

Longitudinal insights into AI in education: Usage, ethics, and policy development in higher education

Luke Parker^{a,*}, A. Jane Loper^b, Christopher W. Carter^b, Josh Hayes^b, Alice Karakas^b

^a Australian Catholic University, Catherine of Siena Centre, 1200 Mair Street, Lake Wendouree, VIC, 3350, Australia

^b University of Kansas, Level 2 - 1122 W Campus Rd, Lawrence, KS, 66045, United States

ARTICLE INFO

Keywords:

Generative AI
Teacher education
AI academic performance
AI ethical considerations
AI integration
ChatGPT

ABSTRACT

Since the launch of ChatGPT in November of 2022, its role in education has been a focal point of debate, with discussions centering on whether it will revolutionize learning, prove to be a temporary trend, or mark a significant technological shift. While initial studies have explored artificial intelligence's (AI) impact on specific classes and institutions, there has been a severe lack of longitudinal research within teacher education programs. This study addresses this gap by analyzing four semesters of data on the evolving use and ethical perceptions of generative AI among students in a teacher education program at a university in the Midwestern United States. Surveys conducted with over 300 students over this time reveal the growing use of GenAI in their educational practices. The findings indicate significant growth in the use of AI for assessment preparation and studying, with usage rates rising from 57 % to 83 % and 44 % to 76 %, respectively. The study also examined the ethical considerations surrounding AI use, identifying ongoing uncertainty and a statistically significant difference in ethical perceptions between AI users and non-users. Additionally, the research highlighted how students perceived the integration of AI into teaching and its impact on academic performance. Findings emphasize the need for teacher education programs to incorporate AI training and address ethical concerns comprehensively and formally.

1. Introduction

The recent surge in artificial intelligence (AI) use among college students, especially large language models (LLMs) like ChatGPT, has sparked significant debate within academic institutions about its use, ethical implications, and potential impact on student learning. As AI continues to evolve, so too do the challenges and opportunities it presents in educational settings. In an era where defining “authentic” student responses is becoming increasingly challenging due to the growing reliance on AI tools, this study contributes to the ongoing discourse concerning AI’s ethical and practical implications in education.

This research explored the evolving relationship between undergraduate students at the University of Kansas and AI tools, such as ChatGPT, over four distinct periods: spring 2023 (May 2023), fall 2023 (December 2023), spring 2024 (May 2024), and fall 2024 (December 2024). To situate this study conceptually, Rogers’ Diffusion of Innovation Theory (1962) offered a useful framework for examining the spread and normalization of AI technologies in higher education settings over

time. By administering surveys across these four time periods, to seven diverse courses within the School of Education and Human Sciences, this study sought to quantify the prevalence of AI use among students, assess their ethical perceptions, and evaluate whether the integration of AI detection software influences their behavior.

As AI becomes more embedded in academic tasks, will students increasingly view it as a beneficial tool? Those perceiving its use as ethical will be more likely to adopt it. The study’s findings contribute to a deeper understanding of how AI has reshaped the educational landscape and the ethical considerations accompanying its use. As AI tools like ChatGPT become more integrated into the learning environment, it is crucial to understand their impact on student behavior and ethical perceptions.

By examining students’ perceptions and usage patterns, this research provides evidence that AI is already becoming an integral part of academic life, influencing how students approach their coursework and also how they perceive the boundaries of ethical use. These insights enable more informed decisions regarding AI’s broader application within

* Corresponding author at: Australian Catholic University, Catherine of Siena Centre, 1200 Mair Street, Lake Wendouree, VIC, 3350, Australia.

E-mail addresses: Luke.parker@acu.edu.au (L. Parker), janeloper@ku.edu (A.J. Loper), ccarter11@ku.edu (C.W. Carter), josh_hayes359@ku.edu (J. Hayes), akarakasneuman@gmail.com (A. Karakas).

<https://doi.org/10.1016/j.caeo.2025.100329>

Received 14 October 2024; Received in revised form 21 November 2025; Accepted 31 December 2025

Available online 1 January 2026

2666-5573/© 2026 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

higher education and offer guidance for educators in adapting their teaching strategies to better support students. This work also provides data points for universities and institutions as they work to develop AI policies for student use. As stakeholders navigate this evolving educational landscape, it is essential to balance the potential benefits of student AI use with the need to uphold the integrity of genuine learning and critical thinking in partnership with those students.

2. Literature review

2.1. Overview

The introduction of ChatGPT has generated substantial attention within higher education, particularly regarding its instructional and administrative applications. Since its initial release, the model has evolved quite rapidly across versions: GPT-3, GPT-3.5, GPT-4 and GPT-5—each iteration offering greater sophistication in language generation and contextual awareness. This review synthesizes research on ChatGPT's emerging roles in higher education, emphasizing major developments, recurring concerns, and areas where further inquiry is needed.

2.2. Historical development of ChatGPT

ChatGPT's development has been marked by several notable milestones, beginning with GPT-3, which gained immediate attention, globally, for its ability to generate human-like text. The subsequent versions, GPT-3.5, GPT-4 and GPT-5, flaunted enhanced capabilities, including improved contextual reasoning and generative accuracy [1,2]. These advancements contributed to the increased use of ChatGPT in educational settings [3], where instructors and students have begun incorporating it into tasks such as assessment design and personalized academic support [4,5].

2.3. Applications of ChatGPT in higher education

2.3.1. Pedagogical and instructional use

Across higher education, ChatGPT has been repeatedly hailed as a “transformative tool” [6,7]. Empirical studies indicate it can assist in grading, generate formative feedback, and even serve as a virtual tutor [8,9]. research also suggests that ChatGPT can enhance learning outcomes by offering individualized support to students [10,11], a feature particularly valuable in large enrollment classes where personalized attention is scarce [12]. Moreover, the immediacy of AI-mediated feedback has been associated with increased student engagement and motivation [13,14]. However, the extent to which ChatGPT can, or should, fully replicate the nuances of human instruction remains an area of ongoing debate [15–18].

2.3. Limitations in educational contexts

At the same time, the literature underscores ongoing limitations. Although ChatGPT can address a wide range of topics and produce coherent responses, it lacks the deep disciplinary understanding required to navigate complex or ambiguous problems, occasionally leading to oversimplification or factual errors [19,20]. This limitation reinforces the need for instructors to consider disciplinary norms and pedagogical goals when integrating AI into coursework [1,21].

2.4. Opportunities and challenges AI integration in educational contexts

ChatGPT presents substantial opportunities to enrich educational practice. Its capacity to deliver on-demand, personalized support may broaden access to high-quality instruction, potentially contributing to more equitable learning environments [22,23]. However, these affordances do not come without significant challenges. Researchers have

documented increases in academic dishonesty, including the submission of AI-generated work without the student engaging in necessary learning processes [24–26]. Additional concerns center on the generation of inaccurate or fabricated content [27–29]. Questions about the reliability of AI detection systems, such as Turnitin's detection tool, further complicate assessment integrity [30–33]. These intertwined opportunities and risks highlight the need for careful pedagogical and institutional planning.

2.5. Equity concerns

Beyond instructional implications, the integration of generative AI in schools raises important ethical questions. Scholars have expressed concerns about data privacy, algorithmic opacity [34] and the extent to which AI systems may perpetuate or exacerbate existing inequities in education [35–37]. These issues underscore the need for institutional policies that foreground transparency, responsible use, and attention to structural inequities, as AI tools become more embedded in higher education contexts.

2.6. Research gaps

Despite the rapidly expanding scholarship on ChatGPT, notable gaps persist. Much of the current literature is anecdotal, exploratory, or grounded in single-institution case studies rather than rigorous empirical design. Longitudinal studies examining ChatGPT's sustained influence on learning outcomes, academic performance, and student engagement are particularly limited. In addition, research on algorithmic bias in generative AI remains limited in scope. While some studies have begun addressing these concerns [38,39], broader examinations of how GenAI bias intersects with educational inequity are still needed. Addressing these gaps is essential for developing a more comprehensive understanding of ChatGPT's long-term role in higher education.

3. Methods

3.1. Research design

This study employs a longitudinal survey design, defined as the repeated observation of the same population over multiple time points [40]. In this case, data were collected across four academic semesters (spring 2023, fall 2023, spring 2024, and fall 2024) from the same academic program using a consistent core instrument. Although individual participants varied across time points due to semesterly course enrollment, the population was conceptually stable (i.e., undergraduate teacher education students in the same program, same year levels). This design permits temporal analysis of trends in AI adoption and ethical perceptions within a defined educational context.

Each data collection wave targeted a different cohort of undergraduate students enrolled in the same core education units, meaning the study did not follow the same individuals longitudinally but rather captured cohort-level trends in the same classes over time. This repeated cross-sectional approach allowed for the examination of changes in AI adoption and ethical perceptions as AI became increasingly embedded in educational discourse and digital practice. The timing of the surveys also aligned with key moments in the public rollout and institutional responses to GenAI, allowing for temporal sensitivity in interpreting findings. This approach was well suited for tracking changes in student behavior and attitudes over time, providing a robust framework for analyzing trends in AI adoption and ethical perceptions. Tested survey instruments were used, and data were analyzed with Jamovi statistical software.

