Placing ChatGPT in the Context of Disruptive Technology in Academic Publishing

Beth Montague-Hellen

Library and Information Services, Francis Crick Institute, United Kingdom
Correspondence: beth.montague-hellen@crick.ac.uk
Twitter: @phdgeek
ORCID: 0000-0003-0946-1842

Abstract

ChatGPT is an AI-based text generating tool which was released at the end of 2022. The tool is significantly better than previous AIs at generating written outputs which appear to have been written by a human including academic research articles. Within academic research there has been considerable interest in whether the tool can be used to write scholarly content, and what the consequences of this would be. Despite the increased quality of output ChatGPT still suffers from many of the flaws which plague other AI tools such as bias, inaccurate training materials and its use leads to concerns around plagiarism and research integrity. This article centres the viewpoint of an academic librarian to discuss ChatGPT in the context of other technologies which have been disruptive. An argument is made that the tool is simply one in a series of transformational developments in scholarly communications, which have all been, eventually, successfully assimilated.

Keywords: Artificial Intelligence; AI; academic integrity; research integrity

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

1

Introduction

Within publishing, libraries and the field of scholarly communications change can be slow, but the progress of technological change is relentless. Although the primary mode of research communication has been the journal article for hundreds of years, the 21st century has seen many innovations which have changed the way that researchers interact with these publications, both in their roles as readers and as authors.

Artificial Intelligence (AI) and natural language processing (NLP) algorithms are not new to computer science. However, public access to tools which provide value in knowledge acquisition or contextualisation have been rare. AI and NLP algorithms were used for small discrete tasks, customer service chatbots and for businesses to predict customer behaviour but were not being used on a regular basis by most people. ChatGPT arrived with a bang on the world stage at the end of November 2022 and rapidly caused many to reassess their position on AI algorithms, both in terms of how these might be used, and the issues that they raised around authorship, intellectual property rights and the replacement of the human workforce (**Crawford, Cowling & Allen, 2023**).

Although based on an algorithm which was developed in 2020, it was not until the web version was trialled that this step forward in AI and chatbot functionality really caught the public's imagination (**Kirmani, 2022**). The internet was alight with newspaper articles predicting the sudden demise of many careers including journalism, education and law. There was an equal number of suggestions that AI, and ChatGPT in particular was a false promise, and there was nothing to worry about. This new algorithm could write articles, essays, and poems (**Ibid**). It could write in almost any style under the sun, and there was no clear way to track the fact that it had been used. There was even talk that the AI singularity, the moment that AI evolves beyond human control, was just around the corner.

ChatGPT forced publishers, librarians, and authors to rapidly consider how AI written content could be used to enhance, replace or subvert the scholarly literature. Several instances of ChatGPT being listed as an author in a research article were identified before publishers started to disallow it for example King and ChatGPT, 2023. Many other applications built on the technology have rapidly been developed such as ChatPDF which allows a reader to ask questions about an uploaded document (**Ortiz, 2023**) and competitors such as Amazon, Google, and Microsoft have increased their own efforts to produce human-like AI applications. (**Rudolph et al., 2023**)

Guidance quickly sprung up in response to the new technology, although this has yet to be standardised. Some publishers have allowed the use of ChatGPT to be placed in the acknowledgements whereas some have

suggested ways in which ChatGPT use should be cited (**McAdoo, 2023**), but across the board the inclusion of the tool as an author was rejected (**Stokel-Walker, 2023**). Standard guidelines on who should be credited as an author include the requirement to make 'Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data' (**Rosenberg et al., 2013**) and to approve the final version of the text, neither of which an algorithm is able to do.

ChatGPT, and other NLP tools, feel like a new horizon in scholarly communication, but are they really? The history of how scholars acquire and share knowledge is constantly changing, and this rate has rapidly increased in the 20th and 21st centuries. There have been tools and inventions previously which have upset the norms in publishing and research, but these have eventually been assimilated into our standard processes. To ensure that tools are used correctly, however, their uses must be understood, they must have clear guidelines, and training should be provided to ensure optimal and ethical use. This article discusses ChatGPT in this light; positing that ChatGPT is simply the next step in a long series of advancements, and discusses how this tool should be contextualised to allow the academy to assimilate and move forward with the use of AI and NLP tools such as ChatGPT.

