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Exploring the role of generative AI in higher education: Semi-structured interviews with students with disabilities

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Abstract

The release of a free generative artificial intelligence (GAI), ChatGPT, in November 2022 has opened up numerous opportunities for students with disabilities in higher education. While the transformative impact of GAI on teaching and learning in general is being debated intensively, little attention has been given to its potential for fostering or hindering inclusion. In news and blog articles, disability advocates have provided insights into the benefits and uses of GAI. However, a comprehensive understanding from a broader sample remains lacking. In order to address this gap, this study raises the question: "How do students with disabilities use and perceive ChatGPT as a tool in higher education?". Semi-structured interviews were conducted with students with disabilities to gain insights into their current utilization of GAI, identify limitations and challenges, and explore their expectations. A total of 33 participants took part, including neurodiverse students as well as students with visual impairments, chronic diseases, hearing impairments, and mental health conditions. Results suggest that ChatGPT brings significant opportunities as an assistant in teaching, writing, reading and research, or self-organization. Based on this study, higher education institutions are recommended to consider the opportunities the tool represents for students with disabilities in their AI policies. They also have a responsibility to train and inform students to harness the potential of GAI. Developers are encouraged to address accessibility issues and to include the opinions of individuals with disabilities in their research. More practically, the results of this study can be used to design future applications that bear in mind the expectations and concerns of students with disabilities.

Keywords Generative artificial intelligence · Students with disabilities in higher education · Digital accessibility; AI ethics

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1 Introduction

Generative artificial intelligence (GAI) can be defined as "a technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts (e.g., languages, instructions, questions)" (Lim et al., 2023, p. 2). In November 2022, the public release of ChatGPT sparked a debate on how this technology will transform higher education. While some universities quickly banned ChatGPT for fear of cheating (De Clercq & Kao, 2023; Hal Schwartz, 2023), some educators emphasized the opportunity to rethink how higher education institutions teach and evaluate knowledge and competencies (McKenna et al., 2023; Morris, 2023). To understand the transformative potential of this GAI in higher education, researchers have collected opinions from researchers and lecturers (Glazko et al., 2023; Morris, 2023) and students (Chan & Hu, 2023). Others have conducted rapid literature reviews on ChatGPT in education (Jahic et al., 2023; Lo, 2023). All recognize both opportunities and challenges. For researchers and lecturers, GAI could support teaching preparation and assessment, facilitate scientific and grant writing, reduce the workload on less meaningful activities, and synthesize literature (Jahic et al., 2023; Lo, 2023; Morris, 2023; Qadir, 2022). Similarly, students could benefit from an always-available and personalized virtual assistant to help with writing and studying, support with research and analysis, and create multimedia content (Chan & Hu, 2023; Jahic et al., 2023; Morris, 2023).

Concerns relate to the risk of plagiarism, low accuracy, the lack of privacy and transparency, possible degradation of human values, job replacement, and possible overreliance on technology (Chan & Hu, 2023; Jahic et al., 2023; Morris, 2023). In an autoethnographic study on the use of GAI for researchers' accessibility needs, Glazko et al. (2023) found that while GAI performed well with low-stake and easy-to-verify tasks, it did worse with specific tasks such as summarization of nuanced arguments or visualization.

1.1 Opportunities and challenges of GAI for students with disabilities

Little attention is given to how GAI could foster or hinder the inclusion of students with disabilities in higher education (Sullivan et al., 2023). News and blog articles from disability advocates suggest that the benefits of GAI could be manifold. For students with communication disabilities, such as dyslexia or cerebral palsy, ChatGPT could facilitate written communication (De Haas, 2023; Heidt, 2024; Hemsley et al., 2023). It could also aid reading comprehension for neurodiverse students by summarizing, simplifying, and explaining content (Heidt, 2024; Leos, 2023). Furthermore, people with attention-deficit hyperactivity disorder (ADHD) could use ChatGPT to customize reminders, provide motivational messages, and help establish routines (Leos, 2023). Additionally, GPT-4 promises multi-modal interactions that could enhance communication for people with hearing or speech impairments (Leos, 2023).

While these blog and news article authors list many potential benefits of ChatGPT, none have devoted much attention to the challenges of this technology. Still, McMurtrie (2023) pointed out the importance of training students to understand the strengths and limits of such tools, as some students could overuse ChatGPT if they do not feel confident enough with their words. Wallbank (2023) also warned against the issue of digital multitasking that could distract students with ADHD more than help them. More generally, the literature on AI and accessibility also suggests specific concerns regarding the use of AI and people with disabilities (Guo et al., 2020; Morris, 2020; Trewin, 2018). For instance, speech-to-text recognition may not function properly for people with unusual speech patterns (Guo et al., 2020).

1.2 Including students with disabilities in the GAI debate

Consequently, there is a need to assess the opportunities and challenges that GAI-based chatbots, such as ChatGPT, entail for students with disabilities in higher education. The voices and realities of people with disabilities must be represented proactively in debates around the transformative power of AI to avoid repeating a scenario in which technologies are adapted sporadically (Quinn, 2023). When accessibility is considered an afterthought, it increases the financial costs and the time it takes for people with disabilities to get the support they need (Heiman et al., 2020). Yet, scientists with disabilities have expressed concerns that those working on AI guidelines do not consider how these tools can help people with disabilities or other under-represented groups (Heidt, 2024). Researchers have also highlighted the lack of perspective of people with disabilities in AI fairness (Baker & Hawn, 2021; Trewin, 2018).

To encourage the development and adoption of inclusive AI applications, this study investigates the following research questions:

How do students with disabilities use and perceive ChatGPT as a tool in higher education?

a. How have students with disabilities used ChatGPT so far?
b. What are the benefits they experience?
c. What are the limitations they identify?
d. What general concerns do they have regarding GAI?
e. What are the future GAI-based applications that students with disabilities wish for?

2 Theoretical background

2.1 Disability and barriers in higher education

From a socio-medical perspective, a disability is the result of the "interaction between individuals with a health condition […] and a range of personal and environmental factors" (World Health Organisation, 2021). This definition elucidates

that people with impairments encounter barriers built in their environment. In higher education, students with disabilities face many obstacles (Fernández-Batanero et al., 2022). Architectural barriers make it difficult – or impossible – to navigate campuses to reach lecture rooms and other facilities (García-González et al., 2021; Moriña, 2017; Tomczak-Plewka, 2016). All signatories of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) guarantee the right to reasonable accommodations, i.e. countries and their institutions are bound to provide adjustments according to individuals' needs to ensure the "enjoyment or exercise on an equal basis with others of all human rights and fundamental freedoms" such as education (CRPD, 2006). Typical reasonable accommodations in higher education include exam adjustments (e.g. extra time, separate room), lecture support (e.g. note-taking assistance, sign language interpreter), or physical space adaptations (e.g. adjustable tables) (Reasonable Accommodations Explained, n.d.). Nevertheless, administrative procedures to receive reasonable accommodations can be burdensome and thus require a lot of additional energy (García-González et al., 2021; Osborne, 2019). Moreover, students must often self-advocate and disclose their disability, which can be emotionally demanding, especially for those with invisible disabilities (Fichten et al., 2020; Moriña, 2017; Osborne, 2019). Furthermore, even if digital learning materials are often better than printed ones handed in classrooms (Fichten et al., 2020), digital content and online learning platforms are regularly found to be inaccessible (Alcaraz Martínez et al., 2021; García-González et al., 2021). There is also a general lack of awareness concerning accessibility and disability-related issues (García-González et al., 2021; Jembu Rajkumar et al., 2020; Schultz & Azadbakht, 2021). While there are efforts to train university staff on the topic, which can greatly facilitate a good student experience, they are insufficient, as negative attitudes are still reported (Moriña, 2017).

2.2 Universal design for learning and technology

To reduce barriers, higher education institutions can follow the principles of the Universal Design for Learning (UDL). The UDL framework encourages lecturers to acknowledge that every learner has a unique way of understanding information, being motivated, and expressing their knowledge (CAST, 2018). Although this approach is meant to support everyone, adopting UDL in higher education can especially reduce the need for students with disabilities to self-advocate for accommodations (Hills et al., 2022). Flexibility is a central element in UDL (Courtad, 2019), but it comes with challenges too. A common barrier is the lack of time and resources to implement UDL (Hills et al., 2022). Along with training and top-down strategies (Hills et al., 2022), lecturers can use technologies to account for the three UDL principles: Multiple Means of Engagement, Action and Expression, and Representation (Courtad, 2019). Many tools have been available for a while now and do not necessarily employ advanced techniques, but recent developments in GAI could bring many opportunities.

The first UDL principle seeks to spark students' interests by presenting information through multiple means of engagement. Courtad (2019) recommends using

summarizing tools, gamified apps, or timers helping students self-monitor. AI assistants can also facilitate students' engagement with study materials and related tasks. For instance, the data analysis software MaxQDA released an AI assistant to help summarize codes and suggest subcodes (MaxQDA Official Channel, 2023). Conversational agents such as ChatGPT can explain or simplify course content or give feedback (Morris, 2023) to students who learn better through dialogue (Singh, 2023) or through repetitive learning (McMurtrie, 2023). ChatGPT can also let students self-test their knowledge (Morris, 2023), which is a manner to engage with learning. This technology could account for the limited resources that university staff possesses and become a first source of information before visiting teaching assistants or lecturers during office hours (Morris, 2023). Teachers can also ask ChatGPT to provide different examples to make their courses more appealing to students (Morris, 2023).

