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Using Generative Artificial Intelligence to Aid Classroom Retention

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Abstract
The use of generative artificial intelligence (AI), which includes tools such as ChatGPT, Bing, and Bard, allows users to find information for specific questions with just a few keystrokes. While this technology is not a replacement for traditional research methods, it can help undergraduate agriculture students be efficient in their time management skills as they move through the various stages associated with writing papers. The question remains whether students increase their retention of knowledge from use of generative AI in conjunction with traditional course lectures. Participants in this research were provided with a video describing generative AI and then completed a course assignment using this technology. Using a pre- and post-evaluation, agriculture students self-assessed how use of generative AI aided retention of knowledge. Questions on the evaluation addressed whether students view generative AI as ethical to use for course assignments and in a professional business environment, if it will aid their future career plans, and if they are more likely to use generative AI due to the assignment. Use of generative AI in conjunction with a course assignment can aid in improved understanding of the benefits and drawbacks associated with this technology. Our analysis provides information on students' prior use of this technology and how it can benefit their retention of knowledge. Results indicate the extent to which students believe use of AI is ethical in business or professional settings, and previously earned dual enrollment credit indicates their retention of knowledge and change in beliefs toward its usefulness in future careers. Students were largely neutral on AI, aiding retention of knowledge more than a traditional lecture or their normal study methods.

1 Introduction

The integration of new technologies is an important component of the educational process for students as they pursue training to achieve their career aims. For students pursuing a career in business, economics, or STEM fields, the ability to successfully use technology is an important skill that is expected in normal job responsibilities. The ability to demonstrate competency in the use of technology during an interview process highlights a student's efficiency in completing tasks to aid firm productivity. This results in academic institutions making significant annual investments in new technology to aid student preparation for the job market. Adoption of technology by academic institutions allows students a chance to discuss the ethical framework associated with the technology.

Academic faculty's adoption of technology does not always match the educational institution's investment (Reid 2014). Reasons for low rates of technology adoption and demonstration by faculty are varied but can include their self-efficacy and background (Reid 2017). The relative newness of a technology and the lack of awareness by faculty members of its potential benefits can slow adoption rates and have negative impacts upon students' preparedness for the job environment. For example, the environmental portion of the Ishikawa fishbone diagram in Reid (2017) does not include industry's expectations of students' technological prowess, which might lead to greater adoption and diffusion of technology by academic faculty in the classroom. Increasing job preparedness among students increases

not only the value of the student's education, but society's view of the academy.

Generative artificial intelligence (AI) is a new technology that is in its early stages and generating much discussion regarding its appropriate use in curricula of academic institutions. ChatGPT, Bing, and Bard are examples of generative AI gaining attention and popularity in society. AlAfnan et al. (2023) discuss consequences of the use of generative AI in the classroom resulting in concerns on plagiarism, unlearning, and academic and professional development. These are valid concerns given generative AI's ability to avoid plagiarism detectors. With the COVID-19 pandemic resulting in significant learning loss (Kaffenberger 2021; Donnelly and Patrinos 2022), generative AI can help mitigate the lack of knowledge undergraduate students are expected to possess even when analytical and critical-thinking skills are not fully developed. Faculty at academic institutions are well-placed to help frame student perceptions about the appropriate and ethical uses of new technology and are often expected to include discussions of ethical consequences in their courses by various accrediting agencies (Kulshreshtha 2005; Snyder and Bairaktarova 2021; Bosman, Oladepo, and Ngambeki 2024).

Businesses are jumping on the AI bandwagon as demonstrated by the investment in generative AI tools by Microsoft and Google, just to name a few (The Economist 2023, "Meet the New Co-Pilot," p. 58). Employers are using terms such as "co-pilot" for AI software, but there are concerns about incorrect information generated and use of confidential or proprietary data. The entire September 16, 2023, edition of The Economist was devoted to how AI could revolutionize scientific discovery. Yann LeCun, who is touted to be a "godfather of modern artificial intelligence" was quoted, "By amplifying human intelligence, AI may cause a new Renaissance, perhaps a new phase of the Enlightenment" (The Economist 2023, "I, Robot Scientist," p. 67).

