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AI in the Hands of Students: How Undergraduate Use and Perceive Generative Tools

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Abstract

As generative artificial intelligence (AI) tools such as ChatGPT, Copilot, and BearcatGPT become more common in higher education, undergraduate students are increasingly using them to support learning, often without formal guidance from instructors. This mixed-methods study explores how students use, perceive, and navigate AI in their coursework, focusing on both learning benefits and ethical challenges. With Institutional Review Board (IRB) approval, data were collected from 240 anonymous survey responses and 40 semi-structured interviews in General Chemistry, Biology, and other STEM courses. Results show that nearly three-fourths of students have used AI for study support, most commonly to review concepts, generate practice problems, and clarify feedback. ChatGPT and Grammarly were the most frequently used tools, followed by Copilot and BearcatGPT, an institutionally managed generative AI platform developed for educational use. While students valued AI for its accessibility and immediacy, nearly half expressed uncertainty about what constitutes ethical use, citing confusion about academic integrity policies. Qualitative analysis revealed themes of curiosity, self-directed experimentation, and a strong desire for clearer faculty guidance. Findings suggest that students are using AI as a supplemental learning aid rather than a shortcut, but the lack of consistent instruction can lead to inequitable outcomes. The study concludes with recommendations for embedding AI literacy and responsible-use frameworks into course design to promote effective and ethical engagement with emerging technologies.

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Introduction

Artificial intelligence has quickly shifted from a specialized field of computer science to an everyday presence in higher education. Tools such as ChatGPT, Copilot, and BearcatGPT, an institutionally managed generative AI platform developed for educational use, now appear in classrooms, study groups, and learning management systems (Kasneci et al., 2023; Dwivedi et al., 2023). As generative AI continues to expand across disciplines, it is transforming how students access information, complete assignments, and interact with course materials. Many undergraduates experiment with these tools to find faster or more personalized ways to study, while instructors are still learning how to integrate them responsibly. This transition presents both new opportunities and complex challenges for teaching and learning.

For many students, generative AI provides immediate explanations, customized feedback, and alternative ways to review difficult material (Zhai, 2023). It serves as an on-demand study companion that supports independent learning. Yet, its accessibility also raises questions about accuracy, authorship, and ethics (Alam, 2023). Some students avoid AI because they worry about crossing academic integrity boundaries, while others depend heavily on it without evaluating reliability.

Recent research highlights that while AI use is rapidly expanding, understanding of ethical boundaries has not kept pace (Alam, 2023; Rudolph et al., 2023; Tlili et al., 2023). Faculty and institutions are beginning to address these issues through new guidelines and training initiatives, but students themselves often receive little explicit instruction on appropriate use. Understanding student perspectives is essential for creating balanced, equitable policies that encourage exploration while maintaining integrity. Data for this study were collected from undergraduate students enrolled in multiple introductory STEM courses, including General Chemistry, Biology, and related disciplines, to capture a broad view of how students experience and apply AI in learning.

The purpose of this study is to examine how undergraduates use, perceive, and navigate generative AI tools in their learning. It identifies the benefits, challenges, and ethical questions that emerge and explores how faculty support can make AI use more effective and responsible. The study is guided by four research questions:

1. How do undergraduates use AI tools in their coursework?
2. What benefits and challenges do they experience?
3. How do students interpret ethical and responsible AI use?
4. How can faculty support equitable and effective AI integration in teaching and learning?

Literature Review

The growth of generative AI has prompted educators to reconsider how students access and process information (*Dwivedi et al., 2023; Zhai, 2023*). Since the release of ChatGPT in 2022, scholars have documented a surge in AI adoption across higher education (*Kasneci et al., 2023; Rudolph et al., 2023*). Early studies focused on faculty use, such as generating quizzes, lesson materials, or feedback (*Zhai, 2023*). Others explored AI's potential to provide adaptive learning experiences and immediate support, particularly for large introductory STEM courses

(*Yuan et al., 2024*). Across these studies, researchers emphasize that the effectiveness of AI depends on thoughtful human oversight and ethical awareness.

Although faculty perspectives dominate much of the early literature, student experiences remain underexplored (Shao & Chen, 2023; Baidoo-Anu & Owusu Ansah, 2023). For many undergraduates, AI tools are not simply instructional aids but everyday companions in their learning process (Alam, 2023). Surveys across several universities have shown that students use AI to check understanding, generate practice problems, and summarize readings (Baidoo-Anu & Owusu Ansah, 2023). These findings suggest that students view AI as a partner in learning rather than a shortcut. Yet, without structured guidance, this independence can produce uneven results.
Ethical considerations are a central concern in the growing discussion about AI in education. Alam (2023), Rudolph et al. (2023), and Tlili et al. (2023) note that students often feel unsure about what counts as acceptable use. This uncertainty can lead to hesitation, overreliance, or avoidance. The UNESCO (2023) report on generative AI in education calls for explicit AI literacy instruction to ensure students understand both opportunities and limitations. Transparency, verification, and critical thinking are now considered key components of responsible AI engagement.

Recent models of technology adoption highlight that students' perceptions of usefulness, ease of use, and ethical clarity strongly influence whether and how they adopt AI tools (*Hasanein & Sobaih, 2023; Dwivedi et al., 2023*). Studies applying this framework to AI suggest that students' comfort and confidence determine not only whether they use these tools but how effectively they use them. Despite growing attention to faculty adoption and ethical concerns, there remains a need for empirical research that centers student voices. Few studies have explored how undergraduates, especially in STEM disciplines, understand and apply AI in real coursework. This study addresses that gap through a mixed-methods approach that combines survey data and interviews to illuminate both the extent of AI use and the reasoning behind it. By highlighting student perspectives, this research aims to inform more equitable and transparent approaches to integrating AI in higher education. Few empirical studies have explored how undergraduates, especially in STEM disciplines, understand and apply AI in real coursework (*Dwivedi et al., 2023; Shao & Chen, 2023*).

Method

Research Design

This study used a mixed-methods design to explore how undergraduate students use and perceive generative artificial intelligence (AI) in their learning. Quantitative data were collected through an anonymous online survey, and qualitative data were obtained through semi-structured interviews. Combining both forms of data provided a broad understanding of how students interact with AI and deeper insight into their motivations, concerns, and experiences.

Participants

Participants included undergraduate students enrolled in multiple introductory STEM courses, including General

Chemistry, Biology, and related disciplines, at a regional college within the University of Cincinnati system. Across two semesters, 240 students completed the online survey, and 40 volunteered for follow-up interviews. Participation was voluntary and open to students regardless of prior experience with AI tools. No identifying information such as names, course sections, or demographic data that could reveal identity was collected.

Data Collection Instruments

Survey

Data were collected through online surveys and follow-up interviews conducted at the end of the semester. The survey consisted of eight sections addressing familiarity with AI, patterns of tool use, perceived benefits, ethical concerns, and attitudes toward classroom integration. It included multiple-choice, Likert-scale, and open-ended questions. Example items included “Which AI tools have you used for schoolwork?” and “How effective were AI-generated materials in helping you understand course concepts?” The survey also asked about perceived usefulness and concerns related to overreliance, accuracy, and ethics.

Interviews

Semi-structured interviews were conducted with a subset of students who had completed the survey and indicated interest in participating further. Each interview lasted approximately 20 to 30 minutes and was conducted either in person or through a secure online platform. The interview guide (Appendix A) included 13 open-ended questions organized into five sections: (1) familiarity with AI tools, (2) use of AI in the course, (3) reflections and impact on learning, (4) challenges and concerns, and (5) closing thoughts and suggestions. Example questions included “How familiar were you with AI tools like ChatGPT or BearcatGPT before taking this course?” and “What suggestions would you have for improving how AI tools are used in future classes?” Participants were reminded that the interview was voluntary, their answers would remain anonymous, and they could skip any question or end the interview at any time. The complete student survey and interview guide used in this study are provided in Appendices A and B. Data from both course sections were reviewed for completeness, standardized for consistent formatting, and then combined into a single dataset for analysis.

Procedure

The study was approved by the University of Cincinnati Institutional Review Board (IRB) before data collection. Students received an information sheet describing the study’s purpose, procedures, and confidentiality protections. Surveys were distributed through course announcements, and interviews were scheduled separately. All data were collected and stored securely on password-protected devices.

Data Analysis

Survey data were analyzed using descriptive statistics, including frequencies and percentages, to identify trends in students’ familiarity with AI, usage patterns, perceived benefits, and ethical concerns across the combined

dataset of introductory STEM students. Open-ended responses were examined thematically to highlight recurring ideas that complemented and explained the quantitative findings.

