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The Use of Generative AI by Students with Disabilities in Higher Education

The use of generative AI is controversial in education largely because of its potential impact on academic integrity. Yet some scholars have suggested it could be particularly beneficial for students with disabilities. To date there has been no empirical research to discover how these students use generative AI in academic writing. Informed by a prior interview study and AI-literacy model, we surveyed students regarding their use of generative AI, and gained 124 valid responses from students with disabilities. We identified primary conditions affecting writing such as ADHD, dyslexia, dyspraxia, and autism. The main generative AI used were chatbots, particularly ChatGPT, and rewriting applications. They were used in a wide range of academic writing tasks. Key concerns students with disabilities had included the inaccuracy of AI answers, risks to academic integrity, and subscription cost barriers. Students expressed a strong desire to participate in AI policymaking and for universities to provide generative AI training. The paper concludes with recommendations to address educational disparities and foster inclusivity.

Keywords: ChatGPT; Artificial Intelligence (AI), Generative AI, students with disabilities, academic writing, AI literacy

Introduction

The astonishing capabilities of ChatGPT led to an explosion of its use when released to the public in November 2022. Its ability to write coherent answers to questions, competently rewrite text in different styles or at different word lengths, proofread and summarize texts, as well as write code, made it useful in a wide range of contexts. Indeed, the way it was able to provide a well-formed answer in response to short prompts dramatically shifted perceptions of the capabilities of AI. However, there were also many concerns raised in public debate, such as around the accuracy and currency of information it produces; its tendency to hallucinate information including sources; bias in its answers; as well as privacy concerns (Fergusson et al., 2023). The alleged use of

copyright material to train LLMs like ChatGPT without consent led to a number of lawsuits. Furthermore, Perrigo (2023) exposed the exploitative way that ChatGPT training content had been filtered by low paid workers in Kenya. There are also issues such as about the environmental impact and resource demands of GPT models and AI in general (Crawford, 2021; Lucconi et al., 2023). Therefore, ChatGPT and the increasing number of similar services such as Google Gemini created considerable controversy, as well as excitement.

One of the major domains of controversy was ChatGPT's use in education. Many potential benefits of generative AI were anticipated for learning such as in making information more accessible, personalising learning or facilitating critical thinking (Farrokhnia et al., 2023). Many uses for teachers were also identified (Sabzalieva & Valentini, 2023). But there were also widespread worries about how generative AI might affect education negatively, especially its potential to increase plagiarism (Cotton et al., 2023; Farrokhnia et al., 2023; Playfoot et al., 2024). The impossibility of automatically detecting text that had been created by generative AI rendered plagiarism detection software ineffective. Yet it was also perceived to be impossible to ban students from using it. Universities, such as the Russell Group in the UK, formulated policies, but it was hard to give clear guidance, and even harder to enforce that guidance. Academics also feared that use of generative AI would make students less critical or write less authentically (Cardon et al., 2023) or impact their creativity (Habib et al., 2023). Many of the wider concerns with generative AI such as around bias, privacy and equity of access were also problematic for its use in Higher Education (Grassini, 2023; UNESCO, 2023). To be used safely implied a level of generative AI literacy (Zhao, Cox, & Cai, 2024).

Despite these issues, some researchers did think that generative AI might be particularly helpful for students with disabilities (Addy et al., 2023), providing new forms of support (Evmenova et al., 2024). This would echo suggestions that generative AI benefits people with disabilities as a whole. For example, Upadhyay (2024) has argued that generative AI offers new opportunities for organizations to provide customized assistive technology-based solutions to employees with disabilities. Adnin and Das' (2024) study suggested that generative AI's 'visual question answering' feature is particularly beneficial for blind users. However, they also highlighted the need to revisit the design and policies around generative AI from the point of view of this particular group of users to ensure equitable benefits. Specifically in the context of learning, there does seem potential for generative AI to offer significant help to students in areas such as proof reading, summarisation of texts and interactive support, areas where students with learning difficulties such as dyslexia could particularly benefit (Zhao, Cox, & Cai, 2024). Universities in the UK have begun offering generative AI chatbots within their learning management systems, including the university where data for this study was collected. At the institution where this study's data were collected, the Google Gemini chatbot was introduced to students as part of the Google-based learning platform. Given the statutory requirement on universities to promote equality of opportunity but the continuing under-representation of students with disabilities in UK HE (Hubble & Boulton, 2021) generative AI seems to have great positive potential. Generative AI especially when combined with improving transcription (of lectures) offers a leap forward for technologies to support their learning. At the same time, generative AI tools have been designed without these user groups specifically in mind, so determining the impact requires investigation.

The early debate about generative AI in HE occurred in a context where there was very little systematic evidence about how AI was being used by students in different learning settings. Research is beginning to emerge on how students use generative AI, but there remains a significant gap in studies specifically addressing how students with disabilities use generative AI, particularly in academic writing, which is a key aspect of higher education. Based on insights from previous research developing a model of generative AI literacy for academic writing (Zhao, Cox, & Cai, 2024), our research aimed to explore how generative AI is used by students with disabilities. With this aim in mind, the research questions for this study were:

- (1) Which generative AI are in use by students with disabilities, and for what purposes?
- (2) What concerns do students with disabilities have about generative AI?
- (3) What forms of support do they want from their institution?

Literature Review

Generative AI in Education

The early controversy around generative AI was not informed by a clear understanding of how it was actually being used. But at the time of writing 18 months after the launch of ChatGPT, a picture is beginning to emerge of how generative AI is being adopted by students. We now have some international surveys (Cheggs, 2023), national studies, e.g., in the UK (Freeman 2024; JISC 2024) and other countries (Almassad et al., 2024; Acosta-Enriquez et al. 2024; Chan & Hu, 2023; Malmström et al., 2023), and institutional studies. In addition, in-depth qualitative studies such as those by Zhao, Cox, and Cai (2024) have provided valuable insights into the use of generative AI in learning by conducting interviews with students from diverse backgrounds. By

capturing detailed personal experiences, these qualitative studies have offered a more authentic and comprehensive understanding of generative AI's role in higher education.

