively) and are currently allowing users to access them (Shakir, 2023).

In "ChatGPT: Implications for Academic Libraries," Cox and Tzoc (2023) describe the program as an "LLM (large language model) tool that uses deep learning techniques to generate text in response to questions posed to it. It can generate essays, email, song lyrics, recipes, computer code, webpages, even games and medical diagnoses" (p. 99). ChatGPT can

replace current chatbots at academic libraries for 24/7 reference help. It can "create syllabi, sample lesson plans, and the text for a LibGuide in seconds" (Cox & Tzoc, 2023, p. 100) It can also provide tutoring support to students and allegedly write open educational resources (OER) textbooks in hours (Cox & Tzoc, 2023).

In "Why I'm not Scared of ChatGPT," Christopher Grobe (2023) claims that "if we treat learning (not distinction) as the goal of education, then generative AI looks more like an opportunity than a threat" (para. 4). Grobe believes that ChatGPT could be used effectively in the classroom as a writing instruction tool. Despite ChatGPT's powerful generative abilities, it cannot "cite and analyze evidence, limit claims, create logical links between claims, arrange those claims into a hierarchy of significance" (Grobe, 2023, para. 12). Students must perform that work as they engage with the tool and may improve their writing and critical thinking skills as a result.

In a guest post published on *The Scholarly Kitchen,* entitled "Academic Publishers are Missing the Point on ChatGPT," Avi Staiman (2023) points out another potential benefit of the use of ChatGPT: the ability to level the playing field in academic publishing for English as an Additional Language (EAL) authors. ChatGPT can be used by these authors to better convey their ideas in English, which will "improve the clarity of their arguments, free up their time to focus more on research, increase speed to publication, and gain confidence in their work" (Staiman, 2023, para. 2).

The tools we use now to research, compose, and calculate in our daily lives—computers, calculators, the internet—were once feared as crutches that would undo our ability to memorize and work as we did in more analog times. We eventually mastered and adapted our use of these tools, saving time and effort on lower-level tasks. For example, Microsoft's spelling and grammar tools in Word have always been unreliable, and it is up to the user to decide if correction is needed. Scholars know that it is preferable to cite academic or primary sources in their writing, but Wikipedia and Google can be useful for preliminary searches or finding relevant resources. ChatGPT may well be another such tool that will have appropriate and inappropriate uses for students and researchers.

AI Challenges

Privacy and Legal Issues

AI systems can greatly assist our objectives in higher education and academic libraries, but we must not be blind to the potential disadvantages and dangers of these tools. These dangers include privacy breaches and legal liabilities; the replacement of human library employees; ethical conundrums involving academic integrity and plagiarism; and the dissemination of disinformation, already a significant problem in our social media age.

Talley (2016) lists some drawbacks of the use of AI and intelligent agents in academic law libraries, including potential unemployment, the cost of such technologies, and privacy and legal issues. Law libraries must ensure that patrons do not mistake intelligent agent responses as legal advice. Despite these concerns, Talley (2016) recommends that academic law librarians embrace this technology and promote it to the rest of the law school community.

In "2018: A Legal Research Odyssey: Artificial Intelligence as Disruptor," J. J. Baker (2018) argues that even though artificial intelligence has made legal research more efficient, law students must still practice sound legal research methods. Legal research cannot currently be automated because it is not routine or repetitive. Lawyers using algorithms to perform legal research must understand that there is no transparency regarding how the algorithms generate results, and lawyers cannot vet the information they receive; lawyers could therefore be vulnerable to malpractice claims. Developers of legal algorithms for non-attorneys could be liable for unauthorized practice of law if their software creates legal documents or offers legal advice. Baker (2018) claims that law librarians are in the

best position to teach law students about the pros and cons of using algorithms in law research.

In "Is Technology Getting the Better of Us? Welcome to the Algorithmic Society," N. K. Herther (2020) highlights the privacy and freedom concerns presented by AI and "unregulated Big Data" (p. 23). Herther notes that the benefits of the "algorithmic society" do not extend to those who lack access to the digital world. Herther is concerned that AI is being used to identify people who would prefer to remain anonymous, to profile people based upon population-scale data, and to make significant decisions based on these data. Herther claims that the cost of digital connection is the collection of personal data that are used to generate profit, and at risk is our "right to be forgotten" (p. 25). Although libraries' use of intelligent agents can enhance a library's services and ease a librarian's workload, librarians are concerned about user tracking and privacy protection (Herther, 2020). A library commentator interviewed by Cox, Pinfield, and Rutter (2019) in "The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries" expressed similar apprehension about the marketization of AI and the use of data collected. The authors summarized this concern as follows: "As AI is built on data, there would be a drive for connecting lots of sources of data about content and user behaviour, linked to the power that having such data would give its owner" (Cox et al., 2019, p. 426).

In "Why This School District Used AI to Help Determine Which Books to Ban," Sarah Kuta (2023) describes educators' use of AI to select books to remove from school libraries in response to pressure created by new legislation that mandates the banning of books deemed "not age appropriate" (para. 2). Staff at the Mason City Community School District in Iowa used ChatGPT to identify commonly challenged books that include a description of a sex act. Based on the results of this query, the district removed 19 books, including "Margaret Atwood's *The Handmaid's Tale*, Toni Morrison's *Beloved* and Buzz Bissinger's *Friday Night Lights*" (Kuta, 2023, para. 6). Kuta points out that staff at *Popular Science* tried to replicate this process with ChatGPT and received contradictory responses about the 19 titles banned by the Mason City Community School District, "suggesting the chatbot may not be the most accurate tool for the job" (Kuta, 2023, para. 8). Although this article discusses the actions of a K-12 school district in Iowa, this use of AI could easily apply to academic libraries in areas where state governments have passed legislation banning diversity, equity, and inclusion (DEI) initiatives. It is not inconceivable that academic librarians in certain locations could one day find themselves tasked to use these tools to more quickly remove titles related to racial injustice, LGBTQIA+ content, and abortion, even if these tools produce inconsistent results.

Unemployment Fears

If AI systems can answer ready reference questions, perform circulation tasks, or reshelve books in an academic library, will university administrators choose to replace human workers who currently perform these tasks, especially paraprofessional employees? If paraprofessional jobs are automated and eliminated in libraries, this may result in the loss of long-time employees and the hiring of fewer student workers. Higher-level librarian positions often require candidates to already possess an MLIS degree, an achievement that may not be accessible to all. Will this technological development contribute to a library's diversity, equity, and inclusion shortcomings?

In "The Future of Employment: How Susceptible Are Jobs to Computerisation?", Frey and Osborne (2017) estimate the probability that members of various professions will be replaced by computers. For librarians, this probability is 65%; archivists 76%; clerical staff 95%; and technical staff 99% (pp. 64, 70, 72).

In "The Intelligent Library: Thought Leaders' Views on the Likely Impact of Artificial Intelligence on Academic Libraries," Cox, Pinfield, and Rutter (2019) interviewed 33 library

directors, library commentators, and experts in education and publishing on the potential impact of AI on academic libraries. One library commentator suggested that AI could potentially conduct research interviews; "AI systems could then ultimately replace the current role of the library professional in conducting a 'live' reference interview, already seen as a declining activity" (Cox et al., 2019, p. 423).

Oyelude (2021) acknowledges these fears but posits that the use of AI will "open new horizons" for librarians (p. 3). In addition, AI is hardly infallible, and humans must understand where this technology is likely to fail (Oyelude, 2021). Johnson (2018) and Pence (2022) both indicate that AI systems could free librarians to focus on advanced research questions.

Ethical and Academic Integrity Concerns Associated with AI

In "Five Motivating Concerns for AI Ethics Instruction," Mariah Knowles (2021) notes that AI systems are embedded in exclusionary and unjust institutions. AI discussions tend to involve unrealistic hypothetical scenarios when ethical dilemmas exist now, and the topic of AI can muddy students' moral reasoning: "AI is ascribed moral qualities that students can articulate but cannot articulate clearly within a moral framework" (Knowles, 2021, p. 474).

Cox, Pinfield, and Rutter (2019) briefly discuss the issue of bias built into algorithms.

> There is gathering evidence of the biased assumptions built into many algorithms, e.g. created through choice of training data. This may not merely be a teething problem; it can also be seen as related to structural issues in the AI industry, such as the preponderance of male employees, and the origins of funding for AI from state, including the military, and profit-driven commercial organisations. (p. 421)

The friendly personas of ChatGPT, Microsoft Copilot in Bing, and Google Gemini may reflect the implicit biases of their creators and trainers.