Interview data were analyzed thematically using an inductive approach, allowing patterns and themes to emerge directly from the students' responses rather than from predefined categories. Transcripts were reviewed multiple times to identify recurring words, ideas, and phrases, which were then organized into broader themes. Seven key themes emerged from this process: familiarity with AI tools, use of AI in coursework, perceived benefits, challenges and concerns, study behavior changes, ethical and responsible use, and student suggestions. Findings from both the survey and interview analyses were then compared to identify converging patterns, areas where quantitative trends and qualitative insights aligned, to strengthen the mixed methods interpretation.

Results

Survey responses from approximately 240 undergraduate students across multiple introductory STEM courses provided insight into how AI tools are used, perceived, and integrated into learning. Quantitative results highlighted high levels of awareness and moderate to frequent AI use, while qualitative responses revealed recurring themes of curiosity, caution, and a desire for structured guidance. The following findings summarize the most prominent patterns identified across the combined dataset. About 20 percent of students reported avoiding AI due to lack of guidance or uncertainty about appropriate use. The most common reasons were limited awareness of available tools, confusion about acceptable use, or concerns about reliability. Nearly 45 percent of all respondents indicated some level of discomfort about what constituted ethical use. When asked to identify potential risks of AI in education, students most often selected overreliance, reduced critical thinking, and concerns related to academic integrity, as shown in Figure 2.

Table 1. Student Use of AI Tools in Coursework

AI Tool	Students Reporting Use (%)
ChatGPT	86.4
Grammarly	65.9
Microsoft Copilot	18.2
Khan Academy AI	11.4
Quizlet AI Tools	34.1
BearcatGPT	15.9
Socratic by Google	13.6
None/I do not use AI tools	4.5

[Note. N = 240 undergraduate students surveyed across two semesters. Students could select multiple tools *BearcatGPT* refers to AI features integrated into the Canvas learning management system at the study institution.]

Students generally expressed positive views about AI's learning benefits. About 60 percent reported using AI to review concepts and clarify difficult material, and approximately 87 percent believed that AI could make complex concepts easier to learn. However, responses were more divided on whether AI should replace traditional

instruction: 82 percent favored AI as a supplement to, not a substitute for, instructor led teaching.

Table 1 summarizes the frequency with which students reported using specific AI tools for coursework. The majority reported using ChatGPT and Grammarly, while smaller subsets used Copilot, BearcatGPT, or other emerging tools.

Figure 1 illustrates the frequency of AI use for coursework among surveyed students. The majority reported using AI tools at least occasionally, with most identifying them as helpful supplements to traditional learning rather than replacements for instructor guidance.

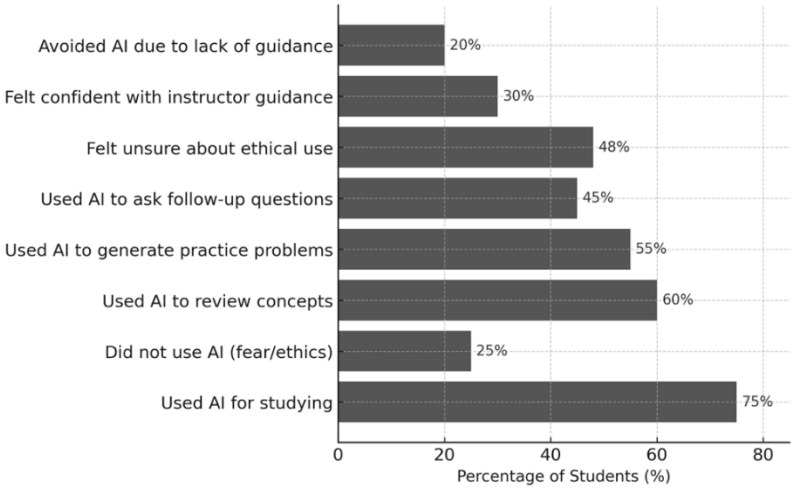

Figure 1. Frequency of AI Use for Coursework

[Note. This figure shows the percentage of students selecting each category describing how they used or avoided AI tools for coursework. Categories include using AI for studying, concept review, and practice problems, as well as avoiding use due to lack of guidance or ethical uncertainty (N = 240).]

