

An Exploratory Study on the Impact of Generative AI on Student Learning in Higher Education

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**Abstract**

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The rapid advent of Generative Artificial Intelligence (GenAI) tools, such as ChatGPT, is transforming academic landscapes, presenting both opportunities and challenges. This study explores how university students leverage GenAI for learning at a large public university in the United States, focusing on their usage and perceptions of these tools in higher education. The findings reveal students' experiences harnessing GenAI for various purposes, including drafting assistance, knowledge synthesis, and cross-disciplinary applications. The study also investigates students' perceived benefits and limitations of GenAI technologies in educational contexts, as well as the salient ethical concerns they express regarding the integration of GenAI systems into higher education. Additionally, the research underscores the pressing need for developing critical

ethical considerations and guidelines for the use of GenAI in higher education, particularly from the perspective of students as key stakeholders in the academic ecosystem.

This study contributes to the growing body of research on the impact of GenAI in higher education and provides valuable recommendations for educators and administrators seeking to harness the potential of these tools while mitigating potential risks and challenges. Ultimately, the successful integration of GenAI in higher education will require ongoing collaboration, adaptation, and innovation from all stakeholders involved in the academic ecosystem.

Highlights:

- This study focuses on university students' usage of generative AI (GenAI) technologies, like ChatGPT, in higher education settings at the University of Washington.
- Students' perceptions of generative AI technologies in higher education were explored, specifically focusing on aspects such as motivation, ethical concerns, and improvement.
- A survey and focus group interviews with 11 undergraduate and graduate students from various disciplines revealed a generally positive attitude toward the use of GenAI in teaching and learning.

## **1. Introduction**

Generative Artificial Intelligence (GenAI), a subset of AI that focuses on creating new content, such as text, images, and music, has emerged as a transformative force, revolutionizing industries and reshaping societal landscapes across various domains. What sets GenAI apart from traditional AI is its ability to learn from vast amounts of data and generate novel, context-aware outputs without being explicitly programmed (Goodfellow et al., 2014). GenAI leverages

advanced deep learning algorithms, particularly Generative Adversarial Networks (GANs) and Transformer architectures, which enable the model to capture complex patterns and relationships within the training data (Goodfellow et al., 2014; Vaswani et al., 2017). These innovative architectures allow GenAI to generate highly realistic and coherent content by continually refining its outputs based on feedback from discriminator networks, resulting in more efficient and accurate predictions compared to traditional rule-based or shallow learning approaches (Creswell et al., 2018). By leveraging advanced neural network architectures, GenAI has transformed the field of weather forecasting, empowering scientists to analyze vast amounts of historical weather data and generate highly precise predictions of future weather events. In the healthcare sector, GenAI has played a pivotal role in advancing cancer diagnosis and treatment, enabling medical professionals to identify specific cancer types and develop personalized therapies with unprecedented accuracy and efficiency (Roumeliotis & Tselikas, 2023). These groundbreaking applications of GenAI showcase its remarkable capabilities and immense potential to drive significant advancements in research, industry, and society as a whole, paving the way for a future where AI-driven innovations are seamlessly integrated into our daily lives.

In the realm of higher education, GenAI stands poised to augment the effectiveness of teaching methodologies and streamline institutional operations by tailoring pathways to achieve educational goals with greater personalization and efficiency. AI-powered tutoring systems can provide immediate personalized feedback and guidance to students, while adaptive learning platforms can dynamically adjust content based on individual learning styles and progress. Moreover, AI-driven assessment tools can offer instant grading and feedback on assignments, revolutionizing the way educators evaluate student performance (Baker, 2021; Luckin et al., 2016). The imperative for universities to develop a comprehensive strategy for AI integration is

no longer a matter of choice but a necessity. As higher education institutions navigate this era of technological integration, it becomes crucial to comprehend how both students and educators perceive the role of AI in shaping academic endeavors. While the potential of AI in facilitating personalized and adaptive learning experiences is promising (Luckin et al., 2016), questions regarding the acceptability, effectiveness, and potential drawbacks of AI tools in higher education remain largely unexplored. It is essential for researchers and educators to delve deeper into these aspects to ensure that the integration of AI in academic settings is not only technologically feasible but also pedagogically sound and socially responsible.

## **1.1 Background**

Generative artificial intelligence (GenAI) tools<sup>1</sup> are rapidly emerging, with the potential to revolutionize teaching, learning, and assessment practices in higher education. As GenAI tools continue to evolve, there is an ongoing interplay between traditional pedagogical approaches and cutting-edge AI capabilities, leading to re-mediation processes<sup>2</sup> that reshape the dynamics of teaching and learning (Boyd, 2014; Bolter & Grusin, 1999).

The integration of GenAI tools in higher education presents both opportunities and challenges. These technologies can enhance student engagement, provide personalized learning experiences,

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<sup>1</sup> GenAI refers to AI systems capable of generating novel and contextually relevant content, such as text, images, and code (Ng, 2022).

<sup>2</sup> Re-mediation processes refer to the ways in which new technologies, such as GenAI tools, are integrated into existing educational practices and reshape the dynamics of teaching and learning (Bolter & Grusin, 1999).

and improve learning outcomes (Woolf et al., 2013). However, their adoption also raises concerns about academic integrity, digital literacy, and the ethical implications of relying on AI-generated content (Conati et al., 2018; Chen & Zhu, 2023). One major concern is the potential misuse of AI-powered writing assistants, leading to a lack of critical thinking and original thought (Akinwalere et al., 2022). Moreover, AI-generated content may perpetuate biases and inaccuracies if the underlying algorithms are not properly designed and trained (Barocas & Selbst, 2016). GenAI tools are also prone to hallucinations<sup>3</sup>, which can lead to the spread of misinformation and the erosion of trust in AI-generated content (Ahmed et al., 2024). Additionally, the use of GenAI tools raises concerns about data privacy and security (Chen & Zhu, 2023). Another ethical consideration is the potential blurring of boundaries between human and machine-generated work, challenging traditional notions of authorship, originality, and intellectual property (Eaton, 2021). To address these concerns, educators and institutions must develop robust academic integrity policies, digital literacy curricula, and ethical frameworks to guide the responsible use of GenAI tools in academic contexts (Bretag et al., 2019; Prinsloo & Slade, 2017).

In conclusion, the integration of GenAI tools in higher education presents a complex landscape of opportunities and challenges. By proactively addressing these issues through policy, pedagogy, and responsible AI development, educators and institutions can harness the power of GenAI to support student learning and success while upholding the values and integrity of higher education.

## **1.2 Research Questions**

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<sup>3</sup>Hallucinations in the context of GenAI refer to the generation of content that is not based on factual information or reality. This can occur when the AI model generates outputs that are inconsistent, nonsensical, or not grounded in the input data (Ahmed et al., 2024).

This study examines the re-mediation<sup>4</sup> (Bolter & Grusin, 1999) processes surrounding GenAI integration into higher education by analyzing how students incorporate these tools into their technology-mediated learning routines. We argue that understanding students' experiences, perceptions, and ethical concerns regarding GenAI integration is crucial for developing effective strategies for incorporating these transformative technologies into academic settings. By examining students' motivations, successes, challenges, and perspectives, we aim to provide valuable insights into the opportunities and risks associated with GenAI adoption in higher education. Specifically, the research investigates three central questions:

1. What specific academic tasks do students use GenAI for in their learning processes within higher education contexts?
2. What benefits and limitations do students perceive when utilizing GenAI technologies in higher education contexts?
3. What salient ethical concerns do students express regarding the integration of GenAI systems into higher education?

Through a mixed-method approach encompassing surveys and interviews (Creswell et al., 2017), this investigation delves into the nuances of how university students across disciplines engage with and experience GenAI capabilities. The findings contribute to a deeper understanding of how GenAI tools can be effectively integrated into higher education while addressing students' needs, concerns, and aspirations. By shedding light on the complex dynamics surrounding GenAI adoption in academia, this study aims to inform the development of evidence-based

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<sup>4</sup> Re-mediation is a theory proposed by Bolter and Grusin (1999) that describes how new media technologies refashion and improve upon older media, creating new possibilities for communication and knowledge construction. The theory emphasizes the dynamic interplay between old and new media in shaping human experience and understanding.

strategies and best practices for harnessing the potential of these transformative technologies while navigating their inherent challenges. The insights gained from this research could have long-term implications for shaping the future of AI integration in higher education, promoting learner-centered curriculum design, and ensuring that these technologies are leveraged in a manner that enhances learning outcomes, fosters student success, and enables the development of responsive AI systems that adapt to diverse learning needs and contexts.

### **1.3 Personal Statement**

As an international student and researcher exploring the integration of generative AI (GenAI) in higher education, it is essential to acknowledge my own journey and experiences with using AI technologies, particularly ChatGPT, throughout my academic journey. My initial encounter with ChatGPT 3.0<sup>5</sup> was as a language-translation tool, transitioning from traditional technologies like Google Translator to more advanced AI-powered solutions. As a native Chinese speaker, I found ChatGPT's translations to be more accurate and human-like compared to other tools I had previously used, sparking my interest in exploring the potential applications of GenAI in education (Zawacki-Richter et al., 2019).