Sullivan, Kelly, and McLaughlan (2023) highlight the possibilities of generative AI, including ChatGPT to enhance participation and student success. According to Sullivan et al. (2023), student perceptions regarding the potential benefits to students is missing from the existing research literature. Cotton, Cotton, and Shipway (2024) discuss the potential benefits to students from improved remote learning and creation of personalized assessments while Perez et al. (2017) suggest chatbot applications can aid with preparation of student-oriented study guides and lecture notes. For the latter study aid, this can be used to reinforce content from previous courses students have not fully mastered and/or retained. It is in this knowledge gap we seek to answer some of the questions raised in the existing literature on student use and perception of AI as it relates to career preparedness, its ethical use both for career and academic pursuits, and its ability to aid in retention of course knowledge.

This study analyzes student perceptions and knowledge of AI applications. Following completion of a pre-assignment survey, undergraduate agricultural majors completed an assignment using generative AI to determine how the activity helped retention of course material. A post-assignment survey was completed by students to measure the change in perceptions. This paper follows with a brief literature review, discussion of methods, presentation of results, and then concluding thoughts.

2 Literature Review

Incorporation of technology into academic curricula has long been part of the teaching process to prepare students for their future career paths. Higgins and Moseley (2001) find that adoption of technology by instructors is tied to student learning outcomes. These outcomes can vary widely by academic discipline due to the presence of accreditation bodies, including the Association to Advance Collegiate Schools of Business (AACSB). As an example, AACSB International requires universities receiving its accreditation in business that "learners and faculty are competent with current and emerging technologies" (AACSB International 2020, p. 22). For students who are in pre-professional tracks, the outcomes are focused on putting the student in a position to receive acceptance to a professional or graduate program. Non-accredited disciplines may see their faculty rely on existing knowledge, prior experiences, and training (Reid 2017). Faculty must also balance students who have

limited prior experience with technology. This can result in student frustration from lack of technical support from software developers, faculty assistance, and/or poor grades received on assignments. These frustrations can often result in poor student evaluations of teaching resulting in reluctance of faculty to adopt additional technology.

Ali (2003) states the importance of education in meeting the needs of society, and faculty's views toward the integration and suitability of technology is important. Newly adopted technology should be a tool to aid learning, not a solution to student learning (Gardner 1998). Thus, faculty can open students' minds to new possibilities with technology. With generative AI, society has already begun the adoption process with faculty having to decide the best way to introduce the technology into courses. Anecdotal evidence suggests the parents of undergraduate students expect academic faculty, including use of generative AI in curricula to prepare students for their future careers. This perception among parents competes with faculty concerns on the time it takes to learn and successfully incorporate new technologies into a classroom setting (Butler and Sellbom 2002). In consideration of generative AI's ability to evade plagiarism checkers and questionable veracity (AlAfnan et al. 2023), faculty may perceive the costs greater than the benefits of its use in academic settings. Regardless of faculty perceptions, industries are already adopting various forms of AI (Kumar et al. 2021; Carvalho and Ivanov 2024; Prieto, Mengiste, and de Soto 2023), necessitating the need for faculty to consider how to introduce students to this technology in an ethical manner consistent with how it will be used in job settings.

Following introduction of a new technology to students, they must still make an adoption decision. Social influences are known to impact student adoption of technology in higher education situations (VanDerSchaaf, Daim, and Basoglu 2021). Even as academic faculty work with undergraduate students who are highly connected, their knowledge and awareness of how to use technology is often limited (Chokri 2012). Tied in with the adoption decision is whether students will accept the technology. Davis (1989) suggests the actual use of a new technology is tied to the perceived usefulness, perceived ease of use, attitude toward using the technology, and behavioral intention to use. External variables are tied to the actual use (Davis 1989), which could include the social influences of an undergraduate's peer group and/or time constraints. Demonstration of its potential applications in future career paths may also assist in the decision to use.

The COVID-19 pandemic has had major implications for learning in the academy. Students were less concerned about studies, with increased focus on their overall well-being, potential loss of existing employment, and implications for their long-term career prospects (Pruitt, Tewari, and Mehlhorn 2020; Gonzalez et al. 2021; Birmingham et al. 2023; Soