

Integrating Artificial Intelligence in Higher Education: Empirical Insights from Students about Using ChatGPT

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Abstract—The world has evolved dramatically in the last several decades and continues to do so. ChatGPT has sparked intense speculation and interest among academic stakeholders about how this emerging technology will transform higher education. In particular, there is ambiguity among researchers and teaching professionals on how to deal with the integration of natural language processing models (e.g., ChatGPT) practically and ethically. The use of ChatGPT is an emerging area of interest that presently lacks the perspective of students on this new technology. Thus, an exploratory study design was applied as a methodological frame to investigate the problem empirically. Semi-structured interview data was gathered from current university students to thematically analyze the phenomenon. The thematic analysis revealed three themes: (1) support for autonomous learning, (2) digital and artificial tutoring, and (3) academic misconduct and ethical considerations. The article presents theoretical and managerial implications and advances the discussion about natural language processing models in higher education. Moreover, the study contributes to the body of knowledge by closing a theoretical gap in the literature on how university students utilize artificial chatbots for and during their studies.

Index Terms—Higher education, artificial intelligence, chatbots, undergraduate students, interview study, ChatGPT

I. INTRODUCTION

The world has changed significantly in the past few decades, and it continues to change. Chat Generative Pre-trained Transformer (more commonly known, and henceforth referred to, as ChatGPT) has created tremendous speculation among stakeholders in academia, not the least of whom are researchers and teaching staff [1, 2]. Artificial Intelligence (AI) is transforming many aspects of modern society, including education [3]. In higher education, AI has the potential to revolutionize teaching and learning, making education more personalized, efficient, and accessible [4, 5]. ChatGPT by OpenAI is an example of a Natural Language Processing (NLP) model that has the potential to transform higher education [6, 7]. This generative language model, i.e., ChatGPT, can generate human-like responses to open-ended prompts, such as questions, statements, or prompts related to academic material.

Initially, the study aimed to empirically investigate how the perceived usefulness of ChatGPT and the associated perceived ease of use influence university students'

behavioral intentions toward using ChatGPT for their studies. To test these hypotheses, the Technology Acceptance Model (TAM) was singled out as the underpinning theoretical framework for investigating these interrelations. The TAM is an information systems theory that models how users come to accept and use technology. The model proposes that perceived ease of use and perceived usefulness predict the user acceptance of technology. However, inquiries addressed to randomly selected students at the university revealed that the cohort of students is largely not (yet) immersed in this emerging technology. Therefore, an exploratory research design has been adopted instead.

The recent release (early 2023) of ChatGPT made it particularly relevant for supporting student learning in a range of contexts, such as language learning, writing, research, and general academic inquiry [8, 9]. This article explores the emergence and use of ChatGPT in the context of higher education, focusing on the application of the technology by undergraduate students during their studies. The use of ChatGPT is an emerging area of interest [7–9]. Thus, an exploratory study design is applied as a methodological frame to investigate the problem empirically. The study advances the discussion about natural language processing models in higher education and contributes to the body of knowledge by closing a theoretical gap in the literature.

II. LITERATURE REVIEW

A. The Transformation of Higher Education

Natural language processing (NLP) models have been in development since the 1950s [10], but it was not until the past decade that they received significant attention and underwent significant advancement, particularly with the development of deep learning techniques and large datasets [11]. The emergence of AI in higher education can be traced back to the beginning of Computer-Assisted Instruction (CAI) [12]. CAI used computers to provide personalized learning experiences for students, adapting the curriculum to their individual needs and pace [13]. Since then, AI has evolved and expanded to include a range of technologies, such as Natural Language Processing (NLP), Machine Learning (ML), and chatbots (e.g., ChatGPT).

Natural Language Processing (NLP) and chatbots are two AI technologies that are transforming education [14, 15]. NLP is a subfield of AI that focuses on the interaction between computers and human language, while chatbots are AI-powered software programs that simulate human conversation [14, 16]. In education, NLP is being used to develop intelligent tutoring systems that can understand and respond to student questions and feedback in natural language

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[17]. These systems can provide personalized support to students, helping them better understand difficult concepts and improve their academic performance [17]. NLP can also be used to analyze large amounts of text, such as academic papers and textbooks, to extract relevant information, and to generate summaries or recommendations for further reading [18].

B. The Emergence of Chatbots in Education

Chatbots are being used to provide support to students around-the-clock, especially in administrative tasks such as scheduling appointments, answering questions about university policies and procedures, and providing guidance on academic programs and career options [19–21]. Chatbots can also be used to facilitate communication between students and teachers, thereby providing a platform for students to ask questions and receive feedback from their instructors in a timely manner [22–24]. An example of a frequently used chatbot in education is Duolingo [25]. Duolingo is a language learning app that uses AI-powered chatbots to help users learn a new language. The chatbots provide personalized feedback and guidance to users, adapting to their individual learning style and pace [26, 27].

