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AI in Higher Education: An Analysis of How Students Perceive AI in Relation to Their Educational Learning Process

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ABSTRACT

With the advent of widely used publicly available Artificial Intelligence (AI) tools, such as ChatGPT, there has been an important question raised about AI's place in education. This study aims to examine the relationship between students, educators, and AI. Twenty students in the College of Information Sciences and Technology (IST) at Penn State were interviewed. Through qualitative analysis, several themes emerged pertaining to how students see themselves using AI in their professional careers, how they currently use AI tools in the classroom, and how they believe AI should be integrated into the classroom in the future. The main themes found were that 1) students believe they will be using AI in the workforce, 2) saving time is a large motivation for AI use, 3) professors and students should learn AI for course use, 4) AI should be integrated into the classroom as a tool, 5) ChatGPT is intuitive to learn, 6) students desire common AI guidelines across classes, 7) there is a lack of trust in AI-generated responses, and 8) dependency on AI inhibits learning. These findings highlight the importance of proactive discussions around appropriate AI integration in education and call for collaboration between students and educators.

TABLE OF CONTENTS

LIST OF TABLES

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Chapter 1 - Introduction

With the recent advent of widespread Artificial Intelligence (AI) use in academics, it is important to research the relationship between students, educators, AI, and academic integrity. This is a crucial time when educators and institutions are attempting to learn how to structure policy and instruction to account for the use of AI in the professional realm. It is important to determine how students use AI and how they see it being incorporated into their learning experiences. With this knowledge, educators can work together with students to provide the most optimal learning experience to leverage AI while emphasizing individualistic thinking and learning.

About one-third of college students in the U.S. use AI to help them complete academic assignments (Chan 2023). Students are heavily using these technologies and there has been a growing concern about how to use AI in the classroom and where the line is between aid and cheating (Chan 2023). This research could aid in understanding this line and creating policies around it.

Current literature takes into account academic integrity questions and suggests plans to integrate AI into education. Several concerns have been identified pertaining to students using AI chatbots in their work. While some contend that AI may erode students' critical thinking skills, others see its potential to revolutionize student learning and hope to create policies that allow them to leverage it in their future careers (Chan, 2023). Researchers also state the importance of students using AI tools ethically and appropriately in their academic work (Halaweh, 2023). Since the widespread use of AI in the classroom is a recent development, there is a dearth of

existing research on how to best integrate AI into the learning process. This field could benefit from an analysis of students' current perceptions of AI tools and how they see AI being used in the classroom and beyond.

The purpose of this study is to learn about how students in the College of IST at Penn State are using AI in their studies. Specifically, the aim of this study is to learn about the different contexts in which students are using AI in their work, how students have learned how to use AI to accomplish their learning goals, and how students see AI being used in the classroom in the future. The following research questions are addressed:

RQ1: How do students believe AI will be used in their professional careers?

RQ2: How do students currently use AI in their academics?

RQ3: How do students believe AI should be integrated into classrooms in the future?

Chapter 2 – Literature Review

To determine the implications of nascent AI technologies in higher education, it is important to study both historical and current perspectives on the use of AI in education. As part of the framework for investigating this, I review: the history of AI and how it found its way to education, what intelligent tutoring systems are and how they paved the way for AI, what digital literacy is, and how it influences how AI is adapted, how *explainable* AI is crucial for students to learn, and how AI is currently being used in higher education.

History of AI Tools in the Classroom

To understand AI's prevalence in education, we can refer back to the ancient Greek philosopher, Socrates. According to Michal Černý (2022), Socrates practiced the teaching approach of iteratively inquiring about what has been discovered in reference to a previous answer. The main focus of this method was listening and creating a dialogue with the one trying to learn. This learning technique of using dialogue to educate was what Socrates, Plato, and Aristotle built their teaching methods on and is seen significantly throughout history. This idea is reinforced by Augustine of Hippo who states that conversation is a fundamental way of knowing and thinking. Today, we can see this philosophy implemented in universities as there is a dialogue between students and teachers, and between students and educational objects (for example a textbook). From this perspective, Černý argues that textbooks can be considered the precursors to chatbots.

Zawacki-Richter et al. (2019) assert that the beginnings of AI can be traced back to Dartmouth College in the 1950s. John McCarthy first used the term in a two-month-long

workshop with the purpose of studying AI based on the notion that "every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it".

Around the same time in 1950, Alan Turing created the hypothesis that a machine could be considered intelligent if its communication was indistinguishable from that of a human (Turing & Haugeland, 1950). This led to the development of several programs whose aim was to facilitate a human-like interaction with people. Later, as instant messengers became prominent, so did chatbots and applications, such as StudyBuddy, which were created in an educational context (Molnár & Szüts, 2018). Around 2005, the beginnings of using chatbots for educational purposes developed with an emphasis on trust (Černý, 2022). This history suggests that a key focus of any new technological advancement (such as recent work on chatbots) will be on the effective integration of these objects into existing educational environments – as opposed to replacing traditional materials outright.

Today, Zawacki-Richter et al. (2019) describe three categories of AI software applications in education: intelligent support for collaborative learning, personal tutors, and intelligent virtual reality. Intelligent support for collaborative learning allows for the curation of content that can be used by a human tutor to guide students and facilitate group interaction based on similar learning models. Intelligent tutoring systems (ITS) are used to create one-to-one tutoring scenarios where, based on the students' learning levels, the ITS creates a learning path for a student. Finally, intelligent virtual reality can engage students in game-based learning environments or in remote lab scenarios.

Overall, it is important to acknowledge the crucial role of dialogue in the learning process, dating back to the time of ancient philosophers and continuing to the present day. As

dialogue is the focus of impactful learning, the future of education will rely on tools that facilitate interaction and allow a student to continuously ask questions and learn. The ability to do this can be seen in educational AI tools. As more general-purpose AI tools develop and become popular among students, such as ChatGPT, it will be important to see how they can be integrated into education to achieve the goals of continuous interaction and learning.

Intelligent Tutoring Systems and Expert Systems

Shute and Zapata-Rivera (2010) define an intelligent tutoring system (ITS) as a piece of software used for education that utilizes an artificial intelligence component. The purpose of an ITS is to track students' work and provide personalized feedback. Shute and Zapata-Rivera argue that in order for something to be considered an intelligent tutoring system, it must have: knowledge of teaching strategies (a pedagogical model), knowledge of the learner (a student model), and knowledge of the domain (a subject matter expert model). In a study conducted by Steenbergen-Hu and Cooper (2014), it was found that ITSs generally had a moderately positive effect on the academic achievement of college students.

Aneja (2023) defines expert systems as pieces of software with the purpose of simulating the judgment and actions of a human who is an expert in a specific field. She states that these expert systems need a designated knowledge base, an inference engine, and an explicit set of rules wherein the engine can provide recommendations. Overall, ITSs and expert systems are similar in that they both use artificial intelligence to store knowledge and regurgitate this knowledge to humans. In this way, ITSs can be considered a specialized type of expert system.

Afzal et al. (2019) discuss a special case of ITSs called dialog-based tutoring. DBT is based on the Socratic idea of dialogue-based learning discussed earlier. Some argue that DBTs are advantageous due to their simulation of human teacher-to-learner interaction that is afforded through natural language dialogue. This interaction requires students to first recall and reflect on the material at hand, facilitating a deeper comprehension of the topic. However, there are limitations to this learning technique due to the reliance on good training data, the subjectivity in training-data annotation, benchmarking, and error handling. Overall, it was found that what most matters to human users is how engaging and valuable the experience of using a DBT was. It is predicted that conversational tutoring will be used in the next generation of personalized educational technology and that more efforts to replicate natural human teacher-learner interactions are needed.

While exploring strategies for developing an optimal ITS, Bradáč et al. (2022) identified several key challenges. The first being that science and mathematics "cannot adequately examine the intricates of certain linguistically defined situations". Second, students also have sensory preferences with their study materials that may not fit in with ITS's structure. Their idea for the development of an ITS involves it being integrated into an already established educational platform to reach a significantly wider audience. This would also involve creating an individual study plan for each student. Their system finds out the student's current knowledge depth (using an expert system) and their learning preferences. They argue that this model of learning can be expanded into multiple types of education even though they still need to draw more accurate conclusions on the benefits of such a system.

It is important to note that popular AI tools today, such as ChatGPT, are all examples of generative AI – specifically AI that creates new content. Brynjolfsson et al. (2023) discuss how

generative AI tools use large language models (LLMs) to process data by predicting the next word in a sentence based on a large corpus of training data as well as previous inputs. The authors argue that LLM training data and input prediction are what give generative AI tools the ability to output generally correct output and semantically meaningful sentences. In this way, contemporary generative AI yields comparable capabilities to those of earlier DBT models.

ITSs are continuously being improved to fulfill their purpose; however, the emergence of ChatGPT and other online chatbots raises the question of where ITSs fit into this landscape. Dialogue-based tutoring was predicted to play a large role in education, but students can now interact with online chatbots to facilitate their learning. There is no question that ITSs are more specialized than general-purpose chatbots but, in the context of higher education, the question arises: Can ITSs be as easily integrated into the classroom and accessible to students as online chatbots?

Digital Literacy and Classroom Implications

According to UNICEF (2019), digital literacy is the "knowledge, skills, and attitudes that allow [people] to be safe and empowered in an increasingly digital world". It should be noted that definitions of digital literacy change based on age, culture, and context. In a framework to prepare adolescents for school, work, and life, digital literacy is foundational and can be placed alongside transferable skills and other job-specific skills.

Lyons et al. (2019) argue that AI is transforming job markets, making the development of digital skills crucial for success. They state that there are millions of jobs around the world that require people with digital skills, but there is a shortage of people able to fill them and this

disparity is only expected to grow. They conclude that it is crucial that people around the world of all ages possess a set of digital skills to live, learn, work, and be a member of society. Due to these factors, they argue that educational systems need a more holistic and systematic approach to foster the development of digital literacy. This idea originated from the claim that there is a continued disconnect between education and the workforce, which is causing this digital literacy divide. Overall, there is a call to develop clear ways in which education systems can work with employers to integrate digital literacy into the classroom to produce tangible outcomes in society.

Selwyn (2022) more specifically describes what digital literacy looks like in the age of AI. He argues that the term 'digital literacy' is now turning into 'algorithmic literacy' where people are beginning to be expected to partake in more AI-focused tasks. Some components of this include being able to recognize when an automated system is being used, how these systems work, knowing how to work with them (e.g., being able to use a natural language processing tool to help you create something), and knowing how to work around them (e.g. knowing when to disregard an automated decision). He points out that some employers are looking for people who are familiar with data and AI in a variety of general occupational areas and that educational systems need to focus on developing this algorithmic literacy to avoid the further development of digital inequality.

Keeping digital literacy in mind when examining changes in education due to the ever-evolving technical landscape is crucial. As more employers are having employees use AI in their day-to-day work, it is advantageous to have educational institutions reevaluate their digital literacy initiatives to account for this. Therefore, it is important to consider the importance of digital literacy in today's world and how students' interactions with AI tools play a role in this.

Explainable AI

According to Rachha and Seyam (2023), Explainable AI (XAI) is “the ability of an AI system to provide clear and transparent explanations for its decision-making processes, which is crucial for building trust and accountability”. They argue that XAI in the field of education is extremely important as it can influence how students understand course material which can lead to an optimized classroom. XAI can also help students better understand the material by creating personalized learning experiences and assessments. The concept of XAI most likely emerged from Clancy’s work in "Rule-based expert systems: the Mycin Experiments of the Stanford Heuristic Programming Project" where learning how to ensure AI systems are understandable and explainable was crucial.

Rai (2020) explains how most current AI systems use black-box models that take in data and provide an output. Zhai (2023) discusses how this type of model does not provide any information on how it produced its output. These types of algorithms are not easily understandable by humans, which in turn obfuscates their decision-making processes – making them difficult to trust when used by students and educators. Rachha and Seyam (2023) discuss how this in turn may also make it difficult for educators to understand why some students may be struggling or doing well. Black-box models are very dependent on the data that is used to train them, so if the data is inaccurate or incomplete, there could be inconsistencies or flaws in its output, reinforcing a lack of trust. Zhai states that since there is a current lack of transparency in AI tools when an incorrect output is produced, there are no methods to identify or correct the mistake. Thus, to better recognize latent flaws or biases in datasets, educators would benefit from knowledge that already exists in fields such as data science.

Rachha and Seyam (2023) argue that since educational institutions are increasingly using AI, there is a need to ensure that the technologies used are transparent in their decision-making processes. They call for a unified framework for XAI in education which would provide a set of guidelines for the use of XAI. Included in this framework could be a common language, taxonomy, and a set of standards for those working in the field of XAI in education. This would allow for the sharing and comparing of work. Rachha and Seyam also call for the development of human-centered AI systems that collaborate with humans to be explainable and transparent where the model provides comprehensive explanations and interactions with the user.

Zhai (2023) expresses similar opinions as he states that in order for students, teachers, and parents to fully comprehend AI tools such as ChatGPT, the tools need to be explainable. Zhai also states that if teachers are going to use ChatGPT and other AI tools in the classroom to enhance the educational experience, they need to have professional knowledge of how it works (such as its capabilities and proper practices for using it for instruction). He argues that without proper knowledge, teachers may not be able to utilize ChatGPT to its fullest potential.