The broad pattern is of positive views of AI tools among students (Chan and Hu's 2023; Acosta-Enriquez et al. 2024). Also, significant numbers (if not a majority) of students having used generative AI in learning, as evident in Freeman's (2024) work. Notably, this work offers an excellent summary of students' attitudes and behaviour in the UK, the context of this study. Freeman's (2024) work offers an excellent summary of students' attitudes and behaviour in the UK, the context of this study. Freeman's (2024) data from February 2024 found two thirds of UK students had used some form of AI and a third had used it for assessments. Yet there was evidence of a digital divide emerging, with students from more deprived postcodes using AI less. ChatGPT is the main service in use according to Freeman (2024). It seems that a common use is to gain an initial understanding a concept, but a very wide range of potential uses have been identified (JISC, 2024). Interestingly, Freeman (2024) found that most UK students thought there was a clear institutional policy on AI. There was a desire for better training by institutions (Cheggs, 2023) and more tools to be provided (Freeman, 2024). Only 22% of respondents were happy with the level of support they had received (Freeman, 2024). Other more qualitative studies have given us a deeper picture of patterns of use among students. For example, Zhao, Cox, and Cai (2024) conducted in-depth interviews and observations with UK students and found they used generative AI in complex ways to support different stages of writing. However, none of these surveys or interview-based studies investigated students with disabilities' use of generative AI in a systematic way, though Malmström, Stöhr and Ou (2023) did note that open text comments provided anecdotal evidence of the value of AI to students with learning disabilities. The study presented here differs from previous research by focusing on

students with disabilities as the primary participants, aiming to fill the gap in the literature regarding the inclusion of generative AI in higher education.

Generative AI for students with disabilities

Although limited research has been conducted on the use of generative AI in education for students with disabilities, some researchers have argued for its potential benefits (Starcevic, 2023). Authors have identified some particular tasks where there might be a benefit, such as:

- **Reading:** Generative AI can support students with disabilities, particularly those with dyslexia, in comprehending learning materials by improving their reading efficiency and effectiveness (Tamdjidi & Bilai, 2023). Research suggests that students with cognitive challenges often struggle to process written texts (Schiavo et al., 2021), which can result in slow and error-prone reading (Brewer et al., 2023). Generative AI tools have the capability to summarize lengthy and complex texts into concise, jargon-free sentences to aid in understanding (Say, 2023). This facilitates easier comprehension of core concepts in reading, thereby enhancing students' engagement with learning materials (Tamdjidi & Bilai, 2023).
- **Writing:** Some researchers have highlighted the potential of generative AI to assist students with disabilities, particularly those with dysgraphia, in planning writing tasks, as well as refining and clarifying their writing (McCarthy & Yan, 2023). Research suggests that students with disabilities often encounter difficulties in setting goals, organizing writing plans, developing coherent ideas, and revising for both meaning and grammar in writing tasks (Roitsch et al., 2021; Graham et al., 2013; Harris & Graham, 2016). Generative AI can

potentially benefit these students by helping clarify writing instructions, establish writing goals, and create structured writing plans (Onufer, 2024), as well as refining their writing to enhance coherence (Sullivan et al., 2023). This, in turn, can improve the clarity and grammatical accuracy of their writing (Botchu et al., 2023).

- **Social engagement:** Generative AI also has the potential to support students with disabilities in improving their social skills (McMurtrie, 2023). Students with learning disabilities may struggle to express themselves and interpret others' speech and actions during conversations, which can lead to increased social isolation (Brewer et al., 2023). Certain generative AI-based tools can simulate real-life communication scenarios, allowing students to practice and develop the skills needed to better understand others and communicate more effectively (Almufareh et al., 2023). This, in turn, can enable these students to collaborate more effectively with their peers and foster a greater sense of engagement in the learning environment.
- **Teaching:** Generative AI can also indirectly benefit students with disabilities by enhancing the quality of teaching. It can check the accessibility of content, for example. Specifically, it has been suggested it could be trained to identify early signs of learning disabilities (Johnson et al., 2023), enabling educators to create personalised teaching strategies to meet the unique needs of students with disabilities (Bozkurt et al., 2023). By affording both direct and indirect benefits, generative AI promises a more inclusive and supportive education environment (Chen & Zhu, 2023), where students with disabilities' access to education resources can be enhanced, potentially improving their learning outcomes (Michel-Villarreal et al., 2023).

However, perspectives on generative AI's impact on students with disabilities are not universally optimistic. Firstly, students with disabilities might struggle to access it effectively. For instance, visually impaired students often find it difficult to interact with text-based chatbots (Tlili et al., 2023). Moreover, generative AI is often trained on datasets that insufficiently account for the needs of marginalized users, resulting in generic functions that fail to meet the specific needs of individuals with disabilities (Bender et al., 2021; Jafry & Vorstermans, 2024). In this case, some of the outputs of generative AI can overwhelm those with learning disabilities, adding to their stress (Botchu et al., 2023; Venkit & Wilson, 2021). For example, early versions of ChatGPT were limited to text-based interactions, which may have added stress for students with dyslexia when interpreting text-based outputs (Botchu et al., 2023). AI-based facial recognition algorithms often lack sufficient training data on students with autism, making the technology prone to misinterpreting their emotions and resulting in a lack of tailored support (Nacheva & Czaplewski, 2024). Venkit and Wilson (2021) found that 13 language models associated disability-related terms with negative connotations, contributing to bias and potentially reducing engagement with these technologies among users with disabilities (McMurtrie, 2023; Rocky Mountain ADA Center, 2023).