3.2. Participants

The participants in this study were undergraduate students enrolled in courses within the School of Education and Human Sciences at the University of Kansas. These students were selected because they represented the primary population engaging with teacher-education coursework, an area where understanding the adoption and ethical perception of generative AI is particularly salient. The courses included Science, Technology, Engineering and Mathematics (STEM) pedagogy, English pedagogy, Teaching English to Speakers of Other Languages (TESOL), Information and Communication Technology (ICT) in education, and introductory teaching seminars. These courses were chosen because they were taught across the various cohorts and commonly taught in both semesters of the year and included assignments conducive to discussions about AI use, thereby providing a stable and relevant population for longitudinal comparison.

This study employed purposive and convenience sampling techniques, as the intention was to examine AI use within a clearly defined and pedagogically relevant instructional context rather than produce generalizable estimates across the entire university. This sampling strategy aligns with the study's focus on teacher-education students, a group likely to encounter AI not only as learners but also as future educators.

Across the four survey distributions, a total of 423 students were eligible to participate, and 319 completed the survey, resulting in a combined response rate of approximately 75 %. Population size was therefore determined by the total enrollment of the participating course sections each semester. No additional recruitment was conducted outside these courses. In total, 65 participants completed the survey in Spring 2023, 60 in Fall 2023, 96 in Spring 2024, and 98 in Fall 2024.

3.3. Survey instrument

The survey instrument consisted of both closed and open-ended items assessing students' use of AI, ethical perceptions, perceived academic impact, attitudes towards institutional policies and beliefs about future use. The survey instrument was developed collaboratively by the research team based on emerging literature and institutional context. Content validity was established through expert review [41]. The survey was independently reviewed by two external experts with expertise in AI in education and survey design. Face validity was supported by pilot testing in the Spring of 2023 with a small group of undergraduate students ($n = 10$) who provided feedback on the clarity and comprehensibility of items. Feedback informed minor revisions to wording and item clarity prior to survey administration.

Over the four distinct data collection periods, many items remained consistent across the four waves. However, a small number of questions were modified or introduced in response to changes in the AI landscape and emergent themes. A full copy of the survey instrument is included in [Appendix A](#) to enhance transparency and replicability in addition to the core survey elements which are noted below.

Quantitative data were analysed using Jamovi software. Descriptive statistics (frequencies and percentages) were used to summarize AI usage patterns. Inferential statistics, including one-way ANOVA, were conducted to examine differences across survey waves, with post hoc comparisons using Tukey's [42] HSD test. Assumptions of normality and homogeneity of variance were checked prior to analysis. Open-ended responses were analyzed using inductive thematic coding. Responses were first read holistically, initial codes were developed, and recurring patterns were grouped into themes. Coding was performed by all authors, with discrepancies resolved through discussion.

3.4. Core survey questions administered across the four waves

1. How prevalent is undergraduate students' use of AI (such as ChatGPT) when completing academic tasks?

2. Can Turnitin accurately identify all assignments as AI-generated?
3. Should AI tools (such as ChatGPT) be banned at the University of Kansas?
4. How important do you think it is for the university and professors to include AI knowledge and skills as a part of class?
5. Do undergraduate students believe that using AI (such as ChatGPT) to complete academic tasks is ethical?
6. Is there a relationship between the ethical perception of AI (such as ChatGPT) and its use in completing academic work?
7. Do students believe the use of AI (such as ChatGPT) has improved their academic performance?
8. Is there a relationship between a student's ethical beliefs on AI and the amount of improvement they perceive AI provides on academic tasks?
9. What are some ways that come to mind where AI (such as ChatGPT) could help teachers and students with learning activities?
10. The university is proposing to integrate new software to detect AI (such as ChatGPT) in submitted assignments. Will the implementation of this new software stop you from using AI on future assignments?
11. Do you think the university should have policies and rules about using AI (such as ChatGPT) - Why or why not?

In alignment with the broader research objectives, researchers formulated a guiding hypothesis to anchor the inquiry. Central to the larger research question, this hypothesis is as follows:

Over the longitudinal data collection periods, the use and implementation of AI by undergraduate students for both studying and completing assignments are expected to rise. Students will increasingly perceive AI as a valuable tool that enhances their academic performance. Moreover, the researchers hypothesize that students who view AI usage as ethical are more likely to engage with the tool compared to those who do not share this belief.

3.5. Theoretical framework

This study is theoretically grounded in Rogers [43] Diffusion of Innovation (DoI) framework, which provides a lens for understanding how new technologies, in this case Generative AI tools, are adopted within social systems over time. The DoI model suggests that innovations diffuse into populations in identifiable stages, initially beginning with Innovators (the first 2.5 %), followed by Early Adopters (13.5 %), Early Majority (34 %), Late Majority (34 %), and Laggards (14 %). In this study, undergraduate students comprise the adopter population, and ChatGPT serves as the focal innovation.

The relevance of the DoI framework lies in its ability to account for the temporal and social dynamics underpinning technology adoption, particularly in educational contexts where both individual agency and institutional structures shape engagement. As a longitudinal investigation, this study is well positioned to observe patterns consistent with Rogers's adoption curve, offering insight into how perceptions of AI ethics, policy, and academic utility evolve over multiple semesters. By applying this framework, the study foregrounds not only the rate and scope of adoption but also the sociocultural and pedagogical conditions that influence diffusion within higher education.

3.6. Ethical considerations in data collection

Because the five Graduate Teaching Assistants (GTAs) served dual roles as both instructors and researchers, the potential for role-related bias was acknowledged. Each GTA was responsible only for their own course sections, with some teaching multiple sections of the same course, resulting in up to seven classes being included in the study across any given semester. To mitigate risks related to coercion or perceived obligation, the research team implemented several safeguards. Students

were verbally and explicitly informed that participation was voluntary, anonymous, and unrelated to course performance. No identifiable information was collected, and Qualtrics metadata such as completion time were anonymized automatically. Surveys were administered outside of assessment contexts, outside of classroom minutes, and instructors did not have access to individual responses at any time. These procedures were designed to promote honest participation while preserving the integrity of the data.

4. Findings and discussions

This section will examine and interpret the study's findings for each of the eleven research questions, providing detailed breakdowns and discussions for each, culminating in a comprehensive synthesis of the findings. A brief overview of the findings related to the guiding hypothesis and any additional information discovered throughout the process will also be presented.

4.1. Research question one

How prevalent is the use of AI (such as ChatGPT) by undergraduate students when completing academic tasks?

In all four survey distributions, students were asked if they used AI for studying and completing assignments. Table 1 below shows the distribution of how students responded to these questions.

The study's findings reveal a significant upward trend in students' use of AI for both studying and completing assignments from the first to the fourth longitudinal survey. Notably, the data from fall 2024 demonstrates a considerable increase in AI usage compared to earlier semesters, with 76 % of students using AI for studying and 83 % employing it for assignments. This increase is statistically significant, as evidenced by the results of an Analysis of Variance test (ANOVA), which showed significant differences in AI usage for studying, $F(3, 1250) = 34.45, p < .001$, and for assignments, $F(3, 1250) = 31.88, p < .001$, based on the timing of data collection. Post hoc analyses using the Tukey criterion further indicated that the number of students using AI to complete academic tasks during fall 2024 was significantly higher than in spring 2024, spring 2023, and fall 2023.

The sharp increase in AI usage in fall 2024 compared to spring 2023 (23 months) could be attributed to several factors. As AI becomes more embedded in instruction, media, and everyday conversations, students may have increasingly incorporated AI into their study routines and assignments. This trend may have been further exacerbated by students' positive experiences with AI tools or by hearing from their peers about the benefits of using AI, such as improved grades, time-saving advantages, and enhanced efficiency. The accumulation of these factors over the 23 months between the first and fourth data points likely contributed to the significant increase in AI usage observed in the study. It is important to note that the first survey was conducted less than three months after the most publicly accessible version of ChatGPT was launched in November 2022. As with any new technology, it can take time to spread through a population, consistent with Rogers' [43] *Diffusion of Innovations* theory, which describes the adoption process progressing from Innovators (2.5 %) through to Laggards (14 %).

Table 1

Prevalence of using AI (such as ChatGPT) by undergraduate students for studying and assignments.

Survey Distribution Date	AI for Studying		AI for Assignments		AI for Either	
	No	Yes	No	Yes	No	Yes
Spring 2023	56 %	44 %	43 %	57 %	35 %	65 %
Fall 2023	57 %	43 %	48 %	52 %	37 %	63 %
Spring 2024	34 %	66 %	26 %	74 %	20 %	80 %
Fall 2024	24 %	76 %	17 %	83 %	12 %	88 %

Students using AI in spring 2023 likely represented the Early Adopters or Early Majority, while by fall 2024, the data suggests a shift toward the Late Majority phase. The observed temporal trend aligns with the expected adoption curve, offering theoretical support for interpreting the growing uptake of generative AI tools within higher education contexts.