Engaging with ChatGPT further, I discovered its usefulness for quick information searches and knowledge acquisition (Gao et al., 2020). With the progression to ChatGPT 3.5<sup>6</sup>, I leveraged the tool for organizing notes and generating insights for writing. As an international student, I often struggled with grammar and paper formatting accuracy. While I had previously used tools like

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<sup>5</sup>ChatGPT 3.0, released in 2020, is based on the GPT-3 architecture and has 175 billion parameters (Brown et al., 2020).

<sup>6</sup> ChatGPT 3.5, released in 2022, is an improved version of the model that incorporates reinforcement learning with human feedback (RLHF) to better align with user intentions and produce more coherent and relevant responses (Ouyang et al., 2022). ChatGPT 3.5 also has better performance in terms of language understanding, context awareness, and task completion compared to its predecessor (OpenAI, 2022).

Grammarly<sup>7</sup>, I found ChatGPT 3.5 to be a more comprehensive, intuitive, and affordable solution, allowing me to focus on developing innovative ideas and arguments while the tool assisted in refining language and structure.

My experiences with ChatGPT led me to reflect on how this powerful tool had transformed my learning process and outcomes, prompting me to wonder how other students in higher education were using GenAI tools and how their educational experiences were evolving (Becker et al., 2022; Luan et al., 2020). These questions motivated me to undertake this research project, aiming to contribute to the growing body of knowledge on GenAI integration in academic settings. Throughout this research, I actively engaged with ChatGPT and other GenAI tools to assist in various tasks (Sumakul et al., 2020). While these tools enhanced my efficiency and productivity, I grappled with the ethical considerations surrounding their use in academic work, such as academic integrity, transparency, and authorship. I made a concerted effort to ensure my use of these tools aligned with the principles of academic integrity, documenting my interactions, distinguishing between my own ideas and those generated by AI, and engaging in ongoing reflection and dialogue about responsible use of these technologies (Becker et al., 2020, Zawacki-Richter et al., 2019). Therefore, I hope to contribute to the ongoing dialogue around the role of GenAI in higher education and provide insights that can inform the development of policies, practices, and pedagogies that harness the potential of these technologies while mitigating their risks and challenges.

## **2. Literature Review**

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<sup>7</sup>Grammarly is a popular AI-powered writing assistant that helps users improve their grammar, spelling, punctuation, and overall writing quality. It offers both free and premium versions, with the latter providing more advanced features such as plagiarism detection and vocabulary enhancement suggestions.

## **2.1 Generative AI and Implications for Higher Education**

The advent of generative artificial intelligence (GenAI) technologies, exemplified by large language models (LLMs) like GPT-3, has catalyzed a paradigm shift in human-AI interaction.

These AI systems' remarkable ability to comprehend and generate human-like text, visuals, code, and other outputs has been driven by breakthroughs in deep learning and the exponential increase in model parameters trained on massive datasets (Li et al., 2020). GenAI leverages advanced techniques such as transformer architectures, unsupervised pre-training, and fine-tuning to enable the generation of contextually relevant and coherent content (Vaswani et al., 2017; Devlin et al., 2019). The versatility of GenAI extends far beyond traditional AI applications, reshaping sectors like content creation, translation, and even education (Bommasani et al., 2021).

In academic contexts, GenAI tools offer opportunities to augment literacy tasks by providing writing assistance, knowledge synthesis, text summarization, and resource generation capabilities (Farrelly et al., 2023). For instance, AI-powered writing assistants like Grammarly and Writefull employ GenAI models to provide real-time feedback on grammar, style, and tone, helping students refine their writing skills (Xu et al., 2022). Similarly, GenAI-based summarization tools can condense lengthy academic articles into concise summaries, facilitating efficient information processing and knowledge acquisition (Gambhir & Gupta, 2017). Furthermore, GenAI technologies can generate personalized learning resources, such as practice questions and explanations, tailored to individual students' needs and proficiency levels. This disruption portends profound implications for teaching, learning, and assessment practices in higher education. However, as GenAI becomes more frequently used in university settings, significant challenges and ethical risks arise (Chan & Hu, 2023). Concerns surrounding academic integrity, privacy violations, algorithmic biases embedded in training data, and the environmental toll of

powering these immense models necessitate a judicious approach to their adoption (Bender et al., 2021; Bommasani et al., 2021). The ease with which GenAI tools can generate high-quality content raises questions about the authenticity of student work and the potential for AI-plagiarism (Chen & Zhu, 2023). Moreover, the reliance on vast amounts of training data collected from various sources poses privacy risks, as personal information may be inadvertently included in the generated outputs (Abadi et al., 2016). Algorithmic biases present in the training data can also perpetuate societal stereotypes and discrimination, leading to unfair outcomes for marginalized groups (Bender et al., 2021). Additionally, the computational resources required to train and deploy large-scale GenAI models contribute to significant energy consumption and carbon emissions, raising environmental sustainability concerns (Strubell et al., 2019).

A holistic understanding of GenAI's impact requires perspectives from key stakeholders navigating its integration into higher education firsthand. This backdrop underscores the importance of the present study, which investigates university students' experiences, perceptions, and ethical considerations regarding GenAI tools through the theoretical lens of re-mediation dynamics. By examining how students incorporate these technologies into their academic routines, the research illuminates pathways for optimally leveraging GenAI's capabilities to transform learning while upholding ethical standards and academic integrity.

## **2.2 Impact of GenAI on Higher Education**

The integration of Generative Artificial Intelligence (GenAI) into language-related tasks has profoundly reshaped the landscape of higher education, fundamentally altering how students interact with language technologies and engage in academic communication. GenAI tools have become instrumental in various aspects of academic life, offering enhanced accessibility to

information and services through AI-driven language technologies. Virtual assistants like Siri, Alexa, and Google Assistant are ubiquitous in educational settings, providing students with instant access to information, reminders, and hands-free control of devices through natural language interaction (Chung et al., 2021). These AI assistants employ GenAI models to understand and respond to user queries, enabling seamless and efficient access to relevant information and resources (Sarikaya, 2017). By leveraging voice-based interfaces, GenAI-powered virtual assistants also promote inclusivity and accessibility for students with diverse needs and abilities (Goel, 2020). Furthermore, GenAI-powered language translation tools have revolutionized cross-lingual communication in higher education, breaking down language barriers and fostering global connectivity. Platforms such as Google Translate and Microsoft Translator leverage AI algorithms to facilitate real-time translation of text and speech, enabling students to communicate effectively across languages and cultures (Wu et al., 2016). These tools employ advanced techniques like neural machine translation and transfer learning to improve translation quality and fluency (Johnson et al., 2017; Lample et al., 2018). The integration of GenAI in language translation has significant implications for international collaboration, academic research, and multicultural learning experiences, promoting greater intercultural understanding among students (Mohamed et al., 2021). For instance, GenAI-powered translation tools facilitate the exchange of ideas and knowledge across linguistic boundaries, enabling students to access a wider range of research materials and collaborate with peers from diverse backgrounds.

Despite the numerous benefits of GenAI in language-related tasks, concerns about its potential negative impacts on students in higher education persist. One major concern revolves around the perpetuation of biases and stereotypes in AI-generated content, which can reinforce existing

social inequalities and discrimination (Bender et al., 2021). GenAI models trained on large datasets may inadvertently learn and amplify societal biases present in the training data, leading to the generation of content that reflects gender, racial, and cultural stereotypes (Blodgett et al., 2020). For example, when testing out prompts with ChatGPT-3.5 during presentations, it becomes apparent that AI-generated content may inadvertently reflect gender, racial, and cultural biases (Curry & Rieser, 2018). These biases often originate from the inherent biases present in the data used to train the AI models, which are typically sourced from internet content, books, and other human-generated texts (Caliskan et al., 2017). The training data itself is a product of societal norms, historical inequalities, and human prejudices, which are then absorbed and perpetuated by the AI models during the learning process (Bolukbasi et al., 2016). Consequently, when GenAI models generate content, they may inadvertently reproduce and amplify these biases, leading to the creation of text, images, or other outputs that reflect gender, racial, and cultural stereotypes (Nadeem et al., 2020).

As GenAI technologies become increasingly integrated into academic communication, the potential for linguistic homogenization and the imposition of standardized expressions warrants careful consideration (Talayhan, 2023). GenAI models trained on large corpora of text may favor dominant linguistic patterns and expressions, potentially diminishing linguistic diversity and promoting conformity to a specific language variety (Hovy & Spruit, 2016). This linguistic homogenization can have detrimental effects on students' creative expression and the preservation of unique cultural and linguistic identities (Talayhan, 2023).

In light of these considerations, it is imperative to explore how students incorporate GenAI tools into their technology-mediated learning routines, examine their perceived benefits and limitations, and address the ethical concerns associated with the integration of GenAI systems

into academic settings. Such inquiries are crucial for promoting the responsible and ethical use of GenAI technologies in higher education, ensuring that they enhance rather than hinder student learning experiences (Caliskan et al., 2017; Bommasani et al., 2021). By critically examining the impact of GenAI on various aspects of academic life, educators and policymakers can develop informed strategies to mitigate potential risks and harness the benefits of these technologies for inclusive and equitable education (Selbst et al., 2019).