To find out about generative AI's impact on students with disabilities, their voices should be heard. However, empirical studies exploring how students with disabilities use generative AI tools are scarce, and their findings are often contradictory. For instance, Chen & Zhu (2023) suggest that generative AI tools may negatively affect students with ADHD by further shortening their attention spans through overly simplified information processing. Conversely, Addy et al. (2023) contend that generative AI tools can enhance the learning experience of neurodivergent students by helping them distil the core concepts of learning materials and by facilitating the

creation of structured learning plans. The inconsistent findings of empirical studies may be attributed to the fact that they do not primarily focus on students with disabilities as core participants. For instance, Chen & Zhu's (2023) study targets K-12 students from all health conditions, not specifically those with disabilities. In response, our research centres on students with disabilities, treating them as principal sources of knowledge. This approach aims to better understand how students with disabilities genuinely interact with generative AI.

Generative AI literacy

The digital has revolution has prompted researchers to describe a widening range of literacies needed to operate in the modern world, such as computer literacy, information literacy, media literacy, and digital literacy. The growing use of AI has led to several attempts to define AI literacy, for example, a seminal definition of AI literacy was proposed by Long and Magerko (2020) comprising of 17 elements and complemented by guidelines for designing explainable AI. However, generative AI has shifted our perception of the capabilities of AI, and also of its ethical challenges. In this context Zhao, Cox and Cai (2024) have proposed a specific generative AI literacy model composed of five elements.

- 1. Pragmatic understanding:** The individual can use generative AI effectively and interpret the information it produces critically
 - The individual can pick the right tool for the task, in the context of the proliferation of tools (including alternative generative AI to ChatGPT)
 - The individual learns to use the chosen tool effectively for a specific task, e.g., “prompt engineering.”

- The individual interprets generative AI outputs critically, given an understanding of how they work and their limits, such as information accuracy, currency, citeability and bias
2. **Safety understanding:** The individual can use generative AI safely (e.g., is aware of privacy risks)
 3. **Reflective understanding:** The individual can assess and take action to manage the impacts of AI on their experience, such as its impact on their learning or technology dependence.
 4. **Socio-ethical understanding:** The individual understands the societal impacts of AI, including as Intellectual Property Rights issues, impact on information culture, misinformation and disinformation, social impacts such as through exploitative process of creation, and the impacts on jobs or job enrichment, equity of access, environmental impacts, implications of the undue social power of BigTech companies.
 5. **Contextual understanding:** The individual understands how to use generative AI appropriately in a particular context and make their own use explicit, as appropriate.

This definition balances the obvious element of “prompt engineering”, with recognition of the need to select and learn a proliferating range of AI services (Baytas & Ruediger, 2024). It gives emphasis to the safety and ethical dimensions of AI. It further emphasises the importance of reflecting on the impacts of use of AI on experience such as through becoming dependent or loss of individual voice. These dimensions identify key aspects of generative AI literacy, but we do not present them as a way of measuring generative AI literacy in a simplistic way. For example, it is not possible to say that all societal impacts of AI should be a central concern, since it is

contested how significant these issues are. Therefore, we only use the definition as a broad framework to interrogate an emerging literacy.

Methods

As there has been limited research on the use of Generative AI by students with disabilities, we adopted an inductive approach to investigate the use and perspectives of these students through an online survey. The survey was divided into three main sections. The first section collected demographic information about respondents (such as gender, level of study, academic department, perceived English language competence, perceived digital competence, and commonly used generative AI). The second section consisted of disability-related questions (including the impact of disability on academic writing, and tools used to address these challenges); Specifically, regarding self-disclosed disabilities, participants were provided with a list of disability conditions based on terminology from an authoritative source of higher education data, Higher Education Statistics Agency [HESA] (2024). These categories were subsequently reviewed and refined by experts from the Disability and Dyslexia Support Services at the university where the data were collected. It is important to note that participants had the option not to disclose any disability conditions. Additionally, some participants could report more than one condition affecting them. As a result, the total number of self-reported disability conditions exceeded the number of participants stating that they did have a disability. The third section consisted of questions relating to generative AI use in general (covering aspects such as its use across different stages of academic writing, costs, students' perceptions of generative AI, their current concerns, and recommendations for universities). Open-text questions were also posed to explore how reported disabilities impact students' academic writing, which specific generative AI

students used to address barriers related to their disability, and their recommendations for universities to enhance support for students with disabilities. As well as posing key questions about generative AI use, the questions were designed to supply material relating to the model of generative AI literacy discussed in the previous section. The complete survey design, including all the questions and their sequence, can be found in the appendix of this paper.

The survey was distributed to all students in a UK university during February and March 2024, which had 7188 registered students with disabilities out of over 30,000 students. The survey gathered 124 valid responses from students with disabilities. Numerical data are presented descriptively and qualitative data were analysed by content analysis, with codes generated inductively from the data. The project received ethics approval from the University of [Anon]. Informed consent was obtained at the beginning of the survey. No identifying information was collected from the survey.

Results

Most participants in the survey identified themselves as female (57%, n=71) or male (28%, n=35). Some participants preferred not to disclose their gender (3%, n=3), while the remaining self-identified as "other" (12%, n=15). The majority of respondents were pursuing a bachelor's degree (69%, n=85), followed by 20% (n=25) studying for a master's degree. The largest group of students came from Science, Technology, Engineering, and Mathematics (STEM) disciplines (40%, n=50), followed by Social Sciences (31%, n=38), Arts and Humanities (16%, n=20), and Health (9%, n=11). A small percentage (4%, n=5) preferred not to disclose their disciplinary background. 95% (n=118) of participants reported that English was their native language. A significant factor here is the reluctance of international students to identify as having a disability. In terms of digital competence, participants were asked to rate themselves on a 5-point

Likert scale: 1 - Fundamental (basic knowledge), 2 - Novice (limited experience), 3 - Intermediate (practical application), 4 - Advanced (applied theory and practice), and 5 - Expert (recognized authority). Most participants rated themselves as having an intermediate (61%, n=75) or advanced level digital competence (27%, n=33).

