

# Exploring ChatGPT’s impact on post-secondary education: A qualitative study

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## Abstract

As Chat Generative Pre-trained Transformer (ChatGPT) gains traction, its impact on post-secondary education is increasingly being debated. This qualitative study explores the perception of students and faculty members at a research university in Canada regarding ChatGPT’s use in a post-secondary setting, focusing on how it could be incorporated and what ways instructors can respond to this technology. We present the summary of a discussion that took place in a two-hour focus group session with 40 participants from the computer science and engineering departments, and highlight issues surrounding plagiarism, assessment methods, and the appropriate use of ChatGPT. Findings suggest that students are likely to use ChatGPT, but there is a need for specific guidelines, more classroom assessments, and mandatory reporting of ChatGPT use. The study contributes to the emergent research on ChatGPT in higher education and emphasizes the importance of proactively addressing challenges and opportunities associated with ChatGPT adoption and use.

**CCS Concepts:** • **Social and professional topics** → **Computing education**; • **Computing methodologies** → **Natural language processing**.

**Keywords:** ChatGPT, conversational AI, Artificial Intelligence in education, post-secondary, higher education, assessment, education

## 1 Introduction

In recent months, the field of natural language processing (NLP) has witnessed a sharp rise in the use of advanced conversational AI models. While previous chatbots like ELIZA [29], PARRY [2, 10], A.L.I.C.E. [7] and Cleverbot [4, 31] existed, they lacked attributes such as scale, training data, and generative capabilities [3, 14, 20]. The latest advancement in this field is OpenAI’s Chat Generative Pre-trained Transformer (ChatGPT). The AI chatbot was first released to the general public in November 2022 and has since become one of the fastest-growing consumer applications to date [21]. Within two months of its release, ChatGPT had already surpassed 100 million users [19]. This technology has ignited the interest of researchers and professionals for its impressive ability to produce human-like responses by understanding conversation context.

ChatGPT is an extremely versatile chatbot with a wide range of capabilities. It can produce and debug computer code, compose music, student essays, and even answer exam questions, depending on the context that it is used in [13, 24, 28]. This chatbot is based on a GPT-3 deep learning model, which was trained on a 175 billion parameter dataset of human conversations [27]. ChatGPT’s pre-existing knowledge enables it to generate text in a variety of languages, including English, Spanish and French, as well as computer programming languages like Python, JavaScript, Java, and more [16]. It can also produce responses in different styles, ranging from formal to informal to humorous, depending on the user’s preferences [6, 12, 16].

These advanced conversational AI models have far reaching applications in various industries, including education, healthcare and customer service [5]. The technology can be a pivoting point for higher education, particularly in the realm of student assignments and assessments [30]. ChatGPT’s ability to generate human-like responses can offer an unprecedented level of support for students. For example students can iterate on new ideas in real-time or even have their assignments completed by the chatbot [22].

Nonetheless, this unprecedented level of support also raises concerns about academic integrity and the role of course instructors [26]. As students increasingly turn to ChatGPT for support in completing their assignments, instructors face uncertainty regarding how to approach this new technology [23]. While the use of such chatbots can increase

efficiency and improve the quality of work, it also presents significant challenges to minimizing plagiarism [32].

Regardless of the potential challenges and uncertainties, ChatGPT's impact on education has the potential to be transformative [17]. Its ability to provide personalized feedback and support for students can improve the quality of education and enhance the learning experience [11]. However, as with any new technology, it is crucial to consider its impact carefully and develop appropriate framework to ensure appropriate usage and equitable access to resources [32].

Despite the early research on ChatGPT and post-secondary environment, there are limited studies done that include a focus group on ChatGPT's impact with the participation of undergraduate and graduate students alongside faculty members. This study stands out by providing a platform for participants to engage in an informal discussion in a respectful, inclusive, and safe environment. In addition to sharing the results with the computer science education community, the focus group activity itself has proven to be beneficial. The faculty members involved in the discussions and subsequent conversations expressed interest in the outcomes. The primary goal of this study includes investigating what stakeholders think about its potential in higher education. This study aims to address the following research questions:

- RQ1: How students/faculty believe ChatGPT should be incorporated into future courses and assignments?
- RQ2: Should courses have more in class assignments instead of take home assignments?
- RQ3: How should professors assess students and make sure the ChatGPT usage is adequate?
- RQ4: How would ChatGPT affect students' learning and/or job preparedness?

## 2 Related Work

Due to the novelty of this topic, there are limited peer-reviewed journal articles on ChatGPT and higher education, in particular, we are not aware of studies reported in the context of focus group discussions. Although a vast amount of research exists on large language models in the education field [15, 25], the focus of this study is solely on literature related to ChatGPT. Nevertheless, some researchers have begun to examine ChatGPT's effect on education more closely. While these studies are ongoing, most published literature suggest that this AI chatbot could pose a challenge to various aspects of post-secondary education, such as academic integrity, ethical considerations, and student assessments outside the classroom [11, 30, 32].

A recent study in 2023 by Lund and Wang highlights that "ChatGPT has considerable power to advance academia and librarianship in both anxiety-provoking and exciting new ways" [17]. Moreover, this study mentions various elements related to ChatGPT, such as ethical considerations, privacy,

and bias, all of which play a major role in how this technology could affect the field of academia. In a similar study on AI language processing and its implications, Mattas [2023] warns of ChatGPT's potential to "revolutionize the way we interact with technology" and stresses that it could change "the way we communicate and access information" [18].

Similarly, a systematic literature review by Winkler and Soellner in [2018] explored the potential of chatbots in education, finding that "chatbots are in the very beginning of entering education" [30]. This review also suggests that chatbots "promise to have a significant positive impact on learning success and student satisfaction" due to their ability to react to individual intent as they provide real-time feedback. Furthermore, Winkler and Soellner report that chatbots can be used to increase student motivation in learning by giving them more control of their learning process. The authors also note that chatbots have a major advantage compared to asynchronous ways of communication as students can engage in a conversation with them at any time. On the other hand, this review also stresses that students do not interact with chatbots the same way they do with human teaching staff and students often "apply simpler sentences" with poor vocabulary which as a result, makes it difficult for chatbots to understand students' intentions. Lastly, Winkler and Soellner advocate for future research to be conducted on understanding at what point in the learning process humans or chatbot assistants leads to better learning outcomes [30].

Another recent study on ChatGPT and traditional assessment in higher education by Rudolph et al. [2023], indicates that this chatbot raises concerns about using essays as an assessment method. Furthermore, the authors argue that instructors may resist in adapting to the change in assessment methods and this may cause problems in the future as "it might not be long before Microsoft integrates ChatGPT's technology" [24]. After this integration, Rudolph et al. argue that ChatGPT would become the new norm and it could be "too late for educational institutions to adjust policies to guide their students" as it would be heavily integrated in professional tools within academia. Interestingly, Rudolph et al. propose an opportunity for educators to introduce an "innovative assessment" within their courses to "foster students' creative and critical thinking abilities". With this respect, Rudolph et al. recommend educators to avoid assessments that are "so formulaic that nobody could tell if a computer completed them" and shift towards peer evaluations and teach-back techniques to measure students' learning [24].

## 3 Methodology

To examine our research questions, we structured our study based on a 120 minute focus group where participants discussed and documented their answers to the questions provided to them. The session offered sufficient scaffolding to help facilitate the discussion on this emerging area.

### 3.1 Study Design

This research study leveraged an existing program called *The Teaching Talks (TTT)* which is available to both undergraduate and graduate students, as well as faculty members at Simon Fraser University (SFU), a research university in Canada. SFU has a student population of over 35,000, and the TTT is specifically offered within the Faculty of Applied Science, which includes 1,300 undergraduate students, 200 graduate students, and 55 faculty members. The TTT provides a platform for individuals to discuss topics related to teaching and learning within the faculty, and undergraduate, graduate, and postdoctoral students can participate alongside faculty members. The Faculty of Applied Science is composed of four schools: Computer Science, Engineering Science, Mechatronic Systems Engineering, and Sustainable Energy Engineering. The session, titled "ChatGPTTT: Listening to the Students' Voices" was open to students and faculty members from all four schools.

