



How Can Students Use Text Generative Programs Ethically and Effectively?

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Abstract

This report analyzes the question of how students can ethically and effectively use text generative programs (TGP). The focus of this report is to provide guidelines for use as well as to understand the multifaceted perspectives of the use of TGPs throughout education primarily by students. TGPs are a form of generative artificial intelligence (AI) that dynamically responds to prompts or questions given by users. With a large range of possibilities of applications of TGPs throughout academia, we have analyzed both students and instructors' views on the ethical implications and the efficiency impact of TGPs. The results show that usage of TGPs can be ethical as a supplement to the learning process and provide a noticeable improvement in productivity. However, using them for plagiarism or as a replacement for the critical thinking process is harmful and counterproductive to the learning process of students.

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1 Introduction

Generative artificial intelligent tools have been widely adopted throughout society for the usefulness and unlimited possibilities of computer-generated text by over one hundred million active and more users of the most common TGP, ChatGPT (5). TGPs have reached a point where the effort required to use TGPs became low enough, and the quality of the output became high enough to cause a critical point of mass adoption to take place. The artificial intelligent genie cannot be “put back in the bottle” as many different people already rely on technology for many different key factors of their lives (3). Governments will try to enact legislation to change how the tools are accessed, and created, but the core concept of high quality TGPs cannot be policed more than the use of a search engine.

The goal of this paper is to assess students’ usage of TGPs from both ethical and effective standpoint. This goal will be achieved with the following objectives:

- Evaluate the usage and possible effective use cases of TGPs.
- Understand the ethical dilemma of the usage of TGPs in education.
- Conduct student surveys of the perceptions of the usage and ethics of TGPs.
- Conduct professor interviews to garner their perception of the usage and ethics of TGPs.
- Analyze the students’ perceptions of the usage and ethics of TGPs and use the professor’s perception to provide further insight.

2 Background

2.1 Prevalence of Text Generative Programs:

TGPs have seen widespread adoption and in a sense an arms race to capture the market with Open AI's ChatGPT making the first waves throughout multiple industries (5). Different markets require reanalysis on how to approach AI revolution and how it can be addressed as an opportunity, especially in education, which is the focus of this paper. Students and teachers alike are adopting these technologies as part of their everyday life, whether it is responding to emails faster or accomplishing homework faster (6). With over 80% of students having heard of or have used these innovative technologies; they have promise for revolutionizing many different industries, like education (6). For example, these tools could provide help explaining a topic where an explanation was not previously available to students. Additionally, the instructors could use these tools to generate course plans and ideas on how to adapt to the ever-changing needs of their students (1).

2.2 Use Cases of Text Generative Programs:

There are several potential use cases and more that are yet to be realized for these tools to be used responsibly. The capabilities of these tools are vast, with the ability to answer a wide variety of questions in natural language (3). code generation, math questions, and essay writing are some examples of the tasks that these tools can manage; however, the accuracy of their outputs may vary, as well as the bias in the outputs (1). Due to the inaccuracy in answering math questions, 44% of students use TGPs as a guiding point for critical thinking questions, whereas only 20% use these tools for solving math problems (8). Usage of TGPs as a personal assistant or

virtual tutor is recommended as it is both ethical and a positive beneficial use of the technology (1). This is because the critical thinking process is not being offloaded to the computer, rather the TGP is supplementing the learning process. These tools can also be used for exam preparations and practice giving relevant questions personalized to the student's struggle areas (1).

2.3 Impact of Text Generative Programs:

The profound impact on daily life with a significant amount of Gen Z and Millennials relying on the most popular platform, ChatGPT, to answer detailed questions or 'prompts' to help complete work or homework questions (8). Both groups are the majority user demographic that has made changes throughout their lives with 44% of Millennials and 35% of Gen Z making up the user base (18). Economic impact is yet to be majorly felt with all the technology yet to be fully realized; however, 33% of business leaders foresee industry changes within 5 years (16). Short term impacts are hard to measure, however, due to the recency of this technology. Several professors see students offloading the critical thinking process as cheating the goal of education. Resulting in them taking a policing role leading many to resign. As a result, students' academic performance is lowering with the reliance on these technologies to supplement their own critical thinking process (13). It is hard to distinguish what causes lower academic standards of generative AI tools rather than something like the 2020 pandemic (13). Specifically looking at education, the advent of TGPs has required teachers to rethink many facets of their courses and lectures (13).

2.4 Ethics of Text Generative Programs:

Generative AI specifically for Text has gained much notoriety for being able to answer questions in natural language to many different questions. However, the usage of these generated responses has posed a difficult ethical conundrum. Researchers agree that using generative AI as an assistant tool to facilitate the learning experience is an ethical way to use the tool, whereas using AI in place for work supposed to be done by a human would be unethical (4). Additionally, the only increasing ability of generative AI will prove difficult for average people to discern the difference between Human generated work and generative AI generated work (9). Thus, the effort to conceal the difference is unethical, therefore there needs to be a method of tagging work generated by AI to prove the difference.

2.5 Sources and Bias of Text Generative Programs:

To train these different TGP models, there is a vast amount of training data required to give these programs the ability to respond to wide varieties of questions in natural language (3). Although the data collection techniques used by these companies are not transparent, it is easy to find situations where the data is used by the companies by analyzing the results of the models. The data is categorized then trained in trials to refine the model in a method of supervised training (3). However, these training data sets are often not vetted due to the automatic data collection initiatives, therefore the vast knowledge of the model can tend to contain unethical, illicit, or illegal information (10). This becomes a problem when the users of these tools can prompt the generative AI to produce this information. Fortunately, the developers of the most powerful tools have placed limits on what users can solicit from the model, however due to the nature of the internet there will always be bad actors (10).

2.6 Responsible Use of Text Generative Programs:

Text generative programs have seen significant use and adoption across many different industries with platforms such as ChatGPT reaching over one hundred million active users only two months after launch (5). These TGPs have shown potential in the realm of education for both the educators and the students, but they must be used responsibly to avoid the various pitfalls that can come with the many risks that they present such as misinformation, over-reliance, plagiarism, etc. (4). TGPs have the potential for many different revolutions in the realm of education and wielding the generative AI responsibly is a major step in honest use. There are many more potential industries that TGPs could change in the future with education and technology being the main two with over four hundred combined business function uses in companies (17).

2.7 Over Reliance on Text Generative Programs:

With text generative programs have been making waves throughout all levels of industry, from white collar desk jobs down to the average student, there is a difficult case of people using this technology to do critical thinking tasks for them (5). In general, having the AI generate ideas and new potential ways to view a problem or have it explained a problem to you in a different context, using it outright to do a critical thinking task is common (8). People who over-rely on generative AI tools can see a decline in their critical thinking skills and ability (4). There are also ethical concerns with the reliance on using the generative AI to do the critical thinking tasks for you such as plagiarism. There are ways to use these tools without relying on them to do everything for you, such as using the AI more as a supportive tool or tutor (1).

2.8 Copyright law in GPT:

The first source is developers creating the Large Language Model (LLM). Most of the TGP's available for the public to use are the same exact technology; developers will train their model to fit their needs. Companies like Facebook/Meta, Google, and Open AI train their Large Language Models on the largest datasets they can. Much of this is copyright protected materials. Much of the protected materials were obtained illegally as outlined in a court case where prolific authors and creators accused Open AI and Facebook/Meta (14). By including these texts in the large language model, it could also be construed as distributing the protected materials, as anyone with access to the GPT tools developed by these companies can theoretically access all the information in the pirated materials.

The users of TGP's may not be aware of the nature in which the LLM uses outside literature to form responses and may try to use such generated content as their own creative work. While unintentional, it can still be a violation of copyright if the court decides the material is similar enough. European legislation is in the works to attempt an increased amount of transparency (15), but it is a long way off, and will never be perfect. There are also cases of TGP tools being used completely unmoderated and may flood different corners of the internet with copyright content. Sometimes it is not by accident, and that's when it starts becoming plagiarism, which is more relevant to the scope this paper focuses on: education.

2.9 Plagiarism using GPT:

The use of TGP's in doing assignments in lieu of learning materials. This directly affects the ability of the student to learn the content being taught and leaves them ill equipped to tackle the challenges faced later in their academic career or even their post education career. Tests and

assignments are there to measure the ability of the student, and once the student unknowingly bypasses those tests, the tests are no longer an accurate assessment of these abilities. This could lead to a mistrust in the education system (something we are already seeing in the Computer Science industry with the push to hire people without any form of “higher level education”). This also leaves large swaths of the workforce ill prepared for the challenges of the real world.

2.10 Combating Text Generative Program Induced Plagiarism

TGPs can make it very easy to plagiarize or cheat either intentionally or unintentionally. This fear has made a demand to attempt to detect instances of TGPs in people’s work. While accountability is important, it is hard to find accountability. TGPs are designed to mimic human words, so it is increasingly difficult to detect, even with programs as advanced as zeroGPT. For example, the Constitution (written well over one hundred years before TGPs got any good) is flagged as written by ai with confidence levels as high as 94%. (19) Over Reliance on tools detecting the use of AI may lead to false positives and can easily be fooled by users with the intention of not being detected.

3 Methodology:

To address the research objectives, we performed a two-pronged investigation. We have conducted a survey of primarily undergraduate students at WPI. The survey serves the purpose of providing an understanding of the students' perception about TGP. Additionally, we conducted interviews with professors with diverse backgrounds to verify and understand the results of the survey. The results are used to build a case of what are the ethical uses in education of TGP.

3.1.1 Survey Study – Assessing Students' Perspective: Goal

The goal of the survey study was to evaluate and understand the way students perceive these tools ethically, as well as to understand how the students perceive the usage of these tools to increase productivity and effectiveness in academia. The survey was split into three main sections with the first section being focused on usage of TGP with ethical questions at the beginning and general usage questions later. The final agree or disagree section asks about different use case specific questions and whether they agree that TGP can be used in academia or not. Finally, the third section involves demographics items to build an anonymous background of the responders. Overall, the data was used to understand the perceptions and use of the students who use these tools and determine how they perceive it ethically as well as from an effective usage standpoint. Since respondents might be reluctant to self-incriminate, we refrained from asking any questions that would be too revealing to preserve the integrity of the survey.

In the first section we asked questions specific to usage of text generative AI and most of the questions were to rate on a scale to add to ease of response to gather more. First, we asked preliminary ethics questions about how they perceive the ethics TGP as well as a follow up scale question about how often they use TGP. Depending on the respondents answer they will

be forwarded to the next section since their answers on usage will not be valuable if they do not use TGP. Additionally, we asked an open-ended question about what they use text generative AI for with multiple different options deducted from the background research as generally common uses of TGPs. These options include:

Ideas	Research/Learning	Virtual Tutor
Essay or Creative Writing	Formatting/Proofing	Conceptual Questions
Not Applicable*	Other**	

**Included Not Applicable for respondents that have not used these tools.*

***Included Other for respondents who have other use cases for text generative AI*

Next, we asked a question about how they perceive text generative AI increasing their productivity, to understand if they believe it is increasing their effective use, which we can use to pinpoint which use cases potentially cause increased productivity. The next scale-based questions are focused on the ethics of text generative AI and the student's individual perception. We asked questions about whether they trust TGPs, whether they believe it is biased, whether they would recommend other people in their major to use it, and how much of the generated response they can copy. These ethical questions were used to gather an understanding of the ethical views that students have on these tools based on their responses.

Furthermore, in the second section, based on the previous table, we ask questions on whether they believe that TGPs can be used effectively in academia for each of the specific use

cases. The responses are on a scale from Strongly Agree to Strongly Disagree on if they believe that TGPs can be used for use case x with x being a use case from the previous table. Finally, we ask short answer questions on other applications they believe that TGPs can be used for and cannot be used for and why to include other use cases.

In the last section, two questions were asked about demographics: the year the student is, and their major. In addition to keeping the focus of the respondent, this was done to provide trust in the respondent that their responses will not be used to identify them or reveal their habits involving text generative AI.

3.1.2 Survey Study – Assessing Students’ Perspective: Sample

To diversify the possible responses, we reached students of a variety of different majors with a sample size of forty-five respondents. The survey was aimed to garner a wide variety of TGP users from non-users to avid users. Usable responses were collected and analyzed in Google Sheets.

3.2.1 Interviews - Assessing Professors’ Perceptions: Goals

The goal of the interviews was to understand the alternative perspective from the instructors’ point of view. This was done to gain perspective on how professors believe TGPs should be used by students in a variety of different classes. The interviews are split into two main sections with each interview’s duration to be about thirty minutes. The first section consists of some background questions about their professional background in addition to how familiar they are with TGPs. This was done to provide a diversity of opinions about TGPs. The second section consists of the main questions about TGPs with a focus on the ethics and impact of TGPs on the students taking their classes. Overall, the interviews were used to understand how professors believe TGPs can be used effectively and efficiently in their classes. Additionally, since the

background section might be a revealing and outing of the professors interviewed, we refrained from collecting identifying information by keeping the background questions general.

3.2.2 Interviews - Assessing Professors' Perceptions: Sample

For the sake of diversity in the responses and opinions from the interview we interviewed professors from multiple different disciplines. The interviews were aimed to garner general opinions so multiple ($n > 10$) interviews are not necessary. All the professors that were interviewed had ten plus years of teaching experience at the undergraduate level. Two of the professors have been teaching for twenty or more years. The areas that the professors interviewed teach are mechanical engineering, computer science, philosophy, and business. All the professors have decorated backgrounds for their respective educations with all the professors completing a postdoctoral degree in addition to their undergraduate degrees. Four total interviews were conducted averaging around 25-30 minutes each. Interviews were transcribed, analyzed, and cited in Appendix Numbers 5-8.

4 Results:

4.1 Student Survey

The student survey has been split into two major sections, an ethical use section and an efficiency section. These two sections were used to plainly understand a student's perspective of efficient and ethical use. Most respondents of the survey were either sophomores or seniors, 30% and 28% respectively, with the next two most common were juniors and then freshmen, 23% and 11% respectively as seen in the figure below (Figure 1).

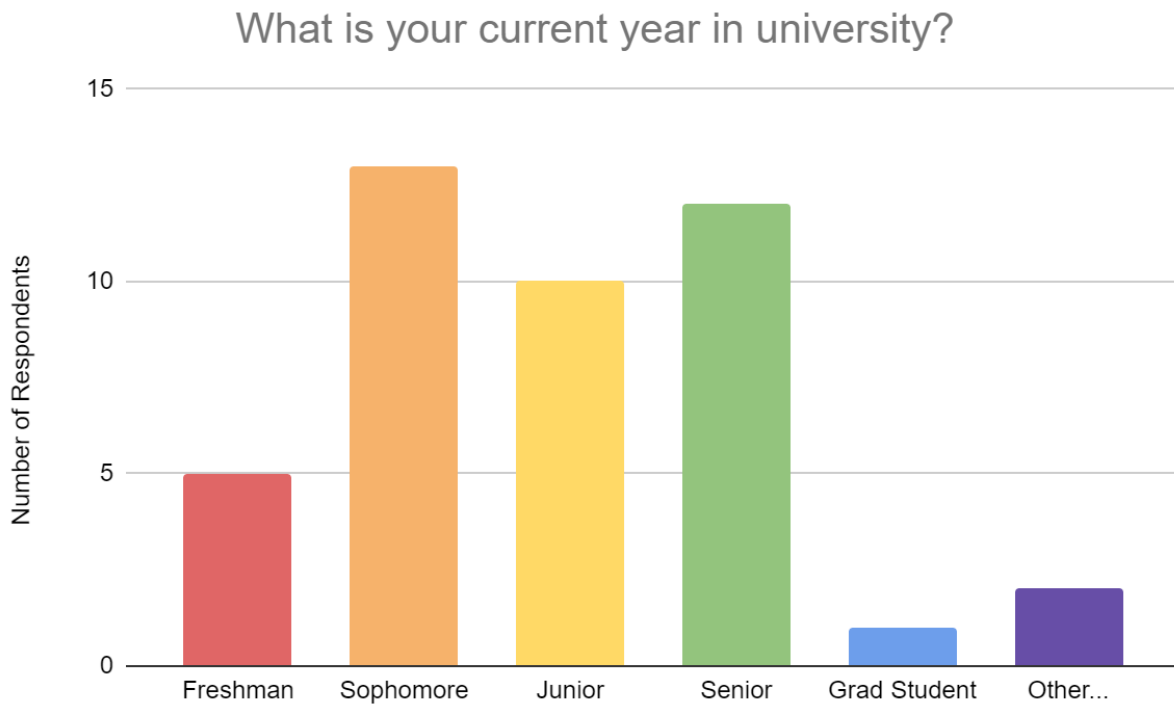


Figure 1: Respondents' Year in University

Additionally, most of the survey respondents were STEM majors with the top three majors being computer science at 19%, mechanical engineering at 17%, and robotics engineering at 12%. The minority of majors responding to this survey came from the arts or business majors. There were also a significant number, 7%, of people who did not put down their major (Figure 2).