For the second UDL principle, which aims to let students express their knowledge in a way that meets their needs, lecturers can use platforms where students can upload answers or work through other media than text, such as video or online portfolio, or using speech-to-text technologies (Courtad, 2019). University teachers have recognized the potential of ChatGPT to facilitate the writing process and reduce the inequalities for students whose native language is not English (Morris, 2023). This argument is also valid for people with various disabilities, such as those using augmented alternative communication (Hemsley et al., 2023), individuals with dyslexia (De Haas, 2023; Leos, 2023), ADHD (Leos, 2023; McMurtrie, 2023), visual impairments (Leos, 2023), or speech impairments (Leos, 2023). Future developments are also promising, as newer applications could include speech-to-text functions (Leos, 2023).

Finally, the third UDL principle accounts for the fact that learners use different senses to learn and have preferences for specific formats. Tools such as tracking, font changer, or text-to-speech can let lecturers present their learning materials in different formats (Courtad, 2019). Although automatic captioning still requires human editing, implementing video captions has become cheaper and more available (Kent et al., 2018).

More generally, lecturers can also ask ChatGPT to formulate suggestions to design a course that is more accessible to students with disabilities (Zhai, 2023). ChatGPT itself stated that it can help students find information regarding reasonable accommodations, support, or assistive technologies (Lyerly, 2023). While this use brings promise, it should be remembered that, to date, the accuracy of suggestions has yet to be validated.

2.3 GAI as an assistive technology

GAI-based technologies like ChatGPT can be referred to as assistive technologies. This concept includes "any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities" (Assistive Technology Industry Association, n.d.). A distinction can be made between mainstream and specialized technologies. The former

is widely used by the general population, while the latter is designed to cater to the specific needs of individuals with impairments. Both can be used as assistive technologies, and the difference between the two is blurry (Fichten et al., 2020). For instance, a mainstream tool such as a spell-checker can be valuable for students with learning disabilities (Fichten et al., 2020). Meanwhile, text-to-speech technologies, initially developed for people with visual impairments, have now become mainstream (Fichten et al., 2020). Regardless, the distinction is helpful because the two types of technologies will not bring the same benefits and challenges. Mainstream devices used as assistive technologies (e.g., iPad, PowerPoint, computers) can significantly impact academic engagement, participation, and psychological well-being (McNicholl et al., 2021). A critical advantage is that students with disabilities do not feel different from their peers without disabilities when they employ technologies used by everyone (McNicholl et al., 2021).

However, unlike specialized technologies, accessibility is often an afterthought in the design and development of mainstream devices (Heiman et al., 2020). This results in higher costs and delays in the inclusion of people with disabilities (Heiman et al., 2020). Moreover, inaccessible tools may also be incompatible with specialized assistive technologies (Heiman et al., 2020). When students with disabilities cannot use mainstream technologies in class, they are denied the opportunity to receive the same learning experience as their peers (Heiman et al., 2020). For these reasons, it is necessary to explore how GAI, with the example of ChatGPT, can be used as assistive technology as well as address ethical concerns.

2.4 AI ethics and disability

Several researchers have underscored potential ethical challenges regarding the use of AI for people with disabilities. In particular, Morris' work (2020) identified seven ethical considerations regarding AI and accessibility: inclusivity, bias, privacy, error, expectation setting, simulated data, and social acceptability. Although these concerns are not specific to GAI, this section seeks to elucidate on these issues and reflect on their relevance within this specific subfield of artificial intelligence.

First, employing AI may be problematic for people with disabilities because they may be excluded from a service that does not work for them (Morris, 2020). Guo et al. (2020) presented a research roadmap arguing that computer vision, speech systems, text processing, integrative AI, and other AI techniques may not work for people with disabilities as it does for those without. Excluding people from an education service would breach the right to equal opportunity to education as described in the UNCRPD, Article 24 (2006). Interestingly, Guo et al. (2020) highlighted that conversational agents might be ineffective for dyslexic individuals if the system has not been trained to interpret texts with atypical spelling or phrasing. OpenAI appears to have undertaken measures to tackle this issue within ChatGPT as disability advocates appraise its utility for dyslexic people (De Haas, 2023; Leos, 2023). This raises questions on whether conversational agents have reached a milestone and if newer applications will be accessible for people with disabilities. Additionally, the question of inclusivity cannot be

reduced to technical specificities. Financial obstacles and a lack of or inadequate training opportunities can impede the uptake of assistive technologies (Heiman et al., 2020). The latest version of OpenAI's model, GPT-4, is not free, which could hinder individuals with disabilities who often face financial constraints (Vaughn, 2023; Wolanin, 2005). To overcome these challenges, higher education institutions could play an enabling role by providing licenses as well as instructional support in utilizing such tools.

Second, the concern about bias refers to discriminatory treatment by AI systems (Morris, 2020). Disability is a category that is very diverse, evolutive, and can be multiple (Trewin, 2018). Due to these characteristics, machine learning algorithms are likely to treat disability as noise in the data, and it is possible that there are not enough people with a specific disability to let the AI identify a category or pattern (Trewin, 2018). In the case of GAI, bias could result in representational harm, as the content it produces might not accurately or positively depict people with disabilities. Representational harm occurs when groups are represented negatively or are lacking positive representations (Baker & Hawn, 2021). For instance, researchers found that natural language processing (NLP) models associate mental illness with negative terms like gun violence, homelessness, and drug addiction (Hutchinson et al., 2020). Glazko et al. (2023) also found that subtle ableist language was introduced when they summarized a research paper with ChatGPT. Additionally, image generators tend to depict persons with disabilities inaccurately and negatively (Davis, 2023; Glazko et al., 2023; Hayes, 2022; Mack et al., 2024). In the specific case of conversational agents in higher education, to the best of our knowledge, no cases of misrepresentation of disability by ChatGPT have been reported. ChatGPT seems to provide correct answers to support students with disabilities in higher education (Zhai, 2023). OpenAI aims to filter harmful content and encourages users to give feedback when they encounter some (OpenAI, 2022). However, as several cases of implicit sexist and racist biases were reported on social media, some of which have been addressed (Davey, 2023), caution should still be warranted when using GPT language models in newer applications.

Third, privacy concerns are more significant for people with disabilities than those without disabilities because disability status might be inferred from data and unintentionally disclosed without consent (Morris, 2020). As disclosure can be emotionally tricky for students with disabilities (Moriña, 2017; Mullins & Preyde, 2013; Osborne, 2019), this issue must be addressed carefully. It is not clear whether students would be willing to disclose their disability or not. For that reason, further research is needed on the opinion of students on the disclosure or use of their disability status in AI technologies.

Fourth, AI systems are still imperfect and can output errors that people with specific impairments may be unable to check (Morris, 2020). In the case of ChatGPT, false information presented convincingly is a common concern requiring users to assess information critically (Chan & Hu, 2023; Lo, 2023). Considering that academic platforms (e.g., journal platforms, learning environments) can be inaccessible (Arias-Flores et al., 2020; García-González et al., 2021; Saripudin et al., 2019), it is essential to ensure that checking the validity of information is not more tedious for students with disabilities.

Fifth, the marketing of AI performance often sets high expectations of what AI can do, which can be deceptive for people who depend on the technology (Morris, 2020).

Sixth, Morris (2020) warns against the use of simulated data to train algorithms as it does not represent well the experience of people with disabilities.

Seventh, "social acceptability" refers to how technologies may be differently perceived by society depending on the disability status of the user (Morris, 2020). For example, the general public may not accept Google Glass due to privacy concerns, but its use to help people with visual impairments may receive more acceptance (Profita et al., 2016). In the current debate over GAI, many fear it will be misused for cheating, or that students will stop learning efficiently (Morris, 2023). On the other hand, the benefits it can offer students with disabilities could help justify its use. Additionally, the development of AI raises questions about the role of higher education. In particular, Mcgrath et al. (2023) found that Swedish university teachers consider that higher education institutions have a responsibility to use AI educational technologies to support students, especially those from disadvantaged groups such as students with a learning disability. The study also highlighted the difficulty of adopting AI-based technologies due to a lack of resources and time (McGrath et al., 2023). Institutional policies are crucial for addressing this ethical concern, as they provide legitimacy to a tool's use and can enable the allocation of time and resources for training and support.

In addition to the seven considerations explored by Morris (2020), Bennett and Keyes (2020) emphasized the need to analyze the use of AI through a justice lens, i.e., by assessing how AI can influence existing power structures, control or surveil people, and how it can be misused. The justice lens invites researchers to consider the impact of AI from a broader, systemic perspective. For instance, the use of proctoring software in exams is not only problematic due to apparent biases towards students with disability and privacy breaches, but they also raise surveillance issues and potential misuse of sensitive data, which can impact individuals directly (Brown et al., 2022).

In sum, research has highlighted critical ethical aspects regarding the use of AI and disability. These issues must be reflected upon when considering using tools such as ChatGPT in higher education or developing newer applications for this field.

3 Methods: semi-structured interviews

The experiences and opinions of students with disabilities on GAI were collected through semi-structured interviews. This qualitative approach is appropriate to gather opinions on a topic that is still partly unknown (Wilson, 2014), as is the case with the subject of this study, since the use of GAI in higher education is relatively new. Semi-structured interviews let participants raise additional information that was not identified beforehand (Wilson, 2014).

3.1 Interview guide

An interview guide composed of open-ended and closed questions was developed based on the existing academic and grey literature mentioned in Section 2. Before the start of the interviews, the first author discussed the topic and design of the study with four experts in accessibility. This step helped revise the interview guide and manage expectations. Additionally, after the first interview with a participant, the first author asked the student about the clarity of the questions and revised questions that did not come out well during the session. The final interview guide was divided into three sections: 1. Introduction and general knowledge about AI, 2. Experience with ChatGPT, and 3. Future development and wishes. The full interview guidelines in German, English, and French are available as supplementary materials. The questions sought to identify the current use of GAI by students with disabilities, specifically focusing on their use of ChatGPT, the opportunities and challenges this technology entails, and the features and functionalities students with disabilities wish the technology would bring. ChatGPT has been taken as an example as it is a widely known tool by students, which renders such an investigation more practical. However, during the discussion, participants were invited to reflect on future developments and other tools they know.

3.2 Sampling

As the research sought to understand how GAI technologies could support the inclusion of students with disabilities, the target population was any student whose disability could impact their use of GAI. To reach as many of those people as possible, our recruitment e-mail listed relevant examples of impairments that we identified based on news and blog articles and discussions with accessibility experts while remaining open to anyone who self-selected as the target group. The following examples were listed: neurodiverse students (e.g., dyslexia, ADHD, autism), students with visual impairments, students with hearing impairments, students with motor impairments hindering writing capacity, and students needing augmentative and alternative communication (AAC). AAC are strategies and tools that let persons communicate with alternative means such as vocalizations, speech approximations, and body movement (e.g. thumbs up for “ok”) or with technologies (e.g. interactive board with picture symbols) when speech-language is impaired (Beukelman & Light, 2020).

Students were recruited via email. Recruitment emails were sent to different stakeholders: researchers working in the field of accessibility, disability offices, disability and diversity networks, and students who agreed to stay in contact with the authors after another project. Emails were written in German, French, or English, depending on the region’s language. Participants needed to fulfill the following requirements:

- Being a student with a disability in a European university

- Having used ChatGPT at least once and being interested in the subject
- Speaking either German, French, or English

Interviews were compensated with a voucher.

3.3 Data collection

Participants received in advance a consent form including information about study objectives, a general outline of the questions, data usage, and storage. The document was read out loud prior to the start of the interview, and students could ask questions. Once they agreed to the participation conditions, the discussion was recorded and transcribed automatically via Microsoft Teams. Nobody required any alternative form of communication during the interviews. The transcriptions were corrected by three research assistants and the first author. The correctors followed an intelligent verbatim style, i.e., they deleted repetitions or verbal fillers such as "umm" (McMullin, 2023) because the study focused on the content and not the form of the answers. While conducting the interviews, the first author took notes of the answers and kept a diary of reflections arising during the meetings. All interviews took place from May 31st to July 3rd, 2023.

3.4 Data analysis

Transcripts were analyzed thematically using deductive and inductive codes. Prior to the analysis, an initial coding was elaborated based on existing literature. Initial codes followed the research and interview questions and structured the analysis. Then, the transcripts were coded by the first author based on the two-cycle methods by Saldaña (2013). While the first cycle summarizes content into detailed pieces of code, the second cycle reduces the content by forming more abstract categories and connecting information (Saldaña, 2013). In the first cycle, text data was coded with the initial coding framework, complemented with inductive descriptive and in-vivo codes that enriched and adapted the initial coding framework. In the second cycle, the codes are restructured to identify patterns and form larger categories. Although it is presented as a two-cycle method, it is essential to note that larger categories can appear during the first part of the analysis, as the process is iterative and based on an initial coding framework. The initial and final coding schemes can be found in the research protocol as supplementary material.

3.5 Declaration on the use of AI

The authors declare that all ideas and analyses were produced by themselves. However, during the preparation of this work, the first author used ChatGPT to proofread, shorten, and reformulate her own text. DeepL was used to get a first translation of the interviewees' quotes. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

4 Results

4.1 Sample description

In total, 33 students with disabilities participated in the study. Interviews lasted between 24 and 65 min.

A majority of interviewees (24) studied in the German-speaking part of Switzerland, 7 participants in France, and 2 in Germany. Respondents were predominantly engaged in studies at the bachelor's level; only six were pursuing their studies at the master's level or equivalent. Most participants were enrolled in social sciences (17), followed by business sciences (6). The fields of computer sciences, medical sciences, and natural sciences each had two interviewees. One participant studied engineering sciences. Three respondents followed double-major degrees combining social sciences with fields such as business, computer science or natural sciences.

Respondents' ages ranged from 20 to 49 years, with a median age of 25. The gender distribution included 23 women and 7 men. Additionally, one student identified as diverse, another was in a discovery phase, and information regarding one participant was unavailable.

Out of the 33 interviewed students, 24 different impairments were reported. Nine mentioned having more than one impairment. The distribution of the types of disabilities is summarized in Fig. 1. The largest group in the sample is neurodiverse students, with 20 individuals. This category includes students with ADHD, with "dys" conditions (e.g., dyslexia, dyscalculia, dyspraxia), autistic students, one student with bipolar type 1, and one student with a schizoaffective disorder. Furthermore, there were nine students with a visual impairment. Seven students had a chronic disease (e.g., migraine, narcolepsy, chronic pain in the hand).

The bulk of participants (19) reported having a user-level experience with GAI, i.e., they mainly knew how to employ tools such as ChatGPT. Nine exhibited a slightly higher level of familiarity as they were keen on acquiring information on the subject. Five participants possessed a more technical level of knowledge because of their current or previous studies or work. Additionally, most participants (22) started using ChatGPT within the first three months after its release at the end of November

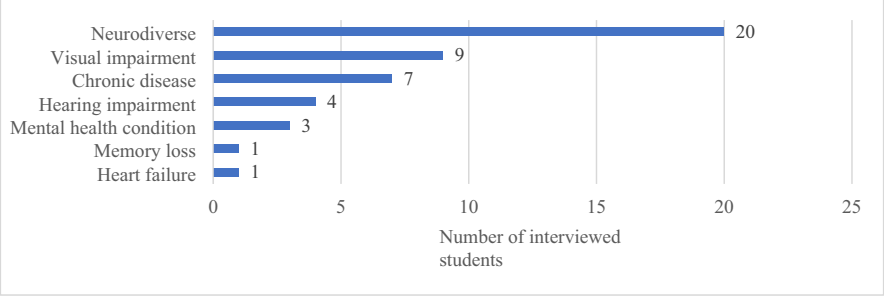

Fig. 1 Distribution of disability types among 33 interviewees. Note that one student could be counted in more than one category

2022. Seven first started between March and May 2023. Three had tried the tool for the interview.

4.2 Uses of ChatGPT

Out of 33 participants, 30 had a favorable opinion regarding ChatGPT as a study tool (Fig. 2). Nevertheless, 11 interviewees highlighted that ChatGPT is most useful when supplementing human teaching or expertise, underscoring its role as a tool rather than a standalone solution. Other accommodations, such as human support, tools, or adaptations, are necessary. 16 participants highlighted the individual's internal empowerment to include others, emphasizing readiness for change and awareness as key components.

The two respondents who were more skeptical than their peers explained either that they relied on human experience to study or that their studies were not adapted to ChatGPT. The final respondent was undecided about the tool's usefulness.

Figure 3 below summarizes the current uses of ChatGPT by participants. These findings are described in more detail in the following subsections. The chart highlights the link between the participants' tasks that were reported as challenging and the assistance provided by ChatGPT. For the sake of clarity, only tasks linked to the uses of ChatGPT were illustrated. Note that challenges arise because of environmental factors and not just personal factors. Nineteen participants reported a general lack of support at their universities due to denied reasonable accommodations, a cumbersome request procedure, insufficient information, or a lack of awareness toward the realities of living with a disability.

To cope with the barriers, students used assistive technologies, invested themselves personally, received paid-human assistance or support from their family and friends, got university reasonable accommodations, or followed therapy or medical treatment. Notably, a little more than one-third of the respondents mentioned their own investment and human assistance each. Personal investment is of particular interest because it reflects a lack of assistance. It is also a solution that is not infinitely extensible and can worsen study barriers.