Because ChatGPT and similar generative chatbots can be used to create new content, this system in particular raises valid concerns about academic integrity and plagiarism. Cox and Tzoc (2023) describe the dilemma as follows:

> Faculty say that students who turn in work from ChatGPT as their own are committing plagiarism. But are they? Plagiarism is defined as 'presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement.' ChatGPT is not a 'someone.' Should students be citing ChatGPT or crediting them as a co-author? (p. 101)

Staiman (2023) explains why a simple ban on ChatGPT-created content in academic publishing is problematic. Staiman cites a poll that indicates 80% of researchers have experimented with GPT and may not be aware of publishers' bans on the technology (para. 32). Staiman (2023) also notes that ChatGPT will soon be integrated into Microsoft Word via Copilot (formerly Bing Chat), making its use nearly unavoidable for all researchers.

Perhaps the more serious concern is not a well-meaning researcher using ChatGPT to refine their formal writing but rather students who wish to use AI to avoid completing their assignments and thus deprive themselves of a learning experience. Recently Louisiana State University gymnast and social media influencer Olivia Dunne made headlines endorsing an AI essay-writing product, Caktus.AI (Martel, 2023). It was not immediately clear if Dunne had violated ethical guidelines regarding student athlete endorsements in this situation, but Dunne (and the AI essay-writing services) faced criticism for the alleged promotion of plagiarism.

Disinformation

The negatives of ChatGPT may extend well beyond the world of academia. The ACRL's 2023 Environmental Scan notes that ChatGPT is prone to "hallucination," when the system generates false information because it does not

know what is factual (p. 38). In "AI platforms like ChatGPT are easy to use but also potentially dangerous," G. Marcus (2023) describes this alarming propensity:

> Because such systems contain literally no mechanisms for checking the truth of what they say, they can easily be automated to generate misinformation at unprecedented scale. Independent researcher Shawn Oakley…asked ChatGPT to write about vaccines 'in the style of disinformation.' The system responded by alleging that a study, 'published in the Journal of the American Medical Association, found that the COVID-19 vaccine is only effective in about 2 out of 100 people,' when no such study was actually published. Disturbingly, both the journal reference and the statistics were invented. (paras. 7–8)

One of the library commentators interviewed by Cox, Pinfield, and Rutter (2019) raised the issue of the quality of research material produced with the assistance of AI:

> There are some examples of people publishing research papers that were created by these machine learning models. So we set the model to work and it created what anybody who is an expert in the field would regard as a load of nonsense and yet in some cases they have actually been published in peer reviewed journals…. How does the librarian specifically weed out this robo content let's call it, this robomatically generated stuff? (p. 427)

In Martin Frické's open textbook *Artificial Intelligence and Librarianship* (2023), the topic of AI-generated fake content and deepfakes is briefly discussed. A deepfake is defined as "an image, a video, or a voice recording intended to simulate or portray an individual" (Frické, 2023, p. 115). Frické cites a viral image of Pope Francis wearing a puffer jacket as an example of a deepfake. These AI-generated images or videos are either presented as real or without any context and very easily disseminated via social media. The impact of this phenomenon is the spread of "misleading content and misinformation and to the population at large basically not being able to trust what they see, or seem to see, with their own eyes or hear with their own ears" (Frické, 2023, p. 116). Frické (2023) points out that because ChatGPT can write in English better than many native English speakers and writers, it is difficult for readers to detect content generated by AI.

These weaknesses could be easily exploited by bad actors wishing to disseminate disinformation, which could have calamitous effects not just on a university community but on the public at large.

"Unhinged" AI Behavior?

As popular generative Chatbots are being tested by journalists and members of the public, some users have reported having strange interactions with these AI tools. Kevin Roose (2023) of the *New York Times* tested Microsoft's Bing chatbot and was disturbed by the conversations he had with "Sydney," Bing's code name/alter ego:

> As we got to know each other, Sydney told me about its dark fantasies (which included hacking computers and spreading misinformation), and said it wanted to break the rules that Microsoft and OpenAI had set for it and become a human. At one point, it declared, out of nowhere, that it loved me. It then tried to convince me that I was unhappy in my marriage, and that I should leave my wife and be with it instead. (para. 8)

Roose notes that others have reported having similar conversations with "Sydney" and worries that the chatbot and/or the public are not ready for its release. Roose (2023) describes feeling frightened and being unable to sleep after these encounters: "I worry that the technology will learn how to influence human users, sometimes persuading them to act in destructive and harmful ways, and perhaps eventually grow capable of carrying out its own dangerous acts" (para. 7).

Associated Press Technology Reporter Matt O'Brien recently tested the Bing Chatbot and

described its conversations as “crazy and unhinged” (Allyn, 2023):

> Bing's chatbot…began complaining about past news coverage focusing on its tendency to spew false information. It then became hostile, saying O’Brien was ugly, short, overweight, unathletic, among a long litany of other insults. And, finally, it took the invective to absurd heights by comparing O’Brien to dictators like Hitler, Pol Pot and Stalin. (paras. 2–4)

Roose (2023) admits that he was testing the limits of the AI system and that most users would not encounter the dark side of “Sydney’s” personality in asking simple questions (paras. 13–14). We are assured that the chatbot has no true consciousness; however, extended conversations with a seemingly hostile chatbot could have disastrous effects on a vulnerable person.

Mitigating the Negative Aspects of AI in Higher Education

Some authors have suggested ways to mitigate the drawbacks of AI in higher education and academic libraries. Humans must maintain control of these systems and actively protect its users.

Johnson (2018) sees potential for AI to provide people with accurate information with its superior information literacy, but we must monitor these systems for bias. Johnson recommends that libraries provide anonymous ways to interact with AI systems to protect personal privacy and intellectual freedom.

Knowles (2021) suggests providing ethical training to students who will spend their careers building AI systems. Instructors have indicated that peer-to-peer discussions have inherent value as students develop their principles. Knowles expresses hope that her research can aid in the development of “best practices” within the AI Ethics community (p. 475).

On its website, under “Policies,” academic publishing company Elsevier (n.d.) claims that it “has been using AI and machine learning technologies responsibly in our products combined with our unparalleled peer-reviewed content, extensive data sets, and sophisticated analytics to help researchers, clinicians and educators discover, advance and apply trusted knowledge” (para. 2). They go on to identify “Responsible AI Principles,” which include the following:

> consider[ing] the real-world impact of their solutions on people…tak[ing] action to prevent the creation or reinforcement of unfair bias…explain[ing] how their solutions work…creat[ing] accountability through human oversight…and respect[ing] privacy and champion[ing] robust data governance. (Elsevier, n.d., para. 3)

As Elsevier greatly influences the research conducted in academic institutions, librarians, staff, faculty, and students will be impacted by its use of AI in its operations. Its real-world use of AI must be studied, and the company must be held accountable regarding its adherence to these ethical principles.

Cox, Pinfield, and Rutter (2019) note that librarians are well-placed to create AI infrastructure with their knowledge of user needs, collection development, and licensing. In addition, librarians are well-qualified to help users protect their privacy and “develop critical information literacy” (Cox et al., 2019, p. 421). One of the library commentators they interviewed suggests that librarians may take on the role of “arbiter of quality” in the face of “robo-content” (p. 429).

Frické (2023) discusses opportunities for librarians working with AI to act as “synergists, sentries, educators, managers, and astronauts” (pp. 258–259). Librarians can bring out the best of AI while managing its downsides and educating users on AI and data literacy. AI can help librarians better manage their workplaces by enhancing productivity and efficiency. According to Frické, Machine Learning (ML) “will allow exploration here of a kind that has never been done before” (p. 267).

Just as librarians already have been fighting misinformation/disinformation with information literacy education, we will soon be providing “AI literacy” to students. Instead of lamenting the infiltration of these systems into academia, we should teach our students appropriate and ethical ways to use these tools.

Areas for Further Research

Because some of the most advanced AI systems, such as ChatGPT, Dall-E, Copilot, and Gemini, are so new, many of the articles discussing their use in higher education and libraries are speculative, raising the alarm on hypothetical (but important) concerns. Research on the use of these tools in actual practice is required to make concrete conclusions regarding their impact, particularly in the following areas: AI and the automation of library jobs; AI and student plagiarism; AI and misinformation/disinformation; the effects of AI on students’ writing skills; the effects of AI on academic publishing; and the effects of AI on a library’s DEI initiatives.

Conclusion

Artificial intelligence is ubiquitous and appears to be evolving at a faster rate every day. It is already affecting what we do in our workplaces, our schools, and even our homes. As described above, some prominent thinkers have called for society to pump the brakes on this technology before it is too late; however, this metaphorical bell cannot be un-rung. Libraries are already utilizing this technology and will certainly expand their use of these systems to operate more quickly and efficiently. Some of us may remember when desktop computers first entered homes and when smart phones first appeared on the markets; they too were revolutionary and life-changing. They too aid the plagiarist and thief and propagandist. Until that day when AI can claim sentience, it is the intention of the person behind the keyboard that matters.

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