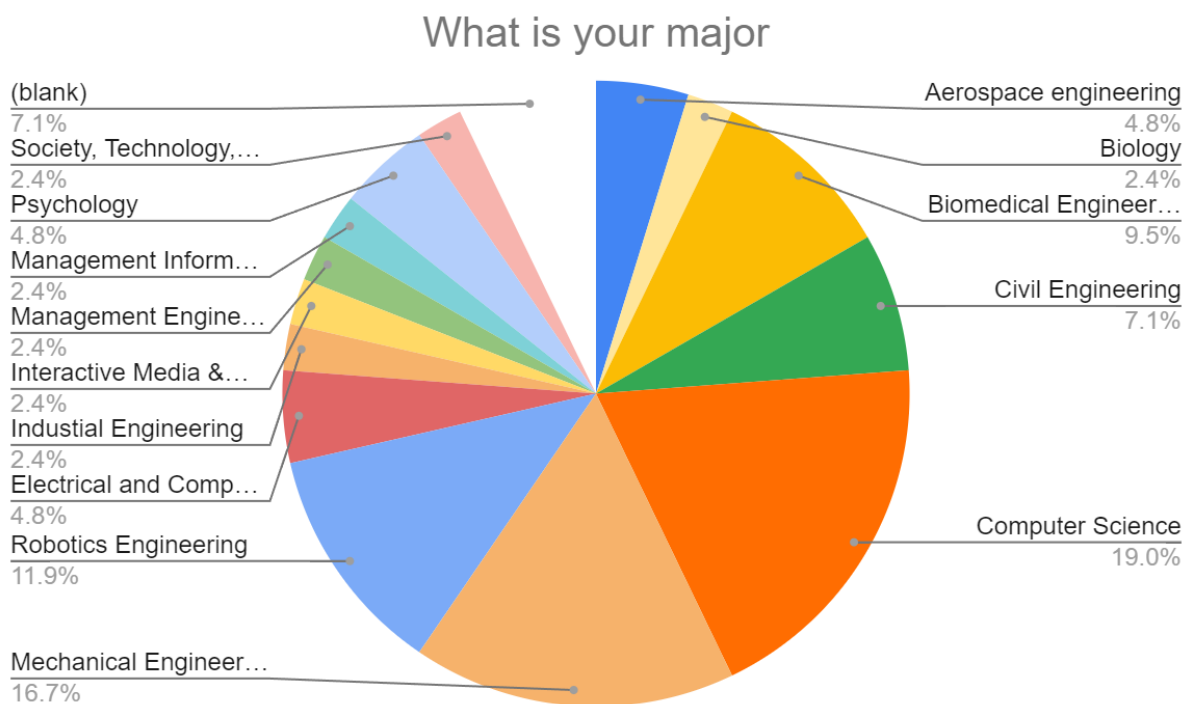


Figure 2: Respondents' Majors

In response to the first question (To what extent do you think it is ethical for students to use TGPs in academia?) Most students responded neutrally or negatively that TGPs are neither ethical nor unethical or unethical to use in academia with the general distribution observable below (Figure 3). However, there were a portion of the respondents that replied that they are ethical to use in academia.

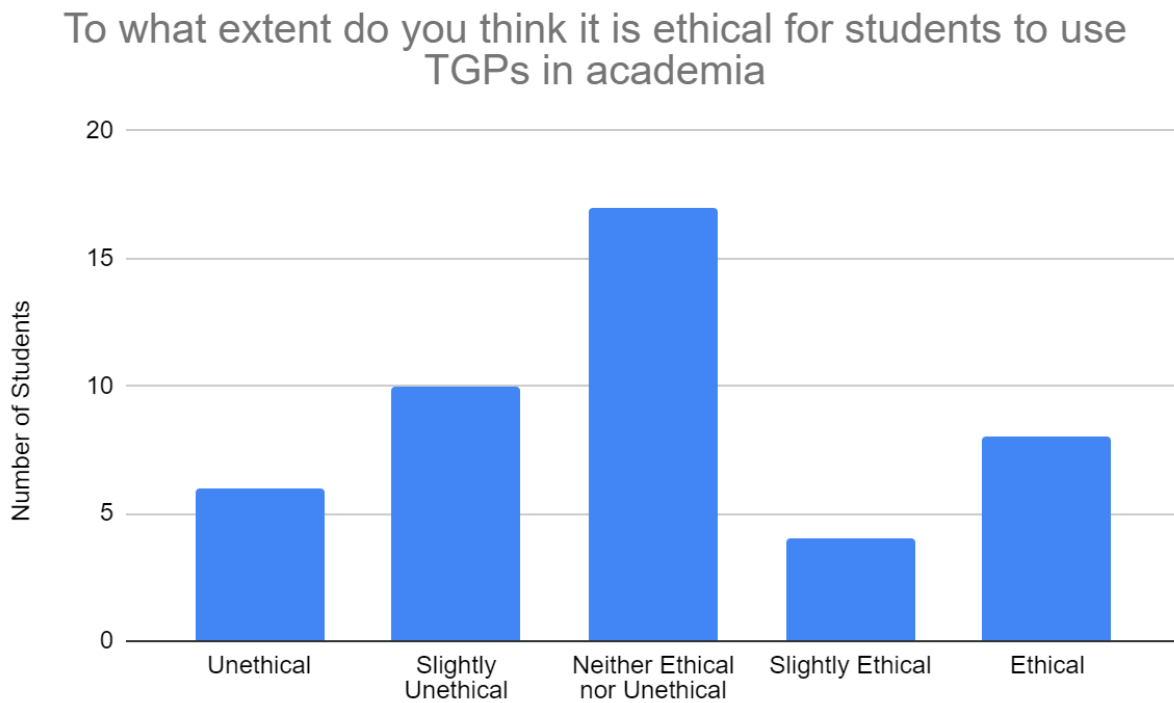


Figure 3: UI Responses

In response to the second question (What portion of an assignment can be completed by TGPs?), 53% of respondents said some of it can be completed leaning towards none of it with no respondents saying all of it can be completed with the general distribution being observable below (Figure 4). None of the students replied that all assignments can be completed by a TGP.

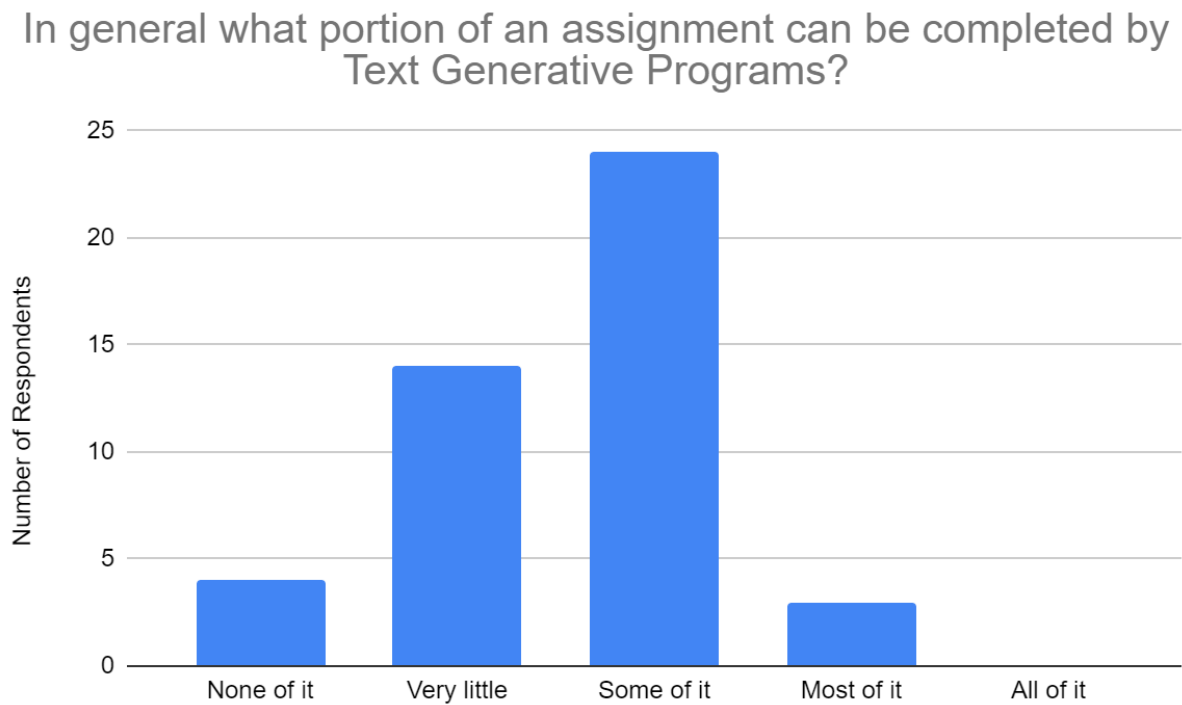


Figure 4: U2 Responses

Many respondents (88%) believed that some or most of the students in their majors are using TGPs. However, few respondents believe barely any, none, or all their peers are using TGPs (Figure 5).

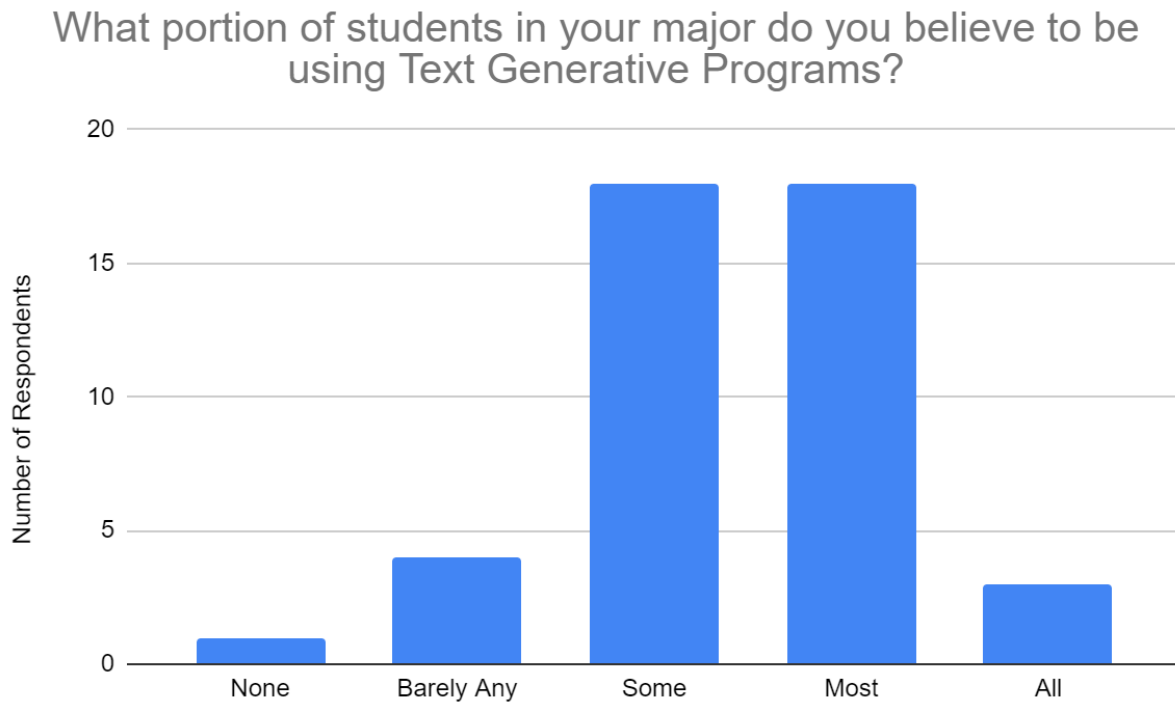


Figure 5: U3 Responses

Most students are also either slightly or moderately knowledgeable of TGPs with 76% of respondents falling into either category. A few of the respondents were either knowledgeable, unaware, or very knowledgeable of TGPs (Figure 6).

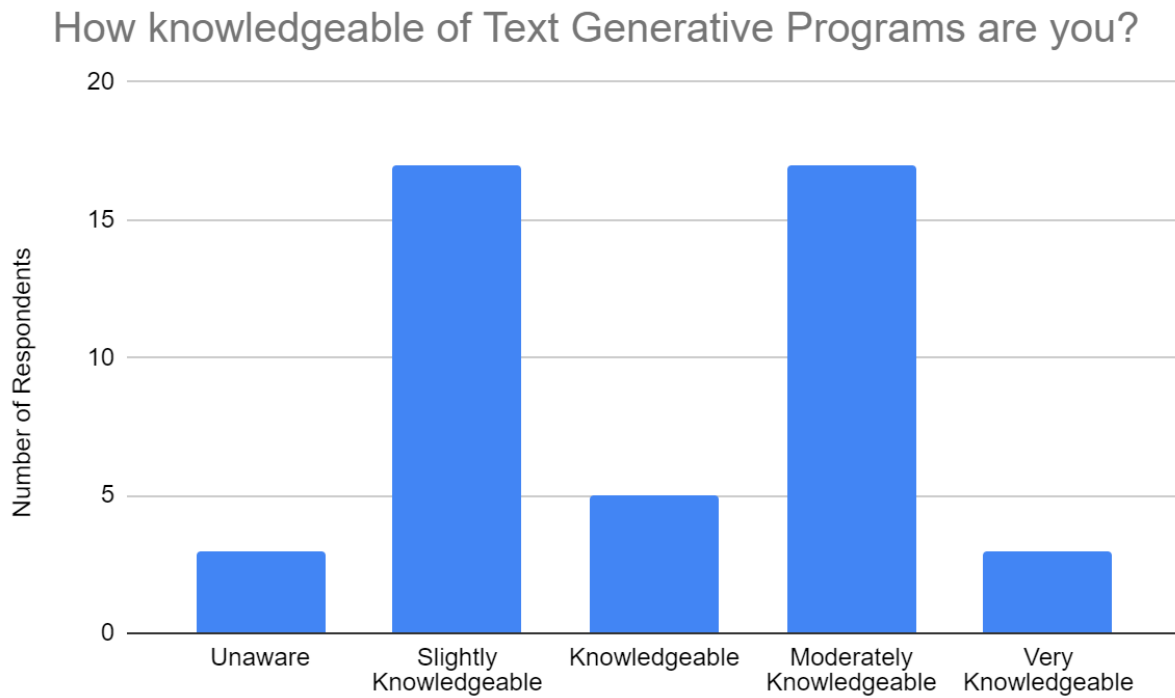


Figure 6: U4 Responses

A significant majority of the survey respondents (90%) also claimed that they infrequently use TGP meaning they never, rarely, or sometimes use it. The low number of the rest of the respondents uses TGPs frequently. There was a filter on the survey filtering out the students that were either unaware of TGPs or did not use them since the purpose of the survey is to determine how to use TGPs effectively and ethically, therefore respondents who did not use or know about TGPs would not provide fair data (Figure 7).

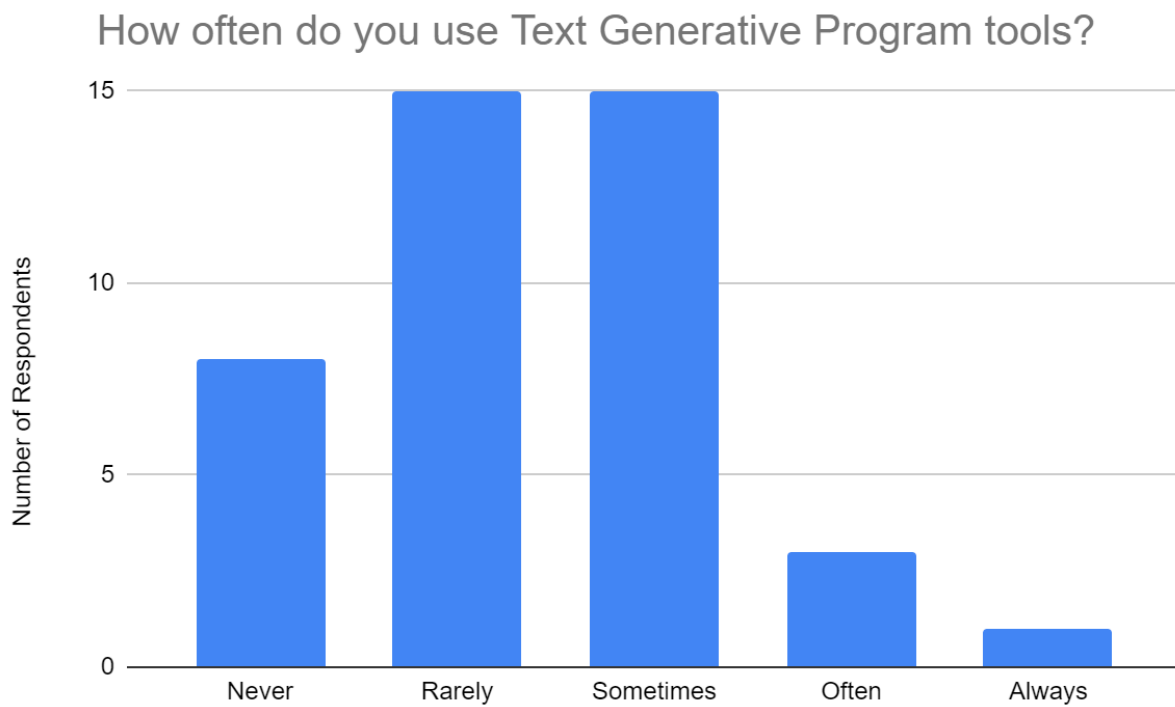


Figure 7: U5 Responses

The most common uses for TGPs based on the responses were using it for generating ideas and for conceptual questions. The uncommon uses were for formatting or proof reading and for essay or creative writing (Figure 8).

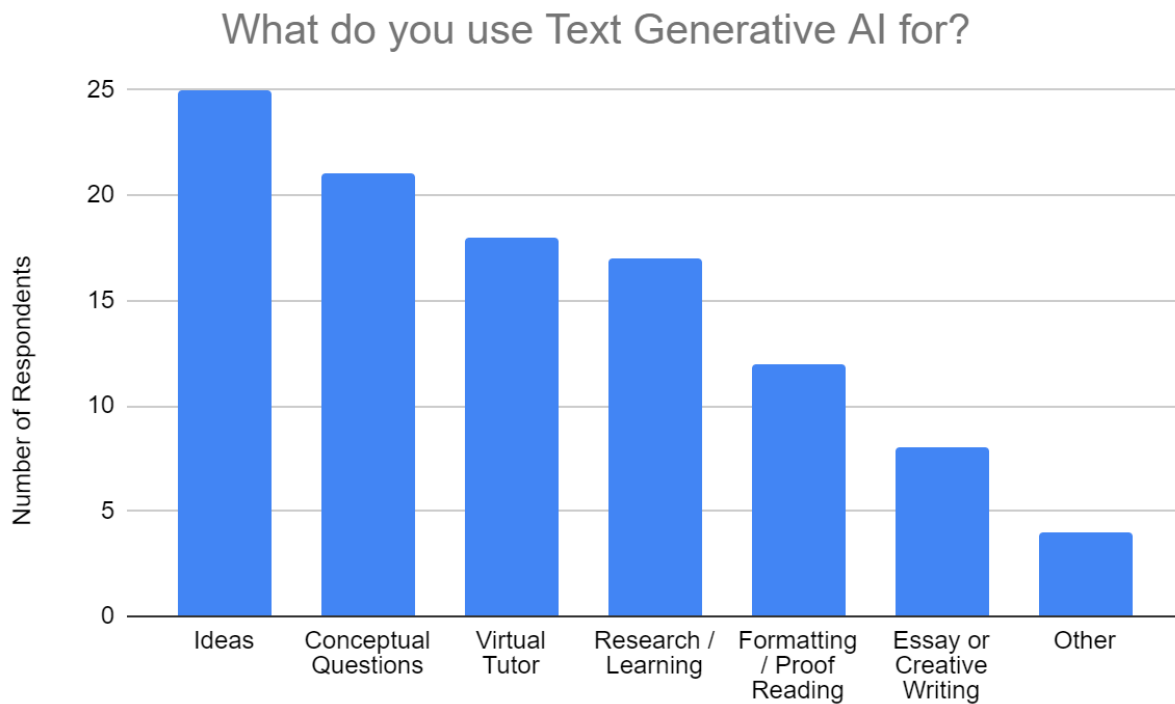


Figure 8: U6 Responses

A significant number of students that use TGPs said that there was a somewhat to a significant increase in their productivity with about 82% of students saying that there was an impact. The other few respondents said that there was little or no impact to their productivity (Figure 9).

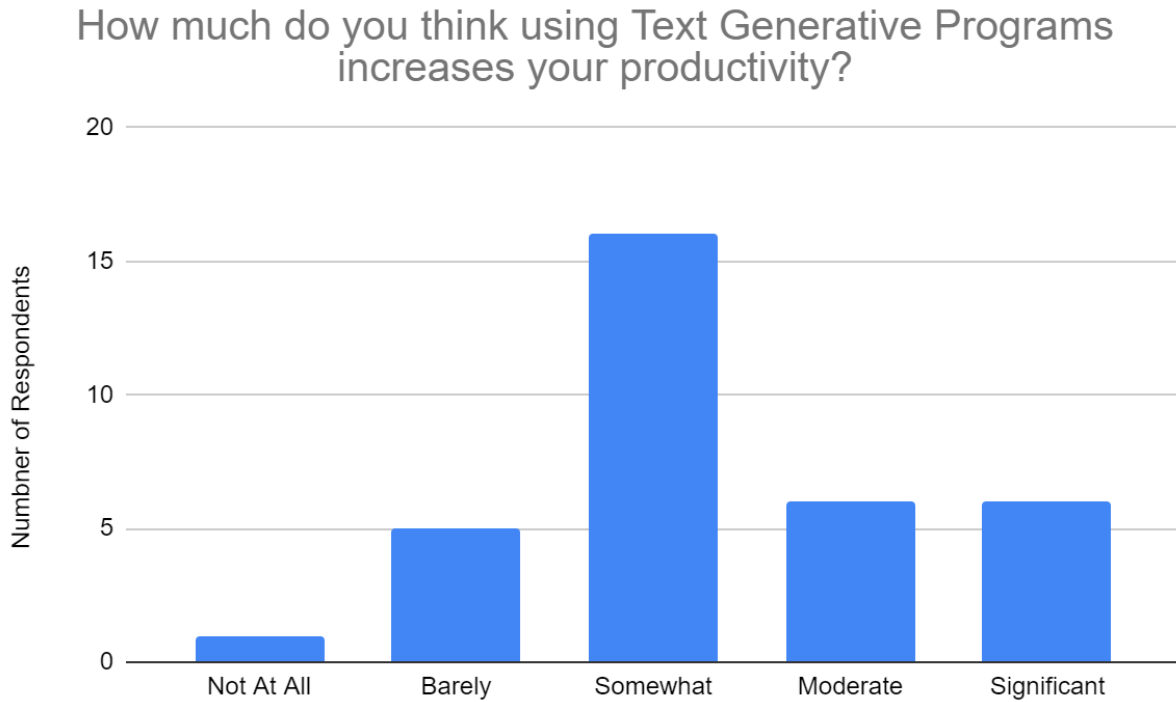


Figure 9: U7 Responses

Most respondents were skeptical of the responses given by TGPs with 52% of students indicating that they trust the answers given by TGPs with no students saying that they always trust the answers. Few students also barely or do not trust the responses generated by TGPs (Figure 10).

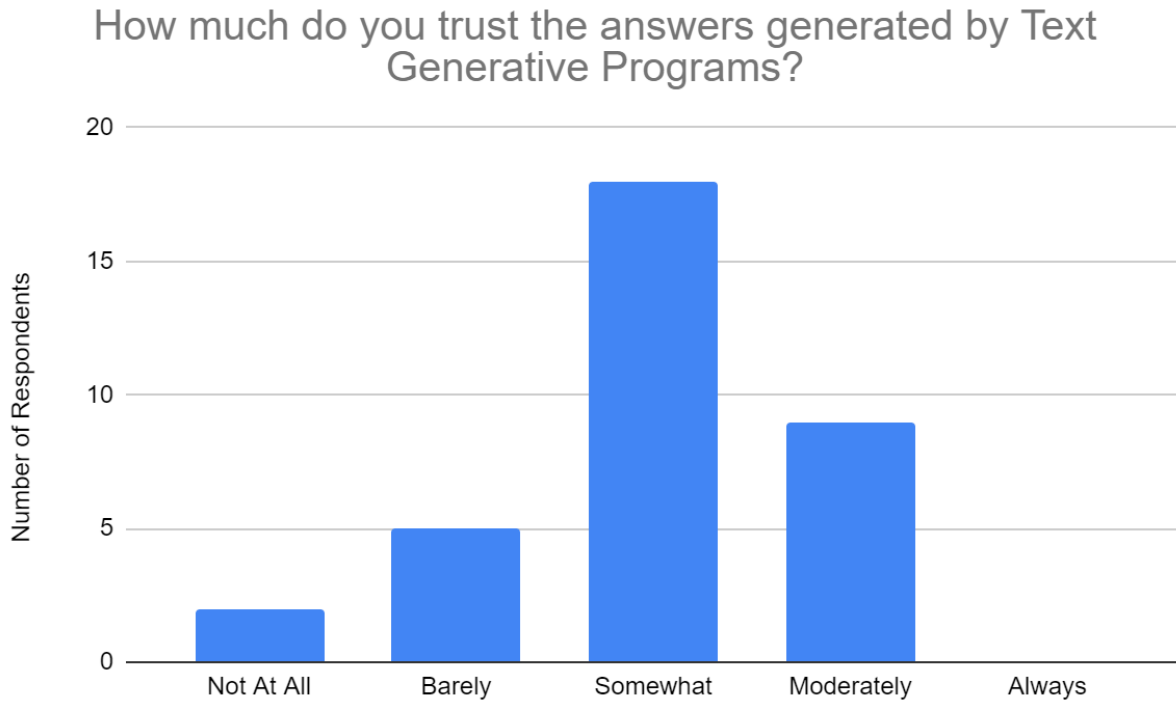


Figure 10: US Responses

A lot of the respondents also said that they would sometimes recommend TGPs in general and to students in their major for use in academia. However, none answered that they would always recommend people to use TGPs in academia (Figure 11).

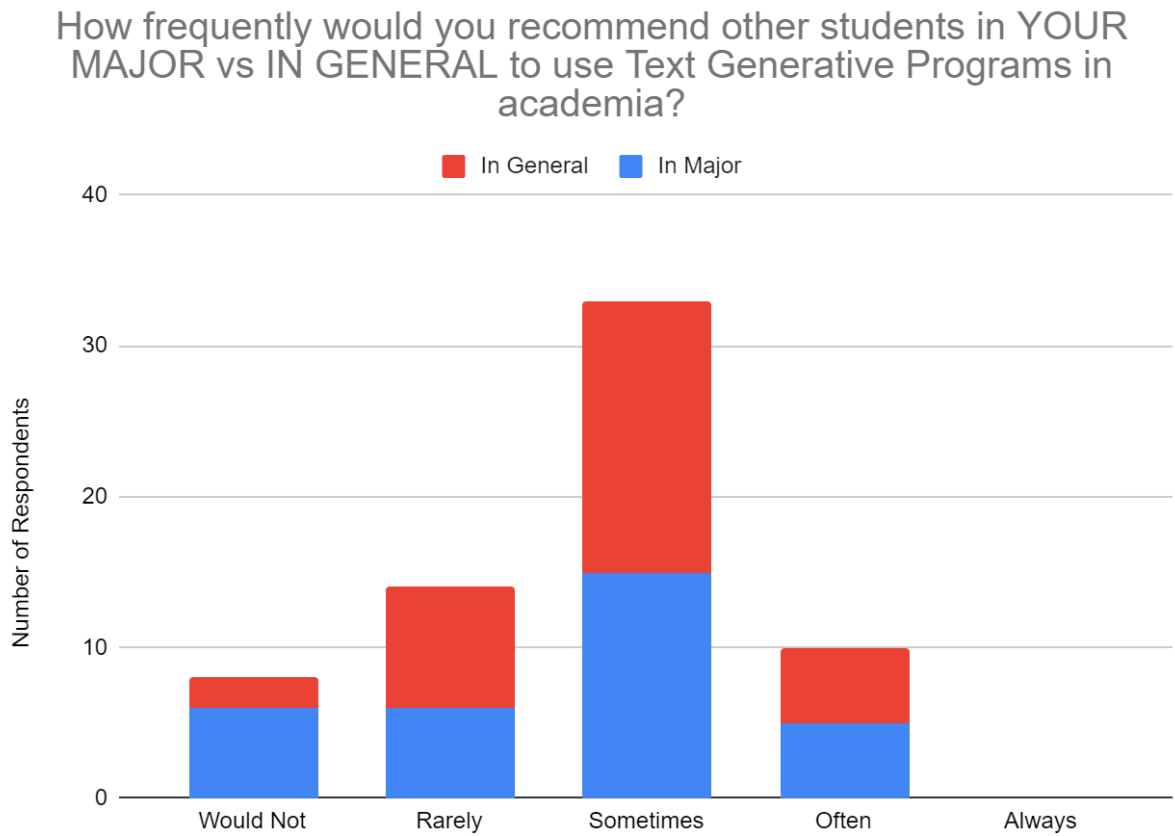


Figure 11: U9 & U10 Responses

Most of the respondents indicated that some of the responses generated by a TGP was usable with none of the respondents saying that all or none of a generated response is usable (Figure 12).

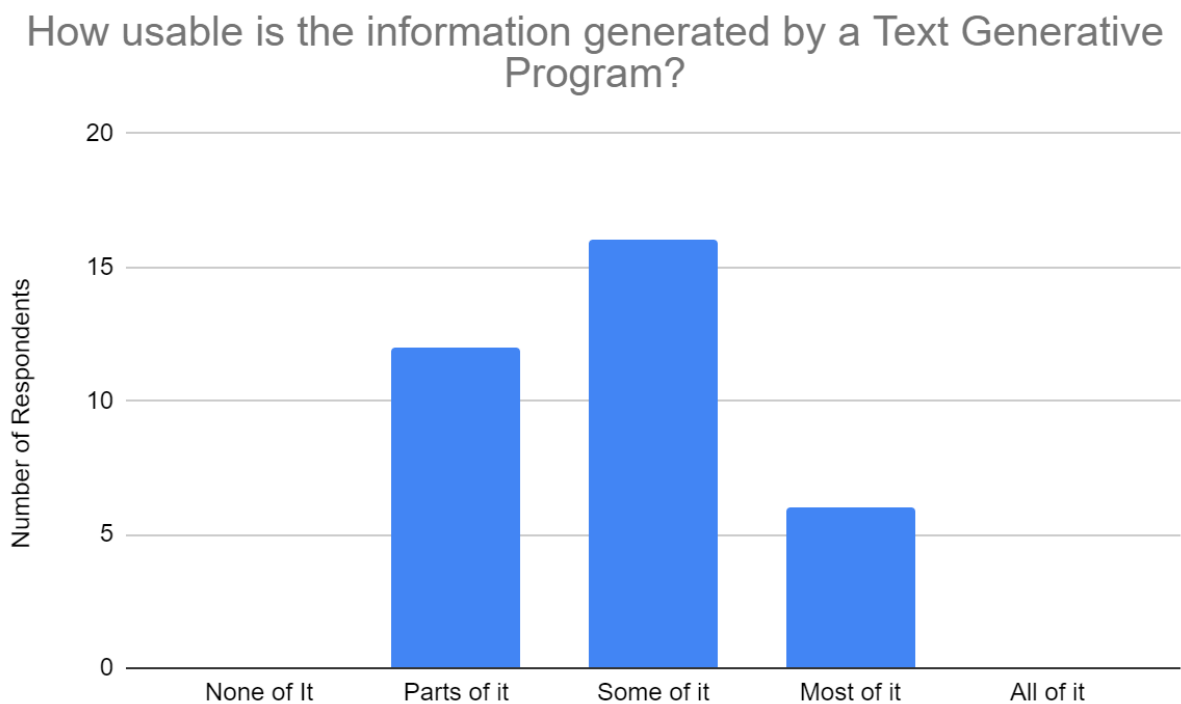


Figure 12: U11 Responses

In response to the general effectiveness questions most students did not say that the usage of TGP for any of the six areas of focus of usage of TGP were ineffective. Most students believed that the usage of TGP as a virtual tutor or for essay or creative writing were an ineffective use of TGP. The respondents concur in the survey that the most effective uses for TGP were for idea generation and proofreading. The controversial answers were using TGP for conceptual questions and for research and learning with most respondents either agreeing or disagreeing in an even split (Figure 13).

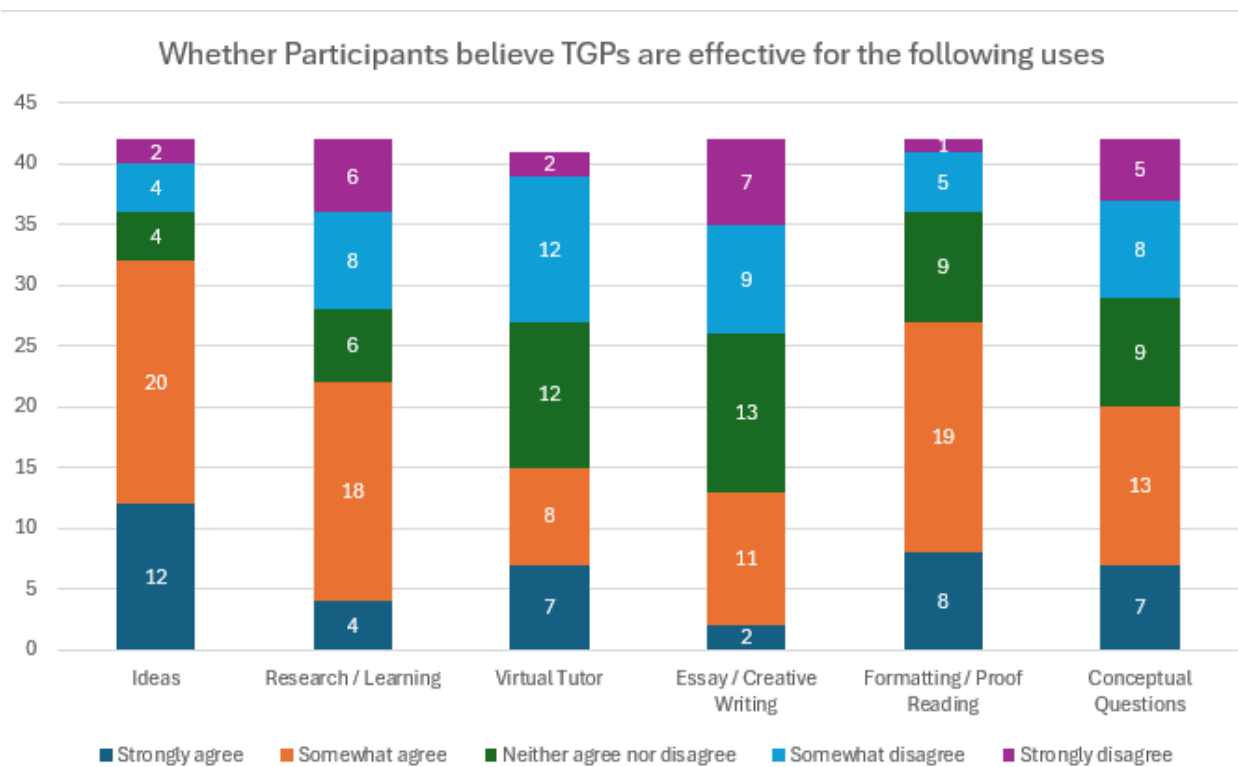


Figure 13: E1 Responses

Overall, from the results of the survey, students believe that the use of TGP in academia is slightly unethical in the context of using it as a replacement for the individual’s thought process.

However, using it as a supplementary or initial source of learning could be a more ethical and effective use of TGP.

4.2 Interviews

Two of the professors were unaware of the use of TGP in education and the other two were very familiar with the usage of TGP. Only one of the professors had used TGP moderately before the interview with the others not using or minimally using TGP. Only one of the professors agreed that there were generally good use cases for TGP in education and encouraged students to use them. Two of the professors said that they do not believe or do not know that TGP are useful for their disciplines. The last professor believed that any use of TGP in education is harmful and forbids their usage in their course policies.

In response to the main questions, the professor that encourages the use of TGP in their class only saw about 30% of their students use it to complete non-AI assignments in their class. The two professors that do not believe that TGP are useful for their discipline have not seen any major usage of TGP in their classes to their knowledge. The professor that forbids the usage in their class still sees about 20% of their students using TGP in their class. The two professors that do not believe that TGP are being used in their classes had ideas of how students could use TGP in their classes. However, none of the students admitted to using TGP for their classes. The professor that encourages the usage of TGP in their classes saw students using it in an allowed way to assist them in completing assignments. The professor that forbids the usage of TGP in their class unfortunately only saw the students using TGP in an unallowed way in their class. Three of the professors agreed that TGP could be used, if possible, to complete the tedious work in their classes. Such tedious work would be the creation of test cases, if possible,

in the example of the computer science discipline. One of the professors argued that there are no ethical use cases of TGP in their class. Two of the professors drew the ethical line of usage of TGP at the point where TGP are replacing the critical thinking process and students are regurgitating what the TGP “thinks” for them.

One of the professors allowed the usage of TGP for any task in their classes if the student cited their usage. They also argued that there has been a positive impact on the students’ efficiency of completion of work in their class. The professors that have not observed any usage of TGP in their classes could not judge the impact of TGP on students in their classes. The last professor argued that there is only a negative impact on students taking their class since it is creating a deficiency in their students’ ability to think critically. All professors agreed that as the TGP become more capable in the future their role in education will expand as well. The specific role that it would serve in the future, three of the professors agreed, would become a necessary device to know and understand how to use a computer. Lastly, two of the professors had modified their course policies to include rules regarding usage of TGP in their class. The other professors that have not observed any usage of TGP in their classes had not modified their course policies due to the lack of data on the student’s usage of TGP in their class. Overall, the consensus conclusion from the professors is that TGP should be cautiously implemented into the classroom in a way that does not hinder the student’s learning process.

5 Conclusions

5.1 Ethical and Effective Use of TGPs for Undergraduate Students

An analysis of the survey indicated that there was a significant amount of skeptical use of TGPs with most students saying that they infrequently use it because of the skepticism and limited usability in correspondence with their major. With most students believing that TGPs are either not effective for the sample uses or simply not trusting the answers generated; we can conclude that one possible effective and ethical use of TGPs in the context of STEM majors could be for idea generation. This can be correlated with the increase in productivity the respondents have seen with most people seeing a net positive impact. Therefore, the conclusion can be drawn that in certain contexts of usage there can be a positive impact in the efficiency students can get their work done.

However, students agree that there should be a limit on what should and should not be completed by TGPs since none of the respondents said that all assignments can be completed by a TGP. Additionally, most students believe that the usage of TGPs in academia is slightly unethical. This could be correlated with most students infrequently using TGPs as well since if they believe that it should not be used in academia then they will not use it themselves.

5.2 The Instructors' Perspective

The student survey contradicts most the instructor's beliefs in most area, since most stem students believe that their peers are using TGPs, whereas the some of the professors that were interviewed did not observe any of their students using TGPs in their classes even though there are no restrictions on the use of TGPs in their classes. The students and professors do agree that

there needs to be clearly defined rules of the usage of TGP's with professors specifically needing to observe usage in their own classes before they can implement rules regarding usage of TGP's.

The ethicality of the usage of TGP's in academia depends on the rules for usage which would be defined by the instructors. Therefore, for the professors who choose to disallow or allow it in their classes, the ethicality of usage becomes clear cut.

5.3 Limitations and Future Work

The studies constructed had some notable limitations. For the student survey, distribution of the survey was not controlled and was lower than the anticipated goal of 100 to 200 total respondents. Additionally, there was the potential that some respondents did not respond completely truthfully as a way of not self-incriminating themselves for the usage of an ethically gray tool. For the interviews, more interviews could have been conducted to get more instructors' views and perspectives on the impact that TGP's are having on their classroom, as for the STEM related professors that were interviewed, none of them had seen use of TGP's in their classes which contradicts the responses of the survey.

The widespread use of TGP's throughout academia by both students and instructors lead to a necessity for rules regarding the use of TGP's. With the focus of this paper being the effective and ethical use of TGP's, future work could look at the potential benefits and consequences of the use of TGP's in a longer study tracking the progression of students who have and have not used TGP's throughout their academic journeys. The time limit of this study as well as the recency of TGP's prevents the study from investigating the long-term impact of TGP's on students throughout their academic journeys.

Appendix A - Survey Questions:

Usage Section

To what extent do you think it is ethical for students to use Text Generative Programs (such as ChatGPT and/or Google Bard)?

- Unethical
- Slightly Unethical
- Neither Ethical nor Unethical
- Slightly Ethical
- Ethical

How much of assignments in general do you believe is ethical to be accomplished by Text Generative Programs?

- None of it
- Very little
- Some of it
- Most of it
- All of it

What portion of students in your major to be using Text Generative Programs ethically?

- None
- Barely Any
- Some
- Most
- All

How aware of Text Generative Programs are you?

- Unaware
- Slightly aware
- Moderately aware
- Aware
- Very Aware

How often do you use Text Generative Programs tools?

- Never
- Rarely
- Sometimes
- Often
- Always

Check all that apply, What do you use Text Generative Programs for? (Example prompts are included in each choice)

- Ideas (Ex: Generate ideas for a creative task)
- Research / Learning (Ex: Who invented the computer)
- Virtual Tutor (Ex: Help me with the questions that I am struggling with but do not give me the answer)
- Essay or Creative Writing (Ex: Generate a claim for this prompt)
- Formatting / Proofreading (Ex: Proofread this email)
- Conceptual Questions (I.e. Questions specific to your major: How do I implement binary sort in java?)
- Not Applicable
- Other

How much do you think using Text Generative Programs increases your productivity?

- Not At All
- Barely
- Somewhat
- Moderate
- Significant

How much do you trust the answers generated by Text Generative Programs?

- Not at All
- Barely
- Somewhat
- Moderately
- Completely

How frequently would you recommend other students in YOUR MAJOR to use Text Generative Programs in academia?

- Would not
- Rarely
- Sometimes
- Often
- Always

How frequently would you recommend other students in GENERAL to use Text Generative Programs in academia?

- Would Not
- Rarely
- Sometimes
- Often

- Always

How usable is the information generated by a Text Generative Program?

- None of it
- Parts of it
- Some of it
- Most of it
- All of it

Agree or Disagree Section

To what extent do you agree with the following statements:

Text Generative Programs are effective in academia for...

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Ideas					
Research / Learning					
Virtual Tutor					
Essay or Creative Writing					
Formatting / Proofreading					
Conceptual Questions					

Are there other applications that you believe Text Generative Programs can be used for by students? Please explain.

Are there other applications that you believe Text Generative Programs should NOT be used for by students? Please explain.

Demographics Section

What is your current year in university?

What is your major? (not abbreviated)

Appendix B - Informed Consent:

Study Personnel: Apollinaris Rowe, Gibson Phillips

Principal Investigators: Nima Kordzadeh

Contact Information: Emails: airowe@wpi.edu, gcphillips@wpi.edu, nkordzadeh@wpi.edu

Title of Research Study: How Students can Ethically and Effectively use ChatGPT

Introduction:

You are being asked to participate in a research study that will research how ChatGPT and more generally text generative AI can be used ethically and effectively by students. Text generative programs are large language modeling tools such as ChatGPT or Google's Bard which are tools that are used to generate responses to a 'prompt' or question in natural language. These responses can have a wide variety of applications. Before you agree, however, you must be informed about the purpose of the study, the procedures to be followed, any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study:

The goal of this project is to explore how text generative AI can be used ethically and effectively by students.

Procedures to be followed:

Students:

Student participants will complete the following survey which includes questions about how they use text generative AI, and how they perceive text generative AI. The survey should take 5-10 minutes to complete.

Risks to study participants:

We do not expect any reasonably foreseeable risks or discomforts to the subject during the duration of the experiment.

Benefits to research participants and others:

The results of this study will help researchers and students understand how people should use their products ethically and effectively. Accordingly, educators and students alike can benefit from the developments of this study.

Record keeping and confidentiality:

All participant entries will remain anonymous, only the investigators and advisors will see the records. All responses will be recorded. "Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to

inspect and have access to confidential data. Any publication or presentation of the data will not identify you."

Compensation or treatment in the event of injury:

We do not expect any injuries during this experiment. Also as a participant "you do not give up any of your legal rights by signing this statement."

Cost/Payment:

You will not be paid for your participation.

For more information about this research or about the rights of research participants, or in the case of research-related injury, contact:

Use the emails mentioned previously. In addition contact the IRB Chair (Professor Kent Rissmiller, Tel. 508-831-5019, Email: kjr@wpi.edu) and the Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu.)

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By choosing the "I consent, begin the survey" option below, you acknowledge that: 1) you are not under 18 years old, 2) You are a college student, and 3) you have been informed about and consent to be a participant in the study described above. You are entitled to retain a copy of this consent agreement.