Previous Technological Upsets

ChatGPT is not the first technology to upset knowledge discovery and publication landscapes, and it won't be the last (**Cox et al., 2019**). Assessing the consequences of previous changes can help us identify where ChatGPT may be transformational, and where it is unlikely to live up to its promise.

eJournals

The first major upheaval in the twenty-first century, within academic publishing, was the movement of journal content from printed paper journals to online eJournals (**Montgomery & Sparks, 2000**). Prior to this, academic librarians and educators had complete control over the hard copy resources housed in their collections. If a student or researcher found a resource within the library, you could have a reasonable level of trust that it was a reputable source.

Moving journal content online meant that librarians no longer had complete control over which resources were considered reputable and which were not, particularly once the drive towards open access made many more articles available to everyone. Predatory journals popped up, difficult to differentiate from high quality peer-reviewed publications, and websites or blog posts were brought up by search engines as often as journal articles were. Libraries combated this through online library

catalogues which could be searched to find only those resources acquired and trusted by the library. The ease of use of tools such as Google meant that control and guidance over knowledge continued to slip away (**Levine-Clark, 2014**).

Google Scholar

Google, and even more so, Google Scholar are often posited as a replacement for academic librarians. These search engines provide access to an enormous corpus of information, far more than could ever be reviewed and assessed by librarians (**Godwin, 2006**). However, rather than removing the need for professionals it has simply shifted their role. Now, instead of being provided with a collection of materials which had already been assessed, the researchers and students must learn to assess the resources themselves, a skill called information literacy (**Taylor & Dalal, 2014**). Librarians are ideally positioned to provide this training.

Google Scholar has to some extent pushed out traditional library discovery software and domain specific search tools such as PubMed although these search tools continue to outperform the generalist Google Scholar (**Morshed & Hayden, 2020**). New efforts to use AI models trained on domain specific knowledge may eventually cause the demise of general-purpose search engines in academic use, but only if they are as easy to access and use as Google Scholar.

Wikipedia

Since the early days of the internet, ideas of provenance of information and author authority have been questioned, and the use of ChatGPT and similar tools will exacerbate this further. Prior to the use of AI tools in scholarly writing, no resource or tool had brought this as sharply into focus as has Wikipedia, an online encyclopaedia which has grown to a scale which completely eclipses its nearest competitors both in terms of content and use (**Ball, 2023**).

As a crowd sourced resource with many editors, Wikipedia relies on two methods to reduce bias. Firstly, the community aspect of Wikipedia allows those with opposing views to engage in discussion, debate and the editing of content originally written by others. Greenstein and Zhu (**2018**) have shown that crowd sourced knowledge does not produce any greater levels of bias than content produced by experts. The second method, which has been essential for the adoption of Wikipedia into the wider scholarly knowledge landscape, is the importance placed on citation of information. Although Wikipedia is sometimes found cited as a source in itself, Ball (**2023**) argues that its true value is as a secondary source, strongly aligning with the assertion by Bould et al., (**2014**) that 'citing Wikipedia or any other tertiary source in the academic literature opposes literary practice'.

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

4

AI so far in Publishing and Libraries

A survey in 2017 showed that 44% of librarians did not believe that super computers would have a serious effect on libraries. Survey respondents also assumed that it would be 30 years before super computers were in libraries. The survey asked about supercomputers broadly, however the questions were asked in light of Watson, a natural language processing AI supercomputer, which was developed to answer questions in a similar way to ChatGPT. The majority of respondents when asked about supercomputers in this context did not believe that they would ever replace librarians and that developments in this area would be positive overall (**Wood, 2018**).

Having said this, in the scant 5 years between this survey and today, could AI-based solutions and tools have become significantly more accessible to students and researchers? The NMC Horizon Report: 2017 Library Edition had suggested a 4-to-5-year timeline to the adoption horizon for AI (**Adams Becker et al., 2017**). AI and Machine learning are already being used within academic libraries (**Ali et al., 2020**) to create chatbots for customer service (**Panda & Chakravarty, 2022**), for pattern recognition in discovery solutions (**Fernandez, 2016**) and in attempts to predict future book usage through analysis of previous reading patterns (**Walker, 2021**).