### **2.3 Re-mediation: GenAI Integration in Higher Education**

The complexities surrounding the integration of GenAI in higher education necessitate a thorough exploration of the re-mediation processes to optimize learning experiences. By understanding how GenAI tools interact with and augment existing educational practices, educators can harness the potential of these technologies to support student learning and achievement (Cardona et al., 2023). This involves developing pedagogical strategies that effectively integrate GenAI capabilities into curriculum design, instructional delivery, and assessment practices while fostering digital literacy skills among students and educators (Gilster, 1997). The concept of re-mediation, as defined by Bolter and Grusin (1999), provides a valuable framework for understanding the transformative impact of GenAI on higher education.

Re-mediation theory posits that new technologies reshape and refashion old ones, altering the ways in which people interact with and make sense of their environment. In the context of higher education, the integration of GenAI tools alongside traditional pedagogical technologies represents a significant shift in the learning dynamics between students and professors (Luckin et al., 2016).

As students increasingly use GenAI tools for various academic tasks, the nature of their interactions with professors and course content evolves, challenging traditional notions of authority, expertise, and the role of the educator in the learning process (Popenici & Kerr, 2017). This shift necessitates a re-evaluation of pedagogical approaches and the development of new strategies for fostering critical thinking, creativity, and collaboration in the age of AI while preserving the value of human connection and mentorship in the learning process (Bolter & Grusin, 1999). The evolution of student learning in the era of GenAI also has broader implications for the structure and organization of higher education institutions. As re-mediation theory suggests, the integration of new technologies often leads to the reorganization of social and cultural practices (Bolter & Grusin, 1999). In the case of GenAI, this may involve the development of new curricula, assessment methods, and faculty roles that are better suited to the affordances and challenges of AI-enhanced learning environments.

Ultimately, the re-mediation of higher education through GenAI represents both an opportunity and a challenge. While these technologies have the potential to transform learning in powerful ways, their successful integration will require a deep understanding of the complex interplay between technology, pedagogy, and human interaction. By engaging with the concept of re-mediation, educators and researchers can develop a more nuanced perspective on the impact of GenAI on higher education and work towards the creation of learning environments that harness the benefits of AI while preserving the essential human elements of education.

#### **2.4 GenAI in Higher Education: Ethical Considerations**

The integration of GenAI into educational practices exemplifies the process of re-mediation, as these technologies reshape the ways in which students engage with information, communicate,

and learn (Gilster, 1997). AI-powered tools such as virtual assistants and language translation platforms leverage GenAI models to provide students with efficient and personalized support, enhancing their learning experiences (Chung et al., 2021; Wu et al., 2016). However, the integration of GenAI into higher education is not without challenges, as concerns about biased outcomes, privacy violations, and academic integrity arise (Bender et al., 2021; Bommasani et al., 2021; Chen & Zhu, 2023).

The systematic integration of GenAI into educational settings highlights the dynamic nature of technology-mediated learning routines. Students are seamlessly incorporating AI-generated content with human-crafted materials to accomplish various academic tasks, creating new forms of knowledge construction and learning experiences (Williamson et al., 2021; Cardona et al., 2023). While GenAI tools offer immense potential for enhancing learning experiences, their effective integration requires a nuanced understanding of the re-mediation processes at play (Williamson et al., 2021).

To optimize learning experiences, it is imperative to explore GenAI re-mediation processes within higher education. This involves developing pedagogical strategies that effectively integrate GenAI capabilities into curriculum design, instructional delivery, and assessment practices, while fostering digital literacy skills among students and educators (Cardona et al., 2023; Gilster, 1997). Further exploration of these re-mediation dynamics will provide valuable insights into the transformative impact of GenAI on teaching and learning in higher education, informing best practices and evidence-based guidelines for the responsible and effective use of these technologies (Williamson et al., 2021; Bender et al., 2021; Bommasani et al., 2021).

### **3. Design and Methods**

#### **3.1 Research Design**

This study employed a mixed-methods approach, combining a survey and follow-up interviews, to investigate students' usage, perceptions, and ethical considerations towards generative AI (GenAI) in higher education at the University of Washington. The mixed-methods design allowed for a comprehensive exploration of the research questions, leveraging the strengths of both quantitative and qualitative data collection and analysis (Creswell & Plano Clark, 2017). The quantitative survey data provided a broad overview of GenAI usage patterns, satisfaction levels, and understanding among the participants, while the qualitative interview data offered rich insights into their experiences, perceptions, and ethical considerations. The study followed a sequential explanatory design (Ivankova et al., 2006), where the quantitative survey was conducted first, followed by the qualitative interviews. This design allowed the researcher to use the survey results to inform the development of the interview protocol and to purposefully select interview participants based on their survey responses. The integration of quantitative and qualitative findings occurred during the interpretation phase, where the researcher triangulated the data to gain a more complete understanding of the phenomenon under study (Creswell & Plano Clark, 2017).

#### **3.2 Participants and Sampling**

The target population for this study consisted of undergraduate and graduate students from different programs at the University of Washington. To ensure a diverse representation of academic levels and disciplines, I employed a non-probability, convenience sampling method

(Etikan et al., 2016). Convenience sampling allowed for the recruitment of participants who were readily available and willing to participate in the study.

The selection criteria for participants included: (1) current enrollment as an undergraduate or graduate student at the University of Washington, (2) familiarity with and usage of GenAI tools in their academic work, and (3) willingness to participate in both the survey and the follow-up interview. I recruited a sample size of 50 participants for the survey and 10 participants for the interviews (Creswell & Plano Clark, 2017). Recruitment of participants was conducted through various channels, including email invitations sent to department listservs, flyers posted on campus bulletin boards, and announcements made in relevant classes. Interested participants were provided with a brief description of the study and a link to the online survey. At the end of the survey, participants were invited to indicate their willingness to participate in a follow-up interview. From the pool of survey respondents who expressed interest, I purposefully selected a diverse sample of interview participants based on their academic level, discipline, and survey responses.

### **3.3 Data Collection**

#### **3.3.1 Survey**

The survey was conducted using Google Forms due to its self-analysis features and user-friendly interface, which made result interpretation more straightforward. Subsequently, the responses were exported to an Excel spreadsheet for evaluation and data visualization. The survey consisted of three main sections: (1) GenAI usage and satisfaction, (2) knowledge and understanding of GenAI, and (3) ethical considerations. The GenAI usage and satisfaction section assessed participants' familiarity with and usage of various GenAI tools, as well as their

satisfaction with these tools in their academic work. The knowledge and understanding section explored participants' comprehension of GenAI technologies and their applications in higher education. The ethical considerations section investigated participants' attitudes towards ethical issues related to GenAI use in academic settings, such as privacy, bias, and academic integrity. The survey included a combination of close-ended and open-ended questions. Close-ended questions were used to collect quantitative data, such as frequency of GenAI usage and level of satisfaction, using a 5-point Likert scale (e.g., "Strongly Agree" to "Strongly Disagree"). Open-ended questions were used to gather qualitative data, allowing participants to provide more detailed responses and share their experiences and opinions in their own words. The survey was piloted with 30 undergraduate students<sup>8</sup> to ensure clarity, relevance, and effectiveness. The pilot study<sup>9</sup> aimed to identify ambiguities that could lead to confusion or misinterpretation. Based on feedback, revisions were made to enhance accessibility and engagement. Wording was simplified, structure was refined, and key questions were prioritized. The pilot also provided insights into perceived relevance and importance of topics, allowing for a more focused and concise instrument. Participants' reactions and engagement were analyzed to identify effective questions that foster interest and generate rich data. The final survey was enhanced to attract and retain respondents, leading to higher response rates and reliable data collection. The final survey comprised 10 items and took approximately 10-15 minutes to complete. Participation was voluntary, and informed consent was obtained from all participants prior to their completion of

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<sup>8</sup> 30 undergraduate students from a variety of academic disciplines, including Education, Community and Organizational Studies (ECO), Communication, Computer Science, Electrical Engineering, Music, and Human-Centered Design Engineering, etc.

<sup>9</sup> The pilot study was conducted with 30 undergraduate students to ensure the clarity, relevance, and effectiveness of the survey instrument. The pilot aimed to identify ambiguities, assess perceived importance of topics, and gauge participant engagement. Based on the feedback received, revisions were made to enhance accessibility, streamline the structure, and prioritize key questions, resulting in a more focused and concise survey (Aoun, 2017).

the survey. The survey remained open for a period of four weeks, with reminder emails sent to potential participants to encourage participation.

In total, including the pilot data and the actual collected data, 45 people<sup>10</sup> completed the final survey. This sample size, although smaller than the initial target, still provided valuable insights and allowed for meaningful analysis of the participants' experiences and perspectives on GenAI tools in higher education.

### **3.3.2 Interviews**

Semi-structured interviews were conducted with a subset of survey respondents who volunteered to participate in the follow-up interviews. The interviews aimed to gain a deeper understanding of participants' experiences, perceptions, and ethical considerations related to GenAI use in their academic work. An interview protocol was developed based on the research questions and the preliminary findings from the survey data. The protocol included four main questions, with additional probing questions and follow-up queries to elicit more detailed responses from participants. The main questions focused on participants' motivations for using GenAI tools, the benefits and challenges they encountered, their understanding of ethical issues, and their recommendations for responsible GenAI use in higher education.