Out of the 33 participants, 23 used ChatGPT at least weekly, among which ten reported utilizing it daily. Conversely, the remaining ten interviewees did not employ

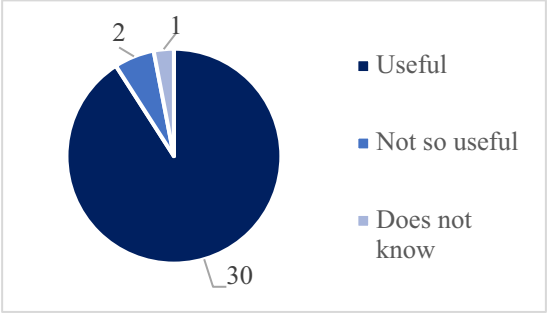

Fig. 2 Overview of the usefulness of ChatGPT in studies according to 33 students with disabilities

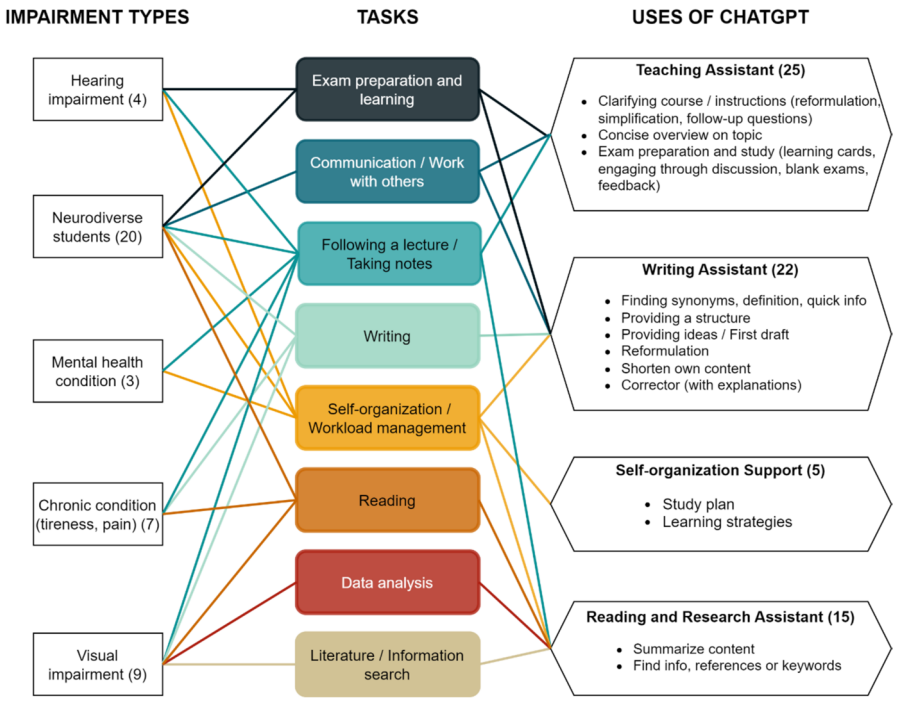

Fig. 3 Schematic representation of the link between impairment types, tasks and current uses of ChatGPT

the tool regularly. Many indicated that their usage frequency depended on specific tasks, often aligning with learning periods or paper writing.

4.2.1 Teaching assistant

Following lectures, taking notes, and having the energy to study are common challenges for students with disabilities. In the absence of human assistants (e.g. notetakers) or materials (e.g. recording and transcripts), students often have to make up for the missing information which results in a higher workload. Consequently, 26 participants mentioned using ChatGPT as a form of teaching assistant to 1) clarify content, 2) get a quick overview on a topic, 3) support exam preparation, and 4) engage with content.

Reasons why those functions are helpful vary depending on the type of disability. Students with chronic or mental conditions and neurodiverse students regularly lack energy or concentration which hinders lecture engagement and note-taking. Furthermore, four neurodiverse students conveyed that they sometimes do not understand lecturers' instructions and could imagine that ChatGPT could help with this issue. Among them, one student had already experimented with the tool and believed they would not have solved the exercise without it.

Those with hearing impairments struggle due to inadequate university adaptation, hindering lip-reading and auditory comprehension. For instance, a student with a hearing impairment said:

> "What I always do when I know that a new topic is coming up, I always ask ChatGPT: "Can you explain 20% of the topic in such and such a way that I understand at least 80% of it?", and then I get a very good summary in which I also know what the key concepts of the topic are […] because I cannot hear out so well what the lecturers say or emphasize, because it's all very mechanical with the hearing aids and then it actually helps me a lot to see where the focal points are now actually." (P25, translated from German)

Similarly, students with visual impairments find unexplained visuals and inaccessible learning materials problematic.

4.2.2 Writing assistant

Using ChatGPT as a writing assistant was the second most popular usage, as 23 participants reported the benefits of employing the tool in this way. While writing is a tedious task for many students, dyslexic or dysorthographic individuals, and people with ADHD require greater assistance. Students with dyslexia/dysorthographia explained that writing can be arduous because they overlook their spelling, grammatical, or conjugation mistakes; it is also hard to acquire vocabulary and start writing. One student with dysorthographia explained the usefulness of receiving explanations on the mistakes he made to improve over time.

Parallelly, students with ADHD reported having difficulties structuring their abundant ideas or thoughts and overcoming writer's block. For instance, P11 explained:

> "Due to my ADHD, I have a lot of ideas, a lot of things that I think are good and then I never know: How do I write this down now? And ChatGPT is extremely helpful because I can simply put in my ideas and ChatGPT can build up a basic framework for me, so to speak. I can then take that and adapt it, as I find that it is then really personalized to me. For that I find ChatGPT just extremely good." (P11, translated from German).

4.2.3 Reading and research assistant

Ten students highlighted that reading and literature search was challenging and time-consuming. For instance, dyslexic participants explained that they had a slower reading pace. Furthermore, students with ADHD and chronic conditions (e.g., tiredness, migraines) and one autistic student elucidated that they struggled to concentrate on long texts. Additionally, students with visual impairments reported barriers to conducting literature searches due to inaccessible platforms (e.g., literature data bank, citation software) or the effort it takes to read with a screen reader and the large number of articles to assimilate.

Seven students used ChatGPT to summarize reading assignments or studies by entering parts of the text or giving the authors and work titles. This facilitated their text understanding and reduced workload. They appreciated getting the core message without complicated sentences or words. For instance, an autistic student explained the following:

> "For example a reading assignment that I have that was just way too long for me to be able to read in two hours and I couldn't concentrate, and it was quite a long text that involved a lot of text that wasn't actually relevant to what it wanted to condense, I asked ChatGPT to summarize what it said, so that I just had an understanding while reading it of what it actually meant. So that I found useful, and it is something that I think I would do again." (P20, original language).

A few interviewees used ChatGPT as a research assistant too. For instance, five persons looked for references, one person for keywords, and one had the tool summarize text data from anonymized interviews.

4.2.4 Self-organization support

The potential of using ChatGPT to help students self-organized is less widespread than other functions. Still, five students found it helpful to provide study plans. Among the five students, four were neurodiverse and one had a hearing impairment. One participant stressed that people with ADHD can benefit significantly from ChatGPT to overcome time management issues. The student with a hearing impairment also mentioned being a mother and having faced difficult times within the family, making it harder to balance her studies with her private life.

A neurodiverse student also asked for learning strategies for someone with memorization difficulty or why he needed to move while he studied. He elucidated as follows:

> "I didn't dare ask "real" people. I didn't dare because I'm quite shy and I don't like thinking of myself as different yet again. "Why do I work like this?" And as a result, it's actually easier to ask something rather than someone. Because we know it's a computer. Even if it's collecting data, we're not going to be judged by it." (P36, translated from French)

Reasons for not using ChatGPT to support their self-organization were often that they did not think about this possibility, did not need assistance, or doubted it would be efficient. Several interviewees mentioned that they were already well-organized or had good strategies and tools such as voice assistants or calendar reminders. Others, notably three students with ADHD, elucidated that their management difficulties laid in sticking to a plan rather than making one.

4.3 Opinion on the use of ChatGPT for reasonable accommodations

While Lyerly (2023) reported that ChatGPT could provide some form of support with the request for reasonable accommodations, almost nobody reported using the tool in this manner. This could be attributed to the newness of the tool (i.e.,

ChatGPT did not exist when they needed to request accommodation), or it might be because the accommodation process is adequate, or they might not have requested any reasonable accommodation in the first place. Still, two participants used the chatbot to help them communicate with the disability office about their impairment. For instance, a student with migraines reformulated a description of the barriers she faced in a friendly manner before talking to the disability office supervisor.

In the interviews, the respondents were invited to envision the potential utility of ChatGPT regarding reasonable accommodation. Opinions diverged on its possible benefits. On the one hand, participants who did not see value in ChatGPT preferred interacting with a person when requesting reasonable accommodations (4) or felt they would be more efficient than the chatbot (3). Some also felt the topic was too sensitive or emotional to be written with ChatGPT (2), questioned its effectiveness (3), or believed that the procedure must be reformed (2).

On the other hand, eight participants believed it could be a source of supplementary information, as they recalled it was not easy to know what type of accommodations they could get. Five participants also imagined that lecturers could use ChatGPT to understand how they can make their courses more accessible and become aware of the issues that students with disabilities face. Four interviewees also reckoned ChatGPT could help reduce administrative burdens by helping fill out forms or drafting emails. Whether ChatGPT could be an accommodation on its own was not supported, as only three could imagine this scenario, whereas two felt it would be unfair to be the only ones authorized to use it.

4.4 Perceived outcomes

Twenty-three participants mentioned several positive outcomes associated with the utilization of ChatGPT in their studies. Personal relief was the most significant advantage. In particular, ChatGPT was lauded for its time-saving capabilities (18), effort or pain reduction (9), capacity to increase autonomy (8), compensation for inadequate support (2), and elevation of confidence (1) and motivation (2). One student with a hearing impairment expressed the sense of relief she experienced:

> "When I started with the lectures, i.e., in 2020, when everything was still online […], I easily spent one day working on a lecture to understand everything and somehow summarize it. Now, I actually manage at least two lectures per day because I use this artificial intelligence. Yes, that also helps me a lot to get ahead faster and to get my things done quickly and then maybe still have a bit of free time." (Participant 25, translated from German)

Nevertheless, the time-saving capacity of ChatGPT needs to be mitigated, as seven participants mentioned that they sometimes wasted time on the platform. For instance, a student with ADHD explained that she lost track of time asking for further details on a topic. Moreover, as generated answers must be fact-checked, checking for accuracy reduced the time-saving effect.

Five participants also believed the tool had positive learning effects such as a deeper level of understanding and a pleasant manner of learning.

4.5 Limitations to ChatGPT

While students recognized many benefits, all but one (who had tried it only once) identified limits in the tool. Limitations relate to accuracy, capacity, writing style, necessary human skills, and platform inaccessibility. Issues regarding accuracy prompted caution from participants or the use of other tools like Perplexity.ai. Similarly, to overcome the impossibility of uploading documents in ChatGPT, a few interviewees reported employing tools like ChatPDF or Chip, or plugins such as ReadPDF. Additionally, although the writing style was often found to be good, about half of the participants noticed that ChatGPT tended to be repetitive, resulting in a robotic tone. According to ten participants, the generated texts must be modified to infuse a personal and human touch. Alike, participants recognized the need for mastering human competencies like prompting skills to obtain the desired answer.

Inaccessibility of the platform hindered in particular students with visual impairments. They noted the lack of labels and a problematic navigation structure that forced users to scroll to find the latest question they asked or to wait while the answer was generated. Greater flexibility and organization of the platform could also support neurodiverse students. For instance, a student with ADHD found that ChatGPT's answers were usually too long, wished for an option to organize chats into different topics and for a possibility to notice when they lost track of time on the platform. Additionally, an autistic student explained that they struggled to find out what to ask ChatGPT despite the examples provided on the platform.

4.6 Concerns and challenges

The following concerns and challenges related to accessibility and people with disabilities in higher education were mentioned: 1) overreliance and impact on studies, 2) cheating and plagiarism, 3) data privacy, and 4) loss of human contact.

4.6.1 Overreliance and impact on studies

Twenty-eight participants were concerned with the overreliance on AI and the impact on their studies. Twenty interviewees raised the issue that people or themselves could stop learning, lack critical thinking, and not check information. Some highlighted the unknown consequences AI could have (6) and that its reliability is unclear (4). For instance, a dyslexic student wondered how much dyslexic people should need to master spelling skills when an AI can correct them. Furthermore, three participants felt that inequalities could be worsened when some know how to use a tool, and others do not.

Participants were invited to reflect on the impact AI could have regarding assistance and accommodation for their needs. Seven participants explained that universities or non-disabled people might get the false impression that students

with disabilities no longer need assistance, which could result in less investment. The following statement illustrates this concern:

> "But it could also be that the requirements increase, that people then say, 'Yes, you have these tools, now do it.' I could imagine that this might be a bit difficult, but that's always the case when you have new technical assistive technology, that people in the popular science field then think that the world is saved and everything is good now. That's usually not the case, because some things just don't work yet, or aren't perfect yet." (Participant 21, translated from German)

4.6.2 Cheating and plagiarism

Twenty interviewees mentioned the issue of exam cheating and plagiarism. These concerns raised questions regarding the value of their degree, as well as uncertainty about the extent to which ChatGPT can be used without being considered plagiarism. In particular, a dyslexic student feared they would not notice they plagiarized a study due to their impairment and therefore was more cautious with using ChatGPT for their work.

4.6.3 Data privacy

Thirteen participants mentioned data privacy as a risk, explaining that data could be shared and misused. Specific consequences were not named, but they mentioned the lack of transparency in data management and the fact that the consequences are yet unknown. For a majority of interviewees, it was not a deterrent from utilizing the tool. They explained that they did not share personal or confidential information such as addresses, names, professional data, or bank accounts. Six also mentioned that their data were already being shared on social platforms.

Out of 23 participants who were asked whether they would share their disability status on ChatGPT, 14 expressed no concerns about doing so. Five respondents elaborated that sharing this information could provide them with assistance or a more personalized experience. Four mentioned feeling confident and viewing their disability status as another aspect of their identity. Six persons indicated they had already shared this information. Nevertheless, six individuals were not willing to share their disability status because they did not know how data would be used. Three participants were less decided on an answer and simply mentioned their decision would depend on the situation.

4.6.4 Loss of human contact

Six participants expressed worries that AI reduces human relationships. Sixteen respondents argued that there will always be a need for human assistance. While eight doubted GAI could match human accuracy, reliability, and efficiency, six emphasized the enjoyment and emotional support from human interactions. For instance, a student with dyslexia explained that there is a unique value in having

a conversation with someone who proofreads a text and doubted that an AI could replicate this.

4.7 University policies

Bearing in mind that interviews were conducted in June and July 2023, when many universities were still working on guidelines, more than half of the interviewees reported a lack of communication from their universities on whether they could use ChatGPT. This led one student to avoid using the tool too much even though she identified potential benefits, as she feared she could fail classes because of it.

While students could understand that the tool is not allowed for examinations, many wished their university would allow its general use and provide guidelines to clarify when and how it can be used. Two participants argued that the tool called for higher education reforms. Still, one person stated that they would not want ChatGPT to be allowed at the cost of proctoring.

4.8 Future development of GAI

Out of 33 participants, 29 indicated they would use GAI in the future. Only four students had more reserve concerning future use, two because of university policies that did not allow it, and two explained they would give it another chance as they did not see the benefits at the moment.

Participants imagined different GAI-based functions to support their studies. Seventeen explained that they wished limits and concerns they identified with ChatGPT would be fixed, particularly the accuracy and accessibility issues. Others mentioned that the performance and capacities of other technologies, such as automatic captions, optical character recognition, and read-aloud functions, could improve with the help of GAI.

Participants mentioned the following future AI-based applications to support their studies:

- **Multi-modal GAI to increase accessibility:** input could become more flexible by allowing speech and text input. Output could be read aloud with accessibility options such as personalized voice speed or highlighting words while reading. A GAI acting as a tutor could explain with visual content such as videos or schemas.
- **Course transcription and structured summary:** The output could be either a short audio summary or a text summary. The recap could highlight important information and let students ask for further explanations.
- **Explaining visual content:** in particular, students with a visual impairment could ask for descriptive information with follow-up questions or a data table. Additionally, GAI could provide written analysis, highlighting what the graph or image shows. This option would benefit students with disabilities when they miss out on course explanations or cannot ask a professor.

- **Facilitate communication:** for instance to explain exam instructions to neurodiverse students.
- **Graph creation:** generating and modifying charts with text input could be an added value for students with visual impairments.

5 Discussion

Backing up the suggestions in blog and news articles from disability advocates (De Haas, 2023; Hemsley et al., 2023; Leos, 2023; Lyerly, 2023; McMurtrie, 2023), the results indicate that AI-based chatbots such as ChatGPT are used and perceived positively by students with disabilities. While the identified uses are fairly similar to the ones for the general student population (Chan & Hu, 2023; Jahic et al., 2023; Morris, 2023), this work shows that students with disabilities employ ChatGPT to solve tasks that can be challenging due to their impairments and the barriers they experience.

The reported positive outcomes by students with disabilities illustrate the importance of considering the perspective of diverse students when evaluating the impact of GAI. For instance, Abbas et al. (2024) found in a quantitative analysis of a general population of students in Pakistan that the usage of ChatGPT could increase the tendency to procrastinate, memory loss, and reduce academic performance. However, our results rather suggest that ChatGPT can help cope with existing barriers in higher education. For example, we found that students with ADHD used the chatbot to mitigate difficulties in getting started with their writing process. An explanation for this discrepancy could be that outcomes associated with the usage of ChatGPT may depend on the users' intended purpose. In Abbas et al. (2024), the authors' explanation regarding the relationship between academic workload and the use of ChatGPT suggested that students are looking for "easy means" or "shortcuts" (p. 3). While this might occur for some students, our results would propose a different interpretation. In our research, students aimed to alleviate the unjustified pressure resulting from the inaccessibility of tertiary education, using ChatGPT as an assistive technology to enhance learning.

This study also indicates that technology must be used to supplement inclusive efforts, not replace them. The importance of different accommodations, personal assistance, and support services should not be underestimated. The inclusion of students with disabilities in online higher education results in a combination of pedagogical, technological, psychological, and emotional factors (Reyes et al., 2022). In particular, disability support centers can provide much-needed emotional support, advise on students' rights, or lower administrative burdens (Shpigelman et al., 2022). In this study, participants have emphasized the intrinsic value of human assistance, highlighting its reliability and the emotional aspect of human interactions. For that reason, although ChatGPT could inform on available accommodations and potential solutions (Lyerly, 2023), it cannot come at the cost of fewer human interactions. In fact, the results highlight that in some cases, ChatGPT is a tool to cope with suboptimal situations where students did not receive adequate accommodations, e.g., when

they did not get note-takers or when lecturers did not have time to answer questions. This suggests that resources must still be allocated to provide human assistance.

5.1 The role of higher education institutions: AI policies and training

According to this study, there is a need for guidance on how to use tools like ChatGPT. It is concerning when students with disabilities refrain from using a tool others found helpful because they do not know whether they are allowed to use it. The lack of communication concerning university policies may be partially attributed to the fact that interviews were conducted when universities were working on clearer guidelines. Nevertheless, results indicate that students with disabilities already had expectations and would appreciate their universities allowing the utilization of ChatGPT. Like Sullivan et al. (2023), we argue that universities would benefit from involving students with different backgrounds or experiences (e.g., non-native speakers, students with children, and students with disabilities) in developing AI policies. Hearing from students directly could sway perception about the tools if it becomes clear that the benefits for students with disabilities outweigh general risks and concerns (tying into the issue of "social acceptability" addressed by Morris (2020)). For example, lecturers and universities are sometimes reluctant to provide recordings, arguing for concerns related to privacy or copyright. Given that many students with disabilities indicated they would benefit from automatic transcriptions of lectures, along with options to summarize and discuss their content, a case could be made that the benefits outweigh the risks.

However, just because students with disabilities could uniquely benefit from GAI does not mean it should be reserved solely for their use. Reducing GAI to an accommodation could force students to disclose their disability status to access it. Similar to other research (Fichten et al., 2020; Moriña, 2017; Osborne, 2019; Shpigelman et al., 2022), this study found that some students with disabilities do not want to be treated differently. For some, ChatGPT allowed them to study without asking for support. For that reason, we agree with other academics arguing that higher education institutions must be reformed (Jahic et al., 2023; Ross, 2023). Universities must consider what skills need to be taught and assessed to prepare students for their careers. Several researchers have pointed out a possible overreliance on technology that could impede learning (Abbas et al., 2024; Walter, 2024). It is critical to consider the perspective of students with disabilities or other disadvantaged groups because ChatGPT can serve as an assistive technology and at the same time exacerbate inequalities.

Furthermore, results also indicate that universities need to offer resources and training for staff and students on using GAI tools. Some institutions and individual educators are already creating resources to help users get the most out of ChatGPT while doing so effectively and responsibly; for example, AI for Education (AI for Education, n.d.) has a "prompt library" for educators, which includes ideas to help students study with ChatGPT. However, greater attention to the perspective of students with disabilities is necessary to raise awareness among lecturers on how they can help students with disabilities employ this tool. Students themselves must also

learn prompting skills and critical thinking. Additionally, universities should not underestimate the financial and training costs that often hinder access to assistive technologies (Heiman et al., 2020).

5.2 Including the perspective of students with disabilities in AI development

This study suggests that ChatGPT is inclusive for neurodiverse students, as mentioned by disability advocates (De Haas, 2023; Leos, 2023), and thus partially disproves the risk identified by Guo et al. (2020). However, there are accessibility issues that must be addressed – in particular, improvements are necessary to include students with visual impairments better. Additionally, accuracy issues are a specific concern that should be fixed in an accessible manner, as individuals with disabilities are particularly reliant on accurate information (Morris, 2020). Failing to do so could reduce the time-saving effect of the tool and thus decrease its usefulness for inclusion.

Moreover, this study also elucidates what future GAI-based functions are valued by students with disabilities. Interestingly, none mentioned future applications that could predict whether they are at risk of failing a course, a function well-researched in the literature on AI educational technologies (Ouyang et al., 2022). While this may be due to the focus of the interviews on GAI and ChatGPT, it raises questions about what empowers students. In a study on students' perception of at-risk prediction programs, Velander et al. (2021) found that students were concerned about who has access to their data and about potential adverse effects, such as discouragement, heightened stress, or deterioration of the study atmosphere. While lecturers may find it helpful to identify students who could be struggling, students may not feel comfortable with this function. Therefore, researchers and developers should be encouraged to investigate the needs of students when they develop tools to enhance learning. Moreover, the point of view of students with disabilities can be enriching as they can identify shortcomings regarding the accessibility of AI applications. Using a participatory approach like Lister et al. (2021) who co-developed a disability disclosure assistant can help identify and guarantee user needs while balancing technical constraints and university requirements. Developers can address accessibility issues by following the Web Content Accessibility Guidelines (Caldwell et al., 2008). Another interesting avenue is to use large language models to enhance accessibility. For instance, Kortemeyer (2023) found promising results in using GPT-4 to convert LaTeX documents containing equations into screen-reader-accessible HTML. However, the potential for automated accessibility measures must be carefully investigated to avoid spreading false promises. For example, Glazko et al. (2023) found that ChatGPT could successfully provide lists of accessibility rules to follow, but would fail in implementing them itself.

5.3 GAI and unknown consequences

The concerns and challenges identified by students with disabilities reflected those identified in the literature for the general population (Chan & Hu, 2023; Jahic et al.,

2023; Morris, 2023). In the interviews, it became apparent that whether GAI could affect students with disabilities negatively was generally unknown to the students. Many students stressed the lack of transparency behind the tools, and one even worried about what could happen to them if companies like OpenAI knew about their disabilities. Still, this study also found that many students with disabilities do not believe that sharing disability status is necessarily problematic. On the one hand, this provides opportunities to develop applications tailored to the specific needs of students. On the other hand, disability status is recognized as sensitive data by the European Union legislation on data protection (European Union, 2016) and the risk of reidentification is higher for individuals with disabilities (Morris, 2020). Research on the use of AI in education and disability is still scarce (Baker & Hawn, 2021) and it is not clear how sharing disability status could impact students with impairments. Therefore, further investigation is needed, along with efforts to increase awareness of these issues.

Moreover, the results highlight that students believe ChatGPT could potentially be used to inform lecturers about the creation of accessible courses as suggested in Zhai (2023). While this use could provide promising opportunities, potential (representational) bias could hinder the benefits of this use. One student reported that ChatGPT could be talking about autism in a harmful and biased manner, concurring with concerns about bias in research on AI ethics and disability (Guo et al., 2020; Morris, 2020; Trewin, 2018). Notably, Glazko et al. (2023) reported subtle built-in ableism when summarizing texts, which could make it hard for non-experts to notice them. Additionally, as noted by one participant, ChatGPT tends to write positively and can lack criticism. Further investigation is needed to identify potential consequences of lacking a decisive stance, such as the risk of inaction or undervaluing accommodation requirements.

6 Conclusion

The rapid development of artificial intelligence raises critical questions on how to adapt higher education and how this technology should be further developed. In such a crucial moment, the perspectives of different stakeholders must be considered. The opinions and experiences of students with disabilities are essential because they are often overlooked (Baker & Hawn, 2021; Sullivan et al., 2023). For this reason, this qualitative study gathered the opportunities and challenges of using ChatGPT in higher education from the perspective of students with disabilities.

While ChatGPT or similar tools can benefit everyone, students with disabilities face several barriers that GAI can partly overcome. Courses are still not wholly accessible, which hinders learning and forces students to invest lots of effort. This study suggests that GAI, such as ChatGPT, can enhance learning outcomes and relieve students with disabilities, e.g., by saving time and increasing autonomy. students with disabilities have highlighted the beneficial uses of ChatGPT in teaching, writing, reading, research, and self-organization. These functions are handy as they align with the flexibility advocated in the UDL framework. Although students acknowledge the utility of ChatGPT, they also highlight specific limitations of

the tool. These encompass accuracy problems, the absence of certain features like access to up-to-date information or document uploading, a somewhat robotic writing style, the requisite for users to proficiently master prompting skills and critical thinking, and accessibility issues. Concerns and challenges included overreliance and impact on studies, cheating and plagiarism, data privacy, and loss of human contact. Looking ahead to future development, students desire enhanced accessibility through multi-modality. To assist them in their studies, students wish for the following functions: transcription and summarization of courses, AI-generated explanations for visual content, support in communication, and the possibility to produce graphs.

This study has several theoretical and practical implications. On the one hand, it supports the argument made by McGrath et al. (2023) that universities have a responsibility to adopt AI tools. This work also raises questions about how AI empowers students. Moreover, the results contribute to understanding the ethical challenges that GAI poses. Notably, they suggest that the inclusivity of chatbots has improved, at least for students with dyslexia. However, students still mentioned accessibility issues, affecting in particular the experience of people with visual impairments. Moreover, potential negative consequences for students with disabilities, specifically those related to bias and privacy issues, must be explored more extensively. The reported challenges and opportunities also provide grounds for a quantitative analysis to understand their significance and compare the opinions of students with and without disabilities.

On the other hand, results can be used by higher education institutions when they develop AI policies and by developers to understand the perspective of students with disabilities.

6.1 Limitations

Qualitative studies typically have a smaller sample size. The study explored and identified uses and challenges that could later be complemented with a quantitative investigation to assess its significance.

Moreover, we did not reach students with disabilities such as motor impairments and those using AAC for this study. As a result, the findings primarily reflect the perspective of neurodiverse students, students with chronic conditions or visual impairments. The point of view of students with a hearing impairment is only partially represented. Further efforts are necessary to understand different points of view and experiences, especially for students with a communication disability, as Hemsley et al. (2023) highlighted.

Furthermore, most interviewees were students who requested reasonable accommodations as universities are usually in contact with these students. This raises a selection bias as students with a disability who did not request compensation for disadvantages were probably not reached. Still, a few participants had not requested accommodations. Moreover, those who requested accommodations could reflect on their experience before receiving adaptations.

Additionally, it is possible that students who were enthusiastic regarding the use of GAI were more willing to participate than those who did not. Nevertheless, in the recruitment, students were only required to be interested in the topic and have used it at least once the tool.