Some researchers have also started to use AI tools during the literature review and discovery phases of their research. AI based discovery tools such as Yewno support the discovery of related topics and highlights hidden relationships within the literature (**Gramatica & Pickering, 2017**). Whilst some researchers have embraced technology such as Yewno particularly expressing its usefulness in identifying new concepts in quickly moving fields (**Kiani et al., 2020**). Others have not felt that it gave them any insight greater than that they could have provided for themselves through the use of concept maps (**Hoeppner, 2018**). Frequently a solid understanding of the topics was required to understand whether suggested connections were useful (**Lacey Bryant, 2022**).

AI tools have already appeared within and alongside word processing software. Grammarly, an AI tool designed to improve grammar and improve the grades of students who use it (**Grammarly, 2012**). Whilst this can be seen as problematic for educators who may lose the opportunity to instil an understanding of language in students (**Toncic, 2020**), for researchers the use of tools to improve readability are extremely beneficial. These tools can go some way to levelling the playing field for non-English speakers and for those with disabilities such as dyslexia.

Whenever new tools are created the most enterprising will always look at how these can benefit them. For most, this will not be a desire to cheat, but a desire to gain an edge, to perform as well as they possibly can, or even to just make their lives easier. We can see this in the increased use of Google Scholar instead of traditional library catalogues (**Halevi et al., 2017; Schultz et al., 2007**). Many librarians still teach that catalogues are better than Google Scholar, but many others realise that this is a losing battle (**Luftig & Plungis, 2020**). Rather than banning tools, or shaming users, teaching responsible use is a far better approach. As discussed previously, students are sternly warned not to cite Wikipedia, however there is a growing positive perception of the website as a way of initially learning about the subject, of gaining a general knowledge before moving onto more specialist and reliable publications. It may that in this model we can start to see a use for tools such as ChatGPT.

Benefits and Uses of ChatGPT

Time Saving and Framework Building

Whilst there is little debate that the use of AI to write large sections of articles or other research outputs is considered to be a research integrity issue, the tool may be useful as a timesaving device, quickly building frameworks based on previous work. The use of AI by lecturers and assessors has been suggested as a good way to free up time (**González-Calatayud, 2021**). Academic staff are overburdened and expected to conduct research alongside teaching (**Miller, 2019**), therefore tools which reduce the time needed to mark an assignment may well be welcomed. There is of course a downside in that, compared to detailed, thoughtful and caring feedback designed to nurture students, the feedback is likely to be formulaic and not provide much more insight than reading a clearly worded marking scheme. To be truly useful these tools would still need to be used alongside an expert educator.

As with the Yewno tool discussed previously, ChatGPT may be a useful way to quickly explore new topics and identify themes and questions. By identifying what ChatGPT does not return it may also be possible to start to identify gaps within the literature.

Proof Reading

Language models such as ChatGPT can be used to proofread or spell check documents, although tools written directly for this purpose may still be preferable. This may be of particular use to writers with dyslexia or who do not have fluent English writing skills. Within academic research the ideas and competency of writers is still frequently tied to their ability to write fluently in English (**Duran & Saenkhum, 2022**), and comments from journal reviewers frequently highlight the quality of language rather than

the underlying research (**Romero-Oliveres, 2019**). A direct spell check would not be a marked increase in functionality over that found in word-processors, however asking ChatGPT to re-write paragraphs of text may be considered quite differently as this is starting to move into the territory usually occupied by authors (**Roe, & Perkins, 2022**).

The algorithm is also able to translate into and from numerous languages and performs similarly to tools such as Google Translate (**Jiao, 2023**). ChatGPT's functionality is limited in this regard and is likely to underperform compared to a tool specifically designed for this purpose. For example, it is unable to translate into extremely rare languages such as Taushiro. This is likely to be because of the lack of examples within the training set. Given time, however, the use of language models such as ChatGPT may allow for writers to initially write in their native language and then translate into English. Scholarly publishing currently biases research written in English (**Mas-Bieda & Thelwall, 2016**). If AI tools can develop to a point where real time, accurate, translate of articles could be easily accessed by both writer and reader, this could go a long way to removing some of the structural barriers that this language bias has erected.

Rapid Learning

ChatGPT can function in a similar way to Wikipedia if asked to write generally about a topic or to give a definition, it can provide a generalised background and entry point for someone new to the topic. Neither Wikipedia nor ChatGPT are considered to be the sources of information, but both are able to function in ways which allow information from other sources to be discovered (**Ball, 2023**).