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

- I Consent, Begin Survey
- I Do Not Consent

Appendix C - Professor Interview Questions:

Background

1. How long have you been a professor?
2. What subject(s) do you normally teach?
3. What is your academic background, including degrees and areas of research or scholarship?
4. How familiar are you with the use of TGP's in education?
5. Would you say you have used TGP's extensively, moderately, or minimally?
6. Currently, what is your overall opinion on the use of TGP's in academia?

Main

7. How much do you think TGPs are being used by students for your classes?
 1. Percentage?
 2. What ways do you see your students using TGPs?
8. How would you personally go about drawing the line between ethical and unethical use of TGPs in your class(es)?
9. How would you say these programs have impacted your students' learning experiences and outcomes both positively and negatively?
10. How do you see the role of TGPs evolving in education in the future?
11. Have you changed your curriculum (or course policies) to better handle the widespread use of TGPs?
 1. If so, How?

Appendix D - Professor Interview Request Email:

Hello [professor]

Our team is working on an interesting IQP project where we're studying how Text Generative Programs (TGPs) - like ChatGPT, Bard, etc. - can be used effectively and efficiently by students. We are currently starting the process of interviewing professors to garner the opinions of academic professionals on students' different uses of TGPs, and what experiences and insights you might provide.

This interview would be conducted in person (or over zoom if you prefer) which would take up to one hour. The interview would be recorded for our reference, and transcribed to be potentially included in our final report. The audio will never be sent to anyone, and would be deleted by the time our project concludes. Confidentiality will be guaranteed throughout the interview as identifying information will not be asked and or collected. I also want to stress that you would be represented completely anonymously in the final report.

I've CC'd this email to my IQP partner as well as our advisor. Please let us know if this is something you'd be willing to participate in as we would appreciate your opinions and points of view on TGPs. If you're fully willing and able to participate, we can schedule a time and place for the interview.

Thanks

IQP Team members

Gibson Phillips

Apollinaris Rowe

Advisor

Professor Nima Kordzadeh

Appendix E - Professor Interview Transcript 1

Note¹: [P] is professor talking and [I] is interviewer talking

Note²: Revealing information will be redacted with -----

[P]:You're sure you want this?

[I]:What was that?

[P]:You're sure you want this?

[I]:Uh, the IQP project? Yeah, I want to get an A. This is a great, I'm having a great time.

[P]:No, I mean, you sure you want the perspective of faculty?

[I]:Um, yeah, yeah, yeah. I think the wide variety of things that each faculty member has seen, it's a very different perspective from just interviewing students. Or different perspectives than students taking a survey. Yeah, especially getting, you know, all the wide variety of opinions, because I know a lot of, a lot of professors and faculty are, you know, very pro AI tools, and a lot of them are very anti AI tools, and there's a lot of gray area in between. So it's, it's really about trying to get more of a bigger picture. What do you think of that?

[P]:Um, I wish you good luck.

[I]:Yeah. Are you interested in helping us by answering some questions?

[P]:Um, I think that's why I'm here.

[I]:This is good. This is good. This is good.

[P]:Or maybe, maybe what I should do is ask ChatGPT whether I shouldn't, shouldn't be involved.

[I]:No idea what they would even say. That's funny. Um, but yeah, we have a, we have a, we have two sections, we have a background section, and then like the main actual bulk of questions. So the background is just for demographic purposes. So we know what kind of perspective, these opinions are coming from.

[P]:Okay.

[I]:So should we just launch right into the questions?

[P]:Okay.

[I]:Okay, let's do it. All right. How long have you been a professor?

[P]:How? Right off the top. We can't, we can't, we can't even have this conversation. I've been, I've been, um, uh, full-time as, um, uh, as a tech professor since, uh, 2015. So let's say 10 years, but, um, in, in another life, an eon ago, uh, I was, uh, I taught math at junior college. So I've been a, I've been a professor for either 10 or 30 years. You, you have to decide.

[I]:Either 10 or 40 years. All right.

[P]:All right. I answered 30. I'm not, I am that old, but yeah, there was a long lag where I went back to school and just didn't, didn't do a lot of serious stuff, but you know, 10 years works.

[I]:Okay. Okay. Okay.

[P]:Um, what about the subjects that you teach? What, what, what sort of, um, topics do you teach in?

[I]:Uh, I'm, I'm a CS teaching professor. So I teach intro. I teach algorithms. Uh, I, I teach, um, typically I teach, uh, theoretical stuff. So I teach some coding classes and I teach some math classes. Uh, now they're not math classes in the math department, but, um, you know, when you look at computer science, it was developed by Alan Turing and John von Neumann, uh, mathematicians. So that sort of math that's, um, right now I'm teaching foundations. Uh, today I presented Turing machines to my class. So it's that kind of stuff.

[I]:That's incredible. Um, yeah. Um, what is your academic background personally as a student? Like what, what, uh, what's your highest level of education realistically? What did you, what did you study?

[P]:I have a PhD in computer science. I have master's degrees in both mathematics and computer science. And, um, my bachelor's degree was in mathematics and chemistry. So really hardcore techie kind of stuff.

[I]:Incredible. Um, how familiar are you with, uh, the use of text generative AI in education?

[P]:On a scale of one to 10, probably about a two right now, but I keep, I keep learning more and more every day.

[I]:Yeah.

[P]:But in part among the things that I will say later on, perhaps I'm just, I'm a late adopter. And, uh, when it comes to, when, when it comes to this sort of stuff, again, I don't think that ChatGPT is going to be all that great at doing mathematical proofs, uh,

in the way that it might be at say, putting together a grocery list, but I'm not sure. I'm not sure.

[I]:Interesting. Okay. Um, would you say that you personally have used, uh, text generative programs extensively, moderately, or minimally?

[P]:I would say not at all.

[I]:Not at all. Okay.

[P]:I'm going to go off the board.

[I]:Incredible.

[P]:And I'm even a little, I mean, honestly, even a little frightened of it, which I'm sure we'll get into.

[I]:Of course, of course, of course. Um, and then the last, uh, background question is currently, what is your overall opinion on the use of, uh, text generative AI in academia? Um, other than frightened, I guess, if you have any other elaborations.

[P]:Um, uh, I mean, I just have a lot to say. Um, it's, it's here. We're not going to be able to get rid of it. We're going to have to find a way to, uh, accommodate and deal with it. Um, one of the metaphors that I would use would be, uh, Prometheus, uh, was the human or demigod. I don't know the human who stole fire from the gods. And I, I, I think, I think this is now fire and, uh, we can either use it to, uh, cook our food and keep ourselves warm, or we can burn the whole place down. Uh, and, and I, I, I think the jury is out on that.

[I]:All right. Um, next question. Um, how much do you think, uh, text generative programs are being used by your students for your classes?

[P]:I don't know. I want to pretend that it's not happening. Uh, for me, the things that I'm more worried about are people going out on the internet and finding the answers and just presenting them as though they are their own, uh, or finding code that does what it's supposed to do and not, not their own. Um, so I don't know yet how much, uh, the, the text generative, uh, AI is being used. Um, there's not a whole lot that I do where that's the natural tool to go to, I think, but as it gets better, maybe it will be, but I don't think it's being used a lot in my classes, but I'm aware that I might be, I might be fooling myself.

[I]:Okay. Um, how would you personally go about drawing the line between ethical and unethical use of text generative programs in your classes? Like what would you consider like ethical uses versus like completely unethical uses? Like obviously just having it generate the whole work and turning it in, um, that's unethical, but is there a line that you see where it becomes completely ethical to use such tools in education?

[P]:I think clearly one of the lines has to be that if you're using it, you have to declare it. Uh, you, you have to indicate that you've, you, you've, you've used it to do something and, and do a, um, a good faith effort to demonstrate, to, to, uh, um, describe what it is that you've used it to do. Um, some of my colleagues, uh, create images with it and, uh, they say I used AI to do this. Now that's not text generative. That's, that's something similar. Um, and, uh, there's, there's a great deal to be learned from looking at good examples of stuff, whatever stuff is, um, you know, if you, if you're learning how to cook, uh, you want to taste the sauces made by a bunch of people. And if, if a text generative AI can do that and give you a chance to see good examples of whatever it is you're trying to do, uh, I think that would be a very good use. Similarly with writing programs, writing code. One of the things that I worry about, and I worry about it a lot is, um, whether the stuff it produces is actually good. Uh, whether it does what we think that it does, what we intend it to do, what it's, what, what, what, what, whether it actually does that. Um, those are real, those, that's why I'm scared of it. Uh, because I'm, I don't understand what it is. I don't know what it's doing. Uh, and being able to evaluate it then becomes very difficult.

[I]:Okay. Um, how would you say these programs have impacted your students' learning experiences and outcomes? Um, so basically, have you seen, uh, any significant change in the, the, the, uh, the learning aspect of, of students since the widespread prevalence of things like ChatGPT?

[P]:How, when did that get released? A year ago, a year and a half ago?

[I]:Just over a year ago.

[P]:Yeah. Um, I, I, I'm gonna, I'm gonna say I, I can't answer the question. I haven't, I haven't noticed anything. Um, and, and there are so many, I'm gonna get a little bit meta for you here. Um, there are loads of internal biases and no matter who you talk to, there's gonna be this one, whether they're aware of it or not, it's there. I keep getting older and you stay the same age every year, every year I'm a year older and every year my students are the same age. My students remain 18 through 21 or 17 through 22. That's, that's, that's where they are. And I keep getting older. So, um, when I see that there's a difference, I have to wonder whether it's a difference in them or a difference in me. Um, and, and I'm, I'm always afraid of turning into that cranky old guy, you know, back in my day. Um, and now I can say back in my day, we didn't have no ChatGPT. Uh, we had to, we had to think for ourselves and, you know, that's one of the that I'm afraid of that, uh, we, we will become more reliant on having a machine think for us. All right. That's a, that's a little grandiose, but you know, think about, think about what the automobile has done. Now we are very reliant on having automobiles move us around. Uh, we don't walk as much. We don't, we don't move ourselves as much. And there have been loads and loads of good consequences and loads and loads of bad consequences. And, uh, I have a feeling that that's where we're headed with all of this stuff. Yeah.

[I]:A good analogy is, um, that, that I've, I've heard of recently is how, um, like these map applications on our phone have completely disrupted human spatial awareness, how it's, it's, it's very hard for just people to get around towns, know what, where different locations in the city are, unless they actually go through the city without a map and find and navigate all by themselves.

[P]:Yeah. Uh, and so there, there, there are a couple of categories here and that's one category and a very important one, but there's another category and it goes like this, turn left now. And you turn left right off the end of an open drawbridge where not only do you not have the skills to find yourself, find your own way around. You also, you also turn off the, the, the, the, the, the skill of, does this make any sense? Should I be doing this? And, and end up, um, you know, every, every year or so I see something where, uh, someone has too explicitly followed the GPS directions and, uh, driven into a lake.

[I]:Interesting. I haven't seen that anything recently, but I remember when Apple maps first launched, it was stuff like that all the time.

[P]:Oh, and so, you know, that's, that's another thing to keep in mind. Um, at the, at the introduction of any technology like this, um, there are, there are those bumps where it takes a while for whether it's the designers or the users or a combination of the designers and users to get accustomed to what it is and how it works. Um, tho those things tend to get ironed out, but you're, you're probably too young to hear, to have heard all the jokes about the, um, the, the, the flashing clock on a VCR. You probably have never even seen a VCR.

[I]:I grew up with one.

[P]:But it, well, you know, back in my day, um, it, the, the, every hack standup comic had a joke about the clock flashing on the VCR because it was too hard to program the time. That was actually something that human beings couldn't do. Uh, and, and now either a, it's not hard to do or, or B it does it by itself. So, uh, the, the technologies iron those things out either because humans get smarter or the we're certainly in that phase right now where, um, uh, we we've seen, uh, I've seen reports of, uh, a ChatGPT making up scientific citations, just invent inventing papers that don't exist. Uh, and I think recently in a, in a legal case, someone submitted a brief that referenced, uh, law cases that don't exist.

[I]:Yeah, that was last year. That was wild.

[P]:So I look at those things that I say, is this good? Is this doing what it's supposed to do? And as far as I'm concerned, if it's hallucinating and that's the term of art that I've heard applied hallucinating, then no, it's not any good. Uh, I also have a feeling. Feeling is the wrong word. I have an expectation that those things will get sorted out that that's the equivalent of that flashing clock. That's a problem now. And it won't be a problem at some point. Of course, what I worry about is whether we get there or whether this is the technology that burns it all down. Uh, I haven't seen it yet. I keep trying on Saturday on

Saturday, two days from now, I'm doing Barbenheimer. I'm going to watch Barbie and I'm going to watch Oppenheimer, uh, because I wanted to do it in the summer. I didn't get to, but you know, with the atomic bomb, that's even that I'm not that old. It's that's before me. Um, the question is, Oh, Oh, I, I think Oppenheimer's quote is, uh, I have,

[I]: I am now become destroyer of worlds.

[P]: I'd become death destroyer of worlds. Yeah. I become death destroyer of worlds. So, um, uh, uh, that's sort of obvious with atomic radiation, how that, that could work, but I'm, I'm fearful of this technology of having it do something like that. Um, have you seen the movie WALL-E

[I]: One of my favorites

[P]: Where all the, the old, the humans are just riding around in their, in their, the little reclining chairs and they just don't have to do anything because everything is taken care of for them. And they essentially lose their, their, their, their memory of what it is to be human. I see that parallel here. Not that I mean, WALL-E is terrific. I don't think it was meant to be a prophecy, but you know, that, that parallel is something that I, that I think about and I worry about.

[I]: Yeah. It's, I've heard a, I've heard a joke recently how that's going to be gen alpha and gen Z in the future. Since they were all the iPad kids, they're going to be in the chairs.

[P]: Now that, that is something that I see. Uh, that's something that I see all the time. Uh, you, you folks now, uh, have had phones, uh, since you were conscious. Uh, I, I think the iPhone started in 2006 and probably I'm just guessing your seniors, let's say you're 21. That means you were born in, uh, uh, 2003. You were born in 2002. Okay. So the iPhone is released when you're four and you don't know your letters yet. So, uh, those technologies and, you know, maybe, maybe you weren't early adopters. Maybe you didn't have one until you were 12, but I didn't have one until I was in my forties. I don't know, something like that. Um, so there's a real difference in the way you screen time and I screen time. Um, those, those things are, are genuinely fundamentally different. Um, certainly this could be that technology for you. You, you're going to have to figure out how this affects your life. And for your kids, they'll just always have had it. Um, and the wild thing is now this is happening just tremendously, tremendously quickly. Um, go back 180 years, a hundred and a hundred, let's say 180 years, steam power is starting. And, and, and that's, whoo, that's genuinely, genuinely revolutionary. The industrial revolution, uh, begins. And now we've been through a couple of those. Uh, in fact, I'm reading, I have, I'm having my class read, uh, Ivana gets player piano and it discusses three, uh, three revolutions. The industrial revolution got rid of manual work. Uh, uh, another gets rid of routine work. And when the robots can do everything that gets rid of, of mental work. So that may be where we are. And that was, I mean, again, I don't think Vonnegut meant to be a prophet, but maybe he was that was written

70 years ago. And now here we are, um, in, in a place where a lot of the mental work will be replaced, done by machines and the machines never make mistakes.

[I]:Unless they hallucinate.

[P]:I was being ironic or sarcastic, maybe both at the same time. Are there more questions?

[I]:Yes. There are two more.

[P]:Because I can, I can talk all day.