With approval from the university's ethics office, the study adopted a focus group method to gather the thoughts and opinions of participants. All participants were informed about the study and consented to have their data included. The first and third authors alongside the educational event director from the undergraduate computer science society prepared materials for the ChatGPTTT session, which served as the foundation for the focus group discussions. The first and third authors led the focus group session, while the first three authors participated in the activity.

### 3.2 Participants

During the session, there were a total of 40 participants who were divided into six groups. Each group consisted of 6-7 people and was randomly organized based on the participants' seating arrangements in the room. However, facilitators did ensure that a faculty member was present at each table. Among the 40 participants, 13 were undergraduate students, 21 were graduate students and 6 were faculty members from across the four schools. At this session, 38 participants attended from Computer Science, while the remaining two were from Engineering Sciences. No other demographic information such as age or gender was collected.

### 3.3 Data Collection

The study was conducted within a 120 minute TTT session that included 36 in-person and 4 virtual participants. After some initial ice-breakers, aimed at fostering a collaborative atmosphere, participants were introduced to the topic of ChatGPT in an educational context and observed a quick demo of how ChatGPT works. To facilitate the group discussions, a PowerPoint slide was provided to each group which contained the following four questions which correspond to our research objectives:

- What are your opinions on how ChatGPT should/should not be incorporated into future courses and assignments?
- Should courses have more in class assignments instead of take home assignments?
- How do you think professors should assess students and make sure the ChatGPT usage is adequate?
- Are you worried about how ChatGPT may affect students' learning and/or job preparedness?

During these discussions, each group designated a note-taker which captured and documented the group's answers for each question in their respective PowerPoint slide. Due to the dynamic nature of group discussions, we acknowledge that not every discussion item was captured, but the note-taker summarized the discussions for each question and included the relevant information for the study. Following the discussions, each group had an opportunity to present their main takeaways and provide others groups in the session with what their group had discussed. The session concluded after some general discussion where all groups were able to share their answers with other participants.

### 3.4 Data Analysis

After the session, the first and second authors aggregated the responses to each question from all groups. During this process, the data was cleaned to fix spelling mistakes and remove any identifiable information. The coders then independently analyzed the responses, identifying themes for each question using Thematic analysis [9]. Afterwards, they met to discuss any discrepancies and arrived at a consensus for the major findings. A coding scheme was used to analyze the collected data, using the four research questions as the main categories. Similar responses were grouped and direct quotes were extracted from the responses to support the findings associated with each question. All authors discussed the ideas that emerged from the activity.

## 4 Results

In our analysis, we observed diverse opinions and approaches to incorporating ChatGPT in post-secondary education (RQ1), however, there was consensus that the chatbot would inevitably be used by students in courses, regardless if course instructors choose to integrate or not. For RQ2, participants suggested more in-class and synchronous elements to combat the misuse of ChatGPT in assignments. Discussion on RQ3 indicated that course instructors should report their ChatGPT usage in assignments and develop better plagiarism detection tools. Moreover, for RQ4, while participants acknowledged the benefits of ChatGPT for students' learning, they also emphasized that inappropriate use of the tool could have negative effects. In the following sections, we explore the findings related to each research question. To protect anonymity of the participants, major themes in the

group discussion are shared as GX (e.g G1, G2, etc.) where X is the number associated with the group.

#### 4.1 Incorporating ChatGPT in courses

The majority of groups acknowledged that educators in post-secondary would inevitably have to face the reality of having the AI chatbot in their course or assignments. Some groups drew similarities between the current conversation on ChatGPT and the introduction of Google in the 1990s (G1, G2, G4, G6). ChatGPT could be described as an "advanced search engine" (G3) that "facilitates learning" (G4) and is "good for making something out of nothing but not good for building on existing concepts" (G2). Groups G1 and G3 respectively argue that "regardless of what we think, ChatGPT will be used" and "[ChatGPT] should not be completely banned. Everyone will eventually use it". Moreover, one group suggested that "googling" is an important skill as "programmers do not know all the tools to build a program" (G4) and thus, teaching how to use ChatGPT effectively could be a way to incorporate it within the classrooms. Potential use-cases of ChatGPT include initiating ideas for assignment, finding and fixing code mistakes and completing tasks where one can verify its accuracy (G2, G3, G5).

