Article

ChatGPT: A disruptive blessing in disguise for higher education?

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Abstract

This study provides initial views on ChatGPT of non-technical students and educators from universities in the USA, Cambodia, Finland, Ghana, and Nigeria. A cross-sectional survey was undertaken during March-April 2023, to assess students' current usage and perceptions of ChatGPT's potential and drawbacks. The survey revealed that students in all countries saw ChatGPT as a timesaver and a valuable source for research, studying, and homework, but students were also concerned about their dependence on ChatGPT and the potential for disrupting learning. Students, who included both adopters and non-adopters, raised several potential benefits and drawbacks of using ChatGPT. The contribution of this exploratory study is to raise the issues that students perceived of using ChatGPT at the time of early adoption. Future research can assess how attitudes to the use of artificial intelligence evolve, as well as offer recommendations on the use of ChatGPT and similar artificial intelligence tools.

Keywords: ChatGPT, artificial intelligence, learning styles, originality, plagiarism, student attitudes

1. Introduction

OpenAI and Elon Musk launched ChatGPT at the end of November 2022 as an artificial intelligence (AI) software enabling users to generate high-quality written work, including memos, technical reports, and academic papers. Critics quickly argued that using ChatGPT carried inherent risks related to the quality and correctness of the output, i.e., plagiarism in education. ChatGPT's attractiveness to students was expected to be high. However, little empirical data has been available on what percentage of students actually know of and use ChatGPT, and, if they do, in which ways, for what purposes, and what benefits or risks they expected.

The research objective was to provide a cross-sectional study of students' attitudes towards the use of AI, and ChatGPT in particular, at the point in time when ChatGPT had just become widely known but was still at the early adopter stage. This was intended to utilise a unique but limited time horizon, before the likely widespread adoption of AI technology, to assess students' attitudes to using AI at the stage when awareness of ChatGPT was high but only the early adopters were actively using ChatGPT.

Our research questions focused on two aspects of the use of AI, through the intended use of ChatGPT. Firstly, whether and how students perceived AI as being useful, and secondly whether students saw moral issues in using AI to actually write assignments. In short, whether students perceived moral issues of using AI to produce what they would present as their own work.

The potential impact of ChatGPT has been a topic of controversial, even polemic debate, on its pros and cons since its launch in late 2022. The website of ChatGPT hails it as a tool for progress that will benefit the future of humanity. Microsoft founder wrote that a new era, the age of AI, is already here: it will change the way people work, learn, travel, get health care, and communicate with each other (Gates n.d.). Others focus on its potential negatives, highlighted by Geoffrey Hinton, the "Godfather of AI" and Elon Musk's recent proclamation on the potential of AI to cause "civilizational destruction" (Metz 2023; Metz et al. 2023). Or, as educators fear, at least in epidemic plagiarism, encouraged by explanations on platforms such as TikTok hailing ChatGPT as "CheatGPT" (Shiitake n.d.). Finally, massive job losses among white-collar workers, especially educators, translators, and journalists were also predicted, at least by the latter.

Such concerns are not new; they are reminiscent of the Luddite-type technophobic reactions to past disruptive innovations as early as Gutenberg's printing press in the 15th century. However, the printing press ultimately led to a more free, enlightened, and richer world through the mass dissemination of knowledge, furthering more innovations - a contribution that - in the opinion of the authors - seems also possible in the case of ChatGPT and other similar Generative Pre-trained Transformers (GPT) and AI in general.

The above reflects controversial viewpoints on ChatGPT and AI in general that appear to be driven primarily by hopes, fears, and preconceived opinions, but without much of an empirical basis, as ChatGPT was only launched in late 2022. This is particularly relevant for empirical data on higher education, as such studies are still not numerous and there are none with a multi-continental perspective, which this paper aims to provide.

2. Literature review

2.1 What is ChatGPT?

ChatGPT was developed by OpenAI and was opened to the public in November 2022. It was established as a convenient user interface built around one specific language model, GPT-3.5, "large language models" (LLMs). The GPT-series LLMs are also called "foundation models" (O'Reilly 2023).

Fundamentally, ChatGPT is a learning machine that can be specialized, retrained, or otherwise modified for specific applications. There are many like-type AI technologies like ChatGPT that are based on the technology transformers, developed by Google Research and Google Brain in 2017 (O'Reilly 2023; Unzueta 2022).

2.2 What does ChatGPT do?

ChatGPT predicts which words are most likely to occur in response to a prompt, and then gives an answer (O'Reilly 2023) which, for its accuracy, is dependent on its prediction. Some users tried to ask questions, but the answers were totally wrong because ChatGPT was designed as a "language model", not a "truth" model. Its error rate is typically 30%. The limitations of ChatGPT are arithmetic and mathematical, whereas citations, consistency, and current events are lacking (O'Reilly 2023). It is good at certain tasks such as content creation, legal advice, customer service, personal assistance, translation, search, and research, even programming, but many teachers are very skeptical about students using ChatGPT, especially with homework help.

Another real concern is "publication ethics": Since ChatGPT has been made available, people have used it regardless, but there are real concerns about the impact on the publications and ethics (Rahimi & Talebi Bezmin Abadi 2023).

2.3 The two sides of ChatGPT?

"ChatGPT took the world by storm" (Dumas 2023) within barely 6 months after its release in November 2022. The following highlights some of the issues and authors particularly pertinent to higher education.

2.3.1 The bright side, or assumed positive applications of ChatGPT

Several authors have discussed the potential applications of ChatGPT across various fields. Biswas (2023a; 2023b) suggested that ChatGPT can assist individuals and groups in making knowledgeable choices concerning their

health by dispensing knowledge about public health concerns, responding to health promotion inquiries, clarifying the responsibilities of health educators, and examining how social and environmental influences can affect public health. Additionally, the involvement of ChatGPT can be instrumental in enhancing comprehension regarding climate change and the precision of climate forecasts.