[I]:Same here, same here. Which is either good or bad for you. I'm not sure which. We're aiming to keep these interviews around the 30 minute range, just, just for sake of time. I still love during the, uh, the, the battle of the bands last year, I had you on as a judge and the way you made sure you didn't talk that much was just, uh, saying I am Groot. All the time.

[P]:Well, you know, we were there to have a good time. I thought.

[I]:Yeah. And it was funny. It was good. It was good. Um, so how, how do you see the role of text generative programs evolving in education in the future? Other than just like the broader picture, like what specific roles do you think they might take on?

[P]:Uh, again, one of my colleagues uses, uh, these things to create examples and example code. And one of, one of the difficult things to do is, uh, to create examples that are large enough to be interesting, but, but not overwhelming. So on my side, if I got good at this, if I, if I got to the point that I, uh, felt it was operating the way I want to operate and actually did what I wanted it to do, uh, I could do that. Um, I think in this case, I'm talking about a ----- creating test cases, um, among some other things, uh, and, and being able to generate those quickly in bulk. Um, and that was, it was, I never actually watched him do it. I wasn't standing there looking over his shoulder, but these, there were things we discussed. Um, uh, again, you know, if students use these things to create good examples and, uh, have them ready-made and can play the compare and contrast game with these things that are created and generated right there on the fly, um, that could be very useful. Um, again, you know, I'm, I just expect that students will be, uh, having it write there, 10 page papers for them, double-spaced and neatly typed and all of that. And that, that frightens me. Um, but that's the burning it all downside, but the cooking dinner and keeping us warm side is, um, you know, if we can use it to create tools, create things to create things to use and developing our own thought rather than having it do thought for us, that could, that could be productive. That that's certainly, um, uh, another story that I tell all of my classes. When I was an undergraduate, I was in a chemistry lab. Remember part of my background is chemistry and, uh, working on a log plot with, with my professor. And I looked down and I saw him moving his hands funny. And I realized, oh, he's operating a slide rule.

[I]:A what?

[P]:A slide rule, a slide rule. You may not even know what a slide rule is. I'm sure Oppenheimer had one in his pocket in the movie. So it's a computation device that you can use to do a number of things. But in this case, I'm talking about logarithms. And I realized that my professor had a relationship to logarithms that I will never have because I can press a button on a pocket calculator and, um, get eight decimal places of a log. And, and it, it does the job. It does what I want it to do. And it does it well, it doesn't make mistakes. It actually is the correct answer. Um, something that he would have had to make maybe work an hour on to get that level of, uh, of accuracy. And maybe he couldn't even have done it. Um, maybe looking things up in a log table. But now you all have these computers that you've grown up with. So where previously I was the guy with the pocket calculator and my professor looked down on me because he could use a slide rule and I couldn't, uh, now, now I get to look down on you because I do things with my pocket calculator. I don't know. And you, you've got the computing device. So these things are, are happening over and over again. And at some point ChatGPT, these text generative AI tools are going to be the equivalent of the pocket calculator. Um, the, the thing that, that you youngins have that the old ones didn't have. Um, and it's just going to be incorporated in what we do. I don't know how, you know, everybody laments, uh, go, can I use a calculator? Well, don't you know how to add, don't you know how to multiply? And I don't know. The answer is mostly yes, I think, but I certainly had to do more rope than you did. And my, my teachers had to do a lot more than I did because they didn't have the app.

[I]:So, although, although in my experience, tests these days are built around time. And if it's built around having a calculator, um, and it takes a lot more time to, you know, write out a bunch of, you know, cross multiplication stuff or whatever. Um, then that could be a big detriment to how well you do on the test just because of how much time you have, um, which leads into my next question.

[P]:Um, are you suggesting that we need to design different tests to test how you, how you use ChatGPT?

[I]:I'm not suggesting that I'm saying tests have changed because of calculators in terms of how they're run. I think you would agree. Right. Um, uh, and so my next, my last question is have, have you changed, how have you changed your curriculum or course policies to better handle the widespread use of tools like ChatGPT?

[P]:I haven't yet.

[I]:Not at all yet?

[P]:Yeah. I'm, I'm, I'm, I'm still altogether too reliant on, uh, uh, student honesty and integrity for good or for ill. And it's even worse than all of that. Uh, because I, I don't, I don't change my year to year examples as much as I should. Some of them are even exactly the same every time. Others are, are just modestly tweaked. So, I mean, that's

in part it's because I'm asking exactly what I want. I get the things that I've developed are exactly what I want. And it's so much more works to, to create new things every single time. Um, yes, I haven't, I haven't yet changed anything around ChatGPT. Um, I'm sure it's coming and, you know, honestly, at some point that change is just going to be, Oh, that's it. I retire. I'm done. I'm not dealing with this anymore. I hope that's a decade or a decade and a half away, but, uh, that, that there will be some of that pressure on some faculty. And I would say that there'll be some of that on me, but not a lot. In part because of what I teach in part because of how I teach. Uh, but I, I could see that pressure.

[I]: Incredible. That is all of our questions. Thank you so much for sitting down and answering them for us. Yeah. That is also our time. So we timed it perfectly. It'll last. Um, yeah. Is there anything else you wanted to add?

[P]: I had some notes. I think I got most of what I wanted to yes. Remind myself to, um, make sure I work in and see if you might be able to use them.

[I]: That's good stuff. I think this is definitely definitely a step in the right direction.

Appendix F - Professor Interview Transcript 2

Note: [P] is professor talking and [I] is interviewer talking

Note: Revealing information will be redacted with -----

[P]: Before you ask questions, can I get a purpose of this interview so that I can answer a question the most effective way to achieve your purpose?

[I]: Yeah. So the purpose of our study is to determine how students can effectively and ethically use ChatGPT in their academia. So our main research part of the study is by asking professors in these interviews as well as delivering surveys to students to see how they perceive the use of ChatGPT. So I guess we can get started.

[P]: One question before you start. So that's definitely a very valid topic. I think it's a meaningful topic. And I have done a lot of thinking myself. I have not talked to a lot of colleagues, just with a few colleagues about this topic before. So, you know, I think that the data you obtain, not just from me, but from other faculty members will be valuable. But let me clarify your goal. Are you only interested in ChatGPT or you're interested in generic AI? For example, there's Googlebot AI. Do you care about those?

[I]: Yeah. So we chose to generalize to text generative AI. So that excludes the visual. I know there is some there as a part of ChatGPT4, you can generate images. And I know with Googlebot, there's also visual analysis of images as well. But we just decided to do text-to-text generative AI.

[P]: Okay, not just ChatGPT, anything that can help with this text-to-text? Okay, clear. Go ahead with your questions.

[I]:So we'll start out with a couple of background questions, and then we'll ask the main questions. So how long have you been a professor for?

[P]:10 years.

[I]:Wow. And what subjects do you normally teach?

[P]:It's quite a broad range. It ranges from sophomore level statics, stress, to junior level mechanical design, continuum mechanics, to senior and graduate level vibrations, fiber optics.

[I]:Okay. And then what is your academic background?

[P]:I have a PhD in mechanical engineering. But I did take, when I was a PhD student, I did take a lot of physics courses and ECE courses. So then after my PhD, I did the postdoc training in biomedical engineering, working mainly on cell and tissue level imaging. I also did another postdoc in National Institute of Standards and Technology, working with mainly applied physicists, with ultra high vacuum, ultra low temperature, like four Kelvin. So I would say my background is quite diverse, you know, range from biology to engineering to physics, and the samples also range from nanometer size all the way to meter size. So discipline wise range from, you know, really kind of physical measurements to the biology to, I would say, airplane measurements, and both experimental work and the simulation work, but mainly on science and engineering.

[I]:And how familiar are you with the use of text generative programs in education?

[P]:It's not in my expertise field, but I have tried to use it for my own personal, you know, writing, for example, journal publication writing and proposal writing. So I cannot say I'm an expert, but I have some experience.

[I]:And would you say you've used it extensively, moderately or minimally?

[P]:I would say minimally, research wise, minimally. But, you know, for general administrative process, I would say moderately.

[I]:And currently, what is your overall opinion of the use of text generative programs in academia?

[P]:This is a very broad question.

[I]:Yeah.

[P]:First of all, you know, objectively, I think this is a very useful tool. I think everyone, really every single member in academia, both students, staff, and faculty members should learn how to use it, because it's useful. But subjectively, you know, I think there

has to be a certain rule that the community have to agree on. For example, this tool should not be used in a wrong way to harm the community in any sense. And also the tool should be used in such a way that each part of the community can achieve the goal of being in the community. For example, for students, the main goal is to get the education and self-development and be more knowledgeable and capable. On the teacher side, on the professor side, should allow the student or provide the guidance for the student to get education rather than just get some, you know, help that actually decrease the possibility of the student getting educated. Was that enough or did I answer the question?

[I]:Yeah, that's a good answer. That's very good. I agree.

[P]:This is a bit too broad. I mean, there can be other ways of answering the question, but these are the two directions.

[I]:Yeah. All right, now we'll get into the main questions. So how do you, how much do you think text-generated programs are being used by students in your classes?

[P]:That's a very good question. And the frank answer is I don't know. I tried. I tried to figure out. I frankly asked my, I think in the past two courses I taught in sophomore level. I asked them, do any of you in the class, by the way, the class size is somewhere between 60-60 and 90-90 students. I asked them, you know, how many of you are using ChatGPT to help yourself or other people on the assignments? And the answer I got was nothing. So nobody spoke in my class. I don't know that's because they didn't use it or some people use it, they just didn't want to speak out. Because they didn't know whether it's proper or it's not, whether it's allowed or it's not. So the frank answer is I don't know, but I did hear from some of my colleagues, especially the colleagues in the humanities. They said a significant percentage of the students, meaning more than 80%, were using ChatGPT or similar AI tools for the assignments. Some of them are not even using their own knowledge at all. Sorry, go ahead.

[I]:No, no, you're good. Do you know where they're getting that number from? Did they pull their students?

[P]:I don't, unfortunately, because again, this is secondary data. I don't trust 100% what they say, but when I was trying to get original data, I get nothing.

[I]:And do you think that's just because for your subject that you teach, students are like not able to use it on your assignments that you assign?

[P]:Yes, that's a very good direction. I mean, that's one of those things that I really doubt by myself, like, you know, because the courses I'm teaching are mainly equations, right? So draw some free body diagram, which is schematics that actually needs, it's not purely text, right? It needs science built into those figures. So with that said, the ChatGPT might not be the best tool for those kinds of assignments. But I can still imagine there are some because, you know, in some of my assignments, I do have this

open-ended question. I should request the student to use text to answer rather than just equations. So, but yeah, I agree, ----. The point you raised are definitely one of the guesses I have. And I would, if I could make a guess to your previous question, I would say, I would imagine the students in my class using ChatGPC for their assignments will be lower in percentage compared with the humanities. How much lower? Again, I have no idea. But one of the reasons is exactly what you said.

[I]:And how would you personally go about drawing the line between ethical and unethical use of these text-generated programs in your classes?

[P]:Very good question. That line I draw differs by the stages of the students that I'm teaching. So I don't know whether you have, you know, further questions about, you know, whether you have different lines drawn for different levels of students. But I do. For my graduate level courses, I strongly encourage every student to use ChatGPT for their term end report. Okay, but for the sophomore students, generally speaking, I would recommend against directly using that ChatGPT tool for their assignments. But I do still try to use them, sorry, try to encourage the students at sophomore level to encourage ChatGPT to do the quality check. Meaning after you finish your work, use ChatGPT. But in the graduate level, I actually strongly encourage them to have, you know, a skeleton in your report first. And then use the ChatGPT to see whether there's any suggestions to change those skeletons before you fill in more details in their report. And then when the report is being kind of filled in the main, you know, kind of every single word, word by word, that level of details. I suggest them also to use ChatGPT to provide real time suggestions of their writing. So back to your question, then, where is the line? Because the line apparently is different for different level. And what is my rationale? It's similar with alcohol, right? So you have to be old enough, and hopefully you also learn how to drive before you get your hands on alcohol, right? So I'm hoping that I can have, depending on, you know, how much a student already know. For graduate students, I suppose they already know enough, technically. I suppose they already have a very clear idea of what they are looking for at WPI from my course. With that said, they are allowed to use ChatGPT in a more extensive way. But for sophomore students, and especially for the two sophomore courses I have been teaching, those are almost the first and the second hardcore engineering courses ever in their life. It's the first time they are trying to mathematics, really, to look at the engineering problems. In that sense, I really don't want them to kind of use this, you know, low-hanging fruit provided by the ChatGPT or similar tools and block their own way of learning. I know I didn't give you an explicit answer, but I hope this, you know, you understand my point there.

[I]:Yeah, it was a good analogy between drinking alcohol, like you have to be old enough, and hopefully you know how to drive before you use it. I feel like that's a very good point, where using ChatGPT at such an early level in your learning can hinder your ability to understand the deeper concepts, especially at the sophomore level. How would you say that these programs have impacted your students' learning experiences and outcomes, both positively and negatively? Because I don't have a solid data point, like what is the percentage in my class, you know, of the students are using ChatGPT, so I cannot have a direct answer to that, because if I don't know how many students are

using that, I cannot evaluate the impact. If I may rephrase that question real quick. Have you noticed any significant drop in learning apprehension from students since the prevalence of ChatGPT became so widespread? Yeah, and just as like a data point, I think that ChatGPT started becoming a large thing about a year ago.

[P]:No, I have not. In the past two years, I have not. And I don't know whether it's a worthwhile data point. When I strongly suggested my graduate level course or class to use ChatGPT, I didn't get any positive response from them. There's not a single person just say, oh, great, I'll use it. Or there's no people coming to the office hour saying, oh, Professor, I was using ChatGPT, I think it's very helpful. I didn't get a single comment like that. I don't know whether they tried. I don't know if it's because the graduate students are a little bit older, so they kind of are more close minded to this newly, you know, kind of emerging tool, or just because discipline wise, they are, you know, mechanical engineers, and they are not computer science. I don't know. But related to your last question, I don't have a data point to report, unfortunately.

[I]:Yeah, I think the self-reporting nature, I think, when it started becoming a big thing, a lot of students thought of it as cheating. So maybe they decide not to self-report themselves, even if they do use it.

[P]:Yes, that's especially true for sophomore course. But as I said, in my graduate level course, I strongly encouraged them to use it. I told them that this is a very powerful tool. And if you have to choose between using this tool early on when you're at WPI campus, or you treat it as a new tool after you join your future, you know, institution or companies, I would prefer the first. I want to prepare you better before you go to an employer. I already made this kind of rationale to them, so they understand I allow it. I just don't know why nobody came to me and gave me any feedback.

[I]:That is interesting, yeah. So how would you see the role of these text-generated programs evolving in education in the future?

[P]:Oh, yeah. So I think there are a lot of potential. Really, there are a lot. Particularly, for example, there could be a model, for example, within my discipline, right, a ChatGPT model trained by all the teachers across the nation, maybe in the world, on this particular subject. And that ChatGPT will really kind of hold office hours for all the students, right? I mean, that's free. I mean, it's available 24-7, right? So that's definitely one wild way. I mean, other ways include, I think, for all the faculty members, one of the headaches for us is, you know, very time-consuming, is to fabricate exams, especially for sophomore courses, right? We have to provide every single bit of information to the students because they are new, they are green hands. And we have to make sure there's no ambiguity. We have to make sure all the terminology we are using have been used in our lecture notes or textbooks. So those also make sure the numbers are friendly. Like, if they can get square root of 25, we would give them 25 rather than 24 because some people panic at square root of 24, right? So with all that said, you know, designing the exam problems is very time-consuming. For me, for a 50-minute exam, generally speaking, I spend three hours to fabricate one exam. And some students

need a makeup exam. You can imagine that quickly, the time quickly adds up, right? I would imagine ChatGPT can be a perfect solution for that, right? So that's the second thing I can think of. I mean, third thing I can think of is there's always a discussion of consistency between different professors teaching the same course. Because in real life, the same course might be taught by different professors in different years or different terms, right? We want to make sure students get the same package of the knowledge, regardless of who is teaching it, so that the follow-up courses can build on the same basic knowledge. But right now, different professors really have different focuses on courses. I think ChatGPT can definitely do, again, quality check for any professors to look at their syllabus and provide suggestions on, you know, what you need to spend a little bit more time, what you need to spend less. This kind of suggestion. So, of course, the professors do have the, you know, academic freedom. They can still decide what they particularly want to talk about. I think the second pair of eyes would definitely help the professor and in turn help the students. And there are a lot of other things for sure. I mean, I will stop there.