NLP models are rapidly becoming relevant to higher education, as they have the potential to transform teaching and learning by enabling personalized learning, on-demand support, and other innovative approaches [14, 16]. In higher education, NLP models have significant relevance for supporting student learning in multiple ways. These models can be employed to analyze and process vast amounts of textual data, such as academic papers, textbooks, and other course materials, thereby providing students with personalized recommendations for further study based on their learning requirements and preferences. In addition, NLP models can be used to develop chatbots and virtual assistants that offer on-demand support and guidance to students, enabling them to access help and information as and when they need it.

C. The Importance of Personalized Learning

ChatGPT is an example of an NLP model that has the potential to transform higher education [8, 9]. This generative language model, i.e., ChatGPT, can generate human-like responses to open-ended prompts, such as questions, statements, or prompts related to academic material. The recent release (early 2023) of ChatGPT made it particularly relevant for supporting student learning in a range of contexts, such as language learning, writing, research, and general academic inquiry [8, 14, 23, 24]. Therefore, the use of NLP models in higher education has expanded beyond the aforementioned examples with new applications being developed to aid students in their academic pursuits.

Personalized learning is an approach to education that aims to tailor instruction to the unique needs, interests, and abilities of individual learners [28, 29]. ChatGPT can facilitate personalized learning by analyzing students' language patterns, feedback, and performance to create customized learning plans including content, activities, and assessments tailored to the individual student's needs [28]. Personalized

learning can be particularly effective in improving student outcomes.

Research (in other contexts) has shown that personalized learning can improve academic achievement, engagement, and self-efficacy [30, 31]. When students are provided with content that is relevant to their interests and abilities, they are more likely to engage with the material and develop a deeper understanding of the subject matter. ChatGPT can provide students with personalized learning experiences by generating content specifically tailored to their learning needs [8, 9]. However, due to the emerging nature of the NLP model, it is unclear how university students utilize ChatGPT for and during their studies.

III. METHODOLOGY

An exploratory study design is typically applied as a methodological framework when the investigated problem is not clearly defined or well understood [32]. Following the example of Creswell [33], an exploratory research approach was applied to collect empirical evidence to transform a practical problem and close a theoretical gap by investigating its complex interrelated elements with regard to students' use of ChatGPT during their university studies. The research is being undertaken from the perspective of undergraduate students, who share their experiences with the emerging digital technology, ChatGPT, and how they utilize the artificial chatbot for and during their studies.

A. Sample and Procedure

The participants were purposively approached by the principal investigator based on a recommendation from their university course instructor and were asked to participate in the study. The students were contacted via email and, with agreeable students, an appointment for an online interview (via Zoom) was agreed upon at a suitable date and time. A prerequisite for participating was being enrolled in a university degree program, having a basic command of the English language, and having basic but first-hand experience with the chatbot, ChatGPT. In total, 27 students were approached, and 12 confirmed their willingness to participate in the study. The data was collected in February 2023. At the time of sampling, the participants were full-time undergraduate students in a Bachelor of Business Administration degree program at a large Finnish university.

Other sociodemographic characteristics (such as gender, year of study, age, nationality, and academic major) of the participants are summarized in Table I based on the empirical interview data. The sample size of 12 can be considered sufficient for an exploratory study design. The author considers having reached thematic data saturation based on the definition set forth by Fusch and Ness [34], i.e., "the ability to obtain additional new information has been attained, and further coding is no longer feasible." The semi-structured interviews were guided by an eight-item interview guide with appropriate probing questions for each item. The length of the interviews ranged from 18 minutes to 37 minutes, with an average duration of 22 minutes.

TABLE I: SOCIODEMOGRAPHIC CHARACTERISTICS (AGE RANGE, GENDER, ACADEMIC MAJOR, NATIONALITY, AND STUDY YEAR) OF THE INTERVIEW PARTICIPANTS

Characteristic ¹	Frequency	Percentage
<i>Age Range</i>		
18-19 years old	1	8%
20-21 years old	3	25%
22-23 years old	6	50%
24 years or older	2	17%
<i>Gender</i>		
Male	5	42%
Female	7	58%
<i>Academic Major</i>		
International Business	5	42%
Tourism Management	3	25%
Digital Information Technology	4	33%
<i>Nationality</i>		
Finnish citizen	9	75%
EU Origin (German and Swedish)	2	17%
Non-EU Origin (Vietnamese)	1	8%
<i>Study Year</i>		
First-Year Student	2	17%
Second-Year Student	3	25%
Third-Year Student	7	58%

Note: ¹Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect the absolute figures

B. Data Analysis and Ethics

The empirical data was analyzed thematically using established methods described by Braun and Clarke [35]. Generally, a thematic analysis aims to identify common themes among the interviewed students and is a flexible qualitative analysis method supporting researchers in exploring perspectives among participants [35]. After the participants' permission was obtained, the interviews were audio-recorded, transcribed verbatim, and sorted based on the questions asked of the participants. Furthermore, the transcripts were used for the thematic analysis and did not disclose the identities of the participating students. The thematic analysis was performed using the data acquired from the interview transcripts to construct groupings and patterns.

These groupings and patterns were established by converting keywords into codes through the highlighting of significant sentences in the transcripts. The specific keywords were extracted based on an inductive open coding approach and shortened to codes. The retrieved codes served as the foundation for bundling and arranging the data into clusters as well as thematically assessing the material [35]. This approach was continued until the principal researcher and the participating research assistants agreed upon the results. Finally, conclusions were reached based on the identified categories and patterns of the perceived usefulness and challenges regarding the students' use of ChatGPT.

The ethical framework accompanying the study was developed based on the good practices of the Ethical Advisory Board in South East Sweden [36]. The particular

objective and scope of the research were explained to interview participants, and written consent was acquired prior to the interviews. Moreover, the students were informed that they could resign from the study at any time and have their collected data removed. The respondents were informed that their participation in the study would not influence their academic achievement. Finally, as a token of gratitude for their time and thoughtfulness, the participants received gift vouchers at the end of the interviews.

IV. RESULTS

The following sections report on the three primary themes that emerged in the process during the thematic analysis of the empirical data. These themes are (1) support for autonomous learning, (2) digital and artificial tutoring, and (3) academic misconduct and ethical considerations. The following subsections summarize the empirical findings organized by theme.

A. Support for Autonomous Learning

The theme of support for autonomous learning refers to independent learning inside and outside the classroom. In general, the interviewed students have found ChatGPT to be a useful support tool for autonomous learning. One common use of ChatGPT is to gain a deeper understanding of complex theories or concepts in students' respective academic majors. The students could ask questions related to a particular topic and receive a comprehensive response from ChatGPT. This can be particularly helpful for students who are struggling with a particular concept or who need a quick refresher on a topic.

This became more evident when the students were asked how often they sought assistance from ChatGPT when doing homework. Nine of the 12 students reported consulting ChatGPT at least once per topic/class, whereas more than half use it on a daily basis to support their independent learning. Furthermore, some students noted that ChatGPT would have been a tremendous enrichment in guiding their learning during the coronavirus pandemic.

"Basically, it was released two, three years too late. It would have made distance learning so much easier for me" (Participant 11).

Hence, it could be hypothesized – based on this statement — that ChatGPT has a particularly useful application for remote learning.

A common response from the students was that ChatGPT impacted the way they took notes in class. Previously, they recorded the classroom discussion with long bullet points on a traditional notepad or alongside the lecture slides on their digital devices (tablet or laptop). However, when using ChatGPT as a support tool, they recorded only keywords or typed these keywords directly into the chat function while in class, whereas the chat history would serve as their classroom notes. Although it was noted that the "personal touch of a teacher" would be missed, ChatGPT was reported as being "more resourceful" (than the course instructor) for most questions requiring an answer.

B. Digital and Artificial Tutoring

The theme of digital and artificial tutoring refers to the use of ChatGPT as a supplementary or, in some instances, a substitute, tutor. Many of the interviewed students said that they used ChatGPT as a tutor for out-of-classroom hours. The students used the chatbot to ask for guidance with regard to their course materials, to reiterate concepts and methods that were not easy to grasp during classroom hours and that required further rehearsal, or to completing learning assignments. The students' choice to use the chatbot (instead of consulting with the respective lecturer) was motivated by personal convenience, as when they prompted the chatbot for a response, they received it instantly. This is illustrated by the exemplary verbatim statement from Participant 6:

"It is an advantage that I can ask ChatGPT anytime about feedback and more explanations. Often, I feel bad to ask my lecturer outside of working hours to do something for me. It is much easier to type my question and have it answered right away because my lecturer might not answer me until the next day" (Participant 6).

Moreover, the students mentioned that ChatGPT can provide a personalized learning experience by analyzing their learning styles and generating customized lessons and exercises tailored to their needs. This was particularly evident among students who struggle with difficult concepts or have a hard time retaining information. Additionally, the students noted that ChatGPT can be used to answer questions and provide them with feedback on their work. When the student inputs a question, the chatbot can generate a response that helps the students understand the material. Moreover, it can provide feedback on their work and, therefore, highlight areas for improvement by suggesting ways to strengthen their writing.