Lund and Ting (2023), on the other hand, argued that ChatGPT has the potential to reduce tension for academia as well as librarianship and promotes exciting new ways of learning and acquiring knowledge. Firat (2023) suggested that ChatGPT is a promising tool for open education, improving the independence and autonomy of autodidactic learners and increasing their motivation and engagement through personalized support, direction, and feedback.

Sallam (2023) noted the potential for ChatGPT to improve scientific writing and encourage research versatility. According to the author, it can also be useful in healthcare research and practice by fostering effective datasets analysis, code generation, literature reviews, personalized medicine, and improved health literacy.

Dwivedi et al. (2023) perceived that ChatGPT has the potential to bring considerable benefits to the banking, hospitality, and tourism, as well as information technology sectors by improving various business operations such as management and marketing. Surameery and Shakor (2023) posited that ChatGPT has a programming problem-solving ability to provide debugging assistance, bug prediction, and bug explanation.

Zhu et al. (2023) identified the potential of ChatGPT to improve writing, identify critical points and themes, retrieve sequential information, and for coding, debugging, and explaining syntax. Further, Ivanov and Soliman (2023) suggested that ChatGPT possesses responsiveness for tourism education and research by generating text for assignments and research papers. Tremblay (2023) said that ChatGPT could help create a college planning handbook for students. Conclusively, ChatGPT has potential applications across various fields, including health, climate research, education, business, programming, tourism, and many more fields which can benefit from the application of ChatGPT.

2.3.2 The dark side (potential risks of ChatGPT)

Many of the same authors who have discussed the virtues of ChatGPT have also discussed the various risks associated with its use. They highlight several concerns related to the accuracy, limitations, biases, ethical considerations, copyright, transparency, legal issues, and cybersecurity risks associated with ChatGPT.

Biswas (2023a, 2023b) highlighted the limitations of ChatGPT, including limited accuracy, biases, lack of context, and the absence of direct interaction with health professionals. Lund and Ting (2023) pointed out that there is limited knowledge on how to use ChatGPT responsibly and ethically without abusing its use. Sallam (2023) worried about various dark sides of ChatGPT including ethical considerations, transparency, copyright, and legal issues. Additionally, concerns were raised about potential biases, plagiarism, lack of originality, inaccurate information, hallucination, improper citation practices, cybersecurity threats, and the spread of misinformation, known as infodemics.

In their respective studies, Dwivedi et al. (2023), Surameery and Shakor (2023), and Zhu et al. (2023) all acknowledged the limitations of ChatGPT, including potential disruptions to established practices, threats to privacy and security, and the adverse effects of biases, misuse, and misinformation. Surameery and Shakor (2023) also suggested that the quality of ChatGPT's output to fix bugs in computer code is contingent upon the quality of the training data and the system's design. Additionally, Zhu et al. (2023) emphasize the risks associated with fabricated information, the importance of updated domain knowledge, and the lack of accountability in decision-making on the basis of ChatGPT's output in environmental research without human wisdom and judgment.

Ivanov and Soliman (2023) raise concerns about authorship and ethical considerations associated with using ChatGPT in scientific research while Tremblay (2023) identified the need for references or citations and that most ChatGPT content is common knowledge, and it is difficult to verify its accuracy or its connection to the original source.

The literature reviewed suggests that, while ChatGPT can revolutionize how humans interact with machines and generate content, it also poses several risks and limitations that must be addressed. Research can contribute to developing responsible and ethical practices for using ChatGPT to ensure its benefits are fully realized without compromising data privacy, security, and accuracy.

2.4 Gaps in the literature

Much of the focus of the existing literature covers the potential applications for ChatGPT and the potential risks. The potential applications are without limit and existing authors have referred to several different sectors, including healthcare, academia, data design and analysis. Authors consider ChatGPT to be able to revolutionize research and encourage as well as extend research. Authors have tended to focus on where and how ChatGPT can be applied. The risks attached to ChatGPT include the accuracy, the content, the lack of two-way interaction in peer review, and conclude that the quality of the system design is critical to the success of ChatGPT. Articles written by journalists tend to anticipate and fear the loss of jobs, possibly their own, as ChatGPT is very good and very fast at writing on many subjects and even in a variety of styles. Other contributions to the ChatGPT discussion seem to be driven by emotions such as fear of the unknown. This seems to be the case in a FOX News interview when the interviewer heard the CEO of Google say: "I do not really understand what is going on in the black box of AI". She also did not look reassured when the Google CEO followed up with "… but neither do I understand the workings of the human brain, and I still continue to use it" (Koberg 2023).

However, there is still limited literature which assesses the reaction of students, and it is for this reason that this paper addresses students' reaction to ChatGPT.

3. Purpose of paper and methodology

3.1 Thrust of research and preview of results

In order to fill this gap and to contribute to the discussions on ChatGPT, as well as to offer recommendations on the use of ChatGPT and similar AI tools, this paper presents an exploratory survey. In March 2023, we surveyed the levels of awareness, usage, (dis-) approval, and intentions to use ChatGPT among business school communities, mainly students in Africa, Asia, Europe, and North America. An interpretation of these early results is provided. Some early conclusions are then drawn about whether and how the potentially disruptive impact of ChatGPT can be harnessed to benefit students during their studies and help them succeed later in "the real world".

This is highly pertinent for business schools. Half of the U.S. firms surveyed (Resume Builder 2023) in March 2023 were already using ChatGPT and 30% planned to use it in the near future (Rand 2023). This implies that job applicants should become well-acquainted with ChatGPT and, as a result, business schools would be well advised to rapidly start preparing their students for successful careers in the business world where ChatGPT is already pervasive.

This paper, therefore, concludes with recommendations and hands-on tips for students and educators in a two-step process : (a) how to save time and effort by asking ChatGPT to do the initial "runway work" such as preliminary search for information or literature search of their assignment, then (b) to critically assess and build on the ChatGPT-generated output as a launchpad for taking their business-related research, studies, and homework to the next level, thus (c) to spend more of their scarce time on producing better, even creative contributions that may push the knowledge and/or skills frontier in business matters outward.

3.2 Methodology and Schools Surveyed

For this early-stage exploratory study on the awareness and views of assumed early adopters, the authors conducted surveys among approximately 500 students, instructors, and others at five universities: The majority of respondents were in Asia, at the CamEd Business School in Phnom Penh, the remaining were at San Jose State University Business School in Silicon Valley, University of Eastern Finland, Kuopio and Joensuu campus, University of Education, Winneba in Ghana and The Federal University of Technology, Akure in Nigeria. The surveys were conducted in March and April 2023, during a period of worldwide media hype surrounding ChatGPT only a few months after its launch. The findings provide timely and valid insights into the current awareness levels and allow actionable conclusions, even recommendations that go beyond what has been published to date, as shown in the next section.

The study took a random sample of students with similar backgrounds, all business school students, appropriate for the requirements of a straightforward and rapidly achievable survey (Pandey & Pandey 2021). The study was

exploratory and presented a basic research and descriptive analysis consistent with Patel and Patel (2019) and with the research design and pragmatic worldview set out in Creswell and Creswell (2023). This approach to determining the intended use of ChatGPT followed exploratory approaches used in studies in AI used in education (Lameras & Arnab 2022) and more specifically using ChatGPT (Cooper 2023).

The sample sizes from each country varied according to the number of students available and comprised 90 students from California, 260 students from Cambodia, 121 students from Africa (Nigeria and Ghana), and 55 students from Finland. It was considered that these would provide enough for a comparative study, which could be administered quickly in order to provide a cross-sectional snapshot during the brief period (March-April 2023) when there was sufficient awareness of ChatGPT to solicit opinions from students but was still at early adopter stage. We considered that the speed of undertaking the survey to provide a cross-sectional study at this time was the key to the contribution of this survey. The samples were therefore collected from student classes that were available to the researchers at the time, except for the study in Africa (Ghana and Nigeria) where the researchers contacted universities to request the survey to be undertaken.

The survey was exploratory and therefore designed to solicit opinions rather than specifically to measure established variables. The survey questions reflected the purpose of the study, to assess the attitudes of students to the use of AI at the early adopter stage after the introduction of ChatGPT. The questions, therefore, focused on the following areas at the time of the survey in March and April 2023:
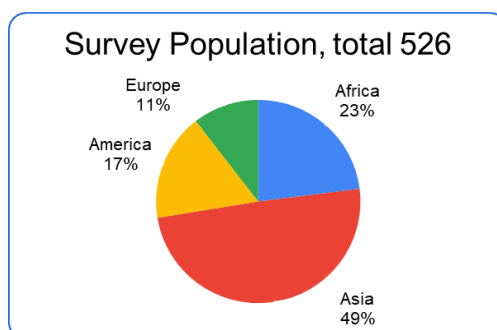
1) Awareness, understanding, and frequency of use of ChatGPT
2) Perceived usefulness of ChatGPT
3) Current purposes of using ChatGPT in achieving learning outcomes
4) Attitude of professors and student guidance
5) Perceived benefits of ChatGPT
6) Perceived drawbacks of ChatGPT

The survey was designed to explore the attitudes of students to the use of ChatGPT and AI in general using both the structure of multiple-choice questions including commonly applicable criteria and at the same time inviting opinions through open-ended questions.

As this was an exploratory study the results were presented, compared, and conclusions were drawn on the relative frequency of responses from each of the four countries. The conclusions of the analysis are presented, and in the discussion section, the interpretation and proposals are put forward for future research based on the literature review and the survey results of this study.

4. Survey results and interpretation

The survey took place in March and April 2023, five months after the launch of ChatGPT in November 2022. The survey comprised business school students from universities in each of four locations, included 260 students from Cambodia, Asia, 121 students from Ghana and Nigeria, Africa, 90 students from California, USA, and 55 students from Finland, Europe (Figure 1).


Figure 1. Composition of the survey (by region)

4.1 Awareness, understanding and frequency of use of ChatGPT

Overall, 70% of all students had heard of ChatGPT and 30% had not (Figure 2). The awareness was highest amongst the students in the USA (90%), in Finland, (91%) and in Ghana and Nigeria (75%), whereas for students in Cambodia the awareness level was 58% (Figure 3).
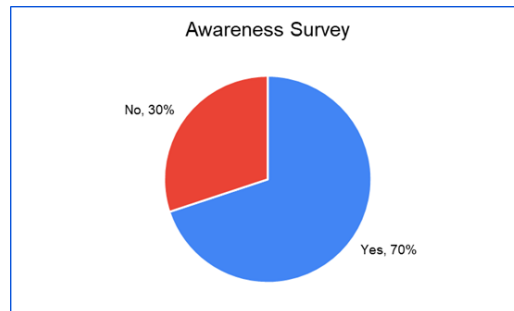

Figure 2. Awareness of ChatGPT within the group of students surveyed
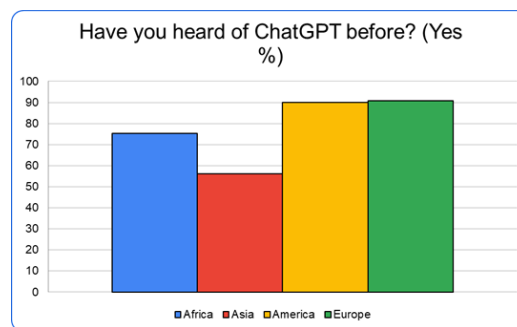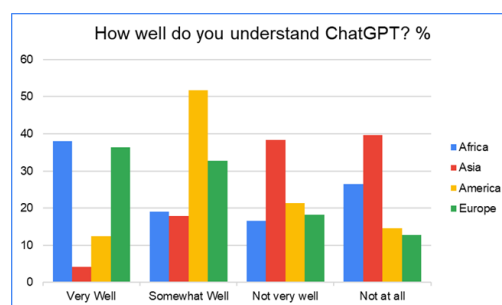

Figure 3. Awareness of ChatGPT amongst students (by region)

A total of 43% of students in all regions claimed to understand ChatGPT "somewhat well" or "very well", compared to 57% "not very well" or "not at all" (Figure 4). However, there was some variation between regions. In Ghana and Nigeria, 57% of students claimed to know ChatGPT "very well" or "somewhat well". This figure rose to 64% in the USA and 69% in Finland, but only 22% of students in Cambodia (Figure 5).
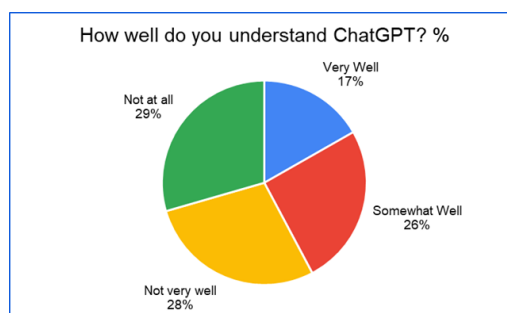
Figure 4. Understanding of ChatGPT amongst students surveyed

Figure 5. Understanding of ChatGPT amongst students surveyed (by region)

Overall, 54% of students claimed to never have used ChatGPT (Figure 6). This total was highest in Cambodia where 73% of students responded to never having used ChatGPT, with a further 17% rarely having used it. The percentage of students who had never used ChatGPT was 42% in the USA, 35% in Ghana and Nigeria, and 31% in Finland. The highest totals for usage (daily, weekly, or monthly) were in Ghana and Nigeria (48%), followed by Finland (44%) and the USA (39%), with only 8% of students in Cambodia responding that they regularly used ChatGPT (Figure 7).
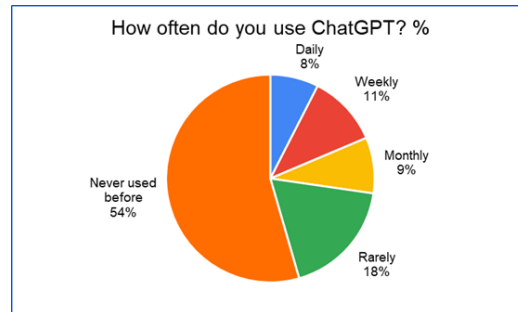
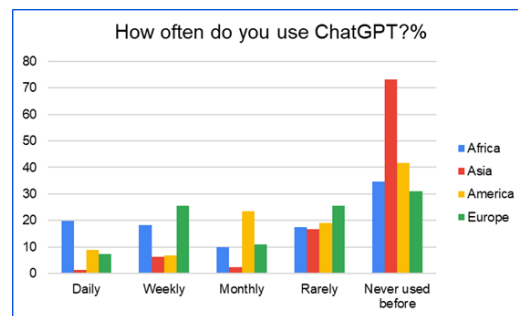**Figure 6.** Frequency of use of ChatGPT among students surveyed

Figure 7. Frequency of use of ChatGPT among students surveyed (by country / region)

4.2 Perceived usefulness of ChatGPT

However, opinions on the usefulness of ChatGPT were overall positive and consistent between regions. Overall, 51% of students across all regions considered that ChatGPT helped them achieve better learning outcomes, with 39% being neutral (Figure 8). In Ghana and Nigeria, 63% of students considered ChatGPT to be "extremely helpful" or "somewhat helpful", with similar totals in the USA (62%), Finland (53%), and Cambodia (41%). The highest neutral total was (46%) in Cambodia, 40% in Finland, 30% in the USA, and 29% in Ghana and Nigeria (Figure 9).
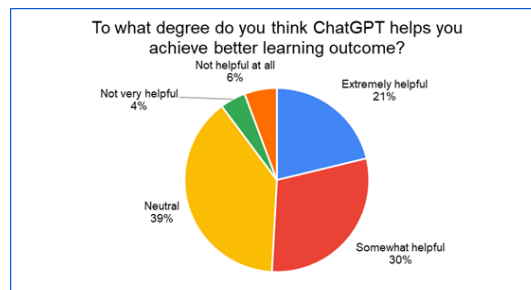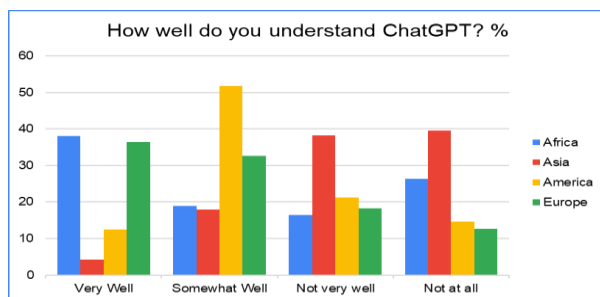

**Figure 8.** Perceptions of the usefulness of ChatGPT in achieving learning outcomes

**Figure 9.** Perceptions of the usefulness of ChatGPT in achieving learning outcomes (by country / region)

The high total across all regions indicating that 51% of students considered that ChatGPT would help them achieve better learning outcomes (Figure 8) indicated perceptions of the positive benefits of ChatGPT. The corresponding high levels of students (39%) who were neutral on the subject (Figure 8) most likely reflected the short time since the launch and limited early uptake of ChatGPT. Most notably, students in Ghana and Nigeria recorded the highest scores for usefulness of ChatGPT, but a significant number of students from all regions considered that ChatGPT would be somewhat helpful or neutral. However, as indicated in responses, very few students from any country considered that ChatGPT would not be very helpful or not helpful at all (Figure 9).

4.3 Current purposes of using ChatGPT

For those students who had used ChatGPT, 61.6% had used it for research, 53.7% while studying, 50.1% for general knowledge, 36.2% for homework help, and 24.2% for entertainment (Figure 10). These totals are consistent across all regions, with "Research" representing the primary purpose for using ChatGPT, followed by study needs, general knowledge and slightly lower totals for homework help and entertainment across all regions (Figure 11).
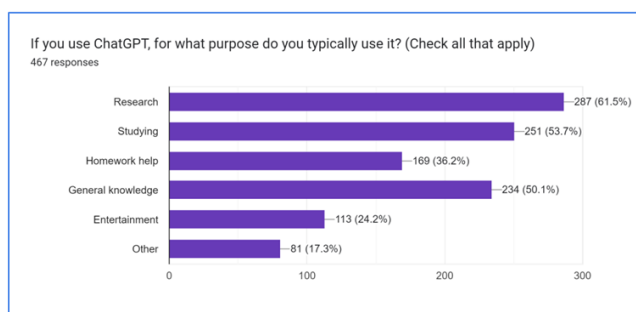
Figure 10. Purpose for using ChatGPT
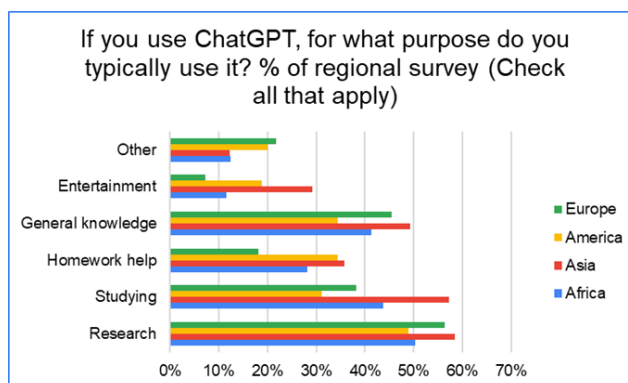
Figure 11. Purpose for using ChatGPT (by country / region)

Open-ended comments relating to how students used ChatGPT were received from respondents. The following topics were raised where students were using ChatGPT for:

- **Search-related applications:** including "*brainstorming*", and as "*an alternative search engine*"
- **Technical applications:** including "*coding, creating excel formulas, problem-solving"*, and "*building coding algorithms*"
- **Personal administration and personal growth applications**: where a comment on potential usage of ChatGPT cited "*investing, idea creation, planning, coding, job applications*", for improving general abilities, including "*to improve communication and writing skills*", and for activities and hobbies, including using ChatGPT for a "*recipe for food*", "*music*", and one student referred to using Chat GPT to generate "*a dancing tutorial*".

Whilst there were not sufficient open-ended comments to establish patterns, these anecdotal comments can be formalised in future research to categorize the usage of ChatGPT.

The high totals for the usage of ChatGPT for research, studying, and general knowledge (Figures 10 and 11) may reflect a tendency to consider AI as being relevant for quickly acquiring knowledge rather than to complete homework, which is more likely to be course specific. This is one aspect to observe over the longer term as ChatGPT and other AI platforms become more widely adopted.

4.4 Attitude of professors and student guidance

The professors (teachers) responding to the survey were split as to whether they encouraged their students to use ChatGPT for learning purposes with more professors stating that they encouraged their students to use it (Figures 12 and 13). However, this reflects only a small number of respondents who were actively teaching faculty.
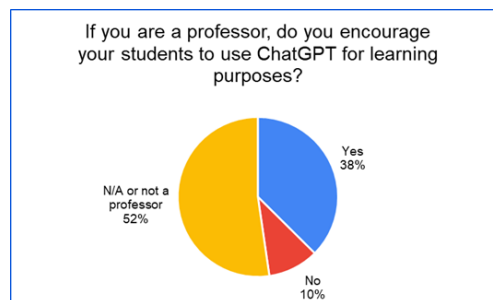

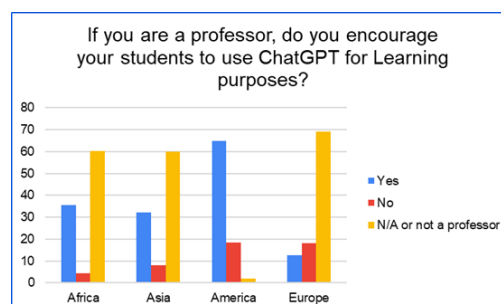**Figure 12.** Attitude of professors to students' use of ChatGPT

Figure 13. Attitude of professors to students' use of ChatGPT (by country / region)

The majority of students stated that they had not received guidance or training on how to effectively use ChatGPT (Figures 14 and 15). This also reflects the timing of the survey so soon after the launch of ChatGPT.
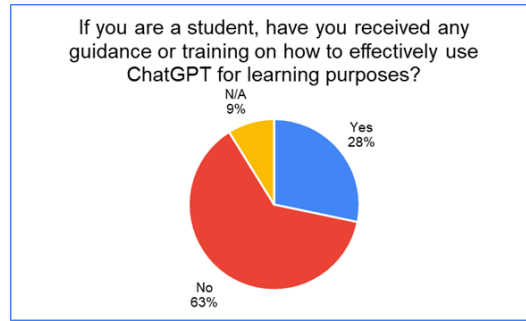
Figure 14. Proportion of students receiving guidance on the use of ChatGPT

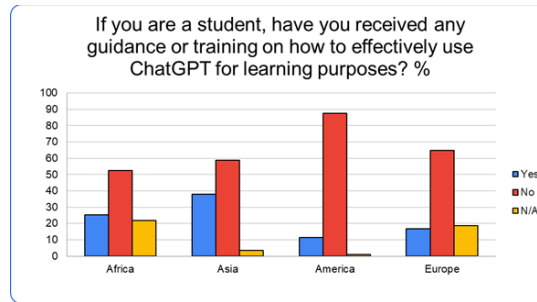**Figure 15.** Proportion of students receiving guidance on the use of ChatGPT (by country / region)

4.5 The perceived benefits of ChatGPT

The perceived benefits of ChatGPT were consistent across all regions. An overall average of 73.8% of the students considered ChatGPT to be providing the benefit of "quick access to information", followed by 60.5% who considered ChatGPT useful for "improved understanding of complex concepts". A total of 36.8% considered ChatGPT to be useful to "improve critical thinking skills", closely followed by 34.9% for "increased motivation for learning" (Figures 16 and 17).
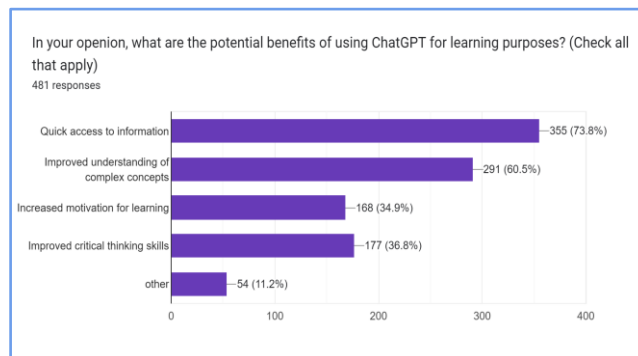