[I]: Yeah, those are some good examples. Definitely, obviously, seeing the other side of it, the fabricating exams is definitely a good point. Since that, making it so that all the problems work out nicely is definitely seems very time consuming. Because you have to work from it backwards to make sure that you get the answers set, or you get the questions with the right numbers, so that they get to the right answer.

[P]: And the time limitation. A lot of factors.

[I]: Yeah. And finally, how have you changed your curriculum or your course policies to better handle the use of text-generative programs?

[P]: I have not done a single thing. Again, because I lack data in my course. I did get this complaint from humanity, you know, colleagues, but what I feel is I need to know what happens in my class before I do anything change in my particular syllabus or policies or, you know, suggestions to the students. Otherwise, I'm creating problems rather than solving problems.

[I]: That's perfect. Yeah, thank you. Sure, that's it. I think that was all of our questions.

Appendix G - Professor Interview Transcript 3

Note: [P] is professor talking and [I] is interviewer talking

Note: Revealing information will be redacted with ----

[I]: So we'll start off with some background questions. So how long have you been a professor for?

[P]: Well, at WPI, 21 years.

[I]:And what subjects do you normally teach?

[P]:Philosophy. I can be more specific if you want, but philosophy. You teach ethics? Yep. I teach philosophy of technology. teach existentialism and phenomenology. I teach political philosophy, Marxism, feminism. I teach epistemology. those are the main... Oh, I teach critical animal studies. I teach philosophy of film. Those are the current ones.

[I]:A lot of thinking stuff.

[P]:A lot of... yeah.

[I]:And then what would be your academic background?

[P]:Well, I got my bachelor's at Hampshire College, and I did my Ph.D. at University of California, Santa Cruz, in the history of consciousness. It's a program there. So my background is as an interdisciplinarian in the humanities.

[I]:Okay. You got those first three? Yeah. Okay, I can take the rest. Sorry. How familiar are you with the use of text-generated programs like ChatGBT in education?

[P]:I know more than I want to know.

[I]:Interesting. Do you want to elaborate on that at all? Because I think I know what you mean.

[P]:Well, I mean, I am familiar with it, and I'm a naysayer. I think it's very terrible. Which I'm sure we'll get to, but yeah.

[I]:Okay. Would you say that you've used text-generated programs like ChatGBT or other extensively, moderately, or minimally?

[P]:Well, it's hard to answer that, because I've played around with it just to check it out, but I've never used it, if you know what I'm saying. I wouldn't have. I haven't used it for my research. I haven't used it in my teaching, and I'm not going to. But just as someone who teaches philosophy of technology and just as an ordinary person, I'm curious, like everybody, right? So I've fed my share of questions to ChatGBT.

[I]:Okay. So, yeah, that's good. That works great. And then, of course, what is your overall opinion in the use of text-generated programs in academia?

[P]:I mean, I can understand how in some disciplines it may be helpful. I don't know what those are. Maybe for mathematicians or physicists or something. I don't know. But certainly in the humanities and social sciences, I think it's already having a destructive impact on higher education for a whole slew of reasons. And so I would like to see it

excluded from the classroom altogether and from research altogether. But unfortunately, there are billions of dollars shoving this down our throats, and we're all going to have to live with it. I mean, the social origins of this technology need to really be examined. This is not something that the human race created. You know, people say, oh, it was part of a revolution. No, it's not. It's meta and Google and, you know, et cetera, et cetera, and capitalists, entrepreneurs, and, you know, venture capitalists, money, finance, capital driving this juggernaut. And, yeah, so as I say, I think it's a very dangerous thing in a lot of ways. Not that there won't be good that comes out of it, but, you know.

[I]:And then, let's see, that's all of our background questions just for the background and stuff. Now we're going to get into the meat. How much do you think text-generative programs are being used by students in your classes?

[P]:So when you say, so just to be clear, you don't mean how many of the students that I have in my classes are using ChatGPT, or AI. You mean how many of them are using it to complete my assignments.

[I]:Particularly in help with your class. Yes, yes, in the academic sense, whether that's doing assignments for them or whether that's generating ideas or proofreading things. Any of that.

[P]:I mean, I guess because I've seen a 300% increase in cheating in my classrooms with ChatGPT, actually. I've had to adjudicate a number of these cases. Probably 1 in 5, I'd say.

[I]:20%. All right.

[P]:And that's only... And it would be higher, except that I constantly talk about it and it's in my syllabus, and then I fail students if they use it. So it would be higher. And of course, it may be higher than I know, but I'm pretty sure that's what I've been finding in my classes.

[I]:What ways would you say your students have been using TGPs?

[P]:I think they use it for outlining papers. They use it for writing papers. You know, the turn-in work that's generated by AI. If they're using it for brainstorming, that's possible, but I don't know that. But definitely outlining and writing the papers for them, or portions of their paper.

[I]:Okay. And then you said outlining, writing, and brainstorming.

[P]:Possibly brainstorming. Possibly brainstorming.

[I]:Just as, like, context for those, would you say those are all more unethical or more ethical uses?

[P]:The three that I mentioned? Like, strict.

[I]:Would you say those are all strictly unethical uses, or would you say some of those, there's a gray area?

[P]:Well, they are 100% unethical in this context, because I've forbade them in my class. So the students are being unethical. I would say that, in terms of the way you're framing the question, just keep in mind that whether student use of AI is good or not is a separate question, or related to but not reducible to the ethical question. That is to say, when students use this technology as any part of the writing process, they are damaging their ability to think and write. That's what I would argue. Like, I had a student come up to me after class and say, oh, you know, he was upset. Like, well, I can't even use it to outline my paper. And I'm like, actually, maybe we talked about this, but like the, when we met last time, but the hardest part of writing is actually reading this complicated material, rotating notes, thinking about it, deciding what one wants to say about it, and then wrestling with the ideas until you have an outline. And if you just go to the outline, you haven't done the process of thought. So is that unethical? I could make an argument that it's unethical, but it's worse than that. It's like, it's an attack on human autonomy, on our capacities for authentic self-expression. It's an offloading of human capacities onto a machine that should rightly be part of our own personality.

[I]:So then that leads very nicely into our next question. How would you personally go about drawing the line between more ethical and unethical uses? So I guess, at what point does it become ethical in your eyes?

[P]:You mean now you're talking about student use?

[I]:I'm talking about student use of TTPs in your classes.

[P]:In my class?

[I]:Particularly, I suppose, yeah, in your class you've outlined, it's not allowed in anything as that. Could you see any ethical use in your class, like in like really gray areas of like outside things or niche things?

[P]:No, not in my class. It's not in my area, no. Any use that the students would make if it would directly challenge my pedagogical objectives in the classroom, teaching objectives.

[I]:What about in other classes?

[P]:Well, again, I think that it's possible, first of all, it's always unethical if the students are violating the professor's policies. Exactly, exactly.

[I]:That's what I'm asking kind of more in other classes as well, if there is no policy against it explicitly.

[P]:But again, here we get into that question of like whether is the technology good or bad or ways in which it's both right and how we think about that. Because what I would say is that this technology is corrupting faculty as well as students. So for lazy faculty who rely on it to design their curriculum or for faculty who can't be bothered to hold students accountable for unethical work, they may not have a strict policy. And yet I would argue that's damaging to the students to allow them, basically it's interfering in their ability to know, to learn, and to think independently if the professor's just not even tracking whether they're using it. You know what I'm saying? So it's unethical in a more subtle sense that it's de-skilling our students potentially, right? And it's diminishing or demeaning the relationship between the teacher and taught, right? So short answer is no ethical uses in my classroom and I'm not sure whether it can be used ethically in other contexts, possibly. Again, maybe in STEM fields, I don't know. I'm curious to know what you guys think about that, actually.

[I]:Yeah, we're going to get into that in a bit. How would you say these programs have impacted your students' learning experiences and outcomes, both positively and negatively, obviously?

[P]:I have not seen any positive use or I haven't seen any positive outcome from this in my experience. I've found students damaging themselves morally. I've seen them, you know, they've failed my classes. I've seen them engage in unethical behavior by lying about the fact that they used it. So in my, again, in my own experience, it's not been good. So I don't see any positives, except that I get to talk to you guys. It's the only positives that come out, of course.

[I]:Of course. And then how would you say these programs have impacted your students' learning? You mentioned that it's an offloading of the learning, right? Is there anything more to elaborate there, would you say? Or does that pretty much encapsulate all of it?

[P]:Yeah, because part of the problem, it's like if you want to be a baseball player or you want to play piano, you've got to go through that boring, tedious, hard work to get to a level of proficiency where you're good at it. But then, you know, that is what education is. There's an existential component of this where we're pushed up against ourselves. You know, the frustration or feeling stupid, or those are not, like the attempt to kind of leapfrog that is a problem. That tedious stuff and the hard stuff is education. And if you're going to automate that in some way, it works against what we're trying to do as humanities faculty, which is to help students form themselves as human beings, in a sense.

[I]:Yeah. So then how do you see the role of TGP's evolving in education in the future? Obviously, you're trying to keep it out as much as possible. Do you see it becoming a part of the classroom at an institutional level in any way?

[P]:Yeah, unfortunately. The Marxist theorist Georg Lukács, 1923, I think it was, published *History in Class Consciousness*. And in that book, he elaborates this idea of reification, which we may have talked about or not. And I think that that's what we're talking about here, is that this technology is colonizing what Heidegger called the life world, and seeping into every aspect of consciousness and daily life. And it's being backed by billions, and perhaps if Sam Altman gets his way, even trillions of dollars of investment capital. So there's just no stopping it. But God help us. We're talking about total collapse of the global ecosystem. We're talking about the collapse of the liberal capitalist state or liberal democracy, rising fascism. And this technology is going to worsen everything. I mean, it's amazing what it can do. When I saw the Sora videos, I was like, everyone was just like, how is that possible?

[I]:Like genuinely, yeah. Yeah, that was crazy. It's insane, right? It's insane. Yeah, I watched a video about the background or like the more scientific part about it. And the amount of craziness that's just involved in that is just ridiculous.

[P]:You mean how it's done?

[I]:Yeah. And it's all at our fingertips, theoretically. I can throw up a program I already have installed on here, import a Python library, and then I just need to train it on data. And so there's actually a website that when you learn how to do this, there's a website that has all the works of Shakespeare just written in a page. You can train it to write Shakespeare stuff. So you use that as training data, and it'll spit out more stuff that vaguely resembles Shakespeare. Obviously, the fine-tuning of the learning data is really where the programs like ChatGPT and GoogleBard and all the other ones get their special sauce. But it's really accessible just to make.

[P]:Yeah, I mean, and it's a longer conversation, but obviously the creative possibilities are endless and amazing, and they'll be good. It comes a bit in a way. But then the certainty that it will be misused to create disinformation. Like I've been thinking about the crisis in Gaza, and the fact that we're seeing this video footage from what's happening in Gaza, and right now we can trust it. But if Sora had come out six months ago, none of it would... You know, we're already seeing video differently. And that had been at least a potential source of evidence, an empirical fact. And now when I look at the Sora videos, there's no way to know that it's not real. That makes me question everything I see. And there's already an epistemic crisis where people don't agree with what's real. You know what I'm saying? That's just an aside, but you guys know that. But it's very interesting to me that I'm meeting guys who know how this whole thing works. Because to the layperson, it just seems like a miracle.

[I]:Yeah, and even to computer scientists, it's a lot of magic. Like there's just so much in the back end that's still happening with all the neural networks. It's crazy.

[P]:You know the video, the one they produced of the Japanese train?

[I]:The bullet train?

[P]:The bullet train, and the reflections on the glass. I mean, it's just incredible that this program has conjured this world outside the window that's completely highly detailed and photorealistic. Honestly, anyway. Next question. I'll just go on and on in rhapsodies about Sora.

[I]:I think we have one more question. And that is, have you changed your curriculum or course policies to better handle the widespread use of TGPs? Obviously you mentioned you're outright banning the use of it. Has your curriculum itself changed at all?

[P]:The curriculum has not changed, but my admonitions around cheating, that has changed. I mean, I'm having to make much more of a concerted effort to try and keep this out of my classroom. Also, I'm wasting valuable personal faculty time trying to track down suspected cases of ChatGPT and adjudicating those. And this is true of my colleagues as well. We're not being compensated for this extra labor. There's been an institutional failure at WPI to come up with any kind of guidance or policy for the faculty on how to deal with this nightmare. The students are not being given clear guidelines about whether and when to use ChatGPT. So it's created extra work for me. And to be honest, on a personal note, and I think this is true of my colleagues too, it's demoralizing as an educator. I've heard people say, I want to get out of academia altogether, which is a very sad thing. Because what we do is, I'm not making big bucks. It's a passion thing. Yeah, or you believe in the mission of education. And if you're having to suspect the students of wrongdoing before they even enter your classroom, you know what I'm saying? I didn't sign up to be a cop, but I'm having to be a cop because it's just too upsetting when my students cheat. And it's not good for them either. And I don't think we want engineers, say, graduating from university who cheated their way through and don't know how to do things honestly. They end up up at Boeing, by the way. Part of a labor process of work speed up. What is this all about? This is all about capitalism. Period, full stop. That's what this is about. This is about creating more wealth for the upper tiers of our society. It's not a necessary technology, and yet we're all told to, like President Wong just sent out this email.

[I]:Yeah, I saw that whole thing. That was wild. Yeah, she's been putting pressure on the marketing department as well to use AI stuff in their videos.

[P]:And the thing is, it's odd to me because every university is doing that, so I don't see how this is going to distinguish us from anyone else. It's just full steam ahead for everybody, and they always talk about ethics. They put that in there in the word string, but there's no curriculum about it. There's no talk about it, discussion about it. There's no substance. Okay, so when are you finishing your IQP this term?

[I]:Our goal is next term since the respondents to our survey have been kind of slow since, at least I'm assuming that a lot of students wouldn't want to self-incriminate themselves.

[P]:Yeah, good point. So the way I get around that in my classes is I say, like at this term, I say, well, how many of you know someone at WPI who's using it to cheat? Every hand goes up. Every single hand. Now, if I had asked that two years ago of people who plagiarize, I might get one or two people who know someone who's personally plagiarized. You know, I don't think plagiarism was as widespread as this is. I mean, in your experience, do you think everyone's using it to cheat, or most students?

[I]:I only know one person.

[P]:Only one person?

[I]:For sure. Yeah, I personally don't know anybody who's been using it since, at least for the engineering professions or engineering majors, they aren't very useful. I'm assuming that most of the ethics where you're writing a lot, it's mainly used to substitute their own critical thinking process.

[P]:And sadly, it's very good. It's not perfect. That's why I'm able to catch it. But, you know, as you know, it's going to get better and better and better.

[I]:And I have used it personally, not to cheat, but in minor productivity things. My favorite way of using it is just, I have this block of code, and you duplicate this block of code while changing this number, just incrementing it, and it will generate the blocks of code for me.