Guided by the terminology used by HESA (2024), we asked students who disclosed disabilities to specify the types of their disability conditions. The commonest disabilities that participants reported were: a) neurodiversity, including ADHD (34.7%, n=43), b) specific learning difficulties such as dyslexia and dyspraxia (29%, n=36), c) social/communication impairments such as autism (21.8%, n=27), and d) mental health conditions, such as depression, schizophrenia or anxiety disorder (14.5%, n=18). Some students disclosed having more than one condition.

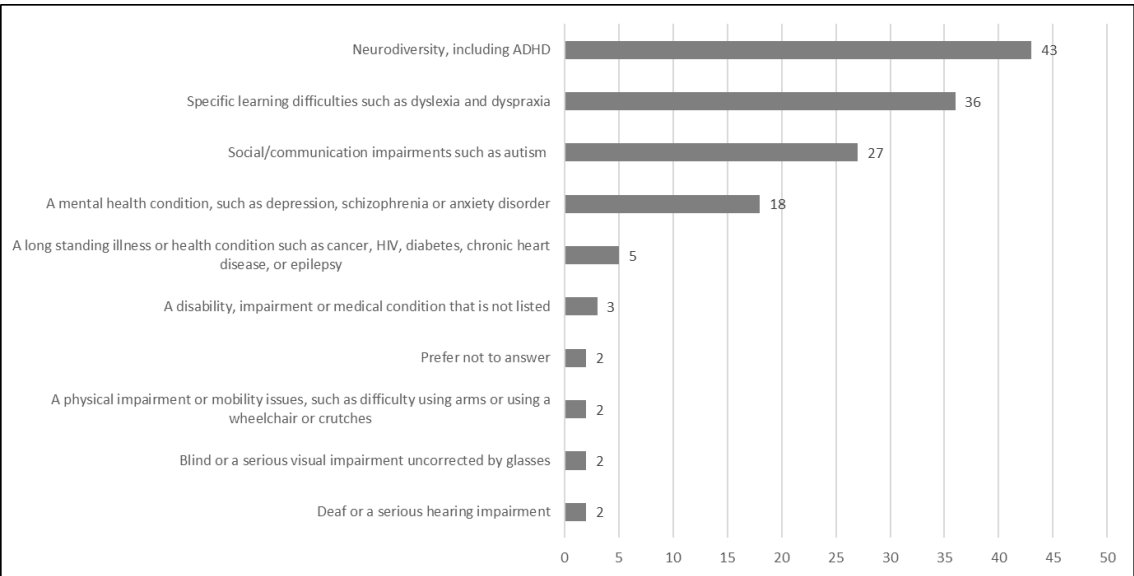


Figure 1: Disability conditions

Note: This is a checkbox question that allows participants to select more than one option.

Main barriers to writing

Respondents were asked how their disabilities affected their writing. Of 124 respondents, 18 did not give an answer and 2 said their disability had no effect on their

writing. The main challenges identified are presented in table 1:

Main Barriers	Number	Percentage
Proofreading (add spelling, grammar)	30	29%
Reading	22	21%
Making their intended meaning clear	21	20%
Perception of being slower than others	18	17%
Concentration	17	16%
Structuring ideas	17	16%
Getting started on a writing task	13	13%
Energy/ motivation	13	13%
Staying on topic	11	11%
Time management	10	10%
Understanding the assessment brief	9	9%

Table 1 Barriers to writing experienced by respondents (n=104)

Please note that this is an open-ended question, and students may report more than one barriers in their responses.

The table reveals the wide range of challenges, many clearly linked to the disabilities they cited. Responses are suffused with emotion with phrases such as “struggle” (used 38 times responses) and “feeling overwhelmed” being commonly used. Answers are full of a sense of barriers to understanding and communication like “I am a much slower writer, and I struggle to put my thoughts into full sentences. I also struggle to vary written tone for appropriate use, I can either write extremely formally or extremely informally”, and the following:

It impacts in more ways than I can list. My entire process of how I do my academic writing will be very different to that of someone who is not autistic because our internal

processes are different. I don't really know how to answer the question. It's hard to list specific effects because the entire process is probably different in a lot of ways.

Use of AI

We were interested to know what drove student use of AI, so we offered four choices about motivation as presented in Figure 2. This showed that a key driver for use was the feeling that generative AI was needed for future career reasons. There was also a strong sense that students saw it as making them more “efficient” but less sense that it had improved their performance and certainly much less sense that it made them more engaged in learning.

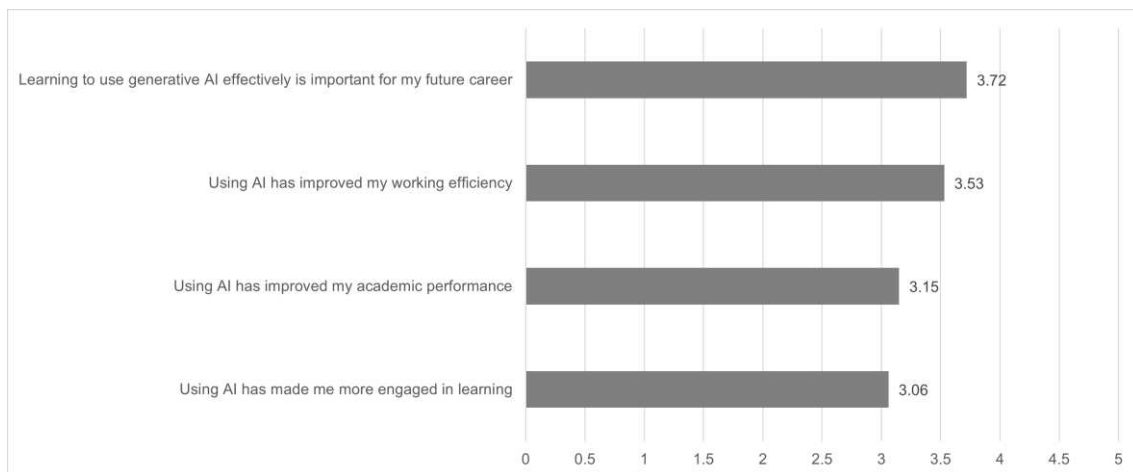


Figure 2: Motivation to use Generative AI

We employed a 5-point Likert scale to capture students' views on the statements above, ranking from strongly disagree =1 to strongly agree =5

Respondents were asked: “What Generative AI tools do you use to support your learning and why?” Of the 124 students who responded to the survey, 77% (n=96) reported using Generative AI. 22% of students (n=28) reported infrequently using or refusing to use Generative AI. It is worth noting that the majority of respondents said they (91%) do not spend money on subscribing to Generative AI.

Students commonly use three main types of generative AI: chatbots (n=82, 66%), rewriting tools (n=18, 15%), and translation software (n=10, 8%). This also accords with the responses to our closed question on the main tools for writing. The top five uses reported by our participants when using generative AI include: (1) summarising reading material, (2) overcoming a mental block, (3) Brainstorming ideas, (4) Rewriting phrases in my assignment and, (5) Structuring ideas for my assignment.

The Use of Generative AI Chatbots (e.g., ChatGPT, Gemini, Copilot, Claude)

Among all the generative AI tools, chatbots were the most common choices (n=82, 66%). Within this category, ChatGPT was the most popular (n=65, 52%), followed by Gemini (n=10, 8%), Copilot (n=5, 4%), and Claude (n=2, 2%).

(1) ChatGPT

The reasons respondents gave for using ChatGPT revolved around its effectiveness in five key areas throughout the stages of the learning process: explaining topics, identifying learning resources, summarising learning materials, structuring the writing process, and refining written work.

Explaining topics (n=18, 15%). ChatGPT was identified as effective in simplifying complex academic topics and jargon, making them more understandable. Compared with human agents, ChatGPT's assistance is available on demand, offering flexibility, as evident in the following quotes: "I use ChatGPT to do the initial step of explaining complex things that I have studied"; "Mostly ChatGPT as I enjoy the flexibility of being able to ask questions to the AI and receive extended answers".

Respondents stated that they use ChatGPT to gain clearer explanations on a variety of topics, including rubric standards, in-class questions, text messages, and academic concepts.

Identifying learning resources (n=9, 7%). Respondents also thought ChatGPT was effective in identifying learning resources. Specifically, they said that ChatGPT excels in formulating accurate search terms and broadening the scope of a search, allowing for more efficient discovery of relevant materials in one go. This functionality is crucial for students with disabilities, as they may struggle to articulate their needs to search engines clearly and can become easily fatigued during the search process, as stated by participants in the following quote: “Things such as ChatGPT can be useful when finding resources and papers on specific content, as scouring the Internet for specific data or research is a tiring task, especially with ADHD”.

Summarising learning materials (n=17, 14%). Respondents also valued ChatGPT for its proficiency in summarising lengthy documents and distilling key concepts from complicated information. For students with disabilities, this feature of ChatGPT is particularly helpful because they often said they faced challenges with concentration and navigating through large volumes of text filled with complex academic language. Students with disabilities use ChatGPT to summarise both lecture notes and lecturer suggested readings.

ChatGPT is really good at making information concise. I use it for this reason, as when my depression and anxiety is bad it can be difficult to comprehend large texts; I lose focus, get mind blanks or simply don't understand information in such large doses. I also use ChatGPT to input large readings that are required on my course, to summarise the key points for me as reading large passages are extremely hard, as well as understanding most academic language.

Structuring the writing process (n=22, 18%). Respondents also valued ChatGPT for its support in structuring their writing, offering a dependable starting point that alleviates anxiety, particularly for students with disabilities who found facing writing tasks challenging, as stated in the following quotes: “I also have combined ADHD which makes it difficult for me to focus on a laborious activity such as writing. ChatGPT is my one go to for how to structure essays”; “ChatGPT is incredibly helpful for getting ideas for what to write about and how to plan out my essays.”

Refining writing (n=24, 19%). The respondents’ preference for ChatGPT also stems from its’ capability for refining their writing in two ways: (1) enhancing the logical coherence of written work by restructuring fragmented sentences into a well-structured whole; (2) improving the precision of word choices to make the written work appropriate for formal academic presentations and communications. Through this support, students felt more confident in preparing essays, reports, and e-mails that meet the high standards expected in academic settings.

I use ChatGPT to give me options for writing in a more concise way. I input a sentence or paragraph and ask ChatGPT to rewrite it and take note of what it has removed and changed, to then change my own work.

(2) Gemini, Copilot, Claude

Apart from ChatGPT, respondents also turned to Gemini (n=10, 8%), BingAI/Copilot (n=5, 4%) and Claude (n=2, 2%) in supporting their learning. Due to their similar functionalities with ChatGPT, respondents’ reasons for selecting these chatbots closely mirror those for ChatGPT. It is notable that Gemini was relatively less used, despite being this chatbot being the approved service at the university where our data was collected.

Compared to ChatGPT, the support provided by the other three chatbots was seen as lacking comprehensiveness. Specifically, Gemini lacks the capability to assist students in identifying learning resources, Copilot was seen as not helping in refining written work, and Claude only demonstrates capabilities in summarising learning materials and refining written work.

Despite these limitations, respondents continued to find these three chatbots reliable. This reliability may stem from two factors. One factor is these chatbots's non-intrusive approach, particularly in the writing process, where they do not directly influence students' learning and thinking processes, as stated by the participants: "I find Google Bard the most reliable and it won't write an essay or paragraph. Rather it will give your ideas to use."

Another factor is the easy access to these chatbots. For instance, one respondent noted that Copilot, which "is embedded the Bing Browser", provides convenient and straightforward access, making it a user-friendly learning assistance.

The reason these chatbots, despite their perceived reliability, are not as popular as ChatGPT primarily stems from their lesser familiarity among respondents, as evident in the following quote: "I use ChatGPT since this is the one I was first introduced to and have become more familiar with."