Moreover, by fall 2024, AI tools had advanced significantly, becoming more sophisticated, varied, and accessible. These tools offered students enhanced capabilities for writing, problem-solving, and content generation (i.e., image generation was not available in spring 2023).

Furthermore, these findings reveal a consistent increase in the use of AI for both studying and completing assignments from the initial to the most recent survey. Between spring 2023 and fall 2024, AI usage for studying increased by 32 %, while AI usage for assignments rose by 26 % and using AI for either rose by 23 %. Interestingly, the use of AI for assignments remains higher than for studying, suggesting that students may perceive AI as more beneficial for productivity-oriented tasks, such as generating polished assignments, rather than for traditional studying, which typically involves deeper understanding and critical engagement with the material. This discrepancy in AI usage for these two purposes invites further exploration into how students view AI's role in learning versus task completion.

It is also noteworthy that the findings from the second survey distribution, conducted in fall 2023, indicated a slight decline in AI usage compared to spring 2023. The fall 2023 data shows the only reduction in AI use relative to the other time points, which warrants further investigation to understand the factors contributing to this brief decline. This may be explained by the initial backlash against using AI tools in the media and general discussions, coupled with the absence of an official university policy, which left AI use in a gray area. As a result, students may have hesitated and taken a step back to reassess their use of AI. However, after recognizing its potential benefits, they likely chose to incorporate it into their study routines and assignment completion in subsequent semesters.

4.2. Research question two

Can Turnitin accurately identify all assignments as AI-generated?

As part of these studies, Turnitin plagiarism detection software was used to analyze undergraduate student assessments during four study periods (spring 2023, fall 2023, spring 2024 and fall 2024). It is important to note that although individual instructors were made aware of general class usage of AI based on these findings, no individual information was shared, and no academic misconduct actions were taken. The University of Kansas is still in the process of developing an official university-wide AI policy; however, individual instructors are currently able to implement their own rules within their classes.

While Turnitin is not the only AI detection tool available, it was chosen for this study due to its integration into the existing grading systems at the University of Kansas. It is also essential to acknowledge that although some universities rely heavily on Turnitin's AI detection capabilities, there are ongoing concerns about the software's reliability [44]. Specifically, the potential for false positives has led several institutions to question the reliability of using Turnitin to determine AI involvement in student work, prompting them to refrain from adopting it for such purposes [45]. It is also important to note that during the first semester of this research (spring 2023), Turnitin reported AI detection scores to instructors even if the result was under 20 %, while acknowledging the possibility of false positives. However, from Fall 2023 onward, Turnitin had adjusted its approach, indicating AI detection for scores under 20 % but only providing a score to instructors if AI exceeded 20 %.

Table 2 shows that Turnitin has detected increasing AI-generated content in student submissions. In spring 2023, Turnitin identified that 9 % of submissions across the seven classes contained elements of AI-generated writing. By fall 2023, this figure had risen to 32 %, representing a 22 % increase, and in spring 2024, it further increased to 40

Table 2

Comparative analysis of AI-generated submission detection across instructors by Turnitin.

Survey Distribution Date	GTA 1	GTA 2	GTA 3	GTA 4	GTA 5	Semester Averages
Spring 2023	34 %	13 %	0 %	0 %	0 %	9 %
Fall 2023	48 %	69 %	20 %	0 %	18 %	31 %
Spring 2024	65 %	82 %	30 %	0 %	23 %	40 %
Fall 2024	74 %	88 %	36 %	0 %	28 %	45 %

% and as of fall 2024 it was 45 %. While AI detectors were not widely available before spring 2023, it can reasonably be assumed that AI use by undergraduate students was minimal to nonexistent. Aside from tools like Grammarly, which contain embedded AI features, LLMs were virtually unknown to students prior to the release of ChatGPT. Consequently, reported AI use has grown from an estimated baseline <10 % to nearly 50 % of students within just four semesters.

It is important to note that GTAs 1 and 2 either graduated or taught different classes in the fall 2024 semester. However, the original class was taught by a different instructor who applied the same AI-related class rules. The survey was still distributed in these classes to ensure consistency in the data.

When comparing this finding with students' self-reported use of AI in assignments (from question 1), the percentage rose from 57 % in spring 2023 to 83 % in fall 2024. It is important to note that Question 1 referred to students using AI in any class assessment, whereas Question 2 focused specifically on assessments submitted for the one class in which students were surveyed. Many students were enrolled in five to six classes during a given semester.

This finding suggests that AI detectors may have improved in identifying AI-generated content, or it may indicate that students are simply using AI more frequently. The increased detection could be attributed to a higher number of students using AI, rather than solely improvements in detection technology. As more students utilize AI, the likelihood of detecting AI-generated content naturally rises, which might not necessarily reflect advancements in AI detection but rather the growing prevalence of AI use.

This finding highlights the growing complexity of considerations that instructors must address, from determining whether students engage with AI to selecting the most appropriate detectors and evaluating these tools' accuracy. These are just a few of the many questions that today's educators must navigate in the evolving landscape of AI in education.

4.3. Research question three

Should AI tools (such as ChatGPT) be banned at the University of Kansas?

Students were asked whether they believed ChatGPT and other AI-related LLMs should be banned at the University of Kansas. As of the time of writing (The Fall of 2025), the university had not implemented any university-wide policy governing or restricting the use of these technologies. This open-ended question was presented to undergraduate students on three occasions, fall 2023, spring 2024, and fall 2024 but was not included in the spring 2023 survey, as researchers had not yet anticipated the long-term implications or the emerging discourse around banning the tool.

Table 3

Undergraduate student responses regarding whether AI tools such as ChatGPT should be banned at The University of Kansas.

Survey Distribution Date	Yes (Ban)	No (Don't ban)	Depending on the context
Fall 2023	6.55 %	60.65 %	31.14 %
Spring 2024	7.29 %	78.12 %	14.58 %
Fall 2024	12.08 %	75.54 %	12.38 %

As illustrated in Table 3, only a small proportion of students in fall 2023 (6.55 %) believed ChatGPT or similar LLMs should be banned. A clear majority (60.65 %) opposed a ban, while 31.14 % indicated that their opinion depended on the context.

In spring 2024, these views shifted noticeably. The percentage of students opposing a ban rose to 78.12 %, a 17.47 % increase from fall 2023 while those taking a context-dependent stance declined sharply to 14.58 %. The proportion of students supporting a ban remained relatively stable at 7.29 %. Students increasingly defended the right to use AI, with one remarking, "No. This university is all about freedom and choices and giving everyone a voice... they shouldn't be able to ban something that is a freedom of speech."

In fall 2024, a new pattern emerged. The percentage of students supporting a ban increased to 12.08 %, the highest across all distributions, marking a 4.79 % increase from spring 2024. Meanwhile, opposition to a ban remained strong at 75.54 %, only slightly below the spring figure. The number of students who selected "depending on the context" continued to decline, falling to 12.38 %.

This shift suggests that as AI becomes more embedded in academic life, students are adopting firmer stances either for or against its use. The decline in nuanced, context-based responses from 31.14 % in fall 2023 to just 12.38 % in fall 2024 may indicate growing clarity and confidence in students' personal and ethical views on AI. One student from fall 2023 had commented:

'I think it highly depends on how it's being used and whether or not it is being used in an ethical manner. If it is being used to write essays from scratch or create something from nothing, then I do think it is highly unethical. If it is being used to simply enhance something that has already been created, such as editing a paper, I don't think it's unethical since it would be the same as asking another peer to edit it.'

While students continue to overwhelmingly oppose an outright ban, the rise in support for banning AI tools between spring and fall 2024 raises new questions. It may reflect growing concerns over misuse, dependency, or academic integrity issues, highlighting the evolving tension between AI's benefits and its ethical risks in higher education.

4.4. Research question four

How important do you think it is for the university and professors to include AI knowledge and skills as a part of class?

This question aimed to determine whether students believe the university and their professors should incorporate AI knowledge and skills into existing undergraduate courses. As the question was not included in the spring or fall 2023 surveys, data presented in Table 4 highlights data from the spring and fall 2024 distributions.

The table above presents student responses from spring and fall 2024 regarding the perceived importance of integrating AI knowledge and skills into university courses. A very small proportion of students (0.51 %) believe that incorporating AI into classes is 'Not Important At All,' with 5.33 % indicating that it is 'Not Very Important.' Combined, these responses suggest that only 5.84 % of students view AI integration as relatively unimportant.

Meanwhile, 18.62 % of students selected a 'Neutral' position, indicating some uncertainty about the importance of AI in their academic

Table 4

Undergraduate student responses regarding the perceived importance of integrating AI knowledge and skills into university courses.