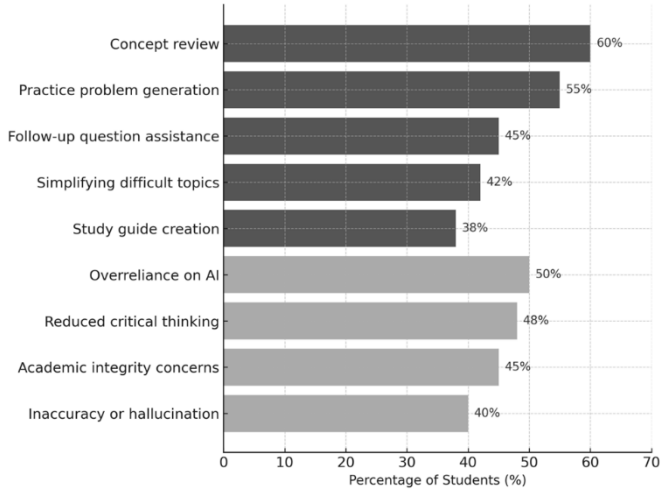

Figure 2. Student Perceptions of AI Benefits and Concerns

[*Note.* Dark gray bars represent learning benefits, including concept review, practice problem generation, and study support. Light gray bars represent ethical concerns such as overreliance on AI, reduced critical thinking, inaccuracy, and academic integrity issues. Percentages reflect the proportion of students identifying each category (N = 240).]

Figure 2 presents students' perceptions of the main benefits and concerns related to AI use in learning. Students most frequently cited improved understanding, faster feedback, and enhanced preparation as benefits, while common concerns included overreliance, inaccuracy, and uncertainty about ethical use.

Qualitative Themes

Interview data provided richer context for the patterns observed in the surveys. Seven major themes emerged from the analysis: familiarity with AI tools, use of AI in coursework, perceived benefits, challenges and concerns, study behavior changes, ethical and responsible use, and student suggestions. Representative quotes from students illustrate how they perceive and navigate these tools in daily learning.

Table 2 summarizes seven major themes that emerged from the interview analysis, each illustrated with representative student quotes.

Table 2. Major Themes from Interview Analysis

Theme	Description	Representative Quote
Familiarity with AI Tools	Students learned about AI from peers or online sources.	"I saw others using AI, but I didn't know the right way to use it."
Use of AI in Coursework	Students used AI for quizzes, study guides, and explanations.	"It helped me make practice exams and test myself."
Perceived Benefits	Students valued quick feedback and personalized explanations.	"It's like having a 24/7 tutor."
Challenges and Concerns	Students worried about accuracy and ethical boundaries.	"I avoided it because I wasn't sure what counted as cheating."
Study Behavior Changes	AI encouraged iterative learning and self-testing.	"I used it to make practice exams and checked what I got wrong."
Ethical and Responsible Use	Students wanted guidance on acceptable use.	"I didn't want to get in trouble, so I barely used it."
Student Suggestions	Students recommended demonstrations and syllabus guidelines.	"If professors showed us how to use it properly, we'd all feel more confident."

Note. Thematic analysis based on 40 student interviews conducted across two semesters.

These findings highlight that students across STEM disciplines are already incorporating AI into their learning but continue to seek ethical clarity and instructional support. The consistency between survey and interview responses underscores a shared desire for guidance on how to use AI tools responsibly and effectively. Together, these results provide the foundation for the discussion that follows, which integrates quantitative and qualitative findings to explore how students engage with generative AI and what supports they need for equitable and ethical use in higher education.

Discussion

The discussion that follows integrates quantitative and qualitative findings to provide a comprehensive view of how students are engaging with generative AI in their learning. The survey results, summarized in Table 1 and Figures 1 and 2, illustrate general patterns of AI tool use, perceived benefits, and ethical concerns among undergraduate STEM students. The interview themes presented in Table 2 complement these findings by offering deeper insight into students' motivations, challenges, and suggestions for effective classroom integration. Together, these data sources provide a cohesive understanding of both how students use AI and what supports they need for responsible, equitable engagement.

The results of this study highlight that undergraduate students are already integrating generative artificial intelligence (AI) into their learning, often in creative and self-directed ways. Most participants viewed AI as a convenient and efficient tool for reviewing material, checking understanding, and generating practice problems. These patterns mirror the quantitative data shown in Table 1 and Figure 1, which show that most students reported using AI tools such as ChatGPT and Grammarly at least occasionally and primarily as learning supports rather than replacements for instructor guidance. These findings align with prior research indicating that students tend to use AI to supplement rather than replace traditional instruction (Shao & Chen, 2023; Baidoo-Anu & Owusu Ansah, 2023). The consistency between the survey and interview data suggests that students are not rejecting AI but are instead experimenting with it to personalize their learning experiences.

Despite their interest and willingness to explore AI, many students expressed uncertainty about appropriate and ethical use. Nearly half of the survey respondents reported feeling unsure about what constituted misuse, and interview participants frequently mentioned a fear of "getting in trouble." This concern is also reflected in Figure 2, which highlights ethical uncertainty and academic integrity as two of the most frequently cited student concerns. Similar patterns have been noted by *Alam* (2023) and *Rudolph et al.* (2023), who observed that the absence of clear guidelines leads to inconsistent practices and anxiety about academic integrity. These findings also echo those identified by *Tlili et al.* (2023), who found that lack of faculty guidance reinforces student hesitation and uneven practices. The present results reinforce that institutional guidance and open discussion are crucial for helping students use AI responsibly.

A striking theme across both data sources was the uneven nature of AI exposure. Some students had extensive experience using tools such as ChatGPT, while others were just learning about them. This unevenness suggests a growing equity gap consistent with UNESCO's (2023) call for inclusive AI literacy and digital readiness. Students who are more confident or technologically fluent are likely to benefit disproportionately from AI-assisted learning. Without explicit instruction, those with limited experience may be hesitant to use these tools or may misuse them unintentionally. As summarized in Table 2, these disparities in familiarity and confidence appeared across multiple interviews and were often linked to access and prior exposure. This pattern mirrors earlier findings on digital literacy, where students' self-efficacy and access strongly influence learning outcomes (UNESCO, 2023). The data also indicate that AI can play a positive role in promoting metacognition and self-regulated learning. Several students described using AI to create their own quizzes, test their understanding, and analyze errors. These

behaviors align with the patterns shown in Figure 2, where students reported that AI improved understanding and supported active learning. They also reflect the principles of active learning and formative assessment, consistent with findings from Zhai (2023), who observed similar metacognitive engagement among STEM learners. When students use AI to engage in iterative self-testing, they are applying higher-order thinking rather than simply copying answers. Faculty can build on this potential by incorporating guided AI activities that emphasize reasoning, reflection, and verification.

The study further supports the idea that faculty modeling is a powerful influence on student behavior. Many participants expressed that they would feel more comfortable using AI if instructors demonstrated responsible use and explicitly discussed academic expectations. As shown in Table 2, several students directly recommended that professors include demonstrations and clear syllabus guidelines to reduce uncertainty. This pattern parallels findings from Dwivedi et al. (2023) and Hasanein and Sobaih (2023), who emphasize that instructor modeling promotes ethical engagement and reduces misuse. It also echoes recommendations by *Alam* (2023), who advocate for faculty transparency as a way to normalize ethical AI practices. Incorporating AI demonstrations into class activities or course materials may reduce misconceptions and encourage thoughtful use.

Overall, the results contribute to a growing body of evidence suggesting that AI literacy should be treated as a core component of modern higher education. Students already rely on these tools, but without structured guidance, their experiences vary widely in quality and outcome. Developing shared policies, transparent communication, and faculty-led training can help bridge this gap. Doing so ensures that the educational benefits of AI are accessible to all students, not just those who experiment confidently on their own.

Conclusion and Future Directions

This study examined how undergraduate students use and perceive generative artificial intelligence (AI) in their coursework, focusing on both learning benefits and ethical challenges. The findings show that most students engage with AI as a supplemental study tool rather than a shortcut. They use it to clarify difficult concepts, generate practice questions, and check understanding. At the same time, many expressed confusions about what counts as acceptable or ethical use, reflecting the absence of consistent institutional guidance.

The combination of survey and interview data reveals that students are not passive users of technology. Instead, they are experimenting, evaluating, and adapting AI to meet their individual learning needs. Their comments also suggest a strong desire for transparency and support from instructors. When faculty openly model responsible AI use and provide structured opportunities for exploration, students report greater confidence, curiosity, and clarity. The results carry several implications for higher education. First, AI literacy should be embedded across courses as a foundational skill rather than treated as an optional add-on. This literacy includes understanding how to verify information, cite AI-assisted work, and distinguish between productive and inappropriate uses (Holmes et al., 2019; Shao & Chen, 2023; Dwivedi et al., 2023). Second, faculty development is vital. Instructors need opportunities to experiment with AI, share strategies, and develop consistent language for discussing it with students. Third, institutions should consider adopting shared guidelines that balance academic integrity with

innovation, ensuring equitable access for all learners.

While this study provides valuable insights, it also has limitations. The sample was drawn primarily from STEM courses at one regional institution, and the findings may not reflect experiences in other disciplines or institutional contexts. Future research could extend this work by comparing usage patterns across fields or tracking how attitudes evolve as AI becomes more integrated into coursework. Longitudinal designs that follow the same students over time could yield deeper understanding of how familiarity, confidence, and ethical awareness develop.