Although all groups were in favor of incorporating this tool into post-secondary courses, concerns regarding academic integrity were raised. The lack of guidelines from the university and instructors on what would dictate misuse of ChatGPT was a recurring theme. G1 raised two questions that exemplify this issue: 1) "what if I expand my idea on ChatGPT? Is that cheating?" 2) "How can students cite content generated by ChatGPT?". Both questions illustrate that without clear guidelines as to what constitutes academic dishonesty, incorporating ChatGPT into post-secondary courses could be troublesome. Furthermore, G6 stresses that the AI chatbot is known to provide incorrect or misleading information which could introduce another challenge for incorporating it into assignments. According to G4, ChatGPT could also be "biased or poisoned by the pre-trained data" which would further reduce its credibility and validity as an educational tool. G3 also advised that "students should not accept the answers [provided by ChatGPT] right away" and that fact-checking is an important caveat of using ChatGPT. Similarly, G2 also emphasized that the chatbot "could be biased as its outputs might be different between those who exclusively use ChatGPT for niche tasks compared to those who integrate it into their life and in the classroom".

#### 4.2 In-class vs. take home assignments

The idea of restricting students to in-class assignments was appealing to most groups. G1 noted that "in-class assignments ... provide a controlled environment where ChatGPT cannot be used" while G2 suggested using quizzes built on the assignments to ensure consistency. By focusing on more in-class assignments and quizzes, instructors could better

control students' access to ChatGPT. G6 proposed designing creative take-home assignments that would be difficult for ChatGPT to solve or developing in-person closed-book written quizzes. However, G6 also indicated that "quizzes in computer science can be inadequate to assess or develop programming skills". On the contrary, G1 argued that "in-class assignments are essentially exams" and by introducing too many of them could put students under more academic pressure to attend classes and perform in a time-restricted environment. Take-home assignments would reduce this pressure, but at the cost of students possibly using ChatGPT to complete them (G1). Conversely, G3 acknowledged that, "ChatGPT can help reduce writing blocks" and argues that educators should "not try to stop, but embrace it" and adapt their course elements accordingly. This group also stressed that "students should still learn the general mechanics of a concept", however, educators should acknowledge ChatGPT's presence and make appropriate changes to accommodate it.

#### 4.3 ChatGPT and student assessment

Assessing student's submissions has always come with the caveat that some may use unauthorized resources to complete their take-home assignments (e.g. Chegg [8]) however, with the introduction of ChatGPT, detecting its usage has posed a new challenge to instructors and teaching assistants (TAs). The idea of how to identify students who have used ChatGPT was a common theme amongst all groups. According to G1, "using ChatGPT is cheating", however, if faculty members add constraints, it would push more students to use ChatGPT within their assignments. Building on that idea, G2 argued that "as long as the final exam is in-person [and] closed-book, ChatGPT is free reign". Interestingly, the same group also proposed that instructors could include a requirement in their assignments for students to provide a report on how they used ChatGPT. In this approach, student assessment can adapt based on the level of ChatGPT usage within the assignment. Furthermore, according to this group, better plagiarism detection tools could help with "detecting people who use ChatGPT", however, developing AI-based plagiarism tools could pose false-positives results and thus, reducing the system's validity and credibility.

In regards to adequate usage of ChatGPT, G2 insisted that ChatGPT should be kept "away from involvement in exams as much as possible (such as creating exams)" as this could add inconsistency between what was taught in the classroom versus what is tested on the exam. On the other hand, another group proposed that ChatGPT could be used for marking assignments and exams to both expedite the process and provide more detailed feedback to the learners (G6). By doing so, the teaching team could spend more time working with students to bridge the learning gap as identified by the assessment results. Although the idea may seem attractive, G5 posed the question of whether course instructions should communicate that ChatGPT would be used to assess

students' submissions. According to the same group, course instructors should *"make it clear if [they] want students to use it or not"*, thus the same argument stands for usage of ChatGPT by course instructors and teaching assistants.