C. Academic Misconduct and Ethical Considerations

Based on the interviews, it has been found that ChatGPT can be utilized for academic misconduct and other unethical purposes. The most common form of misuse identified by the students was plagiarism. This can be further illustrated by having a student input a prompt for an essay on the causes of the global financial crises in 2007/2008. ChatGPT might generate a paragraph like this: "The global financial crisis was caused by a combination of factors, including the subprime mortgage market, the proliferation of complex financial instruments, deregulation, and lax lending standards." Based on the conversations with the participants, some students were able to copy and paste this paragraph into their essay without proper citation. In doing so, they would be committing plagiarism. This is because the text was not written by the student and was not their original work. An example is the following response from participant three:

"To be honest, I was told (by the course instructor) not to use ChatGPT for my assignments and report, but it takes much more effort to do the same task completely by myself. When I feel lazy, I just do it online (with the chatbot) to save time" (Participant 3).

Similarly, another participant expressed that the ease of using a chatbot to complete individual learning assignments influenced their decision-making. Other participants expressed a similar sentiment by stating that "it would be too easy not to use it."

"I would not really use it at the university, but when I am at home and in a rush to do so many other assignments, I just think that ChatGPT could help me out. And after typing the question and receiving the answer, it would be too easy not to use it" (Participant 8).

It was reported that the ease of use of ChatGPT had an impact on the frequency of its use and the likelihood of a student misusing it for plagiarism. The easier it is for a student to use ChatGPT, the more likely that student is to misuse it for academic misconduct. For example, if a chatbot is easy to use and requires little effort from the student to generate high-quality text, the students reported being more tempted to use it for their assignments without properly citing the sources.

V. DISCUSSION AND IMPLICATIONS

A. The Perceived Usefulness of ChatGPT

This study sought to investigate how undergraduate students use natural language processing models — in particular, the most prominent example, ChatGPT — for and during their studies. Although the exploratory nature of this study does not allow for generalization to a wider student population, a few important theoretical and practical (managerial) implications can be derived.

Firstly, the findings of this study suggest that undergraduate students use ChatGPT mainly to generate initial ideas and receive instant feedback. The model was most commonly used for writing essays and homework assignments when the student was struggling to come up with ideas.

Cotton *et al.* [37] suggest a few key strategies that university teaching staff can use to design assessments that prevent or minimize the use of ChatGPT by students. For example, one approach is to create assessments requiring students to demonstrate their critical thinking, problem-solving, and communication skills. Instead of asking students to write an essay on a particular topic, university teaching staff could design assessments requiring students to engage in group discussions, presentations, or other interactive activities involving the application of their knowledge and skills. This would make it more difficult for students to use ChatGPT to complete their assignments [37].

Secondly, the study found that more than half of students used ChatGPT to plagiarize, either intentionally or unintentionally. This highlights the importance of educating students on the ethical use of the chatbot and providing clear guidelines on how to use it responsibly. Therefore, course instructors should emphasize the importance of using critical thinking and research skills to build on the model's output and create original work. Similarly, another study [38] emphasized that the role of supervision is crucial to helping

students avoid plagiarism. Additionally, the university should create a comfortable academic environment by providing free seminars and workshops on academic writing to educate students about avoiding plagiarism [38].

Although the sample of this study is limited in size, it is noteworthy to mention that male students were more casual in their attitude toward unethical behavior than their female peers. Comparably, a study with undergraduate students revealed statistically significant gender differences in students' plagiarism awareness, wherein women have a more negative attitude toward plagiarism than men [39]. Future studies, which will be conducted on a larger scale, are suggested to investigate the underlying causes or motivations behind the observed gender difference in attitudes toward plagiarism awareness, given the current restriction on the number of participants involved in this research. Investigating gender differences in plagiarism attitudes among university students is important because it may have repercussions for interventions that are more specifically catered to each gender, educational policies, curriculum development, and awareness campaigns.

Thirdly, it is important for the course instructor to "lay the groundwork" in the course introduction by addressing how to use ChatGPT responsibly, which includes the degree that it may be integrated with the course assignments. By maintaining clarity on the "do's and don'ts" and removing ambiguity, the educator can more easily impose consequences in the case of a breach [40]. Lastly, the study contributes to the body of knowledge by closing a theoretical gap in the literature on how university students utilize chatbots for and during their studies. Therefore, it advances the theoretical discussion in the field.

The concept of flipped learning has attracted significant attention in educational institutions as a promising approach to teaching and learning [41]. The prospect of integrating this approach into the curriculum is undoubtedly an exciting development. Additionally, it is widely believed that while chatbots may excel in tasks involving low-level information gathering and summarization [22, 23], there will always be a need for human expertise in more complex, reflective, and critical thinking processes. I would argue that the incorporation of chatbots in the classroom has the potential to complement and enhance rather than replace the role of educators in facilitating learning. Moreover, it is important to acknowledge that flipped learning is not a new concept but, rather, an innovative approach to the traditional classroom setting [41].

B. An Integration Model of Artificial Intelligence

As a practical recommendation, the premise of flipped learning is to invert the traditional model of teaching by assigning lectures and instructional materials for students to review before class, thereby enabling them to apply their newfound knowledge through collaborative and interactive activities during class time. The incorporation of chatbots into flipped learning has the potential to streamline the process of knowledge acquisition and provide students with a personalized and self-paced learning experience. However, it is critical to recognize that chatbots are not a substitute for the value of human interaction and personalized feedback that

educators bring to the learning process. As such, it is vital to strike a balance between the integration of technology and the role of human expertise in the classroom, as demonstrated in Fig. 1.

Fig. 1 describes the flipped classroom model in which ChatGPT has been purposely integrated as an additional element to stimulate the learning process of students. In the proposed model, the first phase takes place pre-class and the student could be tasked with researching a particular topic on their own with the assistance of ChatGPT. However, instead of letting the chatbot complete the entire task, the student must present the research during the second stage, i.e., during-class, in which the course instructor can ask questions that allow the students to develop their critical-thinking and problem-solving skills instead of merely repeating the output from ChatGPT. That way, the students could learn how to integrate ChatGPT in a meaningful way to support their studies without sacrificing the development of critical soft skills.

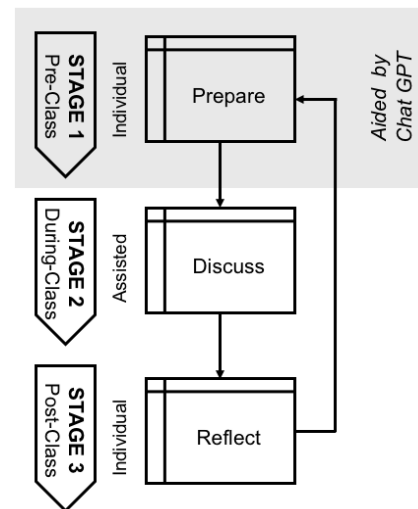


Fig. 1. A Recommended path to integrate ChatGPT into the modern classroom using "flipped learning" as a catalyst.

C. Limitations and Future Works

Lastly, in the context of scientific research, limitations always offer an opportunity for future research. Therefore, the results of this study should be evaluated in their appropriate context. The reader is advised that the results of this study are not directly transferrable into the context of other geographical settings or generalizable to a larger student population. However, the inductive and exploratory research approach opens avenues for future research to quantitatively test the hypotheses derived from this study [42]. In particular, when more university students become accustomed to the usage of ChatGPT, empirical data can be gathered from larger samples and the results can be quantified based on theoretical models.

VI. CONCLUSION

ChatGPT is an advanced language model that has the potential to enhance learning in higher education. However, its widespread adoption raises ethical concerns about its use

in academic settings. University students must use ChatGPT more responsibly by understanding its limitations, avoiding plagiarism, and ensuring academic integrity. This can be achieved through the implementation of updated university policies as well as communication between the course instructor and students about what is considered ethical. When ChatGPT is used as a tool to enhance students' learning and creativity, students can avoid unethical behavior and boost their academic excellence. Moreover, it was reported that ChatGPT has positive implications for distance education, wherein the course instructor is not readily available for university students.

VII. POTENTIAL CONCERNS WITH CHATGPT

As of the writing of this article, a media article emerged on 19 March 2023, reporting on the adoption of artificial intelligence (AI) by Finnish universities for academic purposes. Helsinki University and Jyväskylä University have decided to allow students to use language models such as ChatGPT for coursework. Moreover, the article states that Finnish experts have raised concerns about the impact of AI on education. A professor of computer science at Helsinki University highlighted the risk that students will rely solely on AI-generated answers, thereby leading to a lack of critical thinking. Additionally, he warned about the possibility of AI-generated text being biased or discriminatory if the language model relies heavily on western sources in English. The full article can be retrieved from <https://yle.fi/a/74-20023061> (last accessed on 31 March 2023).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

K.F. confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results. K.F. and V.A. prepared the manuscript and approved of its final version for publication.

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