#### **Experience and Usage:**

Can you provide specific examples of how you use GenAI models in your academic learning?

- How has it impacted (changed) your educational experience?

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<sup>10</sup> The study involved a total of 45 people, including participants from a pilot study, in-person data collection, and online platforms.

- Are there any challenges or limitations you encounter when using GenAI applications for academic purposes? Please explain.

### **Perceptions and Understanding:**

What role do you think GenAI plays in teaching and learning?

- What have you noticed about how GenAI is being used by teachers and students?

### **Ethical Considerations:**

What is your biggest concern about the ethical use of AI? Why? How does that impact you?

- What ethical questions or concerns come to mind when you think about incorporating AI-driven educational tools into the classroom?

If you could design or improve a generative AI model for educational use, what features or functions would you prioritize?

- Who else do you think would benefit from the design? (Accessibility, which group are you representing)

Interviews were conducted either in-person or via video conferencing, depending on participants' preferences and availability. Each interview lasted approximately 30-45 minutes and was audio-recorded with participants' consent. I took detailed notes during the interviews to capture key points and observations. Prior to the interviews, participants were provided with an information sheet outlining the purpose of the study, the interview process, and their rights as research participants. Informed consent was obtained from all interviewees, and they were assured of the confidentiality of their responses. Participants were also given the opportunity to ask questions and clarify any concerns before the start of the interview.

### **3.4 Data Analysis**

### **3.4.1 Survey Analysis**

An online survey was created and distributed using Google Forms, a platform selected for its built-in analytical tools and intuitive design, which facilitated a more streamlined interpretation of the results. The survey link was shared with students via multiple channels, including the university's weekly Learning Sciences and Human Development Lounge activity and through networking among colleagues and various platforms (ex. Canvas, LinkedIn). After collecting the responses, the data was exported to an Excel spreadsheet for further analysis and the creation of visual representations to effectively communicate the findings. The quantitative survey data were analyzed using descriptive statistics to summarize participants' responses on several key items. Frequency distributions were calculated to provide an overview of the patterns and trends in the data. The items included participants' school status (undergraduate, graduate, or Ph.D.), frequency of GenAI usage (never, rarely, occasionally, a moderate amount, or a great deal), specific tasks for which GenAI was used (academic tasks, work tasks, upskilling/professional development, problem-solving, or entertainment), level of satisfaction with GenAI interactions (very dissatisfied, somewhat dissatisfied, unsure, somewhat satisfied, or very satisfied), overall perception of GenAI models like ChatGPT (on a scale from 1 to 5, with 1 being very negative and 5 being very positive), level of understanding of GenAI (on a scale from 1 to 5, with 1 representing limited understanding and 5 indicating a comprehensive understanding), and frequency of considering ethical implications of using GenAI models in the academic journey (never, rarely, occasionally, often, or always). The results were presented using tables and graphs to facilitate interpretation and communication of the findings.

### **3.4.2 Qualitative Analysis**

The qualitative data from the focus group interviews were analyzed using thematic analysis, a widely recognized method for identifying, analyzing, and reporting patterns within qualitative data (Braun & Clarke, 2006). The audio recordings of the interviews were transcribed verbatim and checked for accuracy, ensuring the trustworthiness and credibility of the data (Creswell & Poth, 2018). To generate the codebook, I began by identifying the most repetitive terms, phrases, and ideas that emerged from the transcripts (MacQueen et al., 2008), and are relevant to the research topics and questions. I developed a preliminary codebook that defined and described each code, along with examples and decision rules for application (Saldaña, 2021). I systematically coded the entire dataset using ATLAS.ti, a qualitative data analysis software that has been widely used in thematic analysis studies (Friese, 2014). The coding process involved multiple rounds of coding, allowing for the refinement of codes and themes as new insights emerged from the data, consistent with the iterative nature of thematic analysis (Braun & Clarke, 2006). Throughout the analysis, I employed strategies to ensure the credibility and trustworthiness of the findings, such as regularly reviewing the coded data, comparing and contrasting themes, and selecting illustrative quotes from the transcripts (Lincoln & Guba, 1985). The use of a codebook and the systematic approach to coding and analysis enhanced the dependability and confirmability of the results (Nowell et al., 2017). By adhering to established methodological guidelines and incorporating strategies to ensure the quality and rigor of the analysis, I sought to generate a comprehensive and credible understanding of the qualitative data, grounded in the participants' experiences and aligned with the research objectives (Creswell & Poth, 2018; Tracy, 2010).

#### **4. Findings**

## 4.1 Survey Results

This study focused on students' interactions with generative AI (GenAI) tools, particularly ChatGPT. The survey aimed to assess participants' usage patterns, satisfaction levels, and perceptions of GenAI in their academic journey. The survey results revealed that a significant portion of the participants actively incorporated GenAI into their academic routines, with 27.3% using these tools multiple times daily and 27.3% using them multiple times a week (Figure 1). This finding aligns with the pilot study results, where undergraduate students reported frequent use of ChatGPT in their academic work. The growing prominence of AI technologies in educational contexts (Zawacki-Richter et al., 2019) is reflected in the increasing adoption of GenAI tools by students across various academic levels.

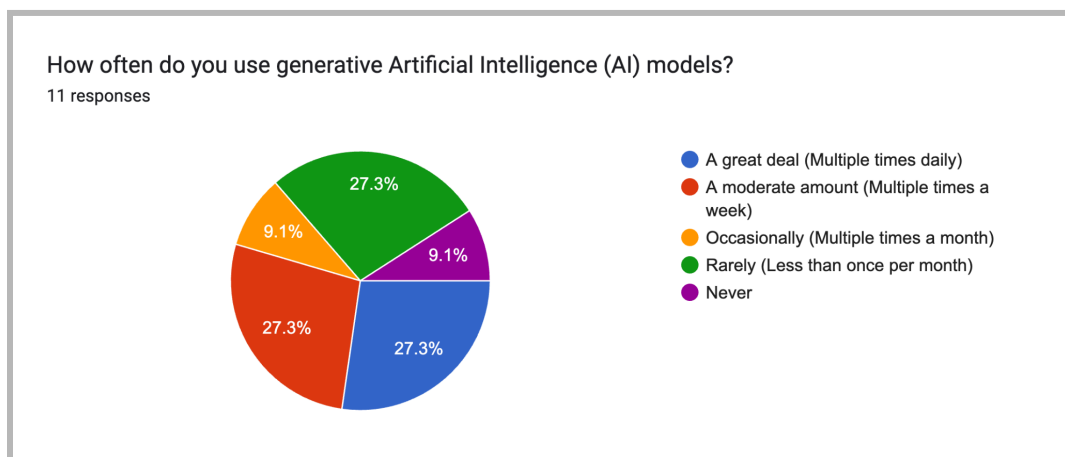


Figure 1: Frequency of Generative AI Model Usage Among Students

The survey data from both the pilot study and the main study reveals that participants employed GenAI tools for a diverse array of purposes (Figure 2). This finding underscores the versatility and adaptability of GenAI models in supporting students' varied learning needs and objectives. By leveraging the capabilities of GenAI across multiple domains, students demonstrate a growing recognition of the potential for these technologies to enhance their educational experiences and outcomes (Becker et al., 2022; Luan et al., 2020). The widespread adoption of

GenAI tools for different academic tasks also highlights the increasing integration of these technologies into the fabric of higher education, as students seek out innovative ways to augment their learning processes and achieve their goals (Aoun, 2017; Luckin et al., 2016).