The Use of Rewriting applications and translation software

Following generative AI Chatbots, the second most common AI-based services were rewrite applications, including: Grammarly (n=13, 10%), Quillbot (n=3, 2%), Wordtune (n=1, 1%). Reasons for students' adoption of rewriting services are threefold, namely: (1) to sharpen the precision of word choice (n=3, 2%), such as "helps with grammar, spelling, structure and making sure the tone of [students'] writing is appropriate"; (2) to

ensure sentence coherence (n=3, 2%), and (3) correct grammatical errors (n=10, 8%).

Overall, with rewrite services students can refine and improve the quality of their written work, a benefit also afforded by ChatGPT. Due to their shared ability to enhance writing quality, ChatGPT was sometimes employed alongside these proofreading tools, serving as an additional aid to further refine students' writing. Specifically, Grammarly (n=4) was the proofreading tool most used in conjunction with ChatGPT. Students adopted Grammarly to "avoid making silly grammatical mistakes" while using ChatGPT to "reword their writing to make it make more sense".

Translation software ranked as the third most popular category of AI-based tools, including: Google translate (n=5, 4%), DeepL (n=4, 3%), and a non-specified software (n=1, 1%). Open ended comments suggested that this related to use in foreign language learning, to understand texts not in English or also to help to refine written work.

Concerns about adopting generative AI

Given the controversy that has surrounded ChatGPT and the central place of awareness of this in our own concept of generative AI literacy (Zhao, Cox and Cai, 2024) the survey sought to discover something about students with disabilities' views about the different areas of controversy (See figure 3). Inaccuracy of answers was the commonest concern, as well as the risk of unfair means. Respondents were also concerned about how paid for services created inequality. There was a moderately developed sense of concern around societal impacts such as on employment. Concerns such as about the exploitative development of ChatGPT and environmental impacts were quite low. What also did not seem to be a concern is that ChatGPT might reduce their ability to develop their own voice in writing. Of the 28 students who said they did not use generative AI at

all the main concerns echoed those of the wider group, around accuracy of information and the potential for unfair means. Two respondents mentioned their lack of expertise as a barrier.

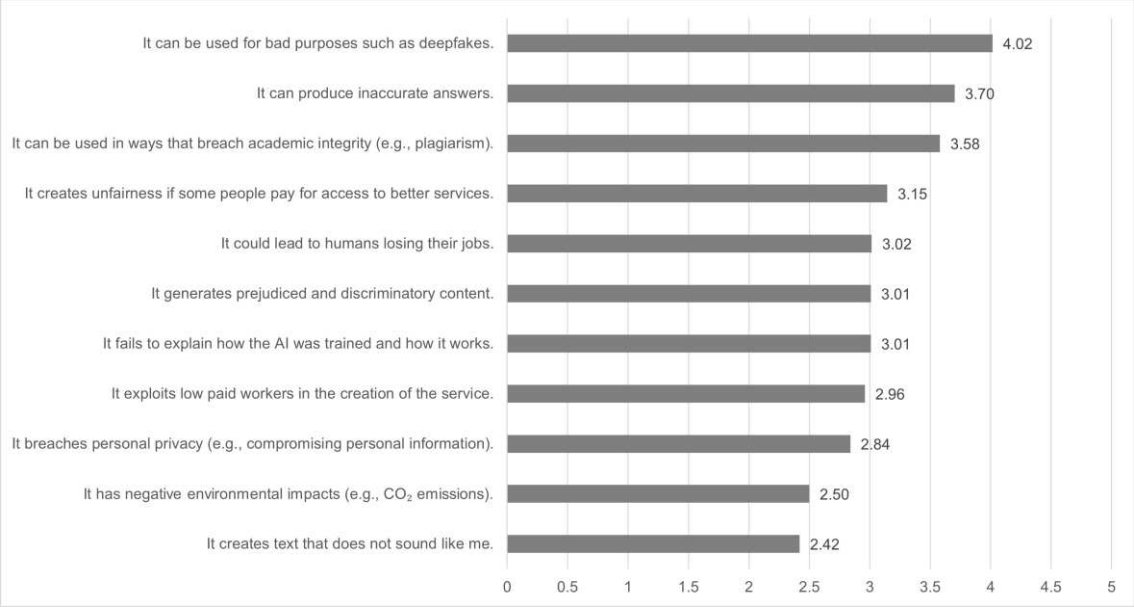


Figure 3: Concerns about Generative AI

Support Students Seek from the University

Our data suggests that students consider that they should be allowed to make ethical use of generative AI. There was also a very strong desire of students to be involved in policy making. Students considered that the university should provide training in how to use generative AI.