#### 4.4 Student learning and job preparedness

Majority of the groups indicated that using ChatGPT could be beneficial for students' learning, especially if they know how to use it properly. Interestingly, G1 mentioned that in the past, students focused on recalling specific previously learned material, but now, they are remembering associations with how to search on Google and utilize tools such as ChatGPT. The idea of how well a student can use this tool seems to be related to their learning takeaways. Specifically, without knowing the subject or topic at hand, students would not be able to use ChatGPT's full potential. Other groups reported a similar idea, for instance, G1 argued that *"knowing the correct prompt for finding the right answer is to know the subject"* which is also inline with G2's response, *"a lot of ChatGPT's usefulness comes with how well you can give it keywords to search things up"*. In other words, these groups suggest that ChatGPT is building on the students' existing knowledge and therefore, using it could further aid in their learning.

On the contrary, other groups presented counter arguments that using ChatGPT could negatively impact students' learning in post-secondary. G3 highlighted that *"some students will probably blindly [use] ChatGPT's answers and this could reduce their learning progress"* and G6 raised a similar concern that *"[ChatGPT] may take away from the learning process"*. These groups seem to suggest that the convenience of ChatGPT could cause students to promptly use the chatbot's answer for their assignments, which would take away from the critical thinking and hands-on practice that instructors were hoping students would engage in. Additionally, another group presented a new perspective that using ChatGPT could introduce *"isolation for students since they [would] stop communicating [with their instructors] to solving their problems"*. This group seems to suggest that using ChatGPT would allow students to easily find the answers to their problems without engaging in a conversation with the instructor. By reducing this communication channel, instructors could potentially lose an informal way to gauge students' learning.

Although most groups did not comment on ChatGPT impact on students' job preparedness, G6 did indicate that *"overuse of ChatGPT will never let you learn and will prevent you from getting [a] job"*. This suggests that students could possibly be less prepared for future job opportunities as they heavily relied on using ChatGPT throughout their education and thus, they were unable to learn the necessary skills for their future jobs.

## 5 Discussion

The use of ChatGPT in higher education is an exciting development that has potential to revolutionize the way we approach teaching and learning. As such, there is a growing need to explore how this technology is being used in educational settings and how it can be leveraged to improve teaching and learning processes.

The results of this study indicate that both students and faculty members have mixed perceptions about ChatGPT's usage in a post-secondary setting. The conversational AI tool provides students an unprecedented level of academic support, however, this also raises great concerns about academic integrity and its role within students' education. Furthermore, many participants found the topic to be highly interesting and expressed a desire for additional sessions related to it. In this section, we highlight the main findings associated with each research question discussed above.

For RQ1, we found that participants came to consensus that ChatGPT will inevitably be incorporated into post secondary courses and assignments. In any case, groups indicated that clear guidelines on acceptable usage must be established by the university or course instructors to avoid academic dishonesty. However, based on the results, the participants appeared to have been unaware of the syllabi guidelines that the university had recently published [1]. Facilitators used this session as an opportunity to share such material with all participants after the discussion concluded. Afterwards, a large group discussion on this material revealed that the guidelines may require revision, however, developing such documents was a great step forward by the university and academics.

Future discussion on RQ1 indicated that ChatGPT could be used to facilitate learning, initiate ideas for assessments, identify and patch code mistakes, and serve as an aid for tasks that do not require critical thinking. Participants warned that ChatGPT users must be aware of the tool's limitations, such as potential incorrect or biased responses and stressed on the importance of fact-checking the chatbot's responses.

Next for RQ2, results suggest that adding more synchronous elements such as in-class assignments and quizzes may regulate ChatGPT usage, encourage student attendance and engagement. Nevertheless, shifting to in-class activities could also increase academic pressure on students and reduce learning opportunities outside the classroom. It is essential to strike a balance between in-class and take-home assignments to minimize the potential misuse of ChatGPT while maintaining a conducive learning environment.

Groups presented various ideas for evaluating students and ensuring adequate ChatGPT usage (RQ3), such as requiring students to report their ChatGPT usage in assignments and developing better plagiarism detection tools. Although there was no agreement on how instructors should assess students and ensure ChatGPT usage is adequate, most groups

raised important topics such as: 1) how ChatGPT can be detected, 2) whether course instructors should use the tool for evaluations and 3) communication of ChatGPT usage by students and instructors. Despite the lack of consensus, all groups did indicate that ChatGPT will change how students are assessed and academics should make an effort to understand its impact to better adapt post-secondary courses.