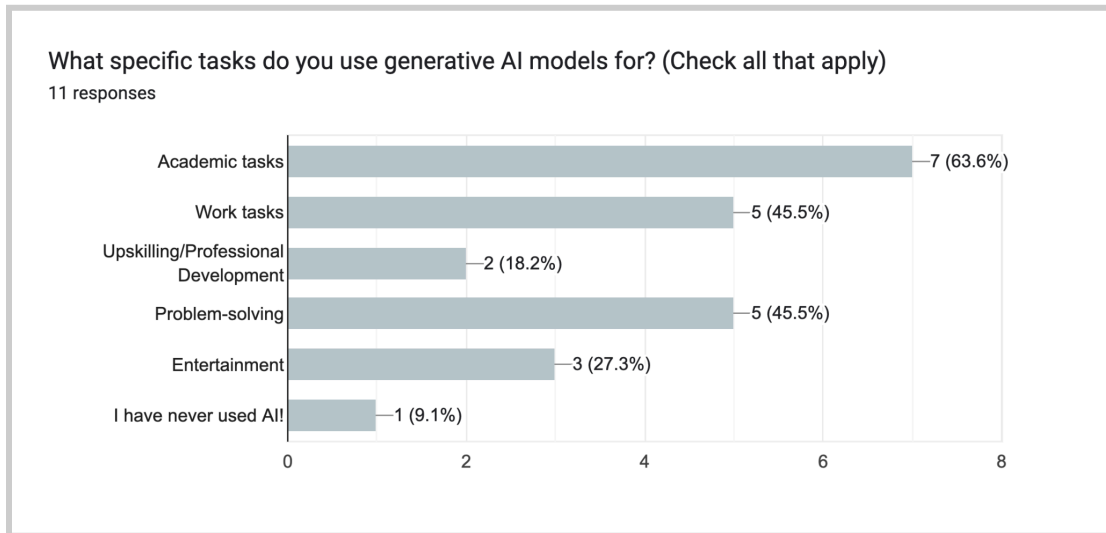


Figure 2: Specific Tasks for Which Students Use Generative AI Models

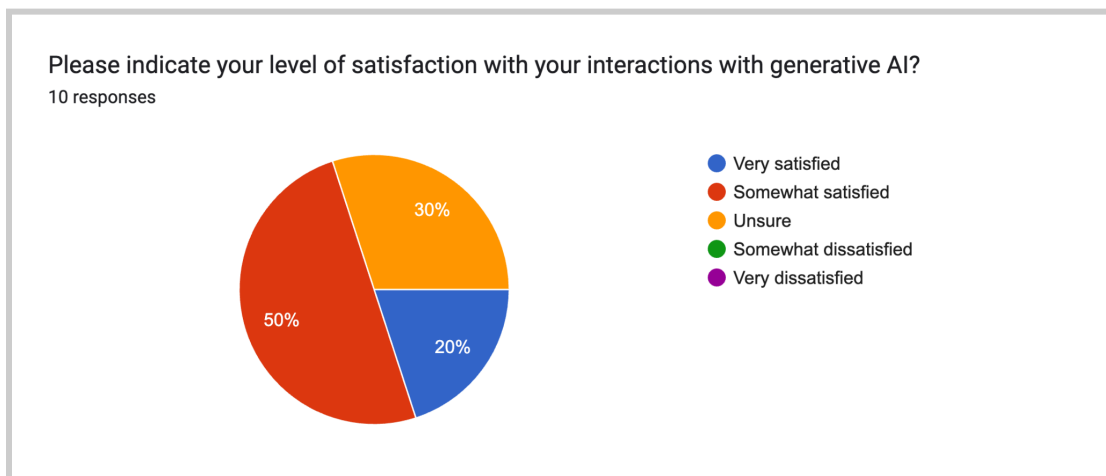


Figure 3: Student Satisfaction Levels with Interactions Using Generative AI

Assessing student satisfaction with generative AI (GenAI) tools in educational settings is crucial for their successful integration and adoption. The data collected indicates that a majority of participants expressed satisfaction with their GenAI interactions, with 50% being somewhat

satisfied and 30% very satisfied, suggests these tools are generally aligned with students' expectations and delivering a positive experience (Figure 3). This positive sentiment is crucial for the successful adoption of AI technologies in academia (Popenici & Kerr, 2017). The follow-up interview will further explore the reasons and specific aspects that bring satisfaction, and student satisfaction data can provide valuable insights for continuous improvement and tailoring of GenAI tools to better meet the specific needs and preferences of learners (Scherer et al., 2019). By understanding what aspects of GenAI tools resonate with students and what areas require further refinement, developers and educators can iteratively enhance these technologies, ensuring their sustained relevance and effectiveness in academic contexts.

On a scale of 1 to 5, where 1 represents limited understanding, 3 represents neutrality, and 5 indicates a comprehensive understanding, please indicate your general understanding of generative AI?  
11 responses

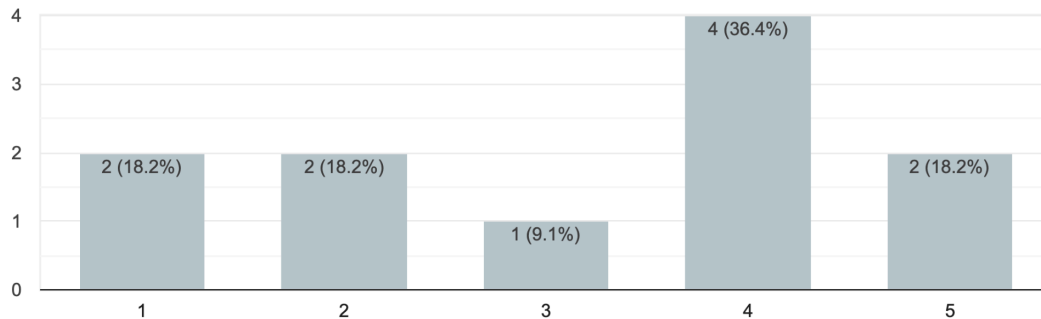


Figure 4: Students' General Understanding of Generative AI on a Scale of 1 to 5

While the majority of participants expressed satisfaction with their GenAI interactions, the data revealed a concerning gap in their comprehension of these tools. Participants' understanding of GenAI varied, with only 18.2% reporting a comprehensive understanding (rating of 5) and 9.1% indicating a neutral level of understanding (rating of 3) (Figure 4). The mean understanding rating of 3.18 ( $SD \approx 1.47$ ) highlights the need for further efforts to improve students' knowledge

and comprehension of GenAI tools, as a lack of understanding can hinder the effective and responsible use of these technologies (Long & Magerko, 2020). Notably, a significant proportion of participants (54.5% often and 27.3% always) reported considering the ethical implications of GenAI usage in their academic journey (Figure 5). This finding underscores the importance of addressing ethical concerns and fostering responsible use of GenAI in educational contexts, as students are increasingly aware of the potential risks and challenges associated with these technologies (Borenstein & Howard, 2021).

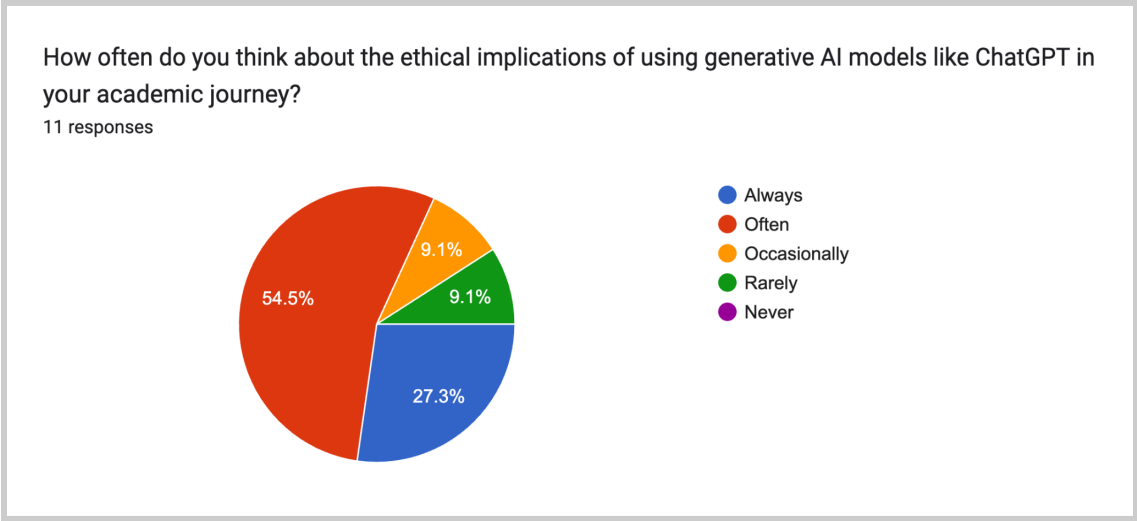


Figure 5: Frequency of Considering Ethical Implications of Generative AI in Academic Work

What ethical concerns, if any, come to mind when you think about using AI models like ChatGPT?  
(Check all that apply)

11 responses

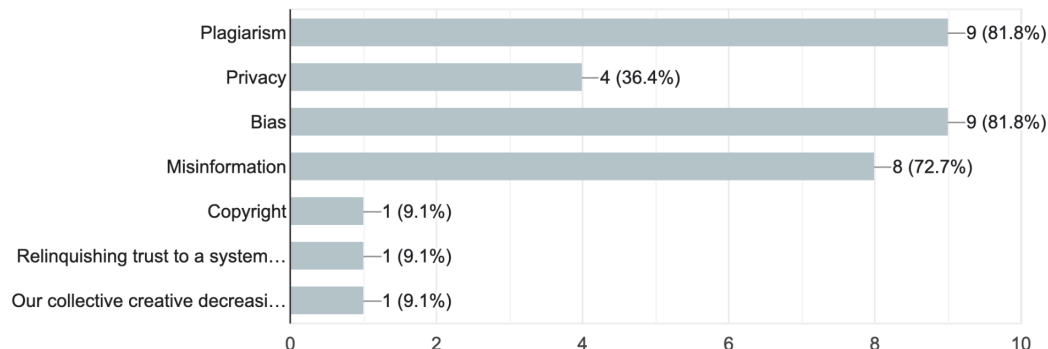


Figure 6: Ethical Concerns Associated with the Use of Generative AI Models

Overall, the survey results shed light on the ethical considerations surrounding the use of GenAI in higher education. As shown in Figure 6, a significant proportion of participants frequently consider the ethical implications of GenAI usage, with a particular focus on issues such as 81.8% AI-assisted plagiarism, 81.8% bias, and 72.7% misinformation. The data suggests that students are highly aware of these ethical challenges, which is crucial for the responsible integration of GenAI tools in educational settings. The high level of student awareness regarding AI-assisted plagiarism highlights the need for educational institutions to develop clear policies and guidelines around the use of GenAI tools in academic work. As GenAI technologies become more sophisticated and accessible, there is a growing concern that students may use these tools to generate content without proper attribution, leading to an increase in plagiarism cases (Perkins, 2023). Educators and institutions must proactively address this issue by providing students with guidance on how to use GenAI tools ethically and responsibly, and by implementing robust plagiarism detection mechanisms that can identify AI-generated content.

While the survey findings provide a broad overview of students' experiences and perceptions of GenAI in higher education, a deeper exploration through qualitative analysis is essential to gain a more nuanced understanding of the complex dynamics at play. The following section delves into the qualitative data gathered through open-ended survey questions and interviews, offering rich insights into students' perspectives on the specific academic tasks they use GenAI for, the perceived benefits and limitations of these technologies, and the notable ethical concerns they raise concerning the integration of GenAI systems into higher education.

## 4.2 Qualitative Analysis

The qualitative data from the focus group interviews provided rich insights into students' experiences, perceptions, and ethical considerations regarding GenAI usage in higher education. Thematic analysis (Braun & Clarke, 2006) was conducted on the interview transcripts, revealing several key themes that offer insights into the complex dynamics of GenAI integration in academic settings and address the research questions through the lens of re-mediation theory (Bolter & Grusin, 1999).

Focus Group 1:

<b>Theme</b>	<b>Sub-theme</b>	<b>Representative Quote</b>
Experience and Usage	Diverse applications	"Summarize books; helpful for summarizing some key points or themes for the book that probably would never have the time to read." (Chris)

	Role in teaching and learning	"Design and improve lesson plan. Give ChatGPT the class standard, different age groups." (Nola)
	Diverse applications	"Use ChatGPT to create a poem based on a learning theory that you're interested in." (Raia)
Challenges and Limitations	Fear of reliance	"Scared of AI, afraid the reliance on AI, raises questions about how the world pushes everyone to go faster, think faster, and eat faster, fast, fast, fast... Use AI for transcripts, not pleasant with it." (Tadeo)
Perceptions and Understanding	Role in teaching and learning	"There's no one way for everything; ChatGPT always provides more than one option and possibilities." (Nola)
	Role in teaching and learning	"Even in early childhood setting use AI in the classroom." (Raia)
Impact on creativity and individuality	Diverse applications	"Pros: How diverse it can be used, there's no limitation with the tool, eliminates many obstacles for creating among people with diverse backgrounds, skills, and abilities." (Chris)
	Fear of reliance	"ChatGPT may take the collective creativity away gradually through reliance."(Tadeo)
Ethical Considerations	Privacy concerns	"Data protection (privacy). Our usage are feeding the data for what use?" (Chris)

Responsible integration and skill development	Continuous use and responsibility	"GenAI tools are going to be continuously used, no matter whether educators like it or not, they need to know how to interact with it and use it responsibly if there is a responsible way." (Raia)
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Focus Group 2:

Theme	Sub-theme	Representative Quote
Experience and Usage	Diverse applications	"No really, more like a supplementary, paraphrase information, to help think things in a different way. Thinking things in a different, wider perspective." (Silver)
	Diverse applications	"With AI's help, don't need to worry about grammar that much, can be more focused on ideas, write my ideas out, ask AI to proofread; use AI for the iteration process." (Dave)
	Diverse applications	"Ask the AI to break up the main points, and what to do. What's the thesis behind this author's argument; what is the reason he is giving. Help with streamlining, be more structured with reading." (Caz)
	Diverse applications	Use for translation, it has higher accuracy than Google Translate. (Q: How do you identify the accuracy?) It produces more human-like language, cultural appropriateness, sense-making, fluency, better grammar, and word choice.  Coding (500 level CS courses); help understanding the lecture and instruction better" (Isaiah)
Challenges and Limitations	Bias and misinformation	"It's based on prediction not understanding." (Isaiah)

	Bias and misinformation	"Biased: the repository, the source of the AI is using. I find that there's a political bias in ChatGPT that leans more towards left-leaning politics." (Caz)
Perceptions and Understanding	Role in Teaching and Learning	"Human beings don't have to spend as much time doing menial tasks anymore, so we can spend more effort and energy in developing different things. Educators can use AI tools to streamline teaching, so that students can focus more on creative aspects." (Caz)
	Role in Teaching and Learning	"Many professors are smart, coming from prestigious institutions; however, they don't know how to teach effectively. It's hard for students to follow their teaching and ideas. Use ChatGPT to learn allow students to learn in their own pace, and received immediate support as a personal tutor" (Isaiah)
	Reliance and Ethics	"With all the data we use to feed, it's only gonna be more and more effective and invasive in education and the workforce... It's crucial for professors to utilize their expertise to promote and instill critical thinking regarding the usage of AI." (Isaiah)
Overreliance and Potential Negative Impacts	Reliance and Ethics	"Most of the teachers believe it would increase reliance on AI that harms learning... Overreliance on AI can stifle creativity and individuality." (Silver & Caz)
Varying Levels of Adoption	Role in Teaching and Learning	"Some professors are old and don't know how this technology works these days; some professors are very transparent with ChatGPT, use ChatGPT to plan the class and students does not notice it." (Caz)
Ethical Considerations	Privacy Concerns	"Students are feeding course content, and assignments to AI." (Isaiah)

	Bias and misinformation	"Bias information output from AI, hard to distinguish the accuracy and accountability that AI gives you." (Silver)
	Reliance and Ethics	"Plagiarism, in the field of artwork, the work that used to take days and nights now only needs a second. Yes, AI can lay a great foundation for writing, but does it also affect students' ability to generate a full paper, knowing the principle of starting writing papers?" (Caz)
Responsible Integration and Skill Development	Role in Teaching and Learning	"Teach the students not to rely solely on ChatGPT and how to use ChatGPT as a tool for critical thinking... Explain how ChatGPT really helps us learn instead of just trying to finish the assignment for grades." (Silver)
Design Considerations	Role in Teaching and Learning	"Use AI to design more engaging educational games." (Caz)
	Visualization of Learning	"Make learning more visual, not just reading long papers black and white." (Isaiah)
	User Experience and Feedback	"User experiences matter, we need to keep updates on how students, educators, and education stakeholders think about AI, why they use AI, how they use AI matters for how we can better design it." (Dave)

#### 4.2.1 Diverse Applications of GenAI in Academic Tasks

The qualitative findings reveal that participants used GenAI tools to streamline and structure their learning processes across various academic tasks. For instance, Caz, an undergraduate major in Political Science, found ChatGPT helpful in "streamlining" and being more "structured" with reading. Caz specifically asked ChatGPT to "break up the main points" and identify "the thesis behind the author's argument." By using ChatGPT to summarize and extract key ideas

from readings, Caz was able to better understand and organize the information, facilitating knowledge construction and meaning-making. This process of breaking down complex information into more manageable parts aligns with the cognitive load theory<sup>11</sup> (Sweller, 1988), which suggests that reducing the cognitive burden on learners can enhance their ability to process and retain information effectively. Moreover, this example illustrates how GenAI tools can support self-regulated learning (Zimmerman, 2000) by empowering students to actively monitor, control, and regulate their learning processes.

In the case of Isaiah from the Computer Science department, he shared his use of AI for translating, analyzing course content, and coding, stating that it helped in "understanding the lecture better" and providing "immediate help" when professors and TAs were not available. Isaiah also mentioned that he used ChatGPT for translation purposes, finding it to be of "better quality than Google Translate" in terms of accuracy, cultural appropriateness, and fluency in human-like language. Furthermore, both undergraduate and graduate students reported using ChatGPT for quick searches, book conclusions, organizing notes, and grammar checks. These applications demonstrate how GenAI tools are increasingly being used as a substitute for traditional methods of information retrieval, knowledge synthesis, and writing support. By leveraging the capabilities of GenAI, students are able to access information more efficiently, summarize key points from lengthy texts, structure their notes effectively, and improve the quality of their writing.

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<sup>11</sup> Cognitive load theory (Sweller, 1988) suggests that reducing the cognitive burden on learners can enhance their ability to process and retain information effectively. Self-regulated learning (Zimmerman, 2000) refers to the process by which learners actively monitor, control, and regulate their own learning processes to achieve their goals.

This shift towards AI-powered tools for various academic tasks highlights the ongoing re-mediation of educational practices, where new technologies are not merely supplementing but actively replacing older methods (Bolter & Grusin, 1999). As GenAI tools become more sophisticated and integrated into students' learning processes, they are transforming the way learners interact with information, construct knowledge, and develop skills. Moreover, these examples illustrate how GenAI tools, as socio-technical agents, actively participate in the learning process, influencing the way students engage with content, construct knowledge, and develop skills (Williamson et al., 2021). From this perspective, GenAI is not merely a neutral tool but an active participant in the learning ecosystem, shaping the possibilities and limitations of instruction and learning (Aoun, 2017; Knox, 2020).

#### **4.2.2 Re-mediating Education: Implications for Teaching and Learning**

The integration of GenAI tools in education can be seen as a transformative process that reshapes the relationship between students, educators, and content (Bolter & Grusin, 1999). As GenAI technologies become more embedded in academic practices, schools and educators will need to adapt their policies and pedagogical approaches to support students in learning with and from these tools (Luckin et al., 2016). This may involve developing new forms of assessment that prioritize critical thinking, creativity, and problem-solving skills rather than mere content recall or reproduction (Aoun, 2017).