Figure 16. Perception of benefits of ChatGPT
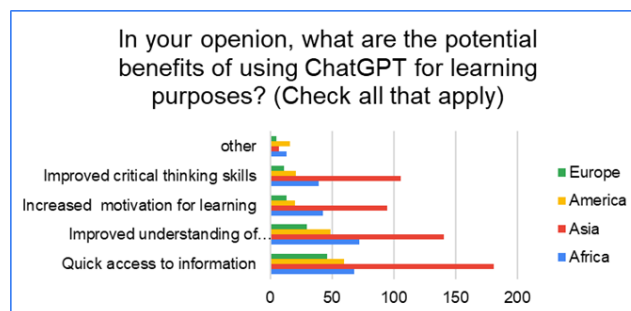

Figure 17. Perception of benefits of ChatGPT (by country / region)

Open-ended comments highlighted several key aspects of how the usefulness of ChatGPT was perceived:

- **ChatGPT as a source of inspiration**: with the ability to "*inspire broader thought*"; it "*gets you out of stuck places, hard homework questions*", it "*can help you write a paper on a topic you don't know how to write or need help*", and being useful for "*idea generation and to gain more details on concepts*"
- **ChatGPT to help kick-start research and projects**: ChatGPT "*helps you start research in the right direction; (it) gives you ideas that you couldn't think otherwise*"; and similarly, it "*gets the ball rolling for ideas*" and "*it helps you start research in the right direction*", and ensures students are "*able to get the information easily*"
- **ChatGPT as a working tool**: providing a "*balance between doing your own work but also using tools to be more efficient*"; and able to provide a "*balance between doing your own work but also using tools to be more efficient*".
- **ChatGPT as a working companion**: ChatGPT is like "*talking to something in conversation*", one student referred to ChatGPT as providing "*better writing, rephrasing of existing sentences*", and allowing students to undertake their "*own research*", "*coordinate learning*", is "*easy to use*" and offers students "*creative ways to use ChatGPT*"; one student referred to ChatGPT as a "*stress reliever*".

These comments support the responses to specific questions that ChatGPT in early stages can be seen as a source of knowledge, being able to formulate answers to specific questions, which places ChatGPT one-step-beyond that of more established search engines.

The high emphasis on the quick access to information and improved understanding of complex subjects, the potential improved critical thinking skills and increased motivation for learning indicate that the early intentions of students may reflect ChatGPT as being seen as a source of information to complement existing search engines and sources of knowledge (Figures 16 and 17). However, the extent to which ChatGPT could, or should be used to compile and format papers and documents that they would otherwise do themselves was not specifically asked.

The open-ended comments reflect the perceived usefulness of ChatGPT as a source of knowledge and understanding that goes one step beyond that of more established search engines and sources of knowledge with the ability to offer answers to specific questions rather than simply to provide background information. This benefit of one-step-beyond established knowledge platforms is a further idea for future research.

4.6 The perceived drawbacks of ChatGPT

The potential downside was reflected in an overall average of 66.5% of students who indicated that using ChatGPT risked a "dependence on technology". A total of 59.1% said that it risked "plagiarism", while 40.5% said that it reduced or eliminated the "personal interaction with instructors and peers" (Figures 18 and 19).
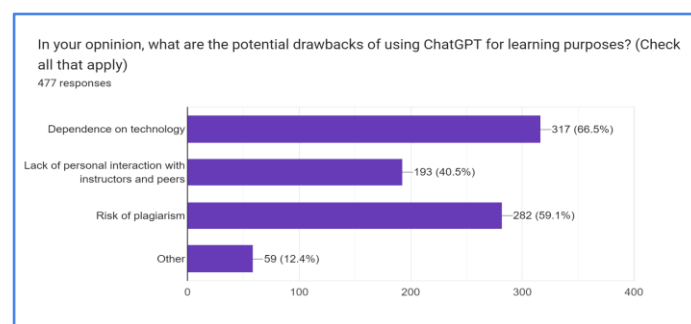
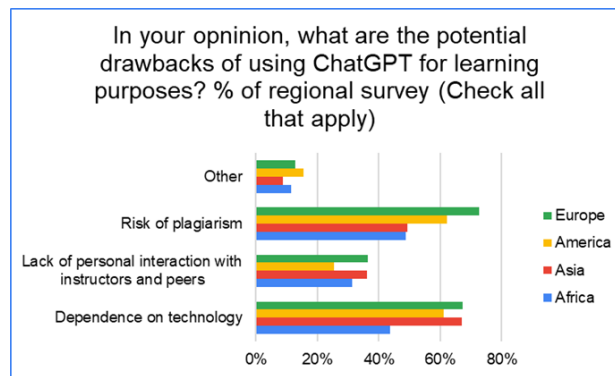**Figure 18.** Potential drawbacks of using ChatGPT

Figure 19. Potential drawbacks of using ChatGPT (by country / region)

The responses to the potential downside of ChatGPT reflected students' and professors' fears of a dependence on technology, a risk of plagiarism and a reduction in the personal interaction with instructors and peers. The high level of responses reflecting these fears demonstrates a balance among student respondents. On the one hand, they could see the potential benefits of rapid and thorough knowledge gathering to the extent that it provides direction and support to specific questions which can extend to complex problem solving, rather than just provision of background information. On the other hand, they were aware of the possible negative impact that this might have on learning itself. This balance of potential benefits and costs is a key finding of this paper and is a subject for much future research.

Open-ended comments reflected these fears and can be summarised under a number of general themes, as ChatGPT's potential for:

- **Perceived lack of accuracy:** the theme which generated the most comments on the potential negative impact of ChatGPT; comments referred to ChatGPT as "*it's always right, not good for current data/news*", "*not all answers provided by ChatGPT are accurate*", and *"it has limited information with some topics"*; students cited "f*ear of inaccuracies*", "*outdated information and limitation of innovation"*; a further comment simply was the ChatGPT was "*inaccurate*", and another questioned "*the credibility of the information*", further exemplified by the comment "*you don't know if the info you are getting is accurate*". Further comments on ChatGPT related to "*false information or inaccurate*", "*incorrect information*", it "*might not be fully accurate especially when doing calculations*"
- **Generating fake information:** going beyond simple inaccuracies, one comment stated that "*ChatGPT can generate false information too. It created fake academic journals that don't exist and attributed them to random people*"
- **Generating biased information:** one comment summarised this potential for inaccuracy more broadly, by stating *"unreliable sources, strong bias to internet-based content and unrevised content, risk of underrepresentation of areas of the world with sparse internet access, normalisation of western perspectives that are overrepresented on the internet*"
- **Encouragement for people to search for confirmation bias:** comments raised referred to the "*possibility of subjective or opinion-based answers*", and the "*risk of seeking false information*", and "*lack of independent thought*"
- **Restricting learning:** with the potential to "*decrease our critical thinking skills*", encourage a "*lack of motivation, procrastination*"; the ability to "*copy and paste materials*", "*students rely on AI instead of actually learning*", highlighting the risk of "*becoming dumb*"
- **Inhibiting critical thinking:** comments referred to the "*risk of losing critical thinking and analytical skills*", that "*critical thinking and creativity is shoved away*"; the "*risk of losing originality and raw idea and thinking*", and that ChatGPT could be "*lost in human creativity*", and "*killing creativity*"
- **Over-reliance on ChatGPT:** two comments referred simply to "*over usage (of ChatGPT)*", and using ChatGPT as "*taking the easy way out*"

One comment summarised a number of the above issues: "*Using ChatGPT makes people think less. When they think less, their mind expands less. I think the more you use ChatGPT, the harder it becomes to freely innovate. Kind of how TikTok reduces attention span if that makes sense.*"

The inclusion of open-ended comments, whilst not providing enough data to distinguish patterns in responses from the regions, has at least provided the opportunity to highlight issues raised by students in addition to the structured questions provided. These comments provide additional material to draw conclusions and implications for future research, which are discussed in the following final sections.

5. Summary discussion of survey results

In terms of contribution to the literature, this is an early-stage exploratory study. It is an early contribution to the growing number of papers which raise the potential areas where ChatGPT can be of benefit or a danger.

Overall, and on the basis of the respondents' answers, we see an awareness of the potential for ChatGPT's benefit, alongside a tendency of students not wanting to become overdependent on AI. Students were also aware of a crucial danger of using ChatGPT like a "ready-to-eat meal delivery service", not for e.g., pizza but "food for thought". A ChatGPT quick fix may be expedient but also self-deluding and may offer superficial and inadvertently inadequate solutions to a query. If students are content with the ChatGPT output and do no more, they have not learned anything in the sense of acquiring knowledge and/or personal skills. If the students end their work with simply having retrieved and handed in the ChatGPT output, their proficiency has not really improved, and they might not be able to produce similar results without ChatGPT. It will have provided students with neither the know-how nor the skills necessary to (re-)produce such insights or new knowledge on their own. Thus, in the absence of the ChatGPT "Magic Wand", the students may not find solutions on their own. Students in our survey were well aware of this.

Overall, we find that students were open-minded but not convinced that ChatGPT offers only benefits. They saw an upside in helping them in complex situations, particularly with quick help in important areas such as research, studying, and homework. At the same time, and common across all countries in the survey, they saw the risk of plagiarism, of becoming dependent on ChatGPT, and potentially of being provided with false information if they rely on ChatGPT too much. Furthermore, the lack of interaction with teachers and other peers was also considered as having negative consequences on learning.

In summary, the authors' findings suggest that ChatGPT had gained significant levels of awareness and usage among early adopters. The results also reflected the dichotomy mentioned in the opening sections, that many respondents expressed disapproval and concerns about ChatGPT's potential negative impact on employment, privacy, and the dependence on the widespread availability and affordability of ChatGPT. On the other hand, the majority of our college interviewees recognized the potential benefits of ChatGPT in education, such as improving access to information, enhancing the quality of education, and promoting innovation. The authors believe that ChatGPT's impact can be harnessed and made to benefit all of humanity through effective integration into the education system. This is what the following section aims to highlight.

The summary of findings is firstly that video conferencing possibilities have become mainstream and are adding additional tools to the educators for existing target groups. Online tools have also widened the educational scope: schools can reach new target groups which have been underserved, leading to new educational opportunities for students and new revenue sources for educational institutions. Secondly, the issues and solutions encountered on three continents and different learning cultures were largely similar, and so were the solutions applied. This leads to the conclusion that things learned from one continent may be transferable to other learning/teaching situations. These conclusions are somewhat tentative and need corroboration by other researchers.

6. Conclusions, predictions, and recommendations

6.1 ChatGPT status, outlook, and proposals

This survey is an early contribution to the still few but growing number of publications on how and where ChatGPT could be used to benefit students, faculty and wider audiences, to be of service (or dis-service), depending on the

perspective of the writers. We have provided an insight into initial perceptions and attitudes of students barely half a year after ChatGPT's launch. The launch was followed by an unprecedented explosion in ChatGPT trial: "ChatGPT crossed 1 million users in 5 days of launch and set the record for the fastest-growing platform by gaining 100 million users by January" (Ruby 2023). Subsequently, ChatGPT had one billion visits in February and 1.6 billion visits in March 2023. The authors predict a rapid and continued growth in awareness and willingness among academic respondents well beyond its current 50%. Given its recent popularity on TikTok as "CheatGPT", the next few cohorts of college students have already received guidance from their institution on how to exploit its potential in various ways. Simultaneously, the authors also see a tendency that students do not want to become overly dependent on the continued availability of ChatGPT and they also expect guidance on its recommended and legitimate, non-plagiarizing use.