As generative AI continues to reshape higher education, the challenge is not whether to use these tools, but how to use them responsibly. By centering student perspectives, institutions can move beyond reaction and regulation toward purposeful design that empowers learners and promotes ethical, equitable engagement with emerging technologies (Baidoo-Anu & Owusu Ansah, 2023; UNESCO, 2023).

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Appendix A. AI in Education Pilot Study: Semi-Structured Interview Guide

Estimated Duration: 20–30 minutes

Format: In person or via secure online platform

Intro Script

"Thanks for taking the time to speak with me. Just a reminder that this interview is voluntary, your answers will remain anonymous, and you're free to skip any question or stop the interview at any time."

Section 1: Opening Questions

1. How familiar were you with AI tools like ChatGPT or BearcatGPT before taking this course?
2. Did you expect to use AI in this class? Why or why not?

Section 2: AI Usage in the Course

3. Can you describe how you used AI tools in this course (e.g., review sheets, Quests, feedback)?
4. Which tools did you use most frequently, and what were they helpful for?
5. Were there specific tasks or topics where AI helped you the most?

Section 3: Reflections and Impact

6. How did using AI affect your understanding of the material?
7. Did it change how you studied or approached assignments? In what way?
8. Did AI make you feel more confident, or did it cause confusion or frustration?

Section 4: Challenges and Concerns

9. Were there moments when you chose not to use AI? Why?
10. Do you have any concerns about using AI tools in your coursework (e.g., accuracy, fairness, overreliance)?
11. Did you feel the way AI was introduced in class was helpful and responsible?

Section 5: Closing Thoughts

12. What suggestions would you have for improving how AI tools are used in future classes?
13. Is there anything else you'd like to share about your experience using AI in this course?

Appendix B. Student Survey on AI-Generated Instructional Materials and AI in Education

Purpose

This anonymous survey was designed to gather student feedback about the use of artificial-intelligence (AI) tools, including instructional materials, in college courses. It included questions for both experienced and inexperienced AI users.

Format

Administered through Microsoft Forms and Canvas. The survey contained multiple-choice, Likert-scale, and open-ended items. Estimated completion time: 8–10 minutes.

Section 1: General Awareness and Usage

- Are you familiar with the concept of artificial intelligence (AI)?
- Which AI tools have you used for schoolwork? (Select all that apply.)
    - ChatGPT
    - Grammarly
    - Khan Academy AI
    - Socratic by Google
    - Quizlet AI
    - Microsoft Copilot
    - Google Bard
    - AI features in learning management systems
    - Other (please specify)
- How often do you use AI tools for schoolwork?
- If you have not used AI tools, what has prevented you from using them?

Section 2: Effectiveness of AI-Generated Instructional Materials

- Which types of AI-generated materials did you find most helpful (e.g., study guides, practice problems, quizzes)?
- How effective were the materials in helping you understand course concepts?
- How do AI-generated materials compare to traditional resources?
- Did AI-generated materials help you prepare for exams or quizzes?
- How well did the materials align with course content and learning objectives?

Section 3: Perceived Benefits of AI in Learning

- Do you think AI can improve the learning experience for students?

- What is the biggest potential benefit of using AI in the classroom?
    - Saving time
    - Personalized learning
    - Clarifying complex concepts
    - Improving access to resources
- How could AI help you understand difficult concepts more easily? (Open-ended)

Section 4: Specific Applications of AI

- Which subjects would benefit most from AI tools?
- How helpful would AI-generated practice questions or quizzes be for your learning?
- Would you find AI-powered virtual tutors helpful for additional support?

Section 5: Concerns and Ethical Considerations

- What concerns do you have about using AI for schoolwork (e.g., overreliance, reduced critical thinking, privacy, accuracy, ethics)?
- Do you think students might rely too heavily on AI tools and avoid doing their own work?
- How important is it to identify when content is generated by AI?

Section 6: Integration and Teacher Role

- How should teachers guide students on appropriate AI use? (Open-ended)
- Should AI supplement traditional methods, replace some teaching aspects, or not be used?
- What role should teachers play in evaluating AI-assisted assignments?

Section 7: Open-Ended Questions

- What are your thoughts on the future of AI in education?
- Describe a scenario where AI could significantly enhance your learning experience.
- What are your suggestions for responsible AI use in the classroom?

Section 8: Demographic Information (Optional)

- Grade level (Freshman, Sophomore, Junior, Senior, Graduate student)
- Primary subject area of study
- Reliable access to technology needed to use AI tools (Yes/No)