One major difference between Wikipedia and ChatGPT, however, is that although neither has a clear provenance for the author, Wikipedia is clear about citing quality sources, the lack of which is currently a major drawback in the use of ChatGPT and similar tools. Whilst neither resource is suitable for citing in an academic document, they can both provide a quick overview of a subject, giving you jumping off points and directions in which to point your research.

Although rapid learning has been included as a benefit here rather than a misuse, it can easily move categories. ChatGPT is by design a generative AI algorithm, it creates text that looks like the answer the user is looking for. Whilst in many cases this text contains useful information, frequently there are serious errors in accuracy (**Baidoo-Anu & Owusu Ansah, 2023**). Information from ChatGPT at the very least should be treated as knowledge gained from an unreliable witness and be fact checked before used in any subsequent outputs.

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

7

Concerns and Misuse

Did the Author Write the Content, Whose Ideas Are These?

There is arguably a difference between these two questions, however in academic scholarship we would usually expect both the writer and the idea generator to be either cited or included as an author. In some areas of publishing, biographies for example, ghost writing is an accepted concept; the author of the book may not be the person who turned ideas into text. In these cases, the person who wrote the text is usually not stated as the writer has sold their copyright. Within an academic context this is considered a research integrity issue – authors must all contribute intellectually, and everyone who contributes intellectually must be named as an author (**Rosenberg et al., 2013**). ChatGPT creates a grey area. Springer Nature and other respected publishers have made it clear that the algorithm does not count as an author, merely as a tool (**Stokel-Walker, 2023**). However, if this is the case, how should its use be identified? Is this even necessary? Other tools that we use for improving our writing, such as spelling and grammar checks are not acknowledged. It may be that in the future the use of AI as part of writing becomes so ubiquitous that it falls into the same category as these.

One of the major reasons why identifying the use of ChatGPT in some form is necessary is that its use plagiarises the ideas and text of other writers (**Cotton et al., 2023**). Although the authors of a work can retrospectively cite articles which corroborate the claims in the text written by ChatGPT, this is unlikely to find all of the actual works which contributed to the training of the algorithm. As such the authors will be failing to credit other scholars appropriately. At the very least it is academically dishonest to pass off AI written text as one's own.

Identification of ChatGPT text is not a simple task because it is designed to write content which looks like a human has written it and which is also not direct plagiarism from other sources (**Else, 2023**). OpenAI, the makers of the algorithm, have provided a new tool for detecting AI written text. However, this tool only identifies true positives 26% of the time and will flag text that is not written by an AI 9% of the time (**OpenAI, 2023**). Whilst the AI detecting tool may be useful as an indicator, it is a long way from being able to accurately identify AI written text whilst not erroneously accusing others of using the tools.

Bias and Prejudice

AI implementations have been notoriously biased and prejudiced. Biases in training sets will always lead to biases in the algorithm. The internet is not known for its moderate and balanced opinions and, as such, any training set built from this corpus will likely have bias and may also have

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

8

implications for EDI (*Equality/Equity, Diversity and Inclusion*). Google photos AI-based image recognition software is a good example of where this has already happened. In 2015 it was highlighted that the Google Photos algorithm was labelling Black people as gorillas. Google put out a statement saying they were 'appalled', but rather than looking in detail about how this could have happened, Google simply stopped the algorithm from identifying gorillas (**Prates et al., 2020**). Until this was pointed out by users, it had not been picked up in testing.

Some bias has already been detected in ChatGPT, although there is no consensus as to which way this bias leans. It is likely that different topics will be skewed in different ways depending on the training set. Although some safeguards have been placed in ChatGPT to prevent toxic language, these can be bypassed by asking the algorithm to write in a certain style (**Zhuo et al., 2023**). Early reports showed that ChatGPT encouraged racial profiling in its responses, particularly regarding the western 'war on terror'. When one user asked the AI which air travellers present a security risk it suggested anyone who was Syrian, Iraqi, Afghan, or North Korean (**Biddel, 2022**).

Academic research and teaching have a long history of centring western ideas and biases (**Chilisa, 2017**), of failing to confront colonialism (**Stein, 2020**) and of ignoring literature written in languages other than English (**Di Bitetti & Ferreras, 2017**). ChatGPT, by having been trained on this very dataset, cannot help but perpetuate these ideas. It is designed to do so, even if not purposefully. If frequently cited aims to decolonise research and universities are to be brought to fruition, new ideas, and new sources should be prioritised. Relying too heavily on ChatGPT, and other trained AI tools, without critical assessment of sources and training data, will set back these efforts further entrenching academic writing in the values of its past.