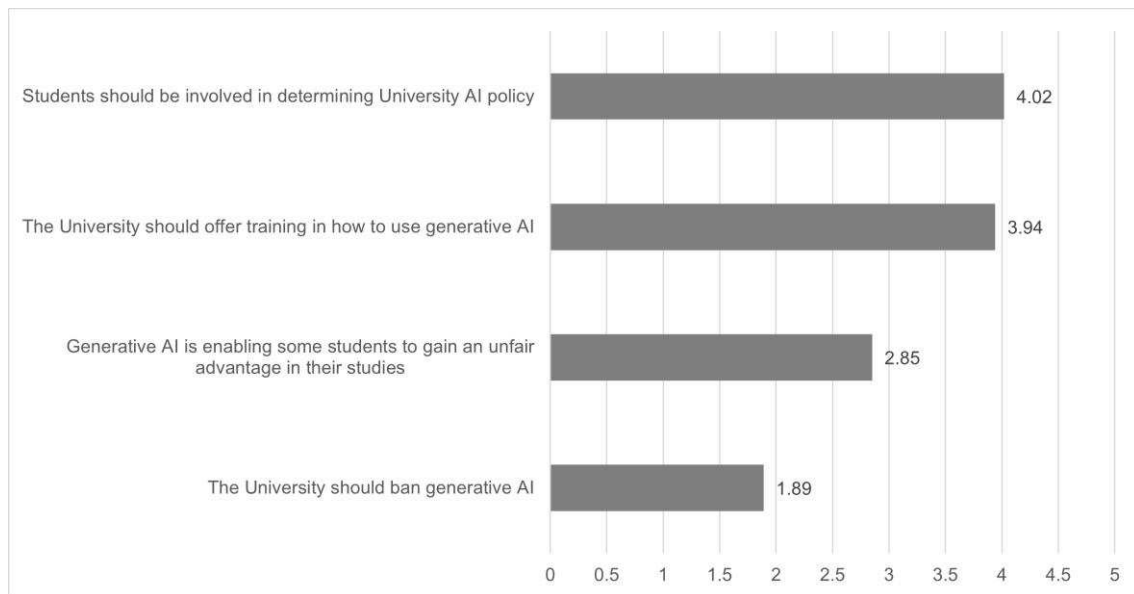


Figure 4: Views Towards Using Generative AI in HE

We employed a 5-point Likert scale to capture students' concerns, ranking from not at all concerned=1 to extremely concerned =5

Respondents were asked an open question about what support and training on how to use generative AI they would like the university to offer. The results correspond to the closed question, that most students wanted the university to provide training on how to use it effectively (n=41, 33%).

Specifically, students would like training on how to use generative AI and avoid unfair means (n=27, 22%) or unethical uses more generally (n=9, 7%).

Training on how to use generative AI responsibly and fact-check it, because it seems important to learn about it if it's going to become widespread, and to maintain a fair academic environment. I think students could use it for almost any aspect of their work and it would currently go unnoticed and unchallenged.

Generally the focus was on training in ethical use, not in how to actually use the technology. There were a few, however, who wanted specific training on topics such as:

1. Writing prompts (n=14, 11%)
2. Use in search, fact checking or referencing (n=12, 10%)
3. Using AI for summarising texts (n=6, 5%)
4. A wider range of tools than the familiar (n=4, 3%)

While most training in demand seemed to relate to writing, a few respondents mentioned support for time planning (n=3). Just a few (n=6, 5%) mentioned disability specific training like the following: “I’d like to know which AI tools the university recommends for people with learning difficulties as an aid”; “I would like to know how Generative AI might be helpful to students with adhd and autism rather than how it might be used broadly in academic settings”.

Discussion

This is one of the first studies to gather empirical data on students with disabilities’ experience of using generative AI, including ChatGPT, rather than general surveys of students or speculation about how generative AI might help such students. Our respondents were primarily those with neurodiversity, including ADHD, specific learning difficulties, social/communication impairments such as autism. These students are still under-represented and needing support to overcome barriers to participation and attainment (Hubble & Boulton, 2021). Respondents acknowledged experiencing a wide range of academic writing challenges, suffused with anxiety and disabilities related struggle. If generative AI can help overcome such barriers, then it would be having a significant impact on inclusion. However, caution should be exercised regarding the potential loss of learning opportunities resulting from over-reliance on generative AI.

Students with disabilities who responded were using generative AI: mostly ChatGPT. Respondents were also using some Grammar checking applications and

translation software. There was little evidence of the wider use of the proliferating range of generative AI tools (Baytas & Ruediger, 2024). Interestingly, few students were paying a subscription for a service. The main reason for ChatGPT's popularity appeared to be students' familiarity with it but also its support to many tasks, whereas other tools only helped with a more limited range of activities. Generative AI chatbots are used throughout the study and academic writing process, for:

1. Explaining complex topics
2. Helping improve search terms and for search
3. Summarising texts and other learning materials
4. Structuring ideas for writing
5. Refining text, by bringing ideas together and improving word choice

Generative AI reduces anxiety around some of these complex tasks, which were experienced as emotionally challenging by students with disabilities. Some of this use accords with speculation in previous literature that generative AI could helpfully support reading, writing and proofreading (McCarthy & Yan, 2023; McMurtrie, 2023; Tamdjidi & Bilai, 2023; Zhao, Xu & Cox, 2024). However, this study offers a more comprehensive understanding of how disabilities impact students and how they use generative AI to overcome challenges in written assignments. For example, our study provides specific evidence of how students with disabilities have used generative AI tools for searching information and accessing learning resources.

Overall, survey responses suggested that students with disabilities experience generative AI as effective assistive technology. Interestingly, the most useful support often comes from generative AI not recommended by their university. In this study, for example, Gemini was relatively less used, despite being this chatbot being the approved

service at the university where our data was collected. This misalignment between students' preference and university's recommendation has triggered concerns. Respondents are concerned that using the preferred yet not approved generative AI could lead to issues about unfair means. Given this concern, some students became hesitant or even refused to use it, missing out on the benefits. This lack of engagement, in turn, may impact fairness in higher education (Freeman, 2024), particularly affecting students with disabilities who are already in a marginalised position (Almufareh et al., 2023). To address this issue and ensure that all students, especially those with disabilities, can thrive in a more inclusive higher education environment, training in AI literacy is needed (Zhao, Cox & Cai 2024).

Returning to our definition of AI literacy we can pinpoint some strengths and weaknesses amongst students with disabilities as a whole. The breadth of uses made to address writing challenges suggests a creative engagement with the wide range of possibilities of generative AI services. Responses indicated appropriate concerns regarding information accuracy and academic integrity. Respondents did seem to be aware of some of the socio-ethical and safety issues and they gave emphasis to issues that affected them directly, rather than wider societal concerns. Concerns also included some reflective points about the potential impact of generative AI on their learning, e.g., in regard to dependency. They were very conscious of the dimension of contextual relevance. We can also identify some significant gaps in student generative AI literacy from the data. They are mostly using ChatGPT, seemingly without consideration of alternatives. Raising student awareness of the societal including environmental impacts of generative AI appears to be a priority. Further work is needed to explore other dimensions of their literacy, such as how effective they were at creating prompts.