The New Era of AI in the Classroom

After the release of ChatGPT in November 2022, and its immediate popularity among students, many researchers have worked to develop suggestions and frameworks for how to integrate similar technologies into education. To provide background as to how students use AI in an academic setting, the Centre for Teaching and Learning at the University of Oxford (2023) has described three categories for how to best use AI. These categories are discovering potential uses outside of just text generation, formulating effective prompts, and managing hallucinations.

Managing hallucinations involves utilizing strategies to identify incorrect/erroneous output from AI software.

Chan (2023) and Lo (2023) both call for schools and universities to immediately update their guidelines and policies regarding plagiarism and academic integrity considering the popularity of AI tools among students. Chan, Lo, and Halaweh (2023) state that instructors need to be trained on how to use ChatGPT to allow them to detect plagiarism. Along with instructors, Chan and Lo argue that students should also be educated on how to use ChatGPT and its limitations. Halaweh overall suggests that students should be allowed to use ChatGPT and other new AI tools as it gives students a chance to develop their ideas and improve their work. He states that this also gives instructors the opportunity to differentiate students who have put more creative effort into their work.

In terms of policy, Perkins (2023), argues that higher education institutions (HEI), need to list the different AI tools by name so that students and staff are aware of the different tools being used and there is no ambiguity of acceptable and unacceptable usage. Perkins and Halaweh state that a ban of these different AI tools is unenforceable and, since these tools allow for numerous benefits, a ban is not recommended. Perkins recommends a policy approach where there is a constantly evolving understanding of plagiarism and human-AI co-creation. This is important as academic misconduct will be defined by HEIs, therefore policies must be clear. Overall, Perkins states that since it is likely that AI tools will be heavily integrated into the classroom in the future, HEIs need to focus on developing their policies.

Neumann, Rauschenberger, and Schön (2023) approach the advent of ChatGPT from the perspective of software development students and discuss ways to integrate it into higher education. They list numerous uses for the tool such as assessment preparation, source code

creation, and translation. However, they list several challenges and opportunities that arise for students when navigating how to use AI tools in an academic setting, such as: using AI without clear rules, different policies in different classes, what is acceptable and what isn't, its unknown potential, tutoring capabilities, and creativity and innovation potentials. They claim that people who learn how to use AI tools will be more efficient workers in the future; therefore, HEIs must incorporate this new technology into their curricula. They recommend that at the beginning of a course, an instructor must specify how ChatGPT may be used in their course (in the form of a handout or integration into lectures). Specifically for software development classes, there can be a wide range of integration as students can use the tool to create unit tests, analyze source code, or explain code. Overall, they acknowledge that adapting the curriculum to these new AI tools will be a time-consuming process; however, they argue that instructors should begin collaborating with each other to learn about different opportunities for integration. Looking to the future, they predict that AI tools will be used by software engineers in practice, education, and research, emphasizing the immediate need to teach students the necessary tools to succeed.

Several researchers have also commented on the ethical considerations that should be noted when discussing ChatGPT. Sallam (2023) points out that since ChatGPT is trained using large amounts of data, there is no guarantee that the data it is trained on is not biased or contains inaccuracies. Bias could arise due to research being primarily conducted in high-income countries and on textbooks that may not be universally used. However, Sullivan, Kelly, and McLaughlan (2023) state how non-native English-speaking students may use ChatGPT to help with their writing and use it as a quasi-translator. Students with communication disabilities can also use ChatGPT to compile information into an easily digestible summary.

In terms of academic integrity, Chan (2023) states that student plagiarism has become a major concern with the advent of ChatGPT, as most tools that caught plagiarism in the past, such as iThenticate, have difficulty assessing work from ChatGPT. Halaweh (2023) argues that students need to be educated on the difference between text generation and idea generation. He states that presentations and defending one's work will have to become more commonplace in educational environments in order to assess the integrity of work done in collaboration with ChatGPT. However, Sullivan et al. (2023) caution that by discussing ChatGPT as a way to cheat more than as a tool, perceptions on how it can be beneficially used in an academic setting can be warped – leading to more students using it strictly as a means for cheating.

Overall, Chan (2023) argues that ChatGPT can be very valuable for instructors, as long as it is kept in mind that there can be accuracy issues. Chan states that ChatGPT can help improve engagement by helping students independently study and facilitate group discussion. Halaweh (2023) claims that ChatGPT will foster creativity and innovation, while original ideas can still be identified. Sullivan et al. (2023) also claim that even though there are challenges, ChatGPT and new AI tools present a great opportunity to enhance student learning and improve employability outcomes. They claim that instructors and institutions need to adapt their teaching practices to align with the new reality these AI tools bring in terms of living, working, and studying.

Several of these researchers discuss areas where current research could be improved. Lo (2023) states that very few studies look at the influence of ChatGPT on student behavior and performance. He also states that many current suggestions are based on the researchers' beliefs and not empirical evidence. Overall, in most of the works discussed, there is a large focus on institutions and educators and not a large emphasis on student impressions and opinions. Sullivan et al. (2023) agree, emphasizing the need to shift current discourse to a more student-led

discussion. They claim that in order for institutions to ensure students use AI tools appropriately, students must be involved in the discussions. Student associations should be able to collaborate with staff to discuss policy development and educational resources surrounding AI tools. A university-wide approach is needed to improve student engagement and should be a part of institutional approaches to integrating AI.

Chapter 3 - Methodology

In this work, I use qualitative analysis methods to search for themes, patterns, and stories in a corpus of text, in this case, interview transcripts (Sharp et al., 2019) to understand how students use AI in education. To collect this data, semi-structured interviews (Sharp et al., 2019) were conducted with students. Since the discussion of AI in academics can be sensitive to some students in relation to academic integrity concerns, I determined that one-on-one interviews could allow for more trust and openness from the participants. The semi-structured interviews conducted helped inform me of each participant's personal experiences and motivations – while simultaneously helping to derive follow-up questions. By establishing a dialogue with the participants, I was able to hear when they may be confused about a question, if they were not sure of their response, or if they had strong feelings about a certain topic. I was also able to record my interviews to aid in my data analysis. My study protocol was approved by the Penn State IRB as STUDY00023470.

Subjects and Recruitment

To recruit participants for my study, I used convenience and snowball sampling. Convenience sampling is a type of nonprobability sampling where people who are available and able to participate in the study are chosen rather than people specifically selected (Sharp et al., 2019). Snowball sampling is a type of convenience sampling where a current participant may suggest another person to participate in the study (Sharp et al., 2019).

I recruited 20 participants to be interviewed during a 45-minute time slot. After my study was approved by the IRB, I asked participants in person, through text, and by email to participate

in the study. Before setting up an interview time, I ensured that each participant was over the age of 18 and was a student studying a major in the College of IST at Penn State. Participants were given information about the purpose of the study and before each interview began, I read a consent form and asked each participant to provide their verbal consent. This form contained information about the anonymity of each participant and how their participation was voluntary.