Survey Distribution Date	Not Important At All	Not Very Important	Neutral	Somewhat Important	Very Important
Spring 2024	1.04 %	9.37 %	33.33 %	40.62 %	15.62 %
Fall 2024	0.51 %	5.33 %	18.62 %	51.76 %	23.78 %

curriculum. The vast majority of students, however, recognize the significance of AI integration, with 51.76 % considering it ‘Somewhat Important’ and 23.78 % deeming it ‘Very Important.’ Together, 75.54 % of students perceive AI knowledge and skills as important for their education, reflecting a strong majority in favor of embedding these technologies into university courses.

In summary, the fall 2024 data reveal increasing student support at the University of Kansas for the integration of AI knowledge and skills into coursework. While a small minority (5.84 %) viewed AI integration as unimportant, and approximately one in five students (18.62 %) remained neutral, the clear majority (75.54 %) expressed support for embedding AI into the curriculum, an upward trend from previous semesters. This finding aligns with early predictions by Luckin et al. [46], who anticipated a future in which AI would become integral to teaching and learning. More recent literature by Stolpe and Hallström [47] and Tubella et al. [48] similarly underscores the pedagogical value of incorporating AI into instructional practice.

4.5. Research question five

Do undergraduate students believe that using AI (such as ChatGPT) to complete academic tasks is ethical?

This question aimed to determine whether students believe using AI tools like ChatGPT to complete academic tasks is ethical. For this question, a response of 1 indicates “very unethical,” 3 indicates “unsure,” and 5 indicates “very ethical.” The data for this question, grouped by survey distribution, is shown below in Table 5.

As shown in the table above, the mean response to whether students believe using AI tools like ChatGPT for academic tasks is ethical has gradually increased across the four survey distributions. While the average remains close to the midpoint of the scale (3 = unsure), each successive survey shows a modest upward shift in the mean score. This indicates a steady trend toward greater ethical acceptance of AI in academic contexts. Although students remain largely uncertain, the data suggests they are slowly moving away from ambiguity and becoming more comfortable with the ethical implications of AI use in higher education. This evolving perception offers valuable insight into how student attitudes are shifting as GenAI becomes more embedded in academic life.

4.6. Research question six

Is there a relationship between the ethical perception of AI (such as ChatGPT) and its use in completing academic work?

This question explored whether students’ ethical perceptions of AI are related to their actual use of AI in academic contexts. The results consistently show a statistically significant relationship between perceived ethicality and usage. Across all four survey periods, students who reported using AI, either for studying or for completing assignments, were significantly more likely to rate the use of AI for academic work as ethical than those who did not use AI.

In the most recent survey (fall 2024), an independent-samples *t*-test revealed that students who used AI for studying ($M = 3.66$, $SD = 0.95$) rated the use of AI to complete academic work as more ethical than those who did not ($M = 2.76$, $SD = 1.05$), $t(317) = -7.04$, $p < .001$. Similarly, students who used AI for assignments ($M = 3.55$, $SD = 1.00$) rated its

ethicality higher than those who did not ($M = 2.88$, $SD = 1.08$), $t(317) = -6.10$, $p < .001$. These findings are summarized in the confidence-interval plots in Fig. 1.

Interestingly, this relationship was consistent throughout all four sampling periods. For the data from spring 2023, independent-samples *t* tests showed those who used AI for studying ($M = 3.41$, $SD = 0.87$) thought the use of AI to complete academic work more ethical than those who did not use AI to study ($M = 2.56$, $SD = 0.97$), $t(63) = -3.72$, $p < .001$, and those who used AI for assignments ($M = 3.35$, $SD = 0.95$) thought the use of AI to complete academic work more ethical than those who did not use it to complete assignments ($M = 2.39$, $SD = 0.83$), $t(63) = -4.25$, $p < .001$.

For the fall 2023 data, independent-samples *t* tests revealed that students who used AI for studying ($M = 3.58$, $SD = 0.95$) perceived the use of AI to complete academic work as more ethical than their peers who did not use AI for studying ($M = 2.85$, $SD = 1.02$), $t(58) = -2.81$, $p = .007$. Similarly, those who used AI for assignments ($M = 3.55$, $SD = 1.06$) considered the use of AI for academic tasks more ethical than those who did not use AI for assignments ($M = 2.76$, $SD = 0.87$), $t(58) = -3.14$, $p = .003$.

In the spring 2024 data, an interesting pattern emerged. Due to the high number of students who reported using AI for academic tasks compared to those who did not, the data did not meet the assumptions required for a traditional Student’s *t*-test. Instead, a nonparametric test was applied to analyze this data. The results indicated that students who used AI for studying ($M = 3.61$, $SD = 0.96$) generally perceived the use of AI in academic work as more ethical than those who did not use AI for studying ($M = 2.74$, $SD = 1.05$), $U = 602.00$, $p < .001$. Similarly, those who used AI to complete assignments ($M = 3.46$, $SD = 1.03$) viewed AI use in academic tasks as more ethical than those who did not use AI for assignments ($M = 2.89$, $SD = 1.11$), $U = 675.00$, $p = .041$.

4.7. Research question seven

Do students believe the use of AI (such as ChatGPT) has improved their academic performance?

The data presented in Tables 6 and 7 show that students believe AI has improved their academic performance. While there was no statistically significant difference in the amount of improved performance between the three survey distributions, the fact that students are perceiving the use of AI as a positive influence on academic performance is clear.

The tables below illustrate that nearly all students acknowledge at least some improvement by implementing AI in their academic tasks. The cumulative results from all four survey distributions ($N = 238$), as only students who stated they use AI to perform academic tasks were

Table 5
Group descriptives of Undergraduate student responses regarding whether they believe using AI tools like ChatGPT to complete academic tasks are ethical.

Survey Distribution	N	Mean	Standard Deviation
Spring 2023	65	2.938	1.014
Fall 2023	60	3.167	1.044
Spring 2024	96	3.302	1.077
Fall 2024	98	3.420	1.100

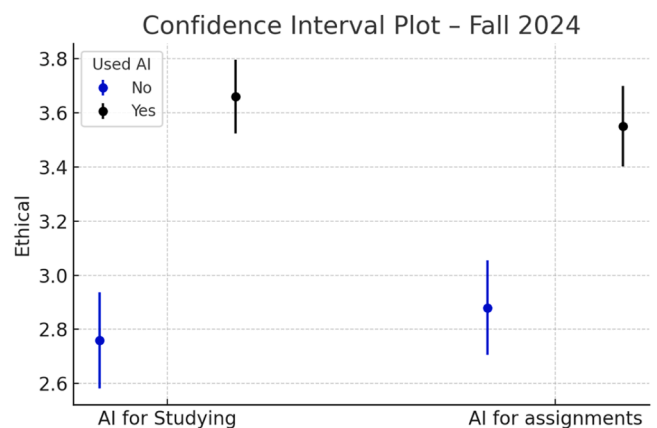


Fig. 1. Confidence interval plots on the relationship between undergraduate students’ ethical perception of AI (ChatGPT) and its use in completing academic work.

Table 6

Cumulative frequency of undergraduate student responses regarding whether they believe the use of AI (ChatGPT) has improved their academic work.

Improvement Value	Frequency	Percentage of Total
1 = No improvement	6	2.52 %
2 = Slight Improvement	33	13.86 %
3 = Moderate Improvement	81	34.03 %
4 = Considerable Improvement	75	31.51 %
5 = Much improvement	43	18.06 %

Table 7

Undergraduate student responses regarding whether they believe the use of AI (such as ChatGPT) has improved their academic performance.

Survey Distribution	N	Mean	Standard Deviation
Spring 2023	34	3.353	0.917
Fall 2023	33	3.364	0.994
Spring 2024	73	3.425	1.105
Fall 2024	98	3.510	1.120

asked to answer this question) are shown in Table 6.

In Fig. 2 below, the y-axis of the grouped histogram details the survey distribution (1 = spring 2023, 2 = fall 2023, 3 = spring 2024, 4 = fall 2024), while the x-axis identifies the Likert value responses when asked if they believe the use of AI has improved their academic performance (1 = no improvement, 5 = much improvement).

Fig. 2 shows a gradual shift from a more normally distributed data set to one skewed left. This indicates that, over time, an increasing number of students are reporting higher levels of perceived improvement in their academic performance due to the use of AI, with fewer students reporting little to no improvement.

These findings are further supported by the data shown in Table 7

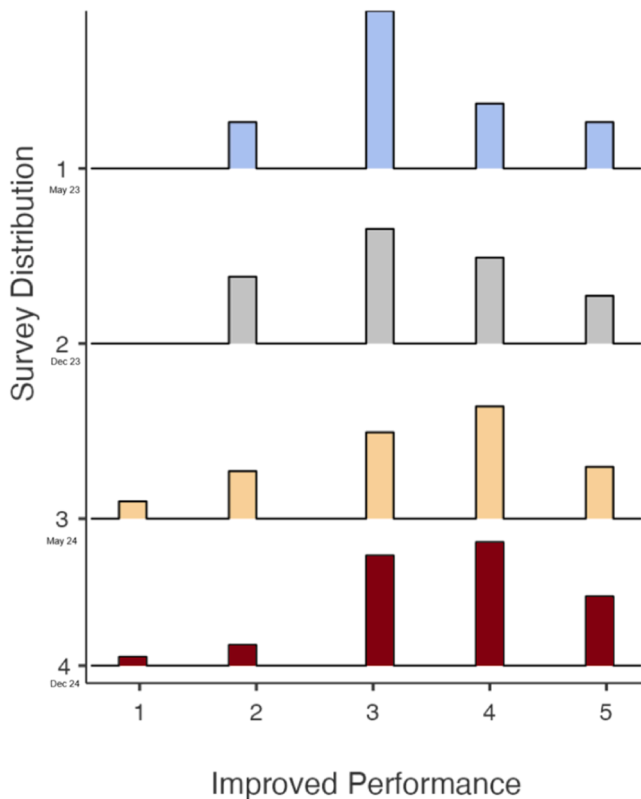


Fig. 2. Grouped Histogram of Undergraduate student responses regarding whether they believe the use of AI has improved their academic performance (1 = no improvement, 5 = much improvement).

above. Notice that while the mean increases gradually each semester, the standard deviation continues to grow. This may suggest that while students generally perceive AI as enhancing their academic performance, there remains a subset who believe otherwise. This finding aligns with research by Alshater [49], which highlights that although tools such as ChatGPT can support academic success in various ways, they also pose significant drawbacks that may hinder performance under certain conditions.

4.8. Research question eight

Is there a relationship between a student's ethical beliefs on AI and the amount of improvement they perceive AI provides on academic tasks?

There is a significant relationship between undergraduate students' ethical beliefs about AI and their perceived improvement in academic tasks due to AI. Looking at the combined data from all four survey distribution periods, a linear regression analysis revealed a statistically significant model ($F(1, 129) = 37.74, p < .001$) with an R^2 value of 0.26 and a regression coefficient for the combined sample of 0.46. These values suggest that 26.1 % of a student's ethical beliefs on AI can be explained by their perceived improvement from using AI on academic tasks.

This relationship has been consistently observed across each distribution period. In spring 2023, the regression analysis yielded $F(1, 32) = 5.46, p = .026$, corresponding to an R^2 of approximately 0.15 (14.5 %). By fall 2023, this increased to $F(1, 28) = 7.42, p = .011$, with $R^2 \approx 0.21$ (20.9 %), a 44.1 % increase in explained variance. The trend continued in spring 2024, with $F(1, 65) = 24.94, p < .001$ and $R^2 \approx 0.28$ (27.7 %), marking a further 32.5 % increase. Most notably, in fall 2024, the strength of the relationship peaked at $F(1, 96) = 41.39, p < .001$ with an R^2 of 0.31 (30.5 %). This final increase represents a 10.1 % gain from spring 2024 and more than double the initial explanatory power observed in spring 2023.

These findings highlight a sustained and growing moderate positive correlation between students' ethical views on AI and their perception of academic benefit from its use. As students increasingly perceive AI as a valuable academic tool, they also appear more ethically accepting of its integration into higher education. Fig. 3 illustrates this progression by plotting each distribution's regression line and R^2 value over time.

4.9. Research question nine

What are some ways that come to mind where AI (such as ChatGPT) could help teachers and students with learning activities?

While investigating students' perceptions of ChatGPT, researchers explored student beliefs about the potential for integrating this evolving technology into standard educational practices through its envisioned use in various learning activities. Results show that 78 % of responses marked favorable perceptions toward integrating ChatGPT into lessons due to how it could assist both instructors and students. 43 % of students remarked how ChatGPT could, "be used to help create rubrics and bounce ideas for lesson plans" and "help teachers create lesson plans and ideas for the classroom." This research question was answered by students who perceived ChatGPT as a virtual tutor, assistant, or collaborator to create engaging lessons and activities that they might not have thought of themselves, "AI can effectively act as tutors, assist in creating and grading assignments," or the possibility of creating materials in faster time than other platforms and resources.

The findings revealed that participants discussed the complexity of language used in academia and the function of simplifying the language through ChatGPT. 17 % of responses pointed to the ability to ask ChatGPT to change the linguistic stylings of a text to make it more accessible for learners. Some examples include "it could help with generating lesson plan objectives, finding inspiration for activities, or even finding accessible ways to present text to students" and "coming up with

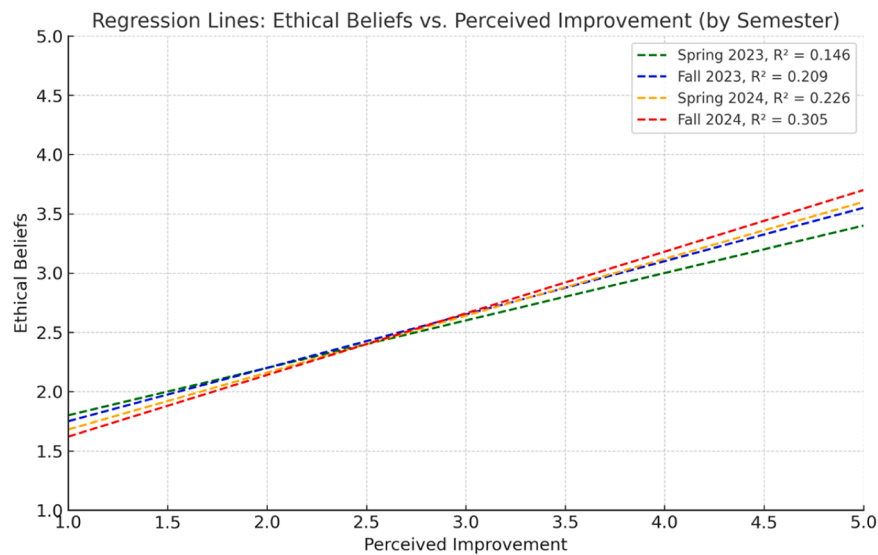


Fig. 3. Individual regression equations and their R^2 values on a single coordinate plane between a student's ethical beliefs on AI and the amount of improvement they perceive AI providing on academic tasks.

questions for exams, rewriting words into something that sounds more fluid and makes sense.” The responses featured an awareness of equitable practices that can support language learners and students with special needs, or make complex theories more accessible through the ability to simplify or reword texts through the use of ChatGPT. This finding aligns with research by ElSayary [50] that highlighted the benefits of tools such as ChatGPT to support students of all backgrounds to engage in educational content.

Conversely, 22 % of responses indicated either an unassured feeling of the benefits that could be found using ChatGPT or plainly stated that it was not beneficial at all. Responses included statements such as, “I honestly don't know,” “not sure,” or, “I don't really think it is beneficial,” which demonstrated their negative perceptions towards the LLMs. However, they did not provide detailed examples.

Overall, the majority of the findings that viewed ChatGPT in a positive light addressed its capabilities of being another tool and resource in their educational attainment. Whether it was in mathematics, “AI helps me understand complex math concepts every day,” or engineering, “describing or illustrating abstract concepts within engineering,” the affirmative perceptions of ChatGPT point to the need for integration of emerging technology within teacher preparation programs or

professional development to help bridge the divide between ages, position, and academic success.

4.10. Research question ten

The university is proposing to integrate new software to detect AI (such as ChatGPT) in submitted assignments. Will the implementation of this new software stop you from using AI on future assignments?

Given the nature of this longitudinal study in relation to the expansion of users of ChatGPT, and the proliferation of discussions regarding ChatGPT's influence in society, industry, and education, the 10th research question examined students' perceptions of institutional decisions against their own practices in their educational attainment. Throughout each iteration of the survey, the number of responses increased and marked a trend towards the continued use of ChatGPT despite the integration of software from the university (see Fig. 4 below). Between May 2023 and December 2023, the students' responses saw a downturn in ‘yes’ and ‘no’ responses, but a continued uptake in the ‘unsure’ category. At the final deployment of the survey, with a higher number of participants responding over the previous turns, the trend showed an increase in ‘no’ and ‘unsure’ responses, indicating students'

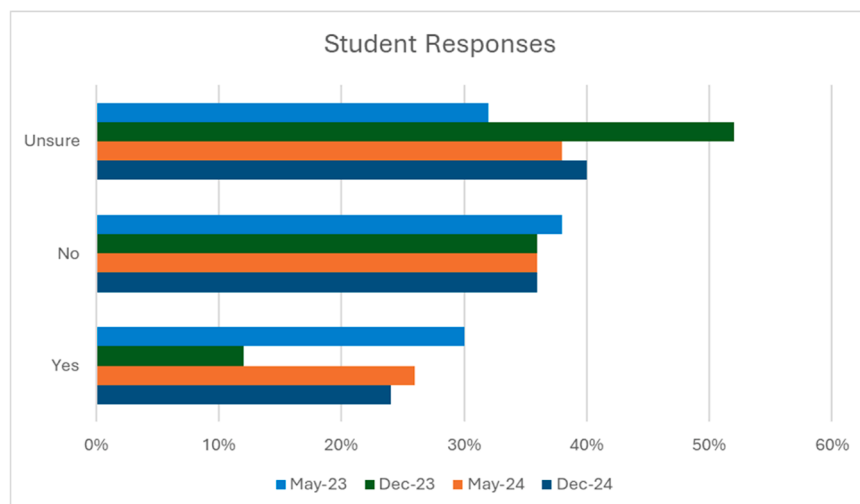


Fig. 4. Bar chart of student responses across all four surveys.

continued use of ChatGPT for their coursework.

