

University Education and ChatGPT: An AI Approach to Knowledge 4.0

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Abstract— Integrating artificial intelligence (AI) in university education has opened a new path for teaching and learning methods. Advances in artificial intelligence, particularly in language models such as ChatGPT, are increasingly becoming crucial to teaching. Studies highlight both the benefits and challenges of using artificial intelligence in daily education, offering students more personalized learning experiences while also raising ethical concerns. This study surveyed 122 participants, including professors and students, to assess the impact of ChatGPT on university education and its contribution to Education 4.0. The results revealed diverse perspectives: 44% of professors and 35% of students believe that ChatGPT can significantly enhance education. Additionally, 20.63% of students reported being highly familiar with the tool, while only 2.44% of professors shared the same level of familiarity. Notably, 90% of participants indicated they had utilized ChatGPT for various academic purposes, such as providing feedback, conducting research, tutoring, and generating ideas for class content. These findings demonstrate the transformative potential of artificial intelligence tools in education, particularly when they are thoughtfully integrated into the educational process, by complementing rather than replacing traditional teaching methods. AI can provide a powerful tool for enhancing the quality and accessibility of education. As universities continue to explore the role of AI in shaping the future of education, it is crucial to address the ethical, pedagogical, and practical challenges that accompany its widespread adoption.

Keywords—Artificial intelligence, Education 4.0, knowledge, ChatGPT, university.

I. INTRODUCTION

In today's world, which opens new doors to technological developments, artificial intelligence (AI) has become a central element. This new wave of AI has created innovative possibilities in various fields, such as education, healthcare, finance, and many more. Several people worry that AI will threaten current jobs by taking them over and leaving individuals unemployed. Others are concerned about the ethical implications that the use of this technology may have. However, artificial intelligence should be seen as a new opportunity for research in this field of study and a tool that can complement and enhance human capabilities, writing, and investigation. As well as a facilitator between professors and students inside classrooms. With artificial intelligence becoming more prominent, many language models propelled by it, such as ChatGPT, are playing a significant role in reshaping the new era of Education 4.0 [1].

The emergence of Education 4.0 is closely linked to the evolution of industrial revolutions. From the use of steam and waterpower in the first Industrial Revolution to the automation brought by electronics in the third, the fourth Industrial Revolution introduced technologies, such as artificial intelligence, the internet, and robotics. Education 4.0 integrates these advancements with traditional learning methods, creating more engaging and dynamic educational experiences [2].

The utilization of ChatGPT in education is significantly more notable as of today. ChatGPT is an AI generative language model that provides human-like responses to questions by analyzing and generating relevant answers based on context. The benefits of this tool are undeniable, despite some associated drawbacks [3].

Among the benefits of ChatGPT being included in Education 4.0, one of the principles is the ability to provide confidence through a more personalized learning experience to students. The model can break down complex problems into smaller and easier problems if the students have difficulties, that way providing a more individualized experience and making students more confident in their skills when breaking down problems. Moreover, ChatGPT can help students verify their solutions to problems they have a hard time with, further enhancing their understanding of any material [4].

From the teaching perspective, ChatGPT can aid professors in creating classroom content and brainstorming dynamic activities tailored to specific learning goals. Additionally, by automating daily tasks like grading assignments, ChatGPT can help professors focus more on guiding and engaging with students [5]. Furthermore, AI chatbots can help admissions officers by providing help to new incoming students on what student life is like in the university they plan to attend [6].

In academic writing, ChatGPT also offers significant advantages. It assists in summarizing texts, generating references, and improving overall writing quality, saving both students' and professors' time. Not only that but also it can help them in the investigation process. For example, ChatGPT can generate investigation topic ideas, and research questions, and provide references to articles of interest [7].

However, despite these numerous benefits, the integration of ChatGPT in Education 4.0 can offer certain drawbacks that must be considered. Ethical problems, concerns about data privacy, and the potential for job displacement

require careful attention [8]. Nevertheless, when used adequately the AI model can produce remarkable results.

Moreover, the adoption of AI and Education 4.0 has significant implications for regions like Latin America and the Caribbean, which face socioeconomic barriers to accessing quality education. High costs associated with innovation tend to prioritize the integration of technology and artificial intelligence into administrative processes rather than learning processes. This has led to a reluctance among higher education institutions to fully embrace these innovations [9].

However, tools such as ChatGPT can broaden learning opportunities by providing accessible resources, all in one place, and personalized support. This can help bridge the educational divide, further increasing the economic growth in these regions and preparing even their future workforce. By facilitating immediate access to resources, this technology has opened a path with the university environment emerging as a catalyst for entrepreneurship among young people [10].

In alignment with the Sustainable Development Goals (SDGs), particularly Goal 4 on quality education, AI tools like ChatGPT can play a significant role in addressing educational disparities. By offering tailored learning experiences and access to information, these technologies can support equitable education in underprivileged regions. Furthermore, their integration into educational systems can empower students by enhancing their digital literacy and self-efficacy, ultimately preparing them for future jobs in the markets and contributing to more sustainable economic growth in line with global development objectives [11].

Research done in Malaysia underscores the pivotal role of self-efficacy in students' preparedness for Education 4.0. This finding emphasizes the necessity for educational institutions to cultivate both confidence and resilience, enabling students to embrace entrepreneurship and innovation. By integrating this into their curricula, schools can empower learners to become proactive, innovative thinkers who are well-equipped for the challenges of a technology-driven economy, thereby supporting the Sustainable Development Goals of equitable and inclusive education while fostering a new generation of entrepreneurs [12].

Another dimension of this digital evolution is the professional development of educators. Investigation into integrating AI into teachers' professional knowledge demonstrates that continuous training is essential for teachers to effectively incorporate AI tools in their pedagogy. This not only enhances teaching methods but also ensures that educators can ethically and responsibly manage these technologies in the classroom [13].

The ethical and responsible use of AI in education is a recurring theme in recent literature. Emphasizing the importance of maintaining privacy, ensures equity and promotes transparency when integrating AI tools such as ChatGPT into educational practices. These principles are vital to safeguard students' rights and to foster an inclusive learning environment [14]. Moreover, the practical application of AI in

education illustrates how chatbots can support language learning and content acquisition. A study on AsasaraBot highlights the potential benefits and challenges of using AI-driven chatbots in educational settings, providing valuable insights into the effectiveness of these tools [15].

Finally, the future of education with AI suggests that technologies such as ChatGPT can revolutionize higher education by enhancing student-teacher interactions and personalizing learning experiences. However, it also calls for addressing the challenges related to ethical considerations and the need for adequate training for both students and educators [16].

This article aims to synthesize these perspectives, offering a comprehensive overview of how AI and emerging technologies are reshaping education [17]. It delves into the readiness of students and teachers, the ethical implications, and the practical applications of these technologies, providing a roadmap for educational institutions to navigate the complexities of Education 4.0.

II. METHODOLOGY

A descriptive and quantitative approach was taken to further investigate and understand the impact and applications of ChatGPT on university knowledge. To achieve this, a comprehensive literary review of relevant academic papers and reports published in the past ten years was conducted. These articles and papers centered on subjects regarding the emergence of artificial intelligence, the relevance of the era of Education 4.0, and how both matters are interconnected, transforming traditional teaching and learning methods.

The primary data collection method was a survey administered to 122 university professors and students using the QUALTRICS platform. The questions included were designed to measure the impact of ChatGPT on higher education. Specifically, the survey assessed participants' familiarity with the model, their perceived obstacles and worries, and the reasons for their use.

A combination of nominal scales for demographic data, Likert scales for attitudes and perceptions, and open-ended responses for qualitative feedback was employed. Moreover, quantitative data were analyzed using descriptive statistics, means, standard deviations, and frequency distributions, to summarize participants' responses.

The results from both quantitative and qualitative analyses were integrated to ensure a comprehensive understanding of the impact of ChatGPT in higher education. This mixed-methods approach provided a comprehensive analysis, allowing for both quantitative and qualitative insights into the role of ChatGPT in higher education.

III. RESULTS

The sample used in this study consisted of 122 participants. As shown in Figure 1, 93% of these participants had heard of

ChatGPT, while the remaining 7% had not, resulting in the survey ending for them. For the 113 participants who were familiar with the artificial intelligence language model, additional information was gathered on their usage, reasons, and perceptions of ChatGPT.

The characteristics of the 113 participants can be seen in *Table 1*. The sample was divided into 63 students, 41 professors, 5 administrative staff, and 4 that comprised the “Other” category. For this study, we will concentrate on the perspectives of students and professors, to ensure that the insights gathered will be reflective of the experiences of those directly involved in the academic environment. Therefore, the analysis will focus on 63 students and 41 professors.

Categorized by age and gender, students predominated with 55.8% of the sample. However, the mean age is 32.61 years old, indicating that, in general, the participants’ age is above or below that age. This demonstrates that the sample includes a younger population mainly composed of students and professors. Despite this, measures of central tendency, such as the variance and standard deviation demonstrated a high significant difference between the ages.

Specifically, the age variance of 211.10 highlights the high spread in age within the sample, noting a wide range of ages. The standard deviation further supports this, showing that the ages vary by 14.53 years from the mean. Similarly, professors accounted for 36.3% of the sample. Similarly, male students and professors constituted the majority with 28.30% and 23.9%, respectively.

The sample’s demographic underscores the wide diversity within the university. This diversity is crucial, as it gives deeper insights and understanding of the participants’ varied perspectives on the ways ChatGPT, and artificial intelligence have affected their academic experience.

The familiarity levels with ChatGPT among students and professors were different. As illustrated in *Figure 1*, 42.86% of those who reported being “Very familiarized” with ChatGPT were students, following those who responded that they were “Moderately familiarized”. On the other hand, 48.78% who felt “Moderately familiarized” were professors. This suggests that professors might be aware of ChatGPT, but they might not use it frequently. Similarly, a high difference can be seen in the “Extremely familiarized” category, where 2.44% of them were professors, compared to a significantly higher 20.63% of students.

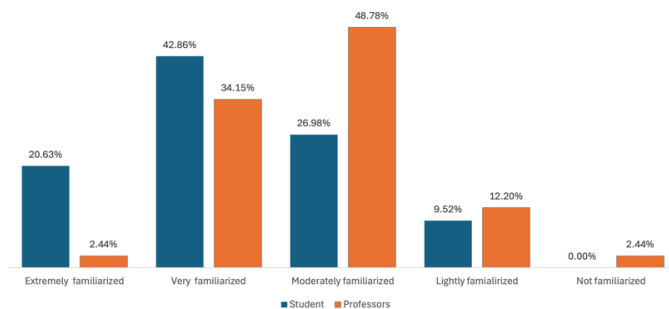


Figure 1 Percentage of familiarity with ChatGPT

Despite the varying levels of familiarity with ChatGPT, 90% of both students and professors reported using the artificial language model in their academic activities. Among those who integrated ChatGPT into their academic work, the usage of it was diverse. Many participants utilized the tool for assistance of any kind, creating rubrics for evaluations, providing feedback on projects, and conducting research. Additionally, participants used it as a tutoring resource, problem-solving, and case studies.

While the integration of ChatGPT in the academic setting has provided support for various educational needs, students and professors have reported that it also has presented challenges in their usage. Among these challenges, concerns about the accuracy of information provided are frequently highlighted. Thoroughly evaluating the responses ChatGPT generates is crucial as it can produce incorrect or false information. Moreover, a strong reliance on the model is another challenge students and professors face. This dependency can impede students from using their critical skills. Beyond excessive dependency, concerns about ethical issues, privacy, and lack of personalized responses are other challenges reported. Even though it can be beneficial, this further enhances the importance of using ChatGPT as a complementary tool to traditional learning and teaching methods in educational settings.

TABLE I
SAMPLE BREAKDOWN (N=113)

Age Range	Student		Professors		Administrative Staff		Others		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
18-24 years old	62	54.90%	0	0.00%	0	0.00%	1	0.90%	63	55.80%
25-34 years old	1	0.90%	4	3.50%	0	0.00%	0	0.00%	5	4.40%
35-44 years old	0	0.00%	11	9.70%	3	2.70%	1	0.90%	15	13.30%
45-54 years old	0	0.00%	16	14.20%	0	0.00%	1	0.90%	17	15.00%
55+ years old	0	0.00%	10	8.80%	2	1.80%	1	0.90%	13	11.50%
Total	63	55.80%	41	36.30%	5	4.40%	4	3.50%	113	100.00%
Gender										
Female	31	27.40%	14	12.40%	2	1.80%	2	1.80%	49	43.40%
Male	32	28.30%	27	23.90%	3	2.70%	2	1.80%	64	56.60%
Total	63	55.80%	41	36.30%	5	4.40%	4	3.50%	113	100.00%

Source: Authors own calculations

In addition to the challenges associated with the model, the level of impact is diverse and notable. Among the participants, 27.40% who responded having a significant impact were students. This was followed by 18.60% of students who noted experiencing a moderate impact. For professors, the most common response was also having a moderate impact with 11.50%. At the extreme, only 0.90% of those who responded ChatGPT has had no impact on education were students, whereas 1.80% of those who felt a transformative impact were professors.

The concept of Education 4.0 revolves around incorporating artificial intelligence in traditional teaching and learning methods. With this, opinions and beliefs about the role of tools, such as ChatGPT vary widely. As shown in Figure 2, 44% of professors agree that ChatGPT can contribute to Education 4.0, compared to the students' 35%. Furthermore, 44% of students agree, while only 7% of professors disagree ChatGPT can contribute to Education 4.0. The difference in opinions between students and professors shows the acceptance and skepticism artificial intelligence brings into education.

Additionally, to examine the correlation between university roles (student or professors) and the level of agreement on ChatGPT contributing to education, a regression analysis was done, as evidenced in Table II. The model shows a weak positive correlation between the variables, while only explaining 3.1% of the variance in the variable of level of agreement. The relationship between both can be proven not significant, meaning that if the participants are students or

professors, it will not predict their level of agreement on integrating ChatGPT in education.

TABLE II
SUMMARY OF REGRESSION MODEL PREDICTING ACCEPTANCE BASED ON ROLES^b

R	R-Squared	Sig.
0.177 ^a	0.031	0.073

^a Predictor: Role in university

^b Dependent variable: Level of agreement on ChatGPT contributing to education.

To investigate possible associations between the participants' roles as students or professors and if they had any worries about integrating artificial intelligence, such as ChatGPT, on education. As demonstrated in Table III, a chi-square test of independence was performed to determine independence between both groups. The results indicated that there was no association between the participants' roles in university and whether they worried or not about integrating ChatGPT into education.

TABLE III
CHI-SQUARE TEST OF INDEPENDENCE

	Value	DF	Sig.
Pearson Chi-Square	4.967	3	0.174

Source: authors own calculations

The demographic analysis in Table IV shows a diverse age range within the sample, with an overall average age of 32.61 years. Students are predominantly young, averaging 18.02 years with little age variation. Professors and administrative staff are older, averaging 47.10 and 44.80 years, respectively, with moderate age diversity. The "Others" group has a wide age range, reflected in a high variance and standard deviation. This age diversity suggests the need for nuanced analysis, as responses may vary significantly across different age groups.