Data Collection

The interviews were conducted on Zoom and recorded using the recording and auto-transcription functionality on Zoom. I first read the participants the one-page consent form and asked them to consent to both participating in the study and to be recorded. Once I gained their approval, I asked them if they were ready to begin and then I started the recording. I then proceeded to ask my questions (see next section for the interview guide) one by one and listened to the participants' responses. When a participant would ask me to clarify a question, I would repeat the question in different wording and ensure the participant was clear on the question. I would also ask follow-up questions when I was interested in hearing more about what a participant was saying. After I was finished asking my list of questions, I asked the participants if there was anything else they would like to add. If there was not, I thanked them and ended the recording and Zoom call.

At the beginning of my interview guide, I asked questions that would allow me to gauge how much a particular participant has used AI and in what contexts. First, I wanted to learn what tasks most students were using AI to accomplish. A follow-up question specifically asked how they were currently using AI and whether its use was encouraged or discouraged by their

professors. After establishing its present use, I asked students their opinions on how AI should be integrated into the classroom in the future - if at all. Then, since a large purpose of higher education is to prepare students for the workforce, I asked students questions about how they see AI being used in their fields and how they thought this impacted AI's prevalence in education if at all. The overall purpose of my questions was to hear from the students how, based on their experiences, they felt AI could be appropriately integrated into the classroom.

Interview Guide

1. Are you currently an undergraduate student studying cybersecurity, security and risk analysis, human-centered design and development, enterprise technology integration, or information sciences and technology in the College of IST at Penn State? Which major are you studying?
2. Have you or do you currently use any AI tools (such as ChatGPT, Copilot, etc.)? Which ones?
3. How did you first learn about these AI tools?
4. What techniques or processes, if any, do you follow when asking an AI tool for help? (e.g. you provide an example with your query)
    a. How did you learn this technique/process?
5. What type of schoolwork do you use AI to help you with?
6. How helpful do you find AI to be when used for your major-related courses?
7. How often do you use AI in your academic work?
8. Describe how your professors currently address the use of AI in academics, if at all.
9. What do you feel the relationship between AI usage and academic integrity should be?

10. What do you feel teachers need to know in order to teach AI in the classroom, if anything?
11. What do you think the future of AI looks like in the field you are majoring in?
12. What do you think is the greatest advantage or drawback is to using AI in academics?
13. Describe any instances in which you have used AI outside of an academic setting (i.e. for work, fun, etc.), if at all.
14. What do you feel you need to know in order to successfully use AI tools?

Data Analysis

I analyzed the data following the coding methodology of grounded theory. Grounded theory is "a general methodology for developing theory that is grounded in data systematically gathered and analyzed" (Strauss & Corbin, 1994). Once I had conducted my interviews and gathered my data, I listened to my recordings again and read through the transcripts which I then uploaded to an analysis tool called ATLAS.ti (https://atlasti.com/). ATLAS.ti is an online tool that facilitates the analysis of qualitative research. I then coded my data in three phases: open coding, axial coding, and selective coding. Open coding consists of discovering different categories appearing in the data (at the sentence level) (Sharp et al., 2019). After I created codes from this phase, I moved on to axial coding which involved going through the categories I created and relating them to their subcategories (Sharp et al., 2019). Then, I conducted selective coding where I created themes around related categories to form a larger theoretical scheme (Sharp et al., 2019).

ATLAS.ti offered a beta AI Coding tool powered by OpenAI. I was interested in seeing how AI would code an interview. The way this tool worked was that I would upload a transcript

of an interview, and the tool would analyze the document to produce coded categories that it thought was appropriate. It was interesting to test this feature on some of my interviews, but I found that I was not able to use a lot of the codes the AI produced because they did not make sense in the context of my research. For example, for one of my interviews, any time my participant mentioned “school”, the AI would generate a code for this. However, I solely interviewed students and focused on questions pertaining to their experiences using AI in the classroom; therefore, “school” was not a very meaningful code in the context of my research. There were some useful codes produced as well. For example, the tool generated a code called “trial and error” which was in reference to how students were able to learn how to use ChatGPT. I found this to be insightful, so it was a code I kept. Overall, it was interesting to see how AI tools are beginning to be integrated into many online platforms with the purpose of expediting what would otherwise be tedious manual work.

Chapter 4 - Results

The purpose of this study was to learn about how students in the College of IST at Penn State are using AI in their studies. Specifically, I study the different contexts in which students are using AI in their work as well as how they have used it thus far, and how they envision using it in the classroom going forward. My research questions are as follows:

RQ1: How do students believe AI will be used in their professional careers?

RQ2: How do students currently use AI in their academics?

RQ3: How do students believe AI should be integrated into classrooms in the future?

Many of the students interviewed were cybersecurity majors, followed closely by human-centered design and development (HCDD) majors. Students majoring in enterprise technology integration (ETI), data science, and information sciences and technology (IST) were also interviewed. Second-year, third-year, and fourth-year students were interviewed.

Table 1. Major Distribution

Major	**Number of Students**
Cybersecurity	8
HCDD	7
Data Science	3
ETI	1
IST	1

Table 2. Year of Participants

Year	Number of Students
Fourth-year	11
Second-year	6
Third-year	3

The most popular AI tool that students use is ChatGPT by far. Students used other AI tools such as GitHub Co-Pilot, Adobe Firefly, VS Code Whisperer, Google Bard, Microsoft Co-Pilot, Bing AI, and Grammarly. For students who use AI tools, there was a relatively even distribution of how frequently they use them.

Table 3. AI Tools Used by Students

AI Tool	Number of Students
ChatGPT	17
GitHub Co-Pilot	4
Adobe Firefly	1
VS Code Whisperer	1
Google Bard	1
Microsoft Co-Pilot	1
Bing AI	1
Grammarly	1

Table 4. Frequency of AI Tool Use

Frequency of Use	Number of Students
High (almost every day)	6
Medium (max 2-3 times per week)	5
Low (max once a week)	6
Don't Use AI Tools	3

After analysis of student response data, several themes emerged including that: 1) students believe they will be using AI in the workforce, 2) saving time is a large motivation for AI use, 3) professors and students should learn AI for course use, 4) AI should be integrated into the classroom as a tool, 5) ChatGPT is intuitive to learn, 6) students desire common AI guidelines across classes, 7) there is a lack of trust in AI-generated responses, and 8) dependency on AI inhibits learning. Each theme is discussed in more detail below.

Table 5. Student Attitudes Towards AI

Theme	Count
Students believe they will use AI in the workforce	53
Saving time is a large motivator	38
Professors & students should learn AI for course use	38
AI should be integrated into the classroom	85
ChatGPT is intuitive to learn	87
Students desire common AI guidelines	9
Lack of trust in AI-generated responses	59
Dependency on AI inhibits learning	56

Students Believe They Will Be Using AI in the Workforce

When students were asked about how they see AI being used in the future, they said that they will be using AI in their jobs after college. Some of these students have heard how professionals are using it in the workforce and this has prompted them to think about how it is taught in education. One student stated,

"I think AI is obviously already out there, and obviously people are using it. And I agree, I think it's the future of where technology is going. I think big companies want to start integrating AI within their workforces and within their products and us, as technology students, have to be able to know how that works and have to be able to integrate it with any solution or within our work. So, I think it's important that we're learning how to use it, and we're exposed to it and we're really getting into the nitty-gritty of AI within our education." [P16]

Another student stated,

"I think it will play a big role within cybersecurity. My dad [who is in cybersecurity] *was saying that a lot of the low, low/medium level tests will probably be gone and replaced with AI. So, I think it will have a big impact and we're going to have to learn how to work with AI instead of having it take over the jobs."* [P15]

Students have not only heard and believe that AI will be used in the workforce, but they are also thinking about how this could be incorporated into their education. Other students focused on how they are currently being prepared for the workforce in their classes. One student stated,

"Last year I took a coding Gen Ed in HTML. Our professor said, 'Hey, I know ChatGPT is on the rise and you can use it if you let me know that you did.' I think he was saying that employers will want us to know how to utilize our resources effectively and by using ChatGPT,

he wanted to guide us and show us how we can use these tools as a resource and not just have it do the work for us." [P11]

Several students shared their experiences with using AI in their internships. A student stated,

"I wish they gave students flexibility to, to kind of, use it how they wish. Is it really up to the professor? If a student is using AI and not learning, does it really matter? I've had internships where the developers I work with use it all the time. So if it's going to be a new standard, then let's make it a new standard in the academic world too." [P14]

Another student shared that,

"For my internship, I used it to create a GUI that would take in data and output an interface. I have never worked with that specific coding language, so ChatGPT was able to walk me through it and help me figure out what that does, what this does, and basically put everything together. That was really helpful." [P19]

Overall, students are thinking about how, especially in technological fields, they will be using AI in the workforce. They are attempting to align what they learn in the classroom with what they are experiencing in their internships and hearing about from professionals.

Saving Time is a Large Motivation for AI Use

When talking about using AI tools, students often mentioned how they will use them for efficiency purposes. They claim that they will use AI when they would like a quick answer to a question or to save time on an assignment. A student stated,

"There are a lot of times where I'm like, I've got so much other more important stuff to do, can I just give it this homework assignment and just have it do it for me and then check it to make sure it's actually correct, and then just get on with my day?" [P5]

When asked about the greatest advantage of using AI, another student answered,

"In terms of advantages, you get stuff done faster." [P8]

An interesting finding pertaining to students using AI to get work done faster is that many students will use ChatGPT as a search engine replacement. Instead of spending time looking through a page of results, they will use ChatGPT to get a specific answer that they can quickly use. One student said,

"It's sometimes easier to just search things up through ChatGPT as opposed to Google because even though it can be not what you're looking for, it's a fast answer." [P3]

This demonstrates that students will take advantage of opportunities to get their work done faster. Students mentioned that even though they could use ChatGPT for their work, they would review anything before submission.

Professors and Students Should Learn AI For Course Use

Students felt that since it seems like AI will become an inevitable factor in academia, professors should familiarize themselves with it. Students also believe that professors should be able to effectively teach students how to use AI in the classroom, if applicable. One student stated,

"I think teachers just need a fundamental understanding of how it works, the basic ways to use it, and then be able to teach it to their students and explain why they could use it and when they shouldn't. Technical literacy is needed now when trying to teach chatbots to others." [P4]

Students also commented on negative experiences that they have had with professors not being familiar with the AI tools they are incorporating into their classes. A student said,

"I've noticed the professor just doesn't really know the potential problems with the machine [AI]. *If professors really want to start using the machines, they need to be familiar with it instead of just having textbook knowledge. I think a lot of the time professors have textbook knowledge of these machines and don't understand there will be problems."* [P7]

Students have also had positive experiences with professors teaching students how to use different tools for assignments in their courses. A student stated,

"He [the professor] *gave us instructions on how to install the whole package and he basically did a walk-along. He says, 'I use it in my work so there's really no reason you shouldn't because it is a tool.' We spend time learning the basics of multiple languages and then we use AI to enhance that. I think that was a really nice approach."* [P14]

Students also suggested that professors who adopt and familiarize themselves with AI tools would be better able to convey academic integrity expectations more effectively. For example, a study participant stated,

"Them [professors] *demonstrating how to use it* [AI] *in a way that meets their academic integrity standards is helpful. For example, I think AI can be really helpful for debugging and they can show students that, in this specific instance, you can use AI tools to help you debug your code rather than just saying 'AI is horrible, don't ever use it'. That will just go in one ear and out the other."* [P8]

Students believe that there is an opportunity for professors to beneficially incorporate AI into the classroom. However, in order to have a positive impact on learning, students assert that professors need to have an understanding of the tools they plan to introduce into the classroom.

AI Should be Integrated Into the Classroom as a Tool

Students talked about how they see AI being integrated into the classroom as a tool to enhance student learning. Students also discussed the benefits that using AI in the classroom could bring. One student stated,

"I've definitely used it [AI] *for my upper-level coding classes. It's been very useful because they've given us the green flag to introduce it to the space. It's been pretty helpful."* [P14]

Another student said,

"IST 311 is a prime example of it being carefully integrated into a classroom. If you're carefully integrating it into a class like that, I think you have a better chance of your students actually trying to learn because you are trying to help them. At the end of the day ChatGPT, just like any type of technological tool, is exactly that – a tool. If you're taught how to use it correctly, you can get the most from that experience." [P6]

Students stated how they can see how it can be difficult to introduce AI into the classroom if students are able to use it to completely generate their assignments. Students suggested that the curriculum may need to be adjusted. One student said,

"The curriculum slowly needs to change to actually make us think without having to just ban this technology altogether because, again, it's not going anywhere." [P12]

Another student stated,

"If this [AI] *is going to be a thing, maybe we shouldn't be relying so heavily on assignments that you can copy and paste into this new technology and just get an A-level paper. Maybe we should just be changing the assignments to begin with."* [P5]

Students also discussed the specific attributes of ChatGPT that make it a beneficial learning tool. Students use the tool to summarize information into digestible bits and use it to quiz themselves. One student said,

"If students use it [AI] *the right way, then I think it can really foster learning. My brother uses it a lot and it really helped him learn. He needs a summary of things and that's how he can really internalize it. From there he can go deeper. ChatGPT definitely helps out with that."* [P20]

Another student said,

"It could also be a great learning resource for those who want to learn and it could be a great way to quiz yourself or study. It could be abused, but it could also be a great resource to develop your own academics and develop your own knowledge." [P16]

Some students drew on history to explain how they see AI being accepted in the classroom. They argue that like other technological advancements, academics will have to adapt to this new technology. One student gave an example,

"It's kind of like a calculator. When you were growing up, you first learn how to do all this math by hand. Eventually, teachers were like, 'okay, you should already know how to do that, now you can use a calculator to help you.' You can get through the problem faster and focus on more complex problems. I think AI is helpful in that sense." [P8]

ChatGPT Is Intuitive To Learn

When asked how students use AI tools, many students described their learning process as trial and error. Many students felt that AI tools like ChatGPT are intuitive to learn if you play around with them. When using ChatGPT to help with assignments, students will continue to prompt the tool until they get an adequate response. One student said,

"Nobody ever really showed me how to do it. I just pulled it up, started typing, and figured it out. If it gave me something I didn't like, I'd ask it to change it." [P10]

Similarly, another student stated,

"You just keep on asking a question. You realize that if you ask the question a certain way, it gives you the different type of answer, and then you learn to alter your question in a way where it gives you the kind of answer you want." [P2]

Even though students stated that this process is intuitive to learn, some students still remarked on the benefit of being officially taught on best ways to use ChatGPT. One student said,

"I attended this one seminar talking about AI and it's actually recommended that you start off generally so that it can get familiar with what you're going to talk about and then go from there with asking more specific questions. It was very useful. It really helped me to not just learn how to use AI, but also understand AI and how it works." [P11]

Even though these students had used ChatGPT before attending this seminar, they were still able to learn how to enhance their skills by receiving a formal education on it.

Students Desire Common AI Guidelines Across Classes

Students discussed how they have experienced confusion in terms of academic integrity policies across classes. Students mentioned how it would be beneficial to have a set of guidelines to follow in terms of how to appropriately use AI for their assignments. One student stated,

"Everyone is going to use it so you might as well set guidelines for how to use it." [P1]

Another student stated,

"I think if we start regulating it [AI use] *now or set guidelines for students, it's probably better to do it earlier rather than wait for them* [AI tools] *to get strong enough where it really becomes a problem."* [P18]

Students discussed personal experiences with attempting to follow academic integrity guidelines in their courses. They are frustrated at the vagueness of expectations in their courses. A student said,

"From my understanding, professors have been given the go-ahead for 300 and 400-level courses to start integrating the use of AI as an efficiency tool. That was the case for maybe 3 weeks and then most of my professors would try to make assignments 'un-ChatGPTable'. Then they're basically so vague to the point where there are no instructions. They don't want to give you enough details for AI to assist you, but then it's too little to even figure out what you're looking for." [P14]

Another student stated,

"I like it as a tool. I think it's able to support students in finding out minor errors and flaws in their code. I wish it was more widespread, accepted, and not based on one individual's opinion on how they should teach the class." [P10]

Lack of Trust in AI-Generated Responses

Even though students discussed the benefits of using AI tools in the classroom, they also pointed out how the responses that AI produces are not always accurate. Students commented on how they would take the time to read the responses that AI produced to see if it made sense and seemed correct. One student said,

"It's not always easy to know when it's lying and when it's not. My hope is that over time maybe there will be some way to just easily fact-check that stuff without having to go manually Google it." [P5]

Another student said,

"Even though it's as awesome as it is, you should still always take it with a grain of salt. The internet's the same way so maybe that's just the eternal problem. For me personally, I've never struggled getting the information I want, it's just, is it true?" [P16]

Students also talked about how they believe there is a perception that ChatGPT is generating the information. They think it is important that people realize that ChatGPT is pulling the information from the Internet and that is a reason it is not always accurate. A student stated,

"I feel like you need to know where the information is coming from. It's getting pulled from all around the Internet, it's not like ChatGPT is coming up with it. I feel like some people, like my parents, think it just comes right from ChatGPT. I'm like, 'No, that's not how it works.'" [P4]

Another student said,

"Just know that it's not always going to be correct because it's only reproducing information that it has been fed. Sometimes it can be biased or just incorrect. It's important to recognize that it's not always the most accurate source of information." [P3]

Students seem to have a level of skepticism about the information being produced from AI even if they still choose to use that information.

Dependency on AI Inhibits Learning

Students discussed how they believe that if students completely rely on AI to complete schoolwork, then they will not learn anything. They emphasize that it is up to the student whether they choose to use it as a tool or use it to complete entire assignments. One student said,

"I think a disadvantage with academics is that people that don't have the will to learn aren't going to learn from it. They're just going to abuse it. But honestly, that comes with anything, it just depends on the person's will to learn." [P19]

Another student stated,

"The greatest drawback, I think, to using AI in academics is that it gives you the solution. You're not learning anything." [P16]

Some students also shared their own personal struggles with using AI while still trying to learn the material. One student said,

"I definitely miss certain lessons because I've used AI. I've missed key points of the lecture or key concepts because I've just immediately gone to the AI machine. I'm like, I need it quickly, so I just asked for it, and it gave it to me. I think that kind of sets students back a lot, but they use it because it's accessible to them and they want to get their assignments done. That's definitely a drawback." [P7]

Another student shared,

"If I wasn't in such high classes, I would probably be using it. But once you start using it, you lose the value of learning, and you can't remember stuff as easily." [P9]

Students point out how it is easy to depend on AI, especially if a student is operating in the mindset of completing assignments as efficiently as possible.

Other Findings

Outside of academics, students mentioned using AI for creative projects and exploring the different tools for fun. Students related how they are currently using AI for idea generation and the creation of art. As an example, one student related how they used AI to assist in the creative writing process,

"This is just a fun thing I'm doing but I'm currently writing a murder mystery, which is kind of fun. I wrote it at too elevated of a tone, so what I've been doing in these past months is using AI to simplify my tone of writing and make it more aimed for the young adult space, which has been very cool." [P6]

Another student shared,

"My friend was trying to come up with a title for a blog she was going to make. Me and her just sat and used ChatGPT to come up with names because neither of us could think of any. It really didn't give us anything great, but we thought it was funny and it got our thought process going." [P4]

Students also mentioned that they were curious about the "behind the scenes" of AI. They mentioned how they would like to know exactly how AI is able to generate responses and where it is getting its data from. One student said,

"I think it's important to know where the information is coming from. I do care about the background, like where the data is coming from and what is it being trained on." [P19]

When interviewing data science majors, I found that the data science professors these students had seemed open to using AI in their courses. Some of the students attributed this to the professors working on AI research and having a deeper understanding of it. One student said,

"I think they [the professors] *are just more proactive and knowledgeable. A lot of them are working on other studies while they're also being professors. So, a lot of them are also very knowledgeable on set issues of AI. For example, some of my teachers have actually used AI in high-level situations like diagnosing certain X-ray or MRI scans of patients. So, I feel like with their domain knowledge of AI they were much more informed on the situation, and they were quick to jump on it."* [P18]

Another student said,

"That [ChatGPT] *was a big thing with the data science community. A lot of our teachers had a lot of knowledge around* [its] *creation."* [P17]

Creative extracurricular use of AI and the data science students' experience were other interesting findings demonstrating how students have used AI tools. These results revealed information about how students see AI being used in their careers, how students are currently using AI, and how they think it should be integrated into the classroom.

Table 6: Quote Guide

Person	Major	Year
P1	Cybersecurity	4
P2	ETI	4
P3	HCDD	2
P4	HCDD	2
P5	Cybersecurity	4
P6	HCDD	4
P7	HCDD	4
P8	Cybersecurity	4
P9	HCDD	4
P10	Cybersecurity	3
P11	Cybersecurity	4
P12	IST	4
P14	HCDD	2
P15	Cybersecurity	2
P16	HCDD	2
P17	Data Science	3
P18	Data Science	4
P19	Data Science	3
P20	Cybersecurity	4

Chapter 5 – Discussion

The results found through my research can provide insights into how AI can be integrated into classrooms. In the first three sections, I discuss how the findings correspond to the research questions posed and detail their specific implications. Subsequently, I explore the broader implications of this work. The chapter concludes with a discussion of the limitations of the study as well as directions for future work.

How Do Students Believe AI Will Be Used in Their Professional Careers?

I asked students one question in my interviews pertaining to how they see AI being used in their professional careers. Students mentioned how they would be working in tandem with AI to improve their work efficiency and for idea generation. Since students see these AI tools being prevalent in their postgraduate lives, it is important to determine how students can be better prepared for this evolving workforce. This finding relates to the sentiments expressed by Sullivan et al. (2023) that increased literacy in AI will increase employability outcomes. The implications of these results involve institutions integrating AI into classrooms, an increased focus on developing students' AI skills, and increased exposure to prevalent tools. It is the duty of educational institutions to prepare students for their professional lives. There is a growing recognition among students that they will be using AI tools in their professional lives, so it is imperative that educational institutions begin the process of working to integrate AI into education. Specifically, students should be learning the skills to more effectively utilize AI tools. For example, how to use them to complete work while still ensuring its quality and understanding. Students also need to be exposed to the range of AI tools that are being used in

the professional world. The more familiar and educated students are about new AI tools, the more this will benefit them in their professional endeavors.

How Do Students Currently Use AI In Their Academics?

Many students mentioned that a prevalent motivation for using AI tools in their academics is to save time. They mentioned how, when an assignment feels monotonous, they will rely on AI tools to complete it. Students seemed to be enthusiastic about the prospect of being encouraged to work in tandem with AI tools on assignments in order to learn the content and how AI can be useful in different instances. Implications of this could be to slowly introduce new assignments that encourage the AI/human relationship. Students might be dissuaded from using AI to complete their entire assignments, they could learn more content, and they could be better prepared for the future. A different narrative surrounding "AI-proof" assignments needs to be developed. Curriculum needs to change in a way where students can have full access to AI tools without academic integrity concerns. This means creating assignments that allow students to work with AI to complete but demand a degree of originality or critical reflection from the student.

An interesting dichotomy emerged from my research where students discuss how they use AI to save time, but they believe that reliance on AI inhibits learning. The data seems to reveal that many college students are simply trying to find ways to optimize their time – and when balancing responsibilities, students are willing to make sacrifices when and where they can. AI tools create an avenue for students to sacrifice learning for time. However, changing the

curriculum as previously discussed to make these two results not mutually exclusive could allow students to save time on their schoolwork, while still learning important concepts.

Many students also mentioned how ChatGPT was intuitive to learn. Students described the trial-and-error process they go through to get an answer they want from ChatGPT. This demonstrates how students are adaptable and can pick up new tools swiftly as they have done with ChatGPT. This indicates that when professors introduce tools in the future, they can rely on students to learn common patterns of usage and how to translate this information to achieve desirable outcomes with respect to student learning.

Students discussed a lack of trust in AI-generated responses. They said that when they receive an answer from AI tools, they must be careful not to automatically believe that the response is true. The implications of this affect both educators and students. Educators must emphasize the importance of establishing a baseline of knowledge. Basic skills should still be thoroughly taught to students with corresponding assessments to ensure students are prepared and learning. Educators should also teach students how to critically assess the information produced by generative AI. This could involve providing examples of ways that students could use AI for assignments and scrutinize produced information to determine if it is appropriate for the assignment. Students should familiarize themselves with techniques such as fact-checking to ensure that they are evaluating work produced by AI instead of taking everything at face value. This will also allow students to work with AI instead of developing a dependence on it.

How Do Students Believe AI Should Be Integrated into Classrooms in the Future?

Students expressed a desire for professors to learn about different AI tools that are relevant in their course. They talked about how they liked when they were presented with a new tool to be able to use in coursework. Students stated how it could dissuade misuse of AI tools if professors were able to teach students how to use the proper tools in an appropriate way in the context of their course. This finding helps to fill a gap in current research where there is a lack of information surrounding the perspectives of students on AI integration in the classroom. Educators should take the time to become familiar with the different AI tools that impact the content of their courses. They should become knowledgeable enough with these tools to communicate to students places in a given course for which their use is appropriate – ideal even – for use. When educators take the steps to become knowledgeable about current technology and are open to integrating it within the classroom, it shows that they care about the class and students are more motivated to succeed.

Students talked about how they believe AI should be integrated into classrooms. They mentioned numerous use cases such as using AI tools in higher-level classes to assist with programming and using it for idea generation. It would be beneficial to integrate AI into courses with the understanding that students must develop a baseline of knowledge that they can reference when using AI tools. This finding relates to findings from Chan (2023), Halaweh (2023), and Sullivan et. al (2023) where they determined that, even though there are challenges, new AI tools present a great opportunity to enhance student learning.

Students also expressed frustrations with a lack of common AI guidelines across courses and even within classes. Students talked about how they can use AI for certain purposes in one classroom, but then are banned in other classrooms. They also talk about how within classes they

can use AI on certain assignments, but it is banned on other assignments. This confuses students and can contribute to the misuse of AI tools. This result reinforces the assertion by Neumann et al. (2023) that challenges for students when navigating how to use AI tools in an academic setting are using AI without clear rules and there being different policies in different classes. It can be hard to establish a blanket AI policy across a college because many courses and assignments have different purposes. It would be beneficial for professors to demonstrate, either at the beginning of the semester or on an assignment basis, how to appropriately use AI on their assignments. If students are given an explicit guide on how to use AI tools, they would be less likely to misuse them. There should be clear rules defined in individual classrooms on how to appropriately use AI in the context of that course. If this is established, this could eliminate the challenge of ambiguity that students face.

Implications

Students will be using AI in their future professional endeavors, and it is important that AI be incorporated into the classroom now. This comes with challenges such as preventing AI from doing the work for students and negating learning. AI needs to be carefully integrated into the classroom to enhance – but not inhibit - learning. This could begin with an analysis of the prevalent AI tools being used in the industry and their capabilities. Then, an examination of the current curriculum needs to occur where educators determine what the core content of their course is. After determining this, assignments can be modified to demand a demonstrated understanding of this material from students. After this is completed, the rest of the course curriculum should be reworked to incorporate the use of relevant AI tools in assignments. By

using this approach, students will develop a baseline of knowledge that they can use in tandem with AI tools to enhance their understanding while preventing dependency on AI.

It will be the responsibility of the student to view AI tools not merely as a way to bypass assignments, but rather how to leverage these tools effectively to enhance their learning. Students should view using AI in their curriculum the same way as using a calculator in that the student must use AI as a tool. Failing to learn effective use of these tools alongside the core content threatens to short-circuit the learning process – and, by extension, their success in a professional setting.

Limitations

My method of data collection was convenience sampling; therefore, my results cannot be generalized to a larger population (Sharp et al., 2019). My sample was twenty students in the College of IST at Penn State which also means my results are not representative of a larger population. Even though the scope of my research was focused on students in the College of IST, my participants were not evenly distributed among majors in the college. A large sample size could have allowed for more representative results as well.

Since I was the only one analyzing the results of my data, my analysis could be affected by my own interpretation and perception (Strauss & Corbin, 1994). My research also has no inter-rater reliability as I solely coded my interviews. Research concerning AI in education is also a new and rapidly changing field. New generative AI tools are being developed and used at a fast pace. Due to this changing environment and lack of extensive prior research, there are no established recommendations and guidelines in the area of AI in education.

Areas of Future Research

I believe it would be beneficial to open a discourse between students and instructors. Students mentioned how in some instances they felt like instructors did not understand their points of view and motivations. It would be interesting to see how students and instructors interact and share their opinions in a setting such as a focus group. Having students and instructors be able to empathize with each other could allow for great progress to be made when it comes to determining new course policies and assignments.

I would like to conduct more extensive research on current AI tools being used. Most students use ChatGPT universally in their schoolwork, whether they are looking for writing, coding, or other types of aid. However, specialized AI tools are starting to emerge (such as GitHub Copilot) that are useful in specific domains. Determining what tools are being used in the industry and analyzing how they can be integrated into specific class types could serve as guidance to institutions on how to use these tools in education.

Through this research, I discovered an interesting dichotomy between students wanting to save time on their work by using generative AI, but believing that using generative could inhibit learning. I would like to interview students more extensively to determine if there is a way that students could feel like they are enhancing their learning but still saving time by using AI tools. It would also be interesting to see how students feel when asked to reflect on their standing in the course given how much they rely on AI. These results could be beneficial when trying to create a groundwork for integrating AI into classrooms.

Even though my study was focused on the College of IST at Penn State, it could be intriguing to conduct a similar study on the entirety of Penn State's campus. In the technological realm, I believe there are clear benefits to learning how to use AI tools. However, I would like to

see students' perspectives in colleges outside of IST. For example, how do students in the College of Arts & Architecture use AI tools and do they see benefits to these tools being integrated into the classroom?

In order to help validate the results of my research, I think it would be beneficial to have a similar qualitative analysis conducted at other universities across the country. Learning how instructors are currently implementing AI tools and hearing the students' perspectives on this could shed light on new effective methods for the integration of AI into the classroom.

Chapter 6 – Conclusion

With the recent advent of widespread AI use in academics, it is important to research the relationship between students, educators, and AI. Through my literature review, I was able to learn that there is a call for educational institutions to update their policies and guidelines to account for the use of generative AI in academics. I also learned that there are numerous opportunities and benefits of integrating AI academics such as the opportunity to enhance student learning and employability outcomes. However, this does not come without challenges and questions as to how to effectively integrate AI into education without sacrificing academic integrity. Through my qualitative analysis of students in the College of IST at Penn State, I was able to provide insight into the different contexts in which students are using AI in their work, how students have learned how to use AI to accomplish their learning goals, and how students see AI being used in the classroom in the future. The results of my research can inform educational institutions on effective ways to integrate AI into the classroom while still preserving the fundamental learning process. Creating classroom policies centered around the education and integration of new technological tools will not only encourage students to use these new tools in ethical ways but will better prepare them for the future.

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ACADEMIC VITA

Maria E. Czura

Design Portfolio: https://mec031502.wixsite.com/mariaczura

EDUCATION

The Pennsylvania State University, Schreyer Honors College *Expected May 2024*

Bachelor of Science in Human-Centered Design and Development

College of Information Sciences and Technology

Minor: Security and Risk Analysis

Dean's List Recipient *Fall 2020 - Spring 2023*

Plum Senior High School *May 2020*

RELEVANT EXPERIENCE

Deloitte Global Software Development Internship *June 2023 - August 2023*

- Created MVC application in C# using the .NET framework which connects to an API to pull user data from a database and display it to users
- Created front-end intern welcome site using AngularJS, HTML, and CSS to display information pertaining to current interns

THON Volunteer - Lead Developer for THON.org *May 2023 - Present*

- Lead team of developers to create and update features on public facing THON sites
- Transition current THON.org site from WordPress to hosted application using Vue.js and Python

PPG UX Design Internship *May 2022 - July 2022*

- Utilized agile development to deliver features for core mobile applications
- Designed and conducted user research on key stakeholders for new UK mobile application

Nittany AI Challenge - SchizophrenAI *November 2021 - Present*

- Awarded second place in competition to utilize artificial intelligence to address pressing global issues
- Designed application called SchizophrenAI to serve as a tool for trained and untrained medical professionals in areas lacking proper medical care to help detect objective symptoms of schizophrenia
- Created high fidelity prototypes, usability testing, and research plan

ACTIVITIES AND WORK EXPERIENCE

Learning Assistant for College of IST *August 2021 - Present*

- Support instructors with teaching-related tasks (grading, holding office hours, assisting students)
- Serve as learning coach and mentor for students

Peer Tutor for College of IST *March 2022 - Present*

- Work one-on-one with peers in the College of IST to provide assistance and support for students as they learn new concepts

SKILLS

- Java, C#, Android Studio, Vanilla Javascript, AngularJS, Node JS, HTML, CSS, SQL, APIs
- Experience working in GitHub, Azure DevOps, Android Studio, Figma, Adobe XD, MS Visual Studio Code, IntelliJ, MS SQL Server 2008, MS Word, MS Visual Studio
- Utilize design thinking process, agile development, personas, scenarios, storyboards, customer journey maps, user flow diagrams, site-maps, use-case diagrams, style guides, high/low fidelity prototypes, product backlogs, assumption mapping, walkthroughs, and usability testing

HONORS AND AWARDS

Evan Pugh Scholar Award - Senior *Spring 2023*
Edward M. Frymoyer Honors Scholarship *Spring 2022*
President Sparks Award *Spring 2022*
President's Freshman Award *Spring 2021*