Accuracy and Reliability

There is a frequently quoted saying in the world of computer science and AI: 'rubbish in – rubbish out' (**Nordling, 2019**). An AI tool is only ever as good as its training data set, and for a tool such as ChatGPT, the training set is largely an unknown quantity. The algorithm is designed as a chat tool, not a tool for the analysis of information, and as such, text returned isn't guaranteed to be accurate or correct. Instead, it is designed to generate a response that looks like it might have been written by a human based on information provided to it (**Zheng & Zhang, 2023**). The model is trained on vast amounts of information, but it is not able to assess that information for reliability, provenance, or accuracy. In short, the algorithm fails to engage with information literacy and without properly reporting or citing where the information was from, the user is unable to check the sources for themselves.

Depending on the rate at which the training set for the algorithm is updated, the results are also unlikely to be particularly timely. The version used in this test was already quite severely behind on current events. When asked in January 2023 who the UK Prime Minister was it answered Boris Johnson, two Prime Ministers out of date. In a fast-moving field, for example British politics in 2022, the answers would quickly be found to be wrong.

A further concern is that whilst ChatGPT is extremely proficient at creating writing that looks correct, when it is not, the errors can be hard to detect. Stack Overflow, a community forum for programmers, has temporarily banned any code created using the algorithm (**Vincent, 2022**). AI-created answers to user questions were being added in high volume, and although they looked like they might be correct, they were frequently not. If these AI generated answers which have a high likelihood of errors crowd out the human written answers, the platform could lose the trust of its users.

Bland, Uninspiring and Lacking Depth

One of the most frequently seen comments given by those who have trialled ChatGPT is that the output is bland and uninspiring (**Bogost, 2022**). Whilst the algorithm may well be able to write a mostly correct review article, the current output would not generally be thought to be adding quality research to the scholarly corpus. The algorithm also fails to add examples unless prompted and does a poor job of citing its work. Even when asked to include citations it frequently includes only one for the whole piece, or simply makes up suitable looking citations to works which do not exist.

Although AI looks to be improving at a rapid pace, the nature of algorithms such as this, trained on a set of data to produce results that look like those found within the corpus, mean that they will always tend towards the average. A human with a clear grasp of the subject matter will make new observations, or at the least write with flair. ChatGPT cannot do this, and so when used for academic writing, without serious editing, it may not be worth the effort.

Discussion

ChatGPT straight out of the box is not currently likely to replace academic writers and researchers. To get the most out of any tool it should be put to the use they were designed for. While a tool may be passable for other activities it almost certainly will not be producing the quality of result one might wish for. Some may use ChatGPT for writing research articles, however this is not its primary purpose, as such is likely to always provide subpar results. ChatGPT can certainly provide text which gives a good starting point for writing. It can give a mostly accurate overview of a

subject, or proofread and re-write an article. The algorithm is a remarkable jump forward in the technology which allows an AI to generate text as if written by a human, but new developments which change scholarly publishing are not infrequent, and on closer look ChatGPT may not be quite the revolution it initially seemed to be. It is always possible, however, that the next step forward in AI will be.

With the pressure on researchers to publish, some may look to ChatGPT as a miraculous way of churning out articles. Many researchers are pushed for time balancing teaching, research and administration responsibilities. Where guidelines are not clear about the extent that these tools can be used and how their use should be referenced, some may use them in way which crosses a line regarding research integrity. ChatGPT and similar tools will not, at present, help a researcher make exciting new leaps of thought as ChatGPT by design trends towards the mean. The tool is only able to replicate what looks like a brilliant thesis, not actually write one.

Accomplished writers, students, researchers and those outside of academia, will continue to bring their own ideas, nuance, and style to their writing, and are not yet in a position to be pushed out by an AI. However, for prosaic writing or formulaic documents, ChatGPT and similar tools may quickly find a place. Tools such as this may become part of the technology landscape for everyday use, and if so, new guidelines on academic and research integrity will need to be drawn up. Even with the current state of the technology publishers must all carefully assess what they consider to be reasonable use of the tool and what is not, and ideally come to a consensus on this. It may not be long before the academic world is once again transformed by a new technology.