The discussion on RQ3 also raised the topic of how ChatGPT could be used by instructors or TA for marking assignments and exams. Doing so will provide more time for educators to focus on teaching and bridging learning gaps. Undoubtedly, if educators discourage the use of ChatGPT, they should be cautious about using it themselves (or their TAs) to avoid creating a double-standard policy in the classroom. Course instructors should be transparent about their expectations and policies regarding ChatGPT usage and provide resources to guide students on acceptable practices.

For RQ4, ChatGPT's influence on students' learning and job readiness showed mixed results. On one hand, ChatGPT can enhance learning by building on existing knowledge and assisting with research. On the other hand, relying on ChatGPT could hinder critical thinking, hands-on practice, and communication with instructors, potentially leading to reduced learning progress and a negative impact on job preparedness. Encouraging appropriate usage and emphasizing the importance of understanding subject matter before using ChatGPT can help mitigate these concerns.

In short, the integration of ChatGPT in post-secondary education presents both exciting opportunities and serious challenges. Clear AI policies, more in-class elements, requirement to report ChatGPT usage, and proactive discussion on responsible practices can help maximize the benefits of ChatGPT while minimizing its potential drawbacks.

## 6 Limitations and Future Direction

This study, like others in the field, has certain limitations that should be considered. First, the participant sample may not fully represent the diversity of post-secondary settings. Although TTT session was open to all undergraduate and graduate students, faculty, and staff within the Faculty of Applied Science, a majority of the attendees were graduate students ( $N=24$ ), with a smaller number of faculty members ( $N=6$ ). Moreover, participants were primarily from technical fields such as Computer Science and Engineering. This study, therefore, may not capture perspectives from non-technical disciplines like social sciences, humanities or medical sciences. Future research should include participants from non-technical backgrounds to ensure that the findings are generalizable across various academic disciplines.

Second, the time constraints of the session may have impacted the depth of discussion and documentation. The entire session lasted 120 minutes, with approximately 75 minutes dedicated to discussing and recording group responses to

the questions provided. Given the complexity of the topic, it is possible that not all relevant aspects were covered within this limited time frame. Future studies should consider allocating more time and/or use alternative data collection methods for in-depth discussions, allowing participants to explore the topic more thoroughly.

Lastly, the reliance on a single volunteer notetaker/group might have resulted in the omission of some discussion points, specifically for questions that sparked extensive conversation. To address this limitation, future work could include multiple notetakers or implement other methods, such as audio recordings, to ensure all discussions are captured.

Furthermore, to better understand the role of ChatGPT's within higher education, we suggest the following possible future directions: 1) Expanding the sample size and including other post-secondary institutions. 2) Examining ChatGPT's long-term and short-term effects on student learning outcomes. 3) Integration vs. incorporation of ChatGPT within post-secondary education. 4) Exploring strategies to mitigate the ethical concerns and potential misuse of ChatGPT.

## 7 Conclusion

The exploration of ChatGPT in post-secondary education settings presents both exciting opportunities and significant challenges. By examining the perception of ChatGPT in academia, this study provides insights into how educators can better prepare for the future of conversational AI. The findings from this study suggest that there is a general consensus among participants that ChatGPT will inevitably be incorporated into post-secondary courses and assignments. However, its integration must be paired with clear guidelines, redesigned assessment methods, and transparent AI policies to ensure responsible usage and mitigate potential drawbacks.

This study contributes to the rapid growing body of research on ChatGPT and its impact on higher education by highlighting the importance of balanced in-class and take-home assignments, improved assessment strategies, and responsible usage of ChatGPT. Additionally, it emphasizes the need for institutions to be proactive in addressing potential challenges introduced by ChatGPT, such as academic integrity, ethical issues, privacy and bias.

While this study has limitations in terms of participant diversity and time constraints, it comes at a time of need to provide insights into the perceptions of students and faculty members in a post-secondary setting, paving the way for future research to further explore ChatGPT's potential and its implications on teaching and learning. With ChatGPT rapidly becoming more popular and dynamically evolving in the educational field, it is crucial for academics to engage in ongoing discussions and develop policies and practices to leverage the potential benefits of this technology while minimizing its challenges.

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