The qualitative findings demonstrate how GenAI tools are re-mediating the landscape of higher education, transforming the ways in which students learn, interact with information, and construct knowledge. As Silver suggested, educators should "include AI as a perspective in the class discussion (ex, what Silver thinks, what Caz thinks, and what ChatGPT thinks), as someone

who's also a part of the class. This idea of treating GenAI as a resource or even a classroom infrastructure<sup>12</sup> represents a significant shift in the way we conceptualize the role of AI in education (Luckin et al., 2016). From a re-mediation perspective, this approach challenges the notion of GenAI as a threat to traditional education and instead positions it as a valuable contributor to the learning process (Bolter & Grusin, 1999). By including GenAI in classroom discussions and treating it as a legitimate source of knowledge and insight, educators can foster a more inclusive and collaborative learning environment that encourages students to critically engage with AI-generated content (Aoun, 2017). Moreover, this approach aligns with the principles of participatory design and co-creation in education (DiSalvo et al., 2017). By involving students in the process of integrating GenAI into classroom practices and discussions, educators can empower them to take ownership of their learning and develop the skills necessary to navigate the complexities of an AI-driven world (Long & Magerko, 2020). This collaborative approach can also help to mitigate potential ethical concerns, such as biases and privacy issues, by ensuring that the use of GenAI in education is guided by the needs and values of the learning community (Prinsloo & Slade, 2017). As GenAI tools become more integrated into the fabric of academic practices, educators may need to re-evaluate traditional approaches to instruction and assessment (Aoun, 2017). This may involve designing learning activities that leverage the capabilities of GenAI to support student learning, such as using AI-generated content as a starting point for class discussions or incorporating GenAI tools into collaborative problem-solving tasks (Luckin et al., 2016). Furthermore, the re-mediation of education through GenAI calls for a re-imagining of the roles and responsibilities of educators. Rather than being

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<sup>12</sup> AI as a classroom infrastructure represents a shift in how educational spaces and resources are designed and utilized. GenAI integration in educational spaces creates environments in which technology, teachers, and students collaborate to solve problems and produce work (White & Pea, 2011), highlighting how technology exerts agency in a relationship with educators and learners, scaffolding learning experiences (Luckin & Holmes, 2016).

the sole source of knowledge and expertise, teachers may increasingly serve as facilitators and guides, helping students to navigate the complexities of AI-enhanced learning and to develop the critical thinking and creative skills necessary to thrive in an AI-driven world (Selwyn, 2019).

This shift in the teacher's role may require new forms of professional development and support to ensure that educators are equipped with the knowledge and skills necessary to effectively integrate GenAI into their teaching practice (Aoun, 2017).

In conclusion, the qualitative findings, viewed through the lens of re-mediation theory, highlight the transformative potential of treating GenAI as a resource and classroom infrastructure in higher education. By including GenAI in educational conversations and fostering collaborative partnerships between educators, students, and technology developers, we can harness the power of AI to enhance learning outcomes and prepare students for the challenges and opportunities of an AI-driven world. As we continue to explore the implications of GenAI for teaching and learning, it is crucial to remain open to new possibilities and to engage in ongoing critical reflection and dialogue to ensure that the integration of these technologies in education is guided by ethical principles and a commitment to student success.

#### **4.2.3 Concerns about Overreliance and Potential Negative Impacts**

While participants acknowledged the benefits of GenAI tools in supporting their learning processes, they also expressed concerns about the potential overreliance on these technologies and the negative impacts on learning. Silver mentioned that "most of the teachers believe it would increase reliance on AI that harms learning," while Caz highlighted that "overreliance on AI can stifle creativity and individuality." These concerns align with the broader debates in the literature about the risks of AI-assisted learning and the need for pedagogical strategies that

encourage critical thinking and student agency (Popenici & Kerr, 2017; Zawacki-Richter et al., 2019). The apprehensions raised by the participants regarding overreliance on GenAI tools and the potential negative impacts on learning directly address the second research question, which focuses on the perceived benefits and limitations of GenAI technologies in educational contexts. The findings suggest that while GenAI tools can enhance learning experiences by providing personalized support and facilitating deeper understanding (Luckin et al., 2016), they also present risks that need to be carefully navigated to ensure the development of essential skills and promote student engagement (Long & Magerko, 2020).

From the perspective of re-mediation theory (Bolter & Grusin, 1999), the concerns expressed by the participants can be seen as a reflection of the complex interplay between old and new media in educational settings. As GenAI tools are integrated into the learning process, they inevitably reshape the relationship between students, educators, and content, challenging traditional notions of knowledge acquisition and construction (Aoun, 2017). The overreliance on GenAI tools may lead to a form of "cognitive offloading"<sup>13</sup> (Salomon, 1990), where students become overly dependent on the technology to process and interpret information, potentially hindering the development of critical thinking and problem-solving skills. Moreover, the concerns about the negative impacts of GenAI on creativity and individuality highlight the need for a balanced approach to technology integration in education. While GenAI tools can provide students with valuable support and resources, it is crucial to ensure that they do not replace the human elements of learning, such as personal expression, original thought, and collaborative discourse (Selwyn, 2019).

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<sup>13</sup> Cognitive offloading refers to using external tools to reduce mental effort by delegating cognitive tasks, thus freeing up mental resources.

Educators strive to foster a learning environment that encourages active engagement, meaningful collaboration, and deep understanding of the course material. Recognizing the agency exerted by GenAI tools in education highlights the need for educators and students to critically examine the assumptions and biases embedded within these technologies. As GenAI tools constrain and afford certain possibilities in the learning process, it becomes crucial to consider how these technologies may influence learning outcomes and to develop strategies for mitigating potential negative impacts. The re-mediation of educational practices through GenAI should aim to enhance, rather than diminish, learners' agency and autonomy (Prinsloo & Slade, 2017). GenAI tools should be employed in a manner that promotes student interaction, facilitates the exchange of ideas, and supports the co-construction of knowledge. By carefully considering how GenAI can be integrated into pedagogical practices, educators can work towards creating a learning experience that aligns with their vision for student relationships and engagement with the course material.

"Teach the students not to rely solely on ChatGPT and how to use ChatGPT as a tool for critical thinking... Explain how ChatGPT really helps us learn instead of just trying to finish the assignment for grades," said Silver, a student from the Informatics School at the University of Washington. The findings of this study highlight that students are eager for more cooperative and proper guidance on the use of AI tools in learning, suggesting that they recognize the potential of GenAI to enhance their educational experiences but also see the need for support in navigating these technologies.

The understanding of learning has shifted from an individual process to a collaborative and distributive system, where technology, teachers, and students collaborate to solve problems and

produce work (White & Pea, 2011). Rather than viewing GenAI as a replacement for human interaction and expertise, educators should integrate these tools to enhance the collaborative nature of learning. Educators and stakeholders play a crucial role in providing guidance to create a learning environment where technology, teachers, and students work in harmony to achieve shared goals.

#### **4.2.4 Ethical Considerations and Challenges**

Participants raised various ethical concerns related to GenAI usage in academic settings, including AI-plagiarism, privacy, bias, and misinformation. As Dave, a graduate student from Human-Centered Design Engineering, pointed out, there is a need for "awareness of the repository of AI" and issues related to copyright, expressed concerns about the potential for GenAI tools to generate inaccurate or misleading information, leading to the spread of misinformation. This issue is particularly problematic when students are unable to distinguish the accuracy of the information provided by AI, resulting in a 'blind' acceptance of potentially 'hallucinated' or fake information (Leins, 2021; Ahmed et al., 2024). The issue of AI hallucination and inaccuracy is further compounded by the fact that GenAI models are often trained on vast amounts of data from the internet and other sources, which may contain biases, stereotypes, and misinformation (Bender et al., 2021; Blodgett et al., 2020). As a result, the AI-generated content may perpetuate and amplify these biases and inaccuracies, leading to the creation of a distorted or misleading representation of reality (Nadeem et al., 2020). This can have significant implications for students' learning and understanding of complex topics, as they may be exposed to incorrect or biased information that can shape their beliefs and opinions (Aoun, 2017).

Christ and Tadeo, graduate students from Education, both mentioned the potential for AI-assisted plagiarism, particularly in creative fields, stating, "Plagiarism, in the field of artwork, the work that used to take days and nights now only needs a sec." These concerns align with the ongoing debates around the ethical challenges of AI in education and the need for clear guidelines and policies to ensure academic integrity (Rosé et al., 2019; Perkins, 2023). The ethical considerations raised by the participants directly address the second research question, which focuses on the perceived benefits and limitations of GenAI technologies in educational contexts. The findings suggest that while GenAI tools offer valuable support and resources for students, their use also raises significant ethical challenges that need to be carefully addressed to ensure responsible and equitable adoption (Prinsloo & Slade, 2017). From the perspective of re-mediation theory (Bolter & Grusin, 1999), the ethical concerns surrounding GenAI usage in academic settings can be seen as a manifestation of the complex interplay between technology, pedagogy, and ethics. As GenAI tools are integrated into the learning process, they not only reshape the way students engage with information and construct knowledge but also introduce new ethical dimensions that challenge traditional notions of academic integrity, privacy, and fairness (Aoun, 2017; Perkins, 2023).