Over the four data collection periods, 24 % marked yes, 36 % marked no, and 40 % marked unsure (see Fig. 5 below). Within the findings, the ‘yes’ response held the fewest numbers across all four iterations of the survey. The number of responses to ‘no’ was higher in only one survey than in the other two. And the percentage of ‘unsure’ responses steadily grew during each distribution of the survey. The most noteworthy part came from the recognition that more and more students were marking “unsure,” which provided a nuanced understanding of student perceptions not being as declarative towards ChatGPT.

Interestingly, since the beginning of this longitudinal data collection, several prominent universities have implemented AI detection tools, only to subsequently withdraw them due to concerns about their accuracy and reliability. For example, Yale University discontinued the use of such tools, citing their high false-positive rates and potential to misidentify student work [51]. Similarly, the Massachusetts Institute of Technology reported that AI detectors often do not function as intended, resulting in significant misclassification [52]. New York University also opted to disable Turnitin’s AI writing indicator, citing concerns about erroneous flagging of human-written texts [53]. These actions underscore the necessity of pedagogically informed, rather than purely technological, responses to student AI use in academic settings.

4.11. Research question eleven

Do you think the university should have policies and rules about using AI (such as ChatGPT) - Why or why not?

Developing from Research Question 10, the findings within Research Question 11 invited participants to reflect on whether universities should implement policies regarding the use of tools such as ChatGPT. This question aligns with recent international research on institutional responses to AI, which found that 52 % of universities permit instructors to determine AI usage, while 39 % offer no clear rationale for their policies, leaving students to navigate inconsistent expectations across their courses [54]. Out of the 95 recorded responses, only eleven (12 %) expressed hesitation or indicated that no formal policy was necessary.

Out of the 95 recorded responses, only eleven (12 %) of responses stated hesitation or a clear rationale that they did not feel a policy was needed at all. Some examples include, “No, I think we should be able to use it however we want to,” “No, there’s nothing that can be completely accurate and I don’t think it will lead to a positive effect,” and “I don’t think so because there isn’t a way to regulate it.” The notable difference between the no responses versus the yes responses came from the short statements respondents left. 10 out of the 11 responses only provided a singular perspective or rationale for not having a policy or rule at a university. One response gave a more thorough reason for why they felt there was no purpose behind a university policy:

NO! What I do on my own computer is not the business of the university whether I use it for assignments or not. It’s either I use it to help get me going on an assignment or the assignment doesn’t get done because it helps cut the time I spend on assignments in half. I need this time cut because I have to work so much to afford to live in this expensive city.

This response highlights the affordance that generative AI provides them given the struggles they face outside of school. While examining ethical considerations for the use of ChatGPT in universities, the realities of what students are facing may need to be considered when contemplating how emerging technology can buttress particular needs they face in terms of time.

In contrast, eighty-four responses (88 %) stated that they felt universities should have policies and rules in place to act as companions to rules of ethics and codes of conduct found within existing university policies. Comments about plagiarism, appropriate citation, and the unethical practice of directly copying and pasting responses to submit as original work were purposefully stated across the yes responses. The following four comments were similarly shared and expressed across all the yes responses:

Yes, with AI’s learning ability (specifically ChatGPT), there need to be policies and rules for use. A person can consistently use AI and it will start to produce full pieces mimicking the actual user without the person having to do anything besides provide a prompt. The more a person uses it, the more the AI learns, the less the person has to work to produce something that looks identical to what they would have produced.

Yes. I think submitting AI-generated work is plagiarism. It recycles many online sources to create what it does, and submitting this as one’s own work is not honest. It makes no sense to grade AI-generated work as if it was actually done by the student.

I think students should not be allowed to use ChatGPT on essays, lab reports, or any assignment that requires writing. However, if a student is using ChatGPT for an assignment question or two, that shouldn’t result in harsh punishment.

Yes, I think when no one else is available to explain something, ChatGPT can be a good resource, but since most students abuse it and use it to cheat, it isn’t worth trusting students to use it correctly.

The findings highlight the differences between the two responses, as the yes responses provided more detail, concern, and perceptions of the ways that LLMs can be abused and used for cheating. The opinions expressed by the participants demonstrate the ethical considerations they considered as part of their educational attainment. And though some responses were short in terms of its word count, they still alluded to the issues of plagiarism and cheating that were found in more in-depth responses.

The most important finding among all the responses came from how students in education courses contemplated and considered the ethical practices of ChatGPT across disciplines. Whether the AI could be a resource to kickstart brainstorming and structure, a tool to help understand complex content knowledge and even a way to circumnavigate the course requirement to have something else complete an assignment, the responses shed light on the necessity of involving students in the discussion about emerging technology given their unique and growing perceptions of the importance of their own education and skills.

5. Further research

While this research has addressed eleven key research questions, AI in higher education remains in its infancy, with numerous emerging research gaps. This study has surfaced several areas that warrant further exploration, such as the impact of institutional policies on students’ decisions to engage with AI and how instructors’ attitudes influence AI usage among undergraduate students. Additionally, there is a need for standalone studies that investigate the potential array of student

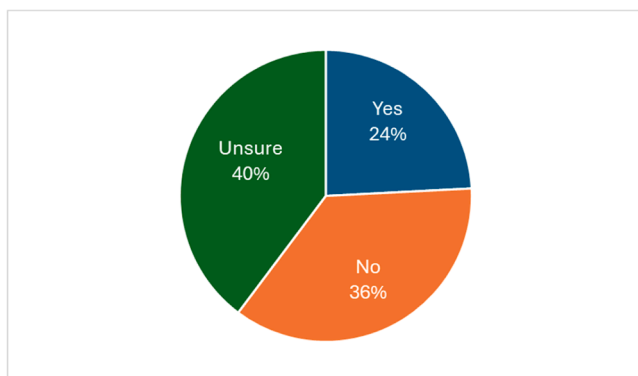


Fig. 5. Overall Pie Chart on whether new AI software will stop students from using AI tools.

learning outcomes related to AI, including both short- and long-term effects.

6. Limitations

This study has several limitations that must be acknowledged. Firstly, the research was conducted at a single public research-intensive university in the Midwestern United States, using purposive and convenience sampling from a teacher education program. While the longitudinal design and four independent survey periods offer valuable insights into evolving student attitudes over time, the single-institution scope and discipline-specific focus limits the generalisability of findings to other higher education contexts. Variability in institutional policies, faculty practices, student demographics, and institutional culture may influence the adoption and perception of AI tools in ways not captured in this study. Future research employing multi-institutional or cross-national designs would offer a more robust basis for testing the consistency and scalability of these trends.

Secondly, the reliance on self-reported survey data introduces potential limitations such as social desirability bias, particularly in responses related to the ethical use of AI or its perceived impact on academic performance. While anonymity and voluntary participation were used to mitigate these concerns, self-reporting remains vulnerable to inaccuracies or misrepresentations of actual behavior.

Additionally, while the research team included Graduate Teaching Assistants (GTAs), some of whom served as both instructors and researchers, several strategies were implemented to mitigate potential biases and ensure the ethical integrity of the study. First, surveys were administered online and anonymously, with no identifying information collected that could link students to their responses. GTAs did not have access to individual data, and metadata such as completion times were also anonymized. Participation was entirely voluntary and occurred outside of class time, with clear written and verbal communication that responses would not affect students' grades, standing, or relationship with the instructor. Second, the survey was not positioned as part of course content or assessment, nor was completion incentivized or required. Students were informed that opting out would carry no penalty or consequence. Third, all members of the research team completed ethics training and adhered to protocols approved by the university's Institutional Review Board (IRB), which required explicit attention to role-based power dynamics.

While these steps helped reduce coercion and bias, the potential for perceived pressure or social desirability bias remains a limitation of instructor-led research. To further mitigate this in future studies, we recommend the use of third-party administrators, institutional research offices, or course sections taught by non-researching staff to improve neutrality. We also suggest employing mixed-method designs that incorporate data triangulation and student focus groups led by independent facilitators.