Acknowledgments

Dr Montague-Hellen is the Head of Libraries and Information Services at the Francis Crick Institute. Previously she has worked as a librarian at the University of Nottingham, Bishop Grosseteste University and Sheffield University. Initially trained as a Bioinformatician and Geneticist, she obtained her PhD at the Brighton & Sussex Medical School before completing postdoctoral appointments in both the UK and USA. Dr Montague-Hellen's current interests lie in supporting Open Research, including Open Access and Open Data, and in EDI.

References

McAdoo (2023). How to cite ChatGPT. APA Style. Available at: https://apastyle.apa.org/blog/how-to-cite-chatgpt [Accessed: 01 May 2023].

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Giesinger Hall, C., Ananthanarayanan, V., Langley, K. and Wolfson, N. (2017). NMC horizon report: 2017 library edition, *The New Media Consortium*, Austin, TX.

Ali, M. Y., Naeem, S. B., and Bhatti, R. (2020). Artificial intelligence tools and perspectives of university librarians: An overview. *Business Information Review*, 37(3), 116-124. DOI: 10.1177/0266382120952016 [Accessed: 01 May 2023].

Baidoo-Anu, D., and Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. SSRN 4337484.
DOI: 10.2139/ssrn.4337484 [Accessed: 01 May 2023].

Biddel, S. (2022) The Internet's New Favorite AI Proposes Torturing Iranians and Surveilling Mosques. Available at: https://theintercept.com/2022/12/08/openai-chatgpt-ai-bias-ethics [Accessed: 01 May 2023]

Bogost, I. (2022) ChatGPT Is Dumber Than You Think. *The Atlantic*. Available at: https://www.theatlantic.com/technology/archive/2022/12/chatgpt-openai-artificial-intelligence-writing-ethics/672386/ [Accessed: 01 May 2023].

Bould, M. D., Hladkowicz, E. S., Pigford, A. A. E., Ufholz, L. A., Postonogova, T., Shin, E., and Boet, S. (2014). References that anyone can edit: review of Wikipedia citations in peer reviewed health science literature. *BMJ*, 348.
DOI: 10.1136/bmj.g1585 [Accessed: 01 May 2023].

Chilisa, B. (2017). Decolonising transdisciplinary research approaches: an African perspective for enhancing knowledge integration in sustainability science. *Sustainability Science*, 12(5), 813-827.
DOI: 10.1007/s11625-017-0461-1 [Accessed: 01 May 2023].

Cotton, D. R., Cotton, P. A., and Shipway, J. R. (2023). Chatting and Cheating: Ensuring academic integrity in the era of ChatGPT. Preprint. DOI: https://doi.org/10.35542/osf.io/mrz8h [Accessed: 01 May 2023].

Cox, A.M., Pinfield, S. and Rutter, S. (2019), "The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries", *Library Hi Tech*, Vol. 37 No. 3, pp. 418-435. DOI: 10.1108/LHT-08-2018-0105 [Accessed: 01 May 2023].

Crawford, J., Cowling, M., and Allen, K. A. (2023). Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI). *Journal of University Teaching and Learning Practice*, 20(3). DOI: 10.53761/1.20.3.02 [Accessed: 01 May 2023].

Di Bitetti, M. S., and Ferreras, J. A. (2017). Publish (in English) or perish: The effect on citation rate of using languages other than English in scientific publications. *Ambio*, 46, 121-127. DOI: 10.1007/s13280-016-0820-7 [Accessed: 01 May 2023].

Duran, C. S., and Saenkhum, T. (2022). "Because she's not a native speaker of English, she doesn't have the knowledge": positioning NNES scholars in US higher education. *Race Ethnicity and Education*, 1-19. DOI: 10.1080/13613324.2022.2088722 [Accessed: 01 May 2023].

Else, H. (2023). Abstracts written by ChatGPT fool scientists. *Nature*, 613(7944), 423-423. DOI: 10.1038/d41586-023-00056-7 [Accessed: 01 May 2023].

Fernandez, P. (2016). "Through the looking glass: envisioning new library technologies" how artificial intelligence will impact libraries. *Library Hi Tech News*. 33(5), 5-8. DOI: 10.1108/LHTN-05-2016-0024 [Accessed: 01 May 2023].