Conclusion

This study is one of the first to investigate how generative AI is being used by students with disabilities. Generative AI has been received by HE as a threat but given the persistent under-representation of students with disabilities in universities, if generative AI helps support them it is a major benefit. The evidence collected suggests a wide range of uses throughout the writing process. Student concerns revolved around information accuracy and the impact on academic integrity. There was some concern that the ability of some to buy access to generative AI created digital inequality but there was less worry about societal impacts. Students wanted training in how to use generative AI but also involvement in policy making.

The research offers significant findings to guide disability support units and to all those who assist students with disabilities in their studies. Given the groups who responded to the survey, it seems appropriate to increase the support around generative AI to students with ADHD, specific learning difficulties such as dyslexia and dyspraxia, and social/communication impairments such as autism spectrum conditions. As regards policy, there seemed to be an ongoing lack of clarity about appropriate and inappropriate uses of generative AI, that was inhibiting use. A policy statement specifically on allowed uses for those with disabilities might be helpful. Yet we know that the diversity of disciplinary approaches to learning and assessment, make it hard to produce generalised guidelines. There was a strong sense that students with disabilities themselves wanted a voice in policy making. Respondents wanted training. Training could highlight the uses that respondents particularly focussed on. Given their usefulness, in the context of their cost, it could also be appropriate to provide subscriptions for students to generative AI services.

Although our study contributes to the understanding of how students with disabilities use AI and offers some practical guidelines for educators and policymakers in higher education, there are a few limitations to the study that need to be acknowledged. In our interpretation of the results, we should consider the potential impact of non-response bias on the results, in other words, that only those using generative AI or very militant against its use would reply. This might mean our results do not represent all views. Without further investigation this is not possible to establish. The survey is still useful because it reveals beneficial uses found by some students. The sample size was relatively small (only 124 out of 7,188 eligible students (~1.4%) responded). Although our study explored a wide range of disability conditions informed by existing categories by HESA, the small sample size made it challenging to differentiate the experiences of students with different disabilities. Similarly, the small sample size made it difficult to distinguish the experiences of students from different backgrounds (e.g., international vs. local; undergraduate vs. postgraduate; across different disciplines). Nevertheless, as an exploratory study and one of the few addressing this under-researched group, our findings provide important insights for future research. For instance, future studies could build on these findings by investigating specific disability conditions or comparing them to understand how they affect students' writing, which would help in providing more tailored support. Future research could also explore the potential mediating role of students' backgrounds in their use of generative AI. The study only focuses on one institution in the UK. The character of existing institutional support might have had an impact on student's views. There was also a disproportionate number of female students in the response, though this reflects the overall gender distribution of the student population of the university

where the data were collected. Future studies could seek a larger sample size of students with a more balanced gender distribution and the gathering cross-institutional data.

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Author contributions

All authors have contributed equally to the work.

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Data statement

The research data includes sensitive information on disability conditions. Although we have ensured full anonymization, we would like to offer the data only upon request.

Appendix: Survey questions

Your gender

Current level of study

Academic department

English language competence

Digital competence

Which Generative AI do you use (1 - Never Often 5 – Always) 2 - Rarely 3 - Sometimes 4 -

- ChatGPT
- Google Gemini (formerly Bard)
- Wordtune
- Quillbot
- GrammarlyGo
- Jasper
- Bing Chat
- Google translate
- Claude from Anthropic
- DeepL
- Otter AI
- Elicit
- Consensus

Do you have any specific feedback on how valuable you find any of the above tools?

Do you consider yourself to have a disability?

What disabilities do you consider yourself to have?

- Specific learning difficulty such as dyslexia, dyspraxia
- Neurodiversity - e.g. ADHD
- A social/communication impairment such as Asperger's syndrome/other autistic spectrum disorder
- A long standing illness or health condition such as cancer, HIV, diabetes, chronic heart disease, or epilepsy
- A mental health condition, such as depression, schizophrenia or anxiety disorder
- A physical impairment or mobility issues, such as difficulty using arms or using a wheelchair or crutches
- Deaf or a serious hearing impairment
- Blind or a serious visual impairment uncorrected by glasses
- A disability, impairment or medical condition that is not listed
- Prefer not to answer

How, if at all, how does this affect your academic writing?

What Generative AI tools do you often use to support your learning and why
What support and training on how to use generative AI would you like the university to offer

How do you use generative AI for academic writing (1 Never 2 Rarely 3 Sometimes 4 Often 5 Always)

- Interpreting an assignment brief
- Finding information about a topic
- Summarising reading material
- Translation of reading material
- Brainstorming ideas
- Validating a draft against assessment criteria
- Overcoming a mental block
- Structuring ideas for my assignment
- Rewriting phrases in my assignment
- Proof reading of my assignment

Monthly cost of subscription to all generative AI tools

Please respond to the following statements (1 Strongly disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly agree)

- Generative AI is enabling some students to gain an unfair advantage in their studies
- Using AI has improved my working efficiency
- Using AI has improved my academic performance
- Using AI has made me more engaged in learning
- Learning to use generative AI effectively is important for my future career
- The University should offer training in how to use generative AI
- The University should ban generative AI
- Students should be involved in determining University AI policy

What, if any, are your concerns about generative AI (1 Not at all concerned Slightly concerned 3 Moderately concerned 4 Very concerned 5 Extremely concerned)

- It can be used in ways that breach academic integrity (e.g., plagiarism)
- It can produce inaccurate answers
- It generates prejudiced and discriminatory content

- It creates text that does not sound like me
- It breaches personal privacy (e.g., compromising personal information)
- It fails to explain how the AI was trained and how it works
- It could lead to humans losing their jobs
- It can be used for bad purposes such as deepfakes
- It creates unfairness if some people pay for access to better services
- It exploits low paid workers in the creation of the service
- It has negative environmental impacts (e.g., CO₂ emissions)

Do you have anything to add about the use of Generative AI tools in an educational setting?