This study employed an 11-question survey instrument to capture multiple dimensions of AI use, perception, and ethics among undergraduate students. Another limitation in the research is the breadth of the instrument, which may introduce challenges related to focus and respondent fatigue. However, given the exploratory and longitudinal nature of the study, the inclusion of a wider range of items was deemed necessary to holistically capture evolving trends. Future research may consider streamlining survey items to target specific constructs more narrowly, particularly when focusing on singular aspects of AI engagement.

Finally, the study did not account for a range of external contextual factors, such as specific course requirements, disciplinary assessment practices, faculty attitudes toward AI, or broader institutional policies, which could have shaped students' perceptions and behaviors. These dimensions may play a significant role in shaping student engagement with generative AI tools. Future research should explore these variables to offer a more comprehensive understanding of AI's role in

contemporary academic practice.

7. Conclusion

This examination of students' use of generative artificial intelligence highlights the need to reform educational practices to thoughtfully and ethically integrate emerging technologies. More specifically, this study shows that students are increasingly using platforms such as ChatGPT more frequently and with greater purpose to meet their needs within constrained schedules and required coursework tasks. This longitudinal study was carried out over four academic semesters, and it points to the need for universities to consider the perspective of students when crafting AI policies to address the gaps between educators and teachers, to adhere to existing policies that combat plagiarism and codes of conduct, as well as gain insights into the new formation of practices that are not even being considered by university faculty and staff.

Through examinations of students' perceptions of AI platform use, this research provides evidence that human teachers remain necessary in the classroom to provide context and to ensure mindful use of openly available tools like ChatGPT that adhere to the increasingly high standards of academic writing and research. Conversely, it draws attention to certain established practices that remain staples within disciplines and require an innovative makeover to bridge the gap between outdated learning methods and open access to information and resources in the digital sphere. In other words, educators need to be as aggressively committed to preparing their students for the technological world of tomorrow by integrating the tools of today in their lessons, tasks, and discussions.

Importantly, the research contributes not only descriptive insights but also a theoretical framing through Rogers' *Diffusion of Innovation* model. The trajectory observed from early adopters experimenting with AI in Spring 2023 to widespread adoption by Fall 2024 follows the expected curve of innovation diffusion. This progression underscores the need for institutions to recognise that, once introduced, emerging technologies rarely remain peripheral. Rather, they diffuse unevenly through student populations, shaped by peer influence, institutional messaging, and perceived utility.

Furthermore, while the evidence presented in this study shows an increase in the use of ChatGPT among university students, it is important to notice how these emerging technologies are discussed in the media and public forums. As these technologies evolve, so too do their user numbers, reflecting how individuals are introduced to them. It is imperative to not only prepare students for these changes during their academic endeavors, but it is also equally important to create professional development opportunities for faculty and staff at universities and industries beyond, to show the strengths of these innovations as well as the weaknesses and problematic influences it could have in the not-too-distant future. Insights from this study show that when crafting policies and procedures affecting multiple groups, securing community support is essential to uphold ethical standards and responsible use, even if some individuals choose to avoid emerging technologies.

CRedit authorship contribution statement

Luke Parker: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **A. Jane Loper:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Christopher W. Carter:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Josh Hayes:** Writing – review & editing, Writing –

original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Alice Karakas:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Survey Instrument

1. What is your major and year level?
2. Have you used AI (ChatGPT) for purposes outside of school this semester? Yes/No
3. Briefly discuss any experiences you have had with using Artificial Intelligence (AI) for personal purposes, not related to school or academics. For example, have you used AI to create artwork, write poems, or come up with new recipes?
4. Have you used AI (specifically ChatGPT) for the purpose of studying this semester? Yes/No
5. Have you used any other tool AI tool other than ChatGPT?
6. Briefly discuss how you have used ChatGPT for study-related activities this semester. For example, did you use it to understand complex topics, summarize reading materials, or clarify lecture notes?
7. Have you used AI (ChatGPT) for help completing an assignment/assessment this semester? Yes/No
8. Briefly discuss how you have used ChatGPT for completing assignments or assessments this semester. For example, did you use it to develop lesson plans, create educational content, formulate assessment rubrics, or gather resources for educational theory papers?
9. Did you use AI (ChatGPT) to complete an assignment/assessment prior to our classroom discussions on its use in academia?
10. Do you think using AI (ChatGPT) has improved your academic performance? KU is integrating a new software to detect AI (CHATGPT) in submitted assignments. Will the implementation of this new software stop you from using AI on future assignments? Do you think using AI (ChatGPT) for academic purposes is ethical?
11. Do you think ChatGPT should be banned at the University of Kansas? Please discuss your answer
12. Do you think the university should have policies and rules about using ChatGPT - Why or why not?
13. Has your use of ChatGPT increased or decreased since the start of this semester?
14. What are some ways that come to mind where ChatGPT could help teachers and students with learning activities?
15. How important do you think it is for the university and professors to include AI knowledge and skills as a part of class?

References

- [1] Cong-Lem N, Soyoo A, Tsering D. A systematic review of the limitations and associated opportunities of ChatGPT. *Int J Hum-Comput Interact* 2025;41(7):3851–66.
- [2] Wu T, He S, Liu J, Sun S, Liu K, Han QL, Tang Y. A brief overview of ChatGPT: the history, status quo and potential future development. *IEEE/CAA J Autom Sin* 2023;10(5):1122–36. <https://doi.org/10.1109/JAS.2023.123618>.
- [3] Oates A, Johnson D. ChatGPT in the classroom: evaluating its role in fostering critical evaluation skills. *Int J Artif Intell Educ* 2025. <https://doi.org/10.1007/s40593-024-00452-8>. Advance online publication.
- [4] Evangelista EDL. Ensuring academic integrity in the age of ChatGPT: rethinking exam design, assessment strategies, and ethical AI policies in higher education. *Contemp Educ Technol* 2025;17(1):ep559. <https://doi.org/10.30935/cedtech/15775>.
- [5] Looi CK, Jia F. Personalization capabilities of current technology chatbots in a learning environment: an analysis of student-tutor bot interactions. *Educ Inf Technol* 2025. <https://doi.org/10.1007/s10639-025-13369-z>. Advance online publication.
- [6] Gill SS, Xu M, Patros P, Wu H, Kaur R, Kaur K, Buyya R. Transformative effects of ChatGPT on modern education: emerging era of AI chatbots. *Internet Things Cyber-Phys Syst* 2024;4:19–23. <https://doi.org/10.1016/j.iotcps.2023.06.002>.
- [7] Kolade O, Owoseni A, Egbetokun A. Is AI changing learning and assessment as we know it? Evidence from a ChatGPT experiment and a conceptual framework. *Heliyon* 2024;10(4):e25953. <https://doi.org/10.1016/j.heliyon.2024.e25953>.
- [8] Kooli C, Yusuf N. Transforming educational assessment: insights into the use of ChatGPT and large language models in grading. *Int J Hum-Comput Interact* 2025;41(5):3388–99.
- [9] Limo FAF, Tiza DRH, Roque MM, Herrera EE, Murillo JPM, Huallpa JJ, González JLA. Personalized tutoring: chatGPT as a virtual tutor for personalized learning experiences. *Przestrz Społeczna (Soc Space)* 2023;23(1):293–312.
- [10] Parker L, Carter C, Karakas A, Loper AJ, Sokkar A. Graduate instructors navigating the AI frontier: The role of ChatGPT in higher education. *Comput Edu Open* 2024;6:100166. <https://doi.org/10.1016/j.caeo.2024.100166>.
- [11] Naznin K, Al Mahmud A, Nguyen MT, Chua C. ChatGPT integration in higher education for personalized learning, academic writing, and coding tasks: a systematic review. *Computers* 2025;14(2):53. <https://doi.org/10.3390/computers14020053>.
- [12] Baidoo-Anu D, Ansah LO. Education in the era of generative artificial intelligence (AI): understanding the potential benefits of ChatGPT in promoting teaching and learning. *J AI* 2023;7(1):52–62. <https://doi.org/10.61969/jai.1337500>.
- [13] Alshahrani A. The impact of ChatGPT on blended learning: current trends and future research directions. *Int J Data Netw Sci* 2023;7(4):2029–40. <https://doi.org/10.5267/j.ijdns.2023.6.010>.
- [14] Heung YME, Chiu TK. How ChatGPT impacts student engagement from a systematic review and meta-analysis study. *Comput Educ: Artif Intell* 2025;8:100361. <https://doi.org/10.1016/j.caeai.2025.100361>.
- [15] Malfatti FI. ChatGPT, education, and understanding. *Soc Epistemol* 2025. <https://doi.org/10.1080/02691728.2025.2449599>. Advance online publication.
- [16] Onal S, Kulavuz-Onal D. A cross-disciplinary examination of the instructional uses of ChatGPT in higher education. *J Educ Technol Syst* 2024;52(3):301–24. <https://doi.org/10.1177/00472395231196532>.
- [17] Priyadarshini S, Priyadarshini S. Investigating the potential of ChatGPT in substituting or assisting teachers in the digital era. *Artificial intelligence technologies for engineering applications*. CRC Press; 2025. p. 54–69. <https://doi.org/10.1201/9781003565529-4>.
- [18] Tan AA, Huda M, Rohim MA, Hassan TRR, Ismail A, Siregar M. ChatGPT in supporting education instruction sector: an empirical. In: *Proceedings of Ninth International Congress on Information and Communication Technology*. 9. Springer Nature; 2025. p. 13–26. https://doi.org/10.1007/978-981-97-5035-1_2.
- [19] Kocot J, Cichecki I, Kaszyca O, Kochanek M, Szydło D, Baran J, Kazienko P. ChatGPT: jack of all trades, master of none. *Inf Fusion* 2023;99:101861. <https://doi.org/10.1016/j.inffus.2023.101861>.
- [20] Mayring P. Qualitative content analysis with ChatGPT: pitfalls, rough approximations and gross errors: a field report. *Forum: Qual Soc Res/Qual Sozialforsch* 2025;26(1).
- [21] Liu Y, Kong W, Merve K. ChatGPT applications in academic writing: a review of potential, limitations, and ethical challenges. *Arg Bras Oftalmol* 2025;88(3). <https://doi.org/10.5935/0004-2749.2024-0269>.
- [22] Kouam AWF, Muchowe RM. Assessing the role of AI technology in mitigating the equity gap in educational access in Zimbabwe: barriers and implications. *J Appl Learn Teach* 2025;8(1). <https://doi.org/10.37074/jalt.2025.8.1.15>.
- [23] Lazkani O. Revolutionizing education of art and design through ChatGPT. *Artificial intelligence in education: the power and dangers of ChatGPT in the classroom*. Switzerland: Springer Nature; 2024. p. 49–60. https://doi.org/10.1007/978-3-031-52280-2_4.
- [24] Kasneci E, Seßler K, Küchemann S, Bannert M, Dementieva D, Fischer F, Kasneci G. ChatGPT for good? On opportunities and challenges of large language models for education. *Learn Individ Differ* 2023;103:102274.
- [25] Lee VR, Pope D, Miles S, Zárate RC. Cheating in the age of generative AI: a high school survey study of cheating behaviors before and after the release of ChatGPT. *Comput Educ: Artif Intell* 2024;7:100253. <https://doi.org/10.1016/j.caeai.2024.100253>.
- [26] Zhang L, Amos C, Pentina I. Interplay of rationality and morality in using ChatGPT for academic misconduct. *Behav Inf Technol* 2025;44(3):491–507. <https://doi.org/10.1080/0144929X.2024.2325023>.
- [27] Pierce M. Academic librarians, information literacy, and ChatGPT: sounding the alarm on a new type of misinformation. *Coll Res Libr News* 2025;86(2):68. <https://doi.org/10.5860/crln.86.2.68>.
- [28] Shen Y, Heacock L, Elias J, Hentel KD, Reig B, Shih G, Moy L. ChatGPT and other large language models are double-edged swords. *Radiology* 2023;307(2):e230163. <https://doi.org/10.1148/radiol.230163>.
- [29] Sun Y, Sheng D, Zhou Z, Wu Y. AI hallucination: towards a comprehensive classification of distorted information in artificial intelligence-generated content. *Humanit Soc Sci Commun* 2024;11(1):1–14.
- [30] Parker L, Carter CW, Karakas A, Loper AJ, Sokkar A. Artificial intelligence in undergraduate assignments: an exploration of the effectiveness and ethics of ChatGPT in academic work. In: *ChatGPT and Global Higher Education: Using Artificial Intelligence in Teaching and Learning*; 2024. p. 219.