Godwin, P. (2006). Information literacy in the age of amateurs: how Google and Web 2.0 affect librarians' support of Information Literacy. *Innovation in Teaching and Learning in Information and Computer Sciences*, 5(4), 268-287.

González-Calatayud V, Prendes-Espinosa P, Roig-Vila R. Artificial Intelligence for Student Assessment: A Systematic Review. *Applied Sciences*. 2021; 11(12):5467. DOI: 10.3390/app11125467 [Accessed: 01 May 2023].

Gramatica, R., and Pickering, R. (2017). Start-up story: yewno: an ai-driven path to a knowledge-based future. *Insights*, 30(2). DOI: 10.1629/uksg.369

Grammarly. (2012). Grammarly User Survey Analysis. Retrieved July 4, 2020 from https://www.grammarly.com/press/research/docs/grammarly studentsurvey-121018133119- phpapp01.pdf [Accessed: 01 May 2023].

Greenstein, S., and Zhu, F. (2018). Do Experts or Crowd-Based Models Produce More Bias? Evidence from Encyclopedia Britannica and Wikipedia. *Mis Quarterly*, 42(3). DOI: 10.25300/MISQ/2018/14084 [Accessed: 01 May 2023].

Halevi, G., Moed, H., and Bar-Ilan, J. (2017). Suitability of Google Scholar as a source of scientific information and as a source of data for scientific evaluation—Review of the literature. *Journal of informetrics*, 11(3), 823-834. DOI: [10.1016/j.joi.2017.06.005](#) [Accessed: 01 May 2023].

Hoeppner, A. (2018). Beyond Bibliographic Discovery: Bringing Concepts and Findings into the Mix. *Against the Grain*, 30(1), 12. DOI: [10.7771/2380-176X.8001](#) [Accessed: 01 May 2023].

Jiao, W., Wang, W., Huang, J. T., Wang, X., and Tu, Z. (2023). Is ChatGPT a good translator? A preliminary study. arXiv preprint arXiv:2301.08745. DOI: [10.48550/arXiv.2301.08745](#) [Accessed: 01 May 2023].

Kiani, M., Asemi, A., CheshmehSohrabi, M., and Shabani, A. (2020). Co-Concept Analysis in Bioinformatics Field by Yewno Based on Experts' Viewpoints. *International Journal of Information Science and Management* (IJISM), 18(2), 229-243.

King, M. R., and chatGPT. (2023). A Conversation on Artificial Intelligence, Chatbots, and Plagiarism in Higher Education. *Cellular and Molecular Bioengineering*, 1-2. DOI: [10.1007/s12195-022-00754-8](#) [Accessed: 01 May 2023].

Kirmani, A. R. (2022). Artificial Intelligence-Enabled Science Poetry. *ACS Energy Letters*, 8, 574-576. DOI: [10.1021/acsenergylett.2c02758](#) [Accessed: 01 May 2023].

Lacey Bryant, S., Bridgen, R., Hopkins, E., McLaren, C., and Stewart, D. (2022). NHS knowledge and library services in England in the digital age. *Health Information and Libraries Journal*, 39(4), 385-391. DOI: [10.1111/hir.12457](#) [Accessed: 01 May 2023].

Levine-Clark, M. (2014). Access to everything: Building the future academic library collection. *portal: Libraries and the Academy*, 14(3), 425-437. DOI: [10.1353/pla.2014.0015](#) [Accessed: 01 May 2023].

Luftig, D., and Plungis, J. (2020). OhioLINK librarians and Google Scholar over time: a longitudinal analysis of attitudes and uses. *Reference Services Review*, 48(4), 683-698. DOI: [10.1108/RSR-04-2020-0031](#) [Accessed: 01 May 2023].

Miller, J. (2019). Where does the time go? An academic workload case study at an Australian university. *Journal of Higher Education policy and management*, 41(6), 633-645. DOI: [10.1080/1360080X.2019.1635328](#) [Accessed: 01 May 2023].

Montgomery, C. H., and Sparks, J. L. (2000). The transition to an electronic journal collection. *Serials Review*, 26(3), 4-18. DOI: [10.1016/S0098-7913(00)00073-3](#) [Accessed: 01 May 2023].

Morshed, T., and Hayden, S. (2020). Google versus PubMed: comparison of google and PubMed's search tools for answering clinical questions in the emergency department. *Annals of Emergency Medicine*, 75(3), 408-415. DOI: [10.1016/j.annemergmed.2019.07.003](#) [Accessed: 01 May 2023].