TABLE IV
STATISTICAL DATA

Group	Mean Age	Standard Deviation	Variance
Students	18.02	0.14	0.02
Professors	47.10	8.13	66.09
Adm. Staff	44.80	7.02	49.28
Others	37.75	16.50	272.25
Total	32.61	15.13	228.96

Source: authors own calculations

IV. CONCLUSIONS

The impact AI tools, ChatGPT, have brought on education, reinforces the concept of Education 4.0 and how these technologies have changed today's traditional teaching and learning methods. By providing personalized learning experiences for students and a variety of content ideas and activities for professors, ChatGPT has paved the way for higher engagement and involvement from both students and professors.

The study revealed great insights into how ChatGPT is perceived and utilized among participants in educational settings. While students and professors have used it in academic activities, the reasons for their use varied. Assistance in projects, improving writing, providing feedback, and brainstorming for new ideas of content or research, were some of the reasons for their use. Despite its benefits, some challenges presented concerns for many of the participants. Professors reported students' having an extreme dependency on the tool could be detrimental to the student's abilities to develop and use their critical and analytical skills. Ethical and privacy issues and the lack of precision in information are some of the other challenges found. Although the AI model presents benefits and obstacles, the use of ChatGPT complementary to traditional teaching and learning techniques can enhance these practices while considering the concerns raised.

The demographic analysis of the sample revealed that students comprised the majority, making up 55.8% of the sample, while professors accounted for 36.6%. The data highlights a significant age difference between groups, with students being the youngest and "Others" showing the most age variability. The overall mean age of 32.61 years reflects a midpoint but doesn't fully represent the considerable age range within specific groups.

Moreover, the impact experienced by students and professors by using ChatGPT since its introduction differed, with 27.40% of students responding having a significant impact, while most professors, 11.50%, reported facing a moderate impact. The variety of responses regarding the impact participants experienced aligns with the high acceptance and hesitance from people surrounding artificial intelligence, as it is something recent.

Furthermore, the regression analysis demonstrated the lack of significant correlation between students and professors and their level of agreement on their belief that ChatGPT will contribute to education. This suggests that the belief of ChatGPT impacting education is not strongly influenced by the participant's role in the university.

As we continue evolving in technology, educational institutions must consider implementing these tools in their curriculum. Not only does artificial intelligence represent a significant advancement in the world, but it also offers opportunities for elevating teaching and learning methods through individualized and dynamic engagement from both parties. Further research should be done, as artificial intelligence in Education 4.0 is a broad topic that is of interest to many in a more technological society.

To further explore the implications of AI tools such as ChatGPT in the educational landscape, it's important to address the potential for these technologies to democratize access to quality education. By providing on-demand access to information and personalized tutoring, AI can bridge gaps in educational resources, especially in underserved areas [18]. This democratization can lead to more equitable learning opportunities, enabling students from diverse backgrounds to benefit from high-quality educational support [19]. The adaptive nature of AI-powered tools means that students can learn at their own pace, receiving immediate feedback and guidance, which can be especially beneficial for those who may struggle in a traditional classroom setting.

However, the integration of AI in education also raises concerns about the digital divide and access to technology. Not all students have equal access to the internet or digital devices, which can exacerbate existing inequalities. Educational institutions must therefore consider strategies to ensure that all students can benefit from these advancements, providing necessary technological infrastructure and support. Also,

training students and educators in digital literacy is needed to effectively use AI tools. This training can help mitigate some of the ethical concerns, data privacy, and the potential misuse of AI-generated content, by fostering a critical understanding of these technologies [20].

Finally, the long-term impact of AI on the traditional roles of educators is a topic worth exploring. As AI tools become more integrated into the classroom, the role of educators may shift from being the primary source of knowledge to facilitators of learning experiences[21]. This transition could allow educators to focus more on mentoring, fostering critical thinking, and providing emotional and social support to students [22]. However, it also necessitates a re-evaluation of teaching methods and curricula to incorporate AI in a way that complements, rather than replaces, human interaction. As we move forward, a balanced approach that combines the strengths of AI with the irreplaceable value of human educators will be essential in shaping the future of education [23].

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