The majority of the student sample consisted of individuals enrolled in social and business sciences, disciplines known for their emphasis on reading and writing tasks. Consequently, the predominance of reported tasks represents the typical activities within these domains. Future research in more technical fields could reveal additional benefits of AI for students with disabilities, though the identified uses remain relevant across domains.

Finally, although students were invited to consider the future development of GAI, the responses were undoubtedly influenced by their current experience with ChatGPT.

Abbreviations GAI: Generative artificial intelligence; UDL: Universal design for learning; UNCRPD: United Nations Convention on the Rights of Persons with Disabilities; AAC: Augmentative and alternative communication

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Data availability To protect study participant privacy, interview transcripts are not made available. Although transcripts were anonymized by deleting information such as name, university, or location, participants shared personal information such as their disabilities, age, and gender which, combined with specific examples in the interviews, could potentially allow reidentification. However, the anonymized data can be made available to reviewers upon request to the corresponding author.

Declarations

Informed consent Ethical issues of the study have been assessed following the regulations of the Medical Faculty and the study has been considered to have no relevant ethical risks.

Before the start of the interview, participants were informed about the conditions of the study and had the opportunity to raise questions. The consent forms in English, German, and French are available as supplementary materials and the procedure is clearly described in the method section of the study. All participants provided informed consent.

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References

Abbas, M., Jam, F. A., & Khan, T. I. (2024). Is it harmful or helpful? Examining the causes and consequences of generative AI usage among university students. *International Journal of Educational Technology in Higher Education, 21*(1), 10. https://doi.org/10.1186/s41239-024-00444-7

AI for Education. (n.d.). *GenAI chatbot prompt library for educators*. https://www.aiforeducation.io/prompt-library. Accessed 21 Aug 2023.

Alcaraz Martínez, R., Turró, M. R., & Granollers Saltiveri, T. (2021). Methodology for heuristic evaluation of the accessibility of statistical charts for people with low vision and color vision deficiency. *Universal Access in the Information Society*. https://doi.org/10.1007/s10209-021-00816-0

Arias-Flores, H., Calle-Jimenez, T., Sanchez-Gordon, S., & Nunes, I. L. (2020). Contributions to improve accessibility and usability of academic journal management systems. Case study: OJS. *Advances in human factors and systems interaction* (pp. 259–264). https://doi.org/10.1007/978-3-030-51369-6_35

Assistive Technology Industry Association. (n.d.). What is AT? *ATIA Website*. Retrieved 3 August 2023, from https://www.atia.org/home/at-resources/what-is-at/

Baker, R. S., & Hawn, A. (2021). Algorithmic bias in education. *International Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-021-00285-9

Bennett, C. L., & Keyes, O. (2020). What is the point of fairness? Disability, AI and the complexity of justice. *SIGACCESS Accessibility and Computing*, *125*. https://doi.org/10.1145/3386296.3386301

Beukelman, D. R., & Light, J. C. (2020). *Augmentative & alternative communication: Supporting children and adults with complex communication needs* (5th ed.). Paul H. Brookes Publishing Co., Inc.

Brown, L. X., Shetty, R., Scherer, M. U., & Crawford, A. (2022). Ableism and disability discrimination in new surveillance technologies. *Center for Democracy & Technology*.

Caldwell, B., Cooper, M., Reid, L. G., Vanderheiden, G., Chisholm, W., Slatin, J., & White, J. (2008). Web content accessibility guidelines (WCAG) 2.0. *WWW Consortium (W3C), 290*, 1–34.

CAST. (2018). *Universal design for learning guidelines version 2.2*. http://udlguidelines.cast.org/. Accessed 09 Aug 2023.

Chan, C. K. Y., & Hu, W. (2023). *Students' voices on generative AI: Perceptions, benefits, and challenges in higher education*. https://doi.org/10.48550/ARXIV.2305.00290

Convention on the Rights of Persons with Disabilities, United Nations General Assembly, Resolution A/RES/61/106. (2006). https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-persons-disabilities. Accessed 27 Feb 2024.

Courtad, C. A. (2019). Making your classroom smart: Universal design for learning and technology. In V. L. Uskov, R. J. Howlett, & L. C. Jain (Eds.), *Smart education and e-learning 2019* (pp. 501–510). Springer Singapore.

Davey, A. (2023). OpenAI chatbot spits out biased musings, despite guardrails. *Bloomberg*. https://www.bloomberg.com/news/newsletters/2022-12-08/chatgpt-open-ai-s-chatbot-is-spitting-out-biased-sexist-results#xj4y7vzkg. Accessed 09 Aug 2023.

Davis, J. A. (2023). *Is AI ableist?* [Video with comment]. LinkedIn. https://www.linkedin.com/feed/update/urn:li:activity:7094344774744256512/. Accessed 09 Aug 2023.

De Haas, A.-A. (2023). ChatGPT: A game-changer for dyslexics. *Dyslexia the Gift Blog*. https://blog.dyslexia.com/chat-gpt-for-dyslexics/. Accessed 12 May 2023.

De Clercq, G., & Kao, J. (2023). Top French university bans use of ChatGPT to prevent plagiarism. *Reuters*. https://www.reuters.com/technology/top-french-university-bans-use-chatgpt-prevent-plagiarism-2023-01-27/. Accessed 12 May 2023.

European Union. (2016). *Regulation (EU) 2016/679 of the European parliament and of the council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance)*. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016R0679&from=EN#d1e1374-1-1

Fernández-Batanero, J. M., Montenegro-Rueda, M., & Fernández-Cerero, J. (2022). Access and participation of students with disabilities: The challenge for higher education. *International Journal of Environmental Research and Public Health, 19*(19), 11918. https://doi.org/10.3390/ijerph191911918

Fichten, C., Olenik-Shemesh, D., Asuncion, J., Jorgensen, M., & Colwell, C. (2020). Higher education, information and communication technologies and students with disabilities: An overview of the current situation. In J. Seale (Ed.), *Improving accessible digital practices in higher education* (pp. 21–44). Springer International Publishing. http://link.springer.com/10.1007/978-3-030-37125-8_2

García-González, J. M., Gutiérrez Gómez-Calcerrada, S., Solera Hernández, E., & Ríos-Aguilar, S. (2021). Barriers in higher education: Perceptions and discourse analysis of students with disabilities in Spain. *Disability & Society, 36*(4), 579–595. https://doi.org/10.1080/09687599.2020.1749565

Glazko, K. S., Yamagami, M., Desai, A., Mack, K. A., Potluri, V., Xu, X., & Mankoff, J. (2023). An autoethnographic case study of generative artificial intelligence's utility for accessibility. *The 25th International ACM SIGACCESS Conference on Computers and Accessibility* (pp. 1–8). https://doi.org/10.1145/3597638.3614548

Guo, A., Kamar, E., Vaughan, J. W., Wallach, H., & Morris, M. R. (2020). Toward fairness in AI for people with disabilities SBG@ a research roadmap. *ACM SIGACCESS Accessibility and Computing, 125*, 1–1.

Hal Schwartz, E. (2023). ChatGPT is banned by these colleges and universities. *Voicebot.Ai*. https://voicebot.ai/2023/02/09/chatgpt-is-banned-by-these-colleges-and-universities/. Accessed 12 May 2023.

Hayes, P. (2022). DALL·E, disability, and diversity. *Paul Hayes*. https://paulrhayes.com/disability-and-dalle/. Accessed 08 Aug 2023.

Heidt, A. (2024). 'Without these tools, I'd be lost': How generative AI aids in accessibility. *Nature, 628*(8007), 462–463. https://doi.org/10.1038/d41586-024-01003-w

Heiman, T., Coughlan, T., Rangin, H., & Deimann, M. (2020). New designs or new practices? Multiple perspectives on the ICT and accessibility conundrum. In J. Seale (Ed.), *Improving accessible digital practices in higher education: Challenges and new practices for inclusion* (pp. 99–115). Springer International Publishing. https://doi.org/10.1007/978-3-030-37125-8_5

Hemsley, B., Power, E., & Given, F. (2023). Will AI tech like ChatGPT improve inclusion for people with communication disability? *The conversation*. https://theconversation.com/will-ai-tech-like-chatgpt-improve-inclusion-for-people-with-communication-disability-196481. Accessed 12 May 2023.

Hills, M., Overend, A., & Hildebrandt, S. (2022). Faculty perspectives on UDL: Exploring bridges and barriers for broader adoption in higher education. *The Canadian Journal for the Scholarship of Teaching and Learning*, *13*(1). https://doi.org/10.5206/cjsotlrcacea.2022.1.13588

Hutchinson, B., Prabhakaran, V., Denton, E., Webster, K., Zhong, Y., & Denuyl, S. (2020). Unintended machine learning biases as social barriers for persons with disabilitiess. *SIGACCESS Accessibility and Computing*, *125*. https://doi.org/10.1145/3386296.3386305

Jahic, I., Ebner, M., & Schön, S. (2023). Harnessing the power of artificial intelligence and ChatGPT in education – a first rapid literature review. In T. Bastiaens (Ed.), *Proceedings of EdMedia + Innovate Learning 2023* (pp. 1489–1497). Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/222670. Accessed 09 Aug 2023.