Nordling, L. (2019). A fairer way forward for AI in health care. *Nature*, 573(7775), S103-S103. DOI: 10.1038/d41586-019-02872-2

OpenAI (2023). New AI classifier for indicating AI-written text. Available at: https://openai.com/blog/new-ai-classifier-for-indicating-ai-written-text/ [Accessed: 01 May 2023].

Ortiz, S. (2023) How to use ChatPDF: The AI chatbot that can tell you everything about your PDF. ZDNET. Available at: https://www.zdnet.com/article/how-to-use-chatpdf-the-ai-chatbot-that-can-tell-you-everything-about-your-pdf/ [Accessed on 08 June 2023]

Panda, S., and Chakravarty, R. (2022). Adapting intelligent information services in libraries: a case of smart AI chatbots. *Library Hi Tech News*. DOI: 10.1108/LHTN-11-2021-0081 [Accessed: 01 May 2023].

Prates, M. O., Avelar, P. H., and Lamb, L. C. (2020). Assessing gender bias in machine translation: a case study with google translate. *Neural Computing and Applications*, 32, 6363-6381. DOI: 10.48550/arXiv.1809.02208 [Accessed: 01 May 2023].

Roe, J., and Perkins, M. (2022). What are Automated Paraphrasing Tools and how do we address them? A review of a growing threat to academic integrity. *International Journal for Educational Integrity*, 18(1), 15. DOI: 10.1007/s40979-022-00109-w [Accessed: 01 May 2023].

Rosenberg, J., Bauchner, H., Backus, J., De Leeuw, P., Drazen, J., Frizelle, F., and International Committee of Medical Journal Editors. (2013). *The new ICMJE recommendations*. Dan Med J, 60(10), 1-2.

Rudolph, J., Tan, S., & Tan, S. (2023). War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education. Journal of Applied Learning and Teaching, 6(1). DOI: 10.37074/jalt.2023.6.1.23 [Accessed: 01 May 2023].

Stein, S. (2020). 'Truth before reconciliation': the difficulties of transforming higher education in settler colonial contexts. *Higher Education Research and Development*, 39(1), 156-170. DOI: 10.1080/07294360.2019.1666255 [Accessed: 01 May 2023].

Stokel-Walker, C. (2023) ChatGPT listed as author on research papers: many scientists disapprove. *Nature*, 613, 620-621. DOI: 10.1038/d41586-023-00107-z [Accessed: 01 May 2023].

Taylor, A., and Dalal, H. A. (2014). Information literacy standards and the World Wide Web: results from a student survey on evaluation of Internet information sources. *Information Research: An International Electronic Journal*, 19(4), n4.

Toncic, J. (2020). Teachers, AI grammar checkers, and the newest literacies: emending writing pedagogy and assessment. *Digital Culture and Education*, 12(1), 26-51.

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

15

Vincent, J. (2022). AI-generated answers temporarily banned on coding Q&A site Stack Overflow. *The Verge*. Available at: https://www.theverge.com/2022/12/5/23493932/chatgpt-ai-generated-answers-temporarily-banned-stack-overflow-llms-dangers [Accessed on 01 May 2023]

Walker, K. W. (2021). Exploring adaptive boosting (AdaBoost) as a platform for the predictive modeling of tangible collection usage. The Journal of Academic Librarianship, 47(6), 102450. DOI: 10.1016/j.acalib.2021.102450 [Accessed: 01 May 2023].

Wood, D.A. and Evans, D.J. (2018). Librarians' perceptions of artificial intelligence and its potential impact on the profession, *Computers in Libraries*, Vol. 38 No. 1, pp. 26-30.

Zheng, H., and Zhan, H. (2023). ChatGPT in scientific writing: a cautionary tale. *The American Journal of Medicine*. DOI: 10.1016/j.amjmed.2023.02.011 [Accessed: 01 May 2023].

Zhuo, T. Y., Huang, Y., Chen, C., and Xing, Z. (2023). Exploring AI Ethics of ChatGPT: A Diagnostic Analysis. arXiv preprint arXiv:2301.12867. DOI: 10.48550/arXiv.2301.12867 [Accessed: 01 May 2023].

Montague-Hellen. Exchanges 2023 11(1), pp. 1-16

16