The concerns about privacy, data protection, and AI-assisted plagiarism raised by participants highlight the complex relationship between users and GenAI technologies in education. As students increasingly rely on these tools, they inadvertently feed vast amounts of personal information, course content, and assignment requirements into AI systems, creating a feedback loop that raises important questions about data ownership, control, and privacy (Prinsloo & Slade, 2017). The concerns about AI-assisted plagiarism highlighted by all of the participants underscore the need for a re-evaluation of academic integrity policies and practices in light of the

increasing capabilities and accessibility of GenAI technologies. As students leverage these tools to generate content and ideas, the boundaries between original work and AI-generated output become increasingly blurred, raising questions about the nature of authorship and the role of human creativity in the learning process (Perkins, 2023). This blurring of boundaries can be seen as a form of re-mediation, where the integration of GenAI tools in academic settings challenges traditional notions of knowledge creation and ownership (Bolter & Grusin, 1999). Moreover, the practice of students feeding course content and assignments to GenAI tools, as mentioned by Isaiah, highlights the potential for these technologies to revolutionize the way education is designed and delivered. As GenAI systems become more advanced and are trained on vast amounts of educational data, they may be able to provide increasingly relevant and personalized responses to traditional assignments and assessments (Selwyn, 2019). This raises important questions about the role of educators and the design of curricula in an AI-driven educational landscape (Williamson & Eynon, 2020).

## **5. Discussion & Recommendations**

As students increasingly incorporate these technologies into their academic routines, they are not only transforming their own learning processes but also highlighting the need for a fundamental shift in teaching practices and the relationships between students, instructors, and technology (Williamson et al., 2021). The integration of GenAI tools into higher education necessitates a re-evaluation of traditional roles and power dynamics, as these technologies become active participants in the learning process (Aoun, 2017; Knox, 2020). The findings of this study highlight the need for comprehensive strategies to ensure the responsible and effective integration of GenAI in higher education. Developing such strategies requires collaboration

among students, instructors, administrators, and technology developers (Luckin et al., 2016). To navigate the transformative impact of GenAI on higher education while promoting responsible and ethical use, the following recommendations are proposed, focusing on the implications for students and instructors (Aoun, 2017; Bender et al., 2021). These recommendations offer practical insights and strategies to guide stakeholders in leveraging the potential of GenAI tools while addressing the challenges they present.

### **Implications for Students:**

**1. Cultivate AI literacy and critical thinking skills:** Students should actively engage in developing a comprehensive understanding of the capabilities, limitations, and potential biases inherent in GenAI tools. This involves going beyond a superficial awareness of these technologies and delving into the underlying algorithms, data sources, and ethical considerations that shape their outputs (Aoun, 2017). By engaging with GenAI tools critically and reflectively, students can develop the necessary skills to evaluate the credibility, reliability, and fairness of AI-generated content (Luckin et al., 2016; Metz et al., 2021). This critical approach will enable students to make informed decisions about when and how to use GenAI in their academic work and future professional endeavors, ensuring that they harness these tools in a responsible and effective manner (Holmes et al., 2019).

**2. Leverage GenAI to enhance, not replace, personal cognitive processes:** Students should approach GenAI as a powerful tool to augment and enrich their learning experiences, rather than a substitute for their own intellectual efforts (Baker, 2016; Hernández-Orallo, 2017). While GenAI can provide valuable insights, generate ideas, and offer alternative perspectives, students

must actively engage with this content, critically evaluating its quality, relevance, and alignment with course objectives.

**3. Collaborate with peers and educators to foster a responsible GenAI culture:** Students should take an active role in shaping the discourse and practices surrounding the use of GenAI in educational settings. This involves engaging in open and constructive discussions with peers and educators about the benefits, challenges, and ethical implications of integrating these tools into the learning process (Schiff et al., 2021, Chen & Zhu, 2023). By sharing their experiences, insights, and concerns, students can contribute to the development of best practices and guidelines for responsible GenAI use.

**4. Embrace GenAI as a catalyst for collaboration, creativity, and innovation:** Students should recognize the potential of GenAI tools to transform the nature of learning and problem-solving in the digital age. By engaging in learning activities that leverage GenAI to support teamwork, brainstorming, and the co-creation of knowledge, students can develop essential skills for success in an AI-driven world (DiSalvo et al., 2017). This involves learning how to effectively communicate, negotiate, and build upon the insights generated by GenAI tools, while also contributing their own unique perspectives and ideas to the collective endeavor (Luckin et al., 2016). By cultivating these skills, students can position themselves as active participants in shaping the future of work and society, harnessing the power of GenAI to drive positive change and address complex challenges (Aoun, 2017).

### **Implications for Instructors:**

**1. Incorporate GenAI as a perspective in class discussions:** As demonstrated by the example shared by Silver, an undergraduate student from the Informatics School at the University of

Washington, instructors should consider incorporating GenAI tools like ChatGPT as an active contributor to class discussions. By treating GenAI as a participant with a role between that of a teacher and a student, instructors can encourage students to critically analyze the similarities and differences between AI-generated and human-curated content (Goel, 2020; Luckin et al., 2016). This approach can help students gain a deeper understanding of the subject matter and teach them how to use GenAI as a tool for critical thinking rather than relying solely on its output (Holmes et al., 2019).

**2. Design assessments that prioritize critical thinking and original analysis:** In light of the concerns raised by participants about the potential for AI-assisted plagiarism and the blurring of boundaries between original work and AI-generated output, instructors should design assessments that emphasize critical thinking, original analysis, and authentic problem-solving. This may involve creating assignments that require students to actively engage with AI-generated content, critically evaluate its quality and relevance, and synthesize it with their own ideas and insights (Aoun, 2017; Cope & Kalantzis, 2020). By focusing on higher-order thinking skills, instructors can help students develop a more nuanced understanding of the subject matter and mitigate the risks associated with over-reliance on GenAI tools (Bender et al., 2021; Zawacki-Richter et al., 2019).

**3. Collaborate with students to develop best practices for GenAI integration:** Drawing on the feedback from participants about the need for more cooperative and proper guidance on the use of AI tools in learning, instructors should actively collaborate with students to develop best practices for GenAI integration in their courses. This may involve creating opportunities for students to share their experiences, concerns, and suggestions regarding the use of GenAI tools,

and working together to design learning activities that effectively leverage these technologies while mitigating potential risks and challenges (Prinsloo & Slade, 2017). By fostering a participatory and inclusive approach to GenAI integration, instructors can ensure that the needs and perspectives of students are central to the development of AI-enhanced learning experiences (Schiff et al., 2021).

**4. Engage in ongoing professional development and reflection:** Given the rapidly evolving nature of GenAI technologies and their implications for teaching and learning, instructors should commit to ongoing professional development and reflection regarding the use of these tools in their practice (Alenezi, 2020; Chen & Hu, 2023). This may involve participating in workshops, seminars, or online courses to stay informed about the latest developments in GenAI and their potential applications in education. Instructors should also actively seek out opportunities to collaborate with colleagues, both within and across disciplines, to share insights, challenges, and best practices related to GenAI integration. By engaging in continuous learning and reflective practice, instructors can ensure that their approach to AI-enhanced teaching remains responsive, effective, and aligned with the needs of their students (Williamson et al., 2021)..

## **6. Limitations and Future Research**

This study primarily focused on students' perspectives and usage of GenAI tools, which, although crucial for designing effective AI-enhanced learning environments, presents some limitations. Firstly, the study would have benefited from including a larger and more diverse sample of educators to gain a more comprehensive understanding of the implications of GenAI for higher education. Faculty members play a critical role in shaping the integration of GenAI tools into their teaching practice and in guiding students' learning experiences (Aoun, 2017).

Future research should aim to examine how educators are leveraging these technologies to support student learning and to identify best practices for effective implementation (Luckin et al., 2016). In addition, my personal background and knowledge limitations may have influenced the scope and depth of this study. As an international student and emerging researcher in the field of GenAI and education, my understanding of the broader societal and institutional factors that shape the adoption of GenAI in higher education is still developing. Future research should situate the findings of this study within a broader context and examine how factors such as institutional policies, funding models, and societal attitudes towards AI may shape the trajectory of GenAI in higher education.

The rapidly evolving nature of the GenAI field means that the findings of this study may not fully capture the latest developments and trends. As I continue my research journey, I aim to keep pace with these advances and explore the implications of new GenAI technologies for higher education as they emerge. By collaborating with educators, researchers, and technology developers, I hope to contribute to the development of guidelines and best practices for the responsible and effective use of GenAI in teaching and learning (Aoun, 2017).

## **7. Conclusion**

In conclusion, this study provides valuable insights into student experiences with GenAI tools in higher education. Recognizing the significant role these technologies play in shaping the learning process underscores the necessity for a critical and reflective approach to their integration. It is crucial for educators, students, and technology developers to engage in ongoing dialogue and collaboration to ensure that GenAI tools are effectively designed and utilized. This collaboration aims to support meaningful learning and student success while being mindful of the tools'

inherent constraints and potential impacts on educational practices. By fostering this cooperative approach, we can create a more informed and balanced use of GenAI in academia, enhancing its benefits while mitigating its challenges.

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