Jembu Rajkumar, A., Lazar, J., Jordan, J. B., Darvishy, A., & Hutter, H.-P. (2020). *PDF accessibility of research papers: What Tools are needed for assessment and remediation?* Hawaii International Conference on System Sciences. https://doi.org/10.24251/HICSS.2020.512

Kent, M., Ellis, K., Latter, N., & Peaty, G. (2018). The case for captioned lectures in Australian higher education. *TechTrends, 62*(2), 158–165. https://doi.org/10.1007/s11528-017-0225-x

Kortemeyer, G. (2023). *Using artificial-intelligence tools to make LaTeX content accessible to blind readers* (Version 2). arXiv. https://doi.org/10.48550/ARXIV.2306.02480

Leos, D. (2023). 5 ways ChatGPT is empowering people with disabilities. *Entrepreneur*. https://www.entrepreneur.com/living/5-ways-chatgpt-is-empowering-people-with-disabilities/448551. Accessed 12 May 2023.

Lim, W. M., Gunasekara, A., Pallant, J. L., Pallant, J. I., & Pechenkina, E. (2023). Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *The International Journal of Management Education, 21*(2), 100790. https://doi.org/10.1016/j.ijme.2023.100790

Lister, K., Coughlan, T., Kenny, I., Tudor, R., & Iniesto, F. (2021). Taylor, the disability disclosure virtual assistant: A case study of participatory research with disabled students. *Education Sciences*, *11*(10). https://doi.org/10.3390/educsci11100587

Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences, 13*(4), 410. https://doi.org/10.3390/educsci13040410

Lyerly, E. (2023). Utilizing ChatGPT to help students with disabilities. *Disability Compliance for Higher Education, 28*(9), 2–7. https://doi.org/10.1002/dhe.31479

Mack, K. A., Qadri, R., Denton, R., Kane, S. K., & Bennett, C. L. (2024). *"They only care to show us the wheelchair": Disability representation in text-to-image AI models*. CHI Conference on Human Factors in Computing Systems (CHI '24). https://doi.org/10.1145/3613904.3642166

MaxQDA Official Channel (Director). (2023). *Webinar: MaxQDA meets AI new features in AI assist* [Video recording]. https://www.youtube.com/watch?v=eQ1juIFCMjo. Accessed 03 Aug 2023.

McGrath, C., Cerratto Pargman, T., Juth, N., & Palmgren, P. J. (2023). University teachers' perceptions of responsibility and artificial intelligence in higher education—An experimental philosophical study. *Computers and Education: Artificial Intelligence, 4*, 100139. https://doi.org/10.1016/j.caeai.2023.100139

McKenna, S., Dixon, D., Oppenheimer, D., Blackie, M., & Illingworth, S. (2023). ChatGPT is the push higher education needs to rethink assessment. *The conversation*. https://theconversation.com/chatgpt-is-the-push-higher-education-needs-to-rethink-assessment-200314. Accessed 12 May 2023.

McMullin, C. (2023). Transcription and qualitative methods: Implications for third sector research. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations, 34*(1), 140–153. https://doi.org/10.1007/s11266-021-00400-3

McMurtrie, B. (2023). How ChatGPT Could help or hurt students with disabilities. *The chronicle of higher education*. https://www.chronicle.com/article/how-chatgpt-could-help-or-hurt-students-with-disabilities?. Accessed 08 Aug 2023.

McNicholl, A., Casey, H., Desmond, D., & Gallagher, P. (2021). The impact of assistive technology use for students with disabilities in higher education: A systematic review. *Disability and Rehabilitation: Assistive Technology, 16*(2), 130–143. https://doi.org/10.1080/17483107.2019.1642395

Moriña, A. (2017). Inclusive education in higher education: Challenges and opportunities. *European Journal of Special Needs Education, 32*(1), 3–17. https://doi.org/10.1080/08856257.2016.1254964

Morris, M. R. (2023). *Scientists' perspectives on the potential for generative AI in their fields*. https://doi.org/10.48550/ARXIV.2304.01420

Morris, M. R. (2020). AI and Accessibility. *Communications of the ACM, 63*(6), 35–37. https://doi.org/10.1145/3356727

Mullins, L., & Preyde, M. (2013). The lived experience of students with an invisible disability at a Canadian university. *Disability & Society, 28*(2), 147–160. https://doi.org/10.1080/09687599.2012.752127

OpenAI. (2022). Introducing ChatGPT [Company website]. *OpenAI*. https://openai.com/blog/chatgpt. Accessed 08 Aug 2023.

Osborne, T. (2019). Not lazy, not faking: Teaching and learning experiences of university students with disabilities. *Disability & Society, 34*(2), 228–252. https://doi.org/10.1080/09687599.2018.1515724

Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022-10925-9

Profita, H., Albaghli, R., Findlater, L., Jaeger, P., & Kane, S. K. (2016). The AT effect: How disability affects the perceived social acceptability of head-mounted display use. *Proceedings of the 2016 CHI conference on human factors in computing systems* (pp. 4884–4895). https://doi.org/10.1145/2858036.2858130

Qadir, J. (2022). *Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education* [Preprint]. https://doi.org/10.36227/techrxiv.21789434.v1

Quinn, G. (2023). *CoSP 16: Opening remarks by the UN Special Rapporteur, Prof. Gerard Quinn*. 16th Session of the Conference of States Parties to the Convention on the Rights of Persons with Disabilities (COSP16), New York. https://srdisability.org/news/cosp-16-openin-remarks-by-the-un-special-rapporteur-prof-gerard-quinn-2/. Accessed 20 July 2023.

Reasonable accommodations explained. (n.d.). *American Psychological Association*. Retrieved 2 October 2024, from https://www.apa.org/pi/disability/dart/toolkit-three

Reyes, J. I., Meneses, J., & Melián, E. (2022). A systematic review of academic interventions for students with disabilities in Online Higher Education. *European Journal of Special Needs Education, 37*(4), 569–586. https://doi.org/10.1080/08856257.2021.1911525

Ross, J. (2023). ChatGPT forcing 'fruitful conversations' about assessment. *Times higher education*. https://www.timeshighereducation.com/news/chatgpt-forcing-fruitful-conversations-about-assessment. Accessed 28 Aug 2023.

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). SAGE Publications.

Saripudin, S., Djohar, A., Rohendi, D., & Abdullah, A. G. (2019). Comparison of accessibility of OER repositories of developed countries and developing countries based on WCAG 2.0 guidelines. *Journal of Physics: Conference Series, 1402*, 077042. https://doi.org/10.1088/1742-6596/1402/7/077042

Schultz, T. A., & Azadbakht, E. (2021). Open but not for all: A survey of open educational resource librarians on accessibility. *College & Research Libraries, 82*(5), 755.

Shpigelman, C.-N., Mor, S., Sachs, D., & Schreuer, N. (2022). Supporting the development of students with disabilities in higher education: Access, stigma, identity, and power. *Studies in Higher Education, 47*(9), 1776–1791. https://doi.org/10.1080/03075079.2021.1960303

Singh, H. (2023). Transforming learning experience through universal design for learning and generative AI: A New era of inclusion and accessibility [social media]. *LinkedIn*. https://www.linkedin.com/pulse/transforming-learning-experience-through-universal-design-singh/. Accessed 08 Aug 2023.

Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning. *Journal of Applied Learning & Teaching*, *6*(1). https://doi.org/10.37074/jalt.2023.6.1.17

Tomczak-Plewka, A. (2016). Eine Fläche wird zum Hindernis. *Impact ZHAW, 35*, 38–39.

Trewin, S. (2018). AI fairness for people with disabilities: Point of view. *arXiv Preprint arXiv:1811.10670*.

Vaughn, M. (Director). (2023). *Global accessibility day 2023: Accessibility & artificial intelligence (AI) [North America Session]* [Video recording]. Open LMS. https://www.youtube.com/watch?v=gTzlKkgryLE. Accessed 08 Aug 2023.

Velander, J., Otero, N., Pargman, T. C., & Milrad, M. (2021). "We know what you were doing": Understanding learners' concerns regarding learning analytics and visualization practices in learning management systems. In M. Sahin & D. Ifenthaler (Eds.), *Visualizations and dashboards for learning analytics* (pp. 323–347). Springer International Publishing. https://doi.org/10.1007/978-3-030-81222-5_15

Wallbank, A. J. (2023). ADHD in higher education: Is digital learning making it worse? *Times higher education*. https://www.timeshighereducation.com/campus/adhd-higher-education-digital-learning-making-it-worse. Accessed 06 July 2023.

Walter, Y. (2024). Embracing the future of Artificial Intelligence in the classroom: The relevance of AI literacy, prompt engineering, and critical thinking in modern education. *International Journal of Educational Technology in Higher Education, 21*(1), 15. https://doi.org/10.1186/s41239-024-00448-3

Wilson, C. (2014). Chapter 2—Semi-structured interviews. In C. Wilson (Ed.), *Interview techniques for UX practitioners* (pp. 23–41). Morgan Kaufmann. https://doi.org/10.1016/B978-0-12-410393-1.00002-8

Wolanin, T. R. (2005). Students with disabilities: Financial aid policy issues. *Journal of Student Financial Aid, 35*(1), 2.

World Health Organisation. (2021). *Disability and Health*. https://www.who.int/news-room/fact-sheets/detail/disability-and-health#:~:text=Disability%20refers%20to%20the%20interaction,%2C%20and%20limited%20social%20supports

Zhai, X. (2023). ChatGPT for next generation science learning. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4331313

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