   Therefore, the authors further assume that the AI genie is out of the bottle (all interdictions, bans notwithstanding), and is already haunting or inspiring hundreds of millions of people around the world. The authors therefore recommend that pragmatic educators and administrators might just as well focus on the bright side: a "genie" allegedly grants many wishes and, in the opinion of the authors, it can and will offer yet unimaginable new possibilities in many areas of human existence. In other words, as the ChatGPT ship has sailed, educators are well advised to ensure that it will not fall off the earth but will rather take higher education to promising new horizons, thus allowing students to explore hopefully rich and equitable new worlds only fantasized about in science-fiction before this decade. The following paragraphs aim to support these claims and present the case for ChatGPT, based on Bill Gates' "New AI Age in Higher Education".

6.2 Hands-on suggestions for using ChatGPT to take higher education to the next level

As stated above "the horses are out of the barn" – to use another adage – the challenge for forward-looking educators is at least twofold: (a) how to domesticate the maverick AI mustangs for academia, harness them and use the power of AI-ChatGPT as new workhorses, and more concretely (b) to offer specific guidance on how to make it actually work for the students in their day-to-day academic work, thus translate the guiding principles into executable instructions or assignments. An experiment in Appendix 1 focuses on the academic areas the students indicated as their most likely uses of ChatGPT, i.e., help with research, studying, and homework. Asked how to best use ChatGPT, the ChatGPT generated by ChatGPT4Plus provided a list of recommendations based on research, studies, and homework. The introduction of the new technology of ChatGPT which has such enormous perceived benefits for completing work that either could not be completed by an individual or could not be completed in the time that ChatGPT can achieve, leaves questions for future research. Addressing both the moral issue for students and the broader population of whether to use ChatGPT at all and if so, the scope and limitations for its use. These questions for the future are considered in the final section.

7. Suggestions for future research

Future research can firstly focus on the attitudes of students, teaching faculty, researchers, and the wider population, to ChatGPT and more broadly to AI. This survey found that there is a mix of opinions and attitudes related to the use of AI, as students see value in the ability of ChatGPT to provide them with quick knowledge and information on complex topics, but also see the risks to the learning process, and the possible acquisition of false knowledge and accusations of plagiarism. This is an area of research which should focus on the moral issues related to AI.

   Future research can secondly focus on the capabilities of AI to answer complex questions, beyond that of existing search engines such as Google or Bing, and now standard sources of information such as Wikipedia. Whether ChatGPT adds more knowledge than can be gained from existing sources needs to be explored. Whether the true value of ChatGPT is to provide knowledge and information, or simply to structure knowledge into a coherent form, effectively finalizing the required work, should also be explored.

   Thirdly, using ChatGPT for simpler questions and more mundane work, such as teachers using ChatGPT to select questions for students to answer, and using ChatGPT to grade papers. These are also a highly worthy questions, as this capability of ChatGPT and AI are less likely to warrant the moral criticism, but positions

ChatGPT and other AI platforms as providing a workhorse to assist with the background work for detailed, time-consuming, complex, but more revision-based applications rather than as a substitute for learning. This could form a more wide-reaching research agenda to assess the true value of ChatGPT and its influence on teaching and learning. Addressing these questions can result in a more generally accepted framework for assessing the moral argument for when and how AI should be encouraged and discouraged.

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Appendix 1 – A ChatGPT Experiment

The next sections will describe concrete ways how ChatGPT can effectively be of use to educators and students, as claimed by ChatGPT4Plus in its answers to the authors' respective questions in early May 2023. Subsequently, the authors tested the viability of ChatGPT's claims/answers, found them adequate as well as useful and complemented them with their own experience/suggestions as follows. The text was created by ChatGPT as an experiment by one of the authors.

Research: Chat GPT can save time laying the groundwork, on which students can build to creatively generate new knowledge or skills

1. **Brainstorming ideas:** ChatGPT 4+ can help students and educators brainstorm research topics, questions, and hypotheses. By asking relevant questions and offering suggestions, ChatGPT 4+ can help students and educators identify research ideas that are feasible, interesting, and relevant to their field of study.

2. **Defining research objectives:** Once students and educators have identified a research idea, ChatGPT 4+ can help them define their research objectives. ChatGPT 4+ can help them pinpoint the research questions they want to answer, the data they need to collect, and the methods they need to use to analyze the data.

3. **Conducting preliminary research:** ChatGPT 4+ can help students and educators conduct preliminary research by suggesting relevant sources of information such as books, articles, and websites. It can also help them narrow their focus and find the most important and useful sources of information.

4. **Developing research plans:** ChatGPT 4+ can help students and educators develop research plans by offering suggestions on how to structure their research projects. It can help them identify the key milestones, timelines, and deliverables for their project, and offer suggestions on how to manage their time effectively.

5. **Providing feedback:** ChatGPT 4+ can provide feedback on students' and educators' research proposals, helping them refine their ideas and approach. By offering constructive criticism and suggestions for improvement, ChatGPT 4+ can help students and educators ensure that their research projects are well-designed and have a strong chance of success.

In summary, ChatGPT can save time and effort in the first phase of the research project, just like or better/faster than Wikipedia articles, and especially the references listed at the end of the articles. It can give researchers a head start by saving them time and effort with the often disliked "grunt work". Thus, the students will have more time for their own contributions and ideally new insights and/or knowledge.

Studies: ChatGPT can enhance students' learning experience and help them achieve their academic goals faster and more securely.

Answering questions; *providing explanations; offering study tips; recommending resources; generating summaries; facilitating collaboration; providing feedback.*

Homework: ChatGPT can offer students assistance with their homework and/or independent study.

Providing instant answers; offering explanations; offering study tips; recommending resources; generating summaries; providing feedback; personalizing learning.

This proactive approach of encouraging students (and not discouraging) was successfully tried in mid-March with more than 100 business students at San Jose State University in Silicon Valley/CA, USA. For the planning and writing of presentations on a specific company's strategy, the students were encouraged to use ChatGPT extensively and judiciously at the same time. The presentation showed a significant improvement over previous years, which the authors attributed to ChatGPT.