- [31] Ibrahim MS, Hassan NM. From chatbots to mind-bots: navigating assessments in the advent of ChatGPT. *Educ Med J* 2024;16(1). <https://doi.org/10.21315/eimj2024.16.1.13>.
- [32] Pudasaini, S., Miralles-Pechuán, L., Lillis, D., & Salvador, M.L. (2024). Survey on plagiarism detection in large language models: the impact of ChatGPT and Gemini on academic integrity. *arXiv preprint (arXiv:2407.13105)*.
- [33] Rafiq S, Qurat-ul-Ain DAA. The role of AI detection tools in upholding academic integrity: an evaluation of their effectiveness. *Contemp J Soc Sci Rev* 2025;3(1): 901–15.
- [34] Mienye ID, Swart TG. ChatGPT in education: a review of ethical challenges and approaches to enhancing transparency and privacy. *Procedia Comput Sci* 2025; 254:181–90.
- [35] Parker L, Carter CW, Karakas A, Loper AJ, Sokkar A. Ethics and improvement: Undergraduate students' use of artificial intelligence in academic endeavors. *Int J Intell Comput Res* 2023;14(1):1187–94. <https://doi.org/10.20533/ijicr.2042.4655.2023.0146>.
- [36] Ly R, Ly B. Ethical challenges and opportunities in ChatGPT integration for education: insights from emerging economy. *AI Ethics* 2025. <https://doi.org/10.1007/s43681-025-00667-y>. Advance online publication.
- [37] Nazir A, Wang Z. A comprehensive survey of ChatGPT: advancements, applications, prospects, and challenges. *Meta-Radiol* 2023;100022. <https://doi.org/10.1016/j.metrad.2023.100022>.
- [38] Lippens L. Computer says “no”: exploring systemic bias in ChatGPT using an audit approach. *Comput Hum Behav: Artif Hum* 2024;2(1):100054. <https://doi.org/10.1016/j.chbah.2024.100054>.
- [39] Rouabhia R. Ethical implications of AI: examining bias and fairness in AI-powered education. Using AI tools in text analysis, simplification, classification, and synthesis. *IGI Global*; 2025. p. 411–38. <https://doi.org/10.4018/979-8-3693-9511-0.ch014>.
- [40] Caruana EJ, Roman M, Hernández-Sánchez J, Solli P. Longitudinal studies. *J Thorac Dis* 2015;7(11). E537.
- [41] Ikart EM. Survey questionnaire survey pretesting method: an evaluation of survey questionnaire via expert reviews technique. *Asian J Soc Sci Stud* 2019;4(2):1–17. <https://doi.org/10.20849/ajsss.v4i2.565>.
- [42] Tukey JW. Comparing individual means in the analysis of variance. *Biometrics* 1949;5(2):99–114. <https://doi.org/10.2307/3001913>.
- [43] Rogers EM. *Diffusion of innovations*. Free Press of Glencoe; 1962.
- [44] Mphahlele A, McKenna S. The use of Turnitin in the higher education sector: decoding the myth. *Assess Eval High Educ* 2019;44(7):1079–89. <https://doi.org/10.1080/02602938.2019.1573971>.
- [45] Halaweh M, El Refae G. Examining the accuracy of AI detection software tools in education. In: 2024 Fifth International Conference on Intelligent Data Science Technologies and Applications (IDSTA). IEEE; 2024. p. 186–90. <https://doi.org/10.1109/IDSTA62194.2024.10747004>.
- [46] Luckin, R., Holmes, W., Griffiths, M., Forcier, L.B., (2016). Intelligence unleashed: An argument for AI in education. <http://discovery.ucl.ac.uk/1475756/>.
- [47] Stolpe K, Hallström J. Artificial intelligence literacy for technology education. *Comput Educ Open* 2024;6. <https://doi.org/10.1016/j.caeo.2024.100159>.
- [48] Aler Tubella A, Mora-Cantallos M, Nieves JC. How to teach responsible AI in higher education: challenges and opportunities. *Ethics Inf Technol* 2024;26(1):3. <https://doi.org/10.1007/s10676-023-09733-7>.
- [49] Alshater Muneer. Exploring the role of artificial intelligence in enhancing academic performance: a case study of ChatGPT. December 26, <https://ssrn.com/abstract=4312358>; 2022.
- [50] ElSayary A. An investigation of teachers' perceptions of using ChatGPT as a supporting tool for teaching and learning in the digital era. *J Comput Assist Learn* 2024;40(3):931–45. <https://doi.org/10.1111/jcal.12926>.
- [51] Yale University. Artificial intelligence guidelines. Retrieved November 22, 2025, from, <https://poorvucenter.yale.edu/ai-guidelines>; 2025.
- [52] Massachusetts Institute of Technology. AI detectors don't work. Retrieved November 22, 2025, from, <https://mitsloanedtech.mit.edu/ai/teach/ai-detectors-dont-work/>; 2025.
- [53] New York University. Disabling the AI tool in Turnitin. Retrieved November 22, 2025, from, <https://www.nyu.edu/content/dam/nyu/provost/documents/Disabling%20the%20AI%20Tool%20in%20Turnitin.pdf>; 2025.
- [54] Parker L, Loper AJ, Hayes J, Karakas A, White S, Hallman H. Comparative analysis of artificial intelligence policies in universities across five countries. *Discov Comput* 2025;28:267. <https://doi.org/10.1007/s10791-025-09745-5>.