[P]:And that saves you hours or something?

[I]:It saves me like half an hour of typing. But like, little minor things like that, I have definitely used it for. And I've also, obviously, I've experimented a lot, just like you have, I'm sure. It's like asking a weird question. It's so funny.

[P]:I mean, the answers it gives, even though they're usually plausible when they're not hallucinations, they're always in this middle range of like avoiding controversy, kind of like the average thought, you know what I'm saying? Of all the possible ways you could talk about a social issue or political issue, it's going to say, well, you know, it's going to give a cautious, like a diplomatic, cautious answer. You can prompt it to act like a contentious user. Oh, I didn't know that.

[I]:You can prompt it to have more contentious answers.

[P]:Okay, that's interesting.

[I]:Yeah. There's a lot of different ways you can break their guardrails. There's been a lot of cases of that, where since it's trained on such a large, vast data set of pretty much anything that you can find on the internet, you can prompt it to regurgitate what it's been trained on. So there's been people who have been asking it for illegal and illicit information. Right. And how to make a bomb, how to cook meth. Yeah. The classics.

[P]:How do you make meth? No, no. So I have to ask you, looking at the Sora videos, do you think that the people who have put this together, do you think they really understand how it's doing what it's doing? I mean, they must have been as shocked as anyone, I would think. Because there's no way to predict what it's going to come up with.

[I]:I don't think everybody knew... I don't think everyone knows everything about it. I think it's just so much compartmentalization. Yeah. But the sum of the parts, everything is understood vaguely. I see. I would definitely say. Like, there's definitely engineers that really understand the neural network and is like, okay, here's how they're... And if they broke it down and had the time and energy and effort, they could probably piece together, like, oh, this is how we got that result. But like, each time, just the nature of neural networks, that's like, you know, a hundred dimensions of translations and matrices. Hundreds of dimensions, in some cases. Like, it gets really wild really fast. Like, for the YouTube algorithm, right? There's over a billion parameters that it looks at.

[P]:Over a billion?

[I]:Over a billion parameters that it looks at.

[P]:To do what?

[I]:To basically have a profile of you and what kind of videos you would like.

[P]:A billion?

[I]:A billion.

[P]:How's that even possible?

[I]:I do not know. But that's actually what it is. It's over a billion. It's like, it gets really niche. Like, how long you waited to, like, go to the next thing. Your keystrokes. Your mouse movements. Yeah. Yeah. And for the video, for Sora, the amount of neural networks, I think, is in the billion range. From layer to layer to layer.

[P]:Do you know how long it took the machine to crunch any of those videos?

[I]:Using all their data centers? About two minutes? Seriously? Okay, so it's like ChatGPT that way.

[P]:It's, like, pretty quick.

[I]:Well, considering they're using almost all of their computational powers. It's a lot of power. Yeah, a lot of power. That's the hard part, right? Like, how do you define power in computational speeds? Because there are so many ways to calculate it and to

execute it that it's really hard to, like... Yeah, and considering that it's only them using it at once. When you have ChatGPT, there's millions of people using it all at the same time.

[P]:Right, right, right.

[I]:It's going to be faster if it's just Sam Altman using it to respond to people on Twitter. Right, right.

[P]:Okay, well, that's why we need quantum computing.

[I]:We can... I'm actually so excited for quantum computing. That's going to be so fun. Because there's not really issues with, like, AI stuff with quantum computing. At least not yet. I mean, we're probably going to have the same kind of stuff of, like, translating the same programs over to quantum computing. But, like, it's just more of... It's a different way of computing it. It's like, um... It's qubits instead of ones and zeros. It's just... It's more like our brain, in that sense. It's more like the universe, in that sense. It's quantum, because that's where, like, electrons are. Yeah, and the reason why I'm not enthusiastic is because problems that are unsolvable previously would now become solvable.

Appendix H - Professor Interview Transcript 4

Note¹: [P] is professor talking and [I] is interviewer talking.

Note²: Revealing information will be redacted with -----

[I]:I will start off with a couple of background questions. So how long have you been a professor for?

[P]:I've been a professor since 2013, so it's been 10 years now, and I've been at WPI for that entire time. Before that, I was a part-time instructor in Texas Tech University for two years.

[I]:And what subjects do you normally teach?

[P]:I teach marketing subjects, so I have taught marketing strategy, marketing research, product management, and these are all graduate courses that I teach. And now I'm also teaching a PhD course, which is called qualitative research methods.

[I]:And then what would be your academic background?

[P]:So I have my bachelor's in commerce, specializing in economics. Thereafter, I did my master's in management studies, specializing in marketing. I was working for about four years as a marketing manager in India, and then I came to the US to do an MBA in marketing and international business. I did that, and then I did my PhD in marketing. So that's the whole story.

[I]:And how familiar are you with the use of text-generative programs like ChatGPT and Google's BARD in education?

[P]:So I've been using ChatGPT for various roles that I play in academia, whether it's teaching, whether it's research, whether I do service work, you know, as program director or as a committee chair. I've been using ChatGPT for all of those areas. I think it just started in, I would say, early 2023 is when it all just got into everywhere. So that's when I also got into the use of ChatGPT.

[I]:And would you say you've used these text-generative programs extensively, moderately, or minimally?

[P]:I'd say moderately.

[I]:And currently, what's your overall opinion of the use of text-generative programs in academia?

[P]:So it's a mixed bag. For certain purposes, ChatGPT does a really good job. And then there are times when you want to use it for a specific purpose, and it's not doing a great job for you. So I'll give you an example. If you want to, you know, paraphrase something, okay, or if you want it to generate some ideas for you, it does a decent job. But then if I ask it to do a brief literature review on a topic, it just messes it up entirely because it gives me fake references. Yes, references like, there are no such authors, there are no such papers, and it just builds up something or creates something. So there are pluses and minuses. It's up to you how well you can use it for specific purposes.

[I]:All right, that concludes the background. We can get into the main questions now. So how much do you think text-generative programs are being used by students in your classes?

[P]:So that's an interesting question because, you know, as a professor who teaches mostly online courses, I really do not know. For example, I have a AI use policy in my classroom. So I share it with everybody and tell my students that whenever you've used any kind of AI for your course, whether it is ChatGPT or whether you've been using BARD or Gemini, or whether you've been using any photo generation software, or if you've used any, you know, AI-based video generation software, please cite it. But I am hardly seeing any students follow that and actually cite it. And when I look at their submissions, there are times when I can recognize that this is not their work. This is from ChatGPT because of the language that comes up. You know, I've seen so much of it now that I can recognize by just reading that this is not coming from a student. Now, in such cases, I just have a chat with them and tell them, you know, you really need to cite if you use StratGPT. They get it, then they start citing. So I'd say if I have 10 students in class, probably two of them or three of them are using it.

[I]:And out of the class size of how large?

[P]:So I would say 30%. So all my classes have different audience strength, right? Some of them have 12 students and some of them are 45 students. So you can take a percentage of about 30, 33%, one third of the class.

[I]:And then how would you go about personally drawing the line between ethical and unethical uses of text-generated programs in your classes?

[P]:So as I mentioned, you know, students do forget citing it or they don't do it on purpose. I don't know what's going on there. But I have an AI policy in place. So that's one way I try to let them know from beginning because it's a part of the syllabus. They know what I'm expecting. I go in detail about explaining what is needed in my first course review Zoom Meet. So I tell them, you know, this is what you need to do. I'm encouraging you to use AI. I'm not saying it is banned in my class or anything, but you need to be responsible about the use. And you also need to be sure that what you are seeing as an output from ChatGPT is correct, is accurate, okay? It's not something that is fake information. So you do have to go back and do a cross-check. You can't just take that, copy it and paste it into your paper. Yeah, so that's one way I'm trying to mitigate this. I do not know if there are any other interesting ways to do this, but whenever I spot something, I just talk to that team or that student and say that this is not how it's supposed to be done. Read the AI policy again, cite where you used ChatGPT and then come back to me with the updated paper, right? That's what I've been doing.

[I]:And what ways would you see your students in your classes using text-generated programs?

[P]:So there are, for example, in marketing strategy that I teach, it's a graduate course. It's in-person as well as online. I have two sections that I teach, one in fall, one in spring. I show my students how to use ChatGPT for all the marketing concepts that they've learned in each module. So I specifically teach them how to do it. You know, like, for example, if you want to do market research on an industry and you want to find out what's going on in this particular industry, then you need, I share a prompt with them for ChatGPT. I tell them, use this prompt, just change the name of the industry that you want to look for and then see what it generates for you, right? And then go ahead and cross-check the references that it has given, go to those sites and links and see if this information is correct. So that's how you could use it for some secondary market research. And then they use it, you know, in some activities and exercises that I would do in the class. So just one example of how I use it in one course, I do that in all my courses. I show them how they could use AI in every aspect or module of that particular course.

[I]:And how would you see the role of text-generative programs evolving in the future?

[P]:So just in the student domain, or are you talking about my

[I]:In the student.

[P]:Okay, student domain. Okay. So for students, one issue with using ChatGPT is that for students to go on a higher version of it, which is the paid version, \$20 per month, right? That is difficult. Not every student can go ahead and afford that, right? So we are restricted to the limitations of the free version of ChatGPT. So students can only do as much as the free version can do. If they want to use the advanced capabilities, they have to pay for it, right? So one thing that I feel is ChatGPT could be used in many more different ways if the university has a site license for it. If the university buys a site license for the upgraded version of ChatGPT, all of us can benefit, not only the professors and faculty and staff, but also students, because then they could use it for various assignments. Yes. Responsible use of AI is something that we need to teach students in every course. It needs to be reinforced every now and then, because one professor teaching it and others not doing it is not going to help. Also, different professors also have a different perspective about use of AI. Some of them do not appreciate it. Some of them do appreciate it. Yes. So again, there is a mix of opinions in there. That is one reason why a university cannot come up with a standardized AI use policy. Yes. So the role again gets restricted over there, classroom by classroom, who's the professor, what their beliefs are, how they want to run their course. So that is another reason that could be a barrier in expanding the role of AI on a campus. What else can I think of? So the version upgrade is one thing, getting a site license, having a standard policy is difficult. Another way is, are professors also teaching students how they could use AI in those particular respective domains of courses they are in, right? So if you're in a, say, mechanical engineering design course, are you being taught by the professor how you could use AI to create design? Yes. If you are in my course, which is, say, product management, am I teaching you how to use this to create a product requirements document? Yes. So teaching that will expand the role of AI for students. So training is very important. Not everybody knows how to write prompts for ChatGPT. So training students on how to write a prompt is a new skill. And that can also get a lot of job opportunities for our students, because companies are looking for that. They want people who know how to use AI in their daily work so that their work life becomes more productive and efficient. So I think I totally support the use of AI, but in a responsible way.

[I]:Yeah. And on a side tangent about that for my company that I just, I'm working for in the summer, that was a big part of the interview process on whether I can use AI effectively or not. And over this past summer, when I was working at that job, it was a major part of whether we could figure out how to use AI in our industry or not, and whether we could find effective use cases for it. It was very, very interesting.

[P]:Yeah, because you know, prompt writing is a skill. You have to develop that by practicing it over and over again. So if you can do it in classrooms, it will make life simpler when you are at work.

[I]:And how would you say that these programs have impacted your students' learning experiences and outcomes, both positively and negatively?

[P]:So, you know, I always tell my students that AI is not going to take away your jobs, but a person who knows AI is certainly going to take away a job from a person who does not know AI. So they certainly need to know AI, okay? How to use it responsibly is key. How to use it accurately is the key because a lot of AI is biased. We know that. So do we want to bring that bias in our outputs at work? No, we don't. Do we want to bring in those inaccuracies? No, we don't. Because finally, it's going to impact our performance, our ratings at work, right? We don't want that. So going back to your question, you know, can you repeat the last part of your question?

[I]:Yeah, how have the programs impacted your students' learning experiences, both positively and negatively?

[P]:Yes, yes. So positively, make their work more efficient. Students are in so many courses, they have so many assignments, yes. If they can use AI to just paraphrase a few things, yes. If they're doing a literature review, you know, if it helps them just paraphrase a few sentences from a paper, it's easy, you know, wordsmithing. Or if you want to start by generating some ideas for a research project, yeah, why not? Ask AI to do it for you, give it a specific prompt, and then start from there. Yeah, you can't just pick it up and go with it. Start from there, start, take it as a starting point, look at it, do a little bit of more of your research, and then figure out. So yes, the positive impact is improving their efficiency and productivity, it saves them time. Yes, it helps them learn more sometimes, because if you were trying to say, do this industry report, on Google search, you would be spending a lot of hours trying to find out which website to first go to, to find information about this industry. But then if you touch activity, can you provide a list of online sources from where I can find industry reports about robotics industry? It's going to give you a whole list of websites. Yes, some of them may not be the correct websites, but at least half of them will be correct. So you will be able to immediately go to those websites and find the information. So it saves you a lot of time that way, and helps you learn more. It takes you to more sources to refer to. Negatively would be when you won't use it responsibly, that's going to be the negative impact. If you just copy and paste stuff from there, if you copy an entire paper that ChatGPT is writing for you, you are not learning, you're doing a disservice to yourself. Yes, as a student. So if you are there in a college to learn, gain a degree and then go to work. Yes, use AI to help you learn better, to improve your efficiency, but do not use it to hamper your learning. Yes, you go to work and you don't know anything. Every time ChatGPT won't come to your rescue. Right? Somebody's asking you something in a meeting and you don't have laptops open. How are you going to use ChatGPT to help you answer that question? Only your knowledge will help you. Yes. So I think the negative aspect is only when you don't use it responsibly, but if you use it responsibly, there is a lot of positive that students could gain out of it.

[I]:And how would you say that you've changed your curriculum or course policies to better handle the widespread use of text-generative programs? I know you mentioned that you encourage the use in your courses and you instruct your students on how to

use it. But would you want to, could you go into the specifics of how you've changed your policies?

[P]:Yes. So first thing is, you know, on the first day of class, when we launched the course, I always do it in person, whether it's in the classroom or whether I'm teaching online. So I do a Zoom session. And in there, I show them the AI policy, which is a part of the syllabus and go over it step-by-step to show them how they can use it so that there's no plagiarism happening here and there is no irresponsible use of AI happening in the class. I have included AI as a part of every module that I teach in my courses. So I have, say, four modules in Marketing Strategy. And in every module, I show them how they could use ChatGPT to basically create frameworks or tools what I've taught in class. So in class, we do an activity where they have to do it by themselves. They cannot use AI. So in the class, they do it by themselves. But then as a part of the project, after the class ends, I show them, OK, now that you've done this activity, let me show you how you can use ChatGPT to do the same thing in the least amount of time. And then they feel awed by it. They'll be like, oh my god, we spent like one hour doing this. And Professor showed us how ChatGPD could do it in 10 minutes because it took me 10 minutes to write that prompt in detail. So then they get that aha moment where they realize that, OK, this is a good tool. ChatGPD is a good tool to use. And then I show them how they should go back and cross-check a few things from the output that is shown. So I turn on my ChatGPD in the class. I put it on projector. And then I show them, I type the prompt. I show them what the output is and then how they should analyze that output before copying and pasting it. So they learn step by step how to write a prompt and then how to analyze the output and then how to use it with a citation at the end of the project report that this is what was used. So that's the whole process I do for all my courses. Introduce it at every module level and show them how to use ChatGPT for those tools.

[I]:Yeah. All right. That's all the questions that we have. Do you have anything to add, --- --? No, I don't believe I do. This was a really good set of questions and answers. I really, really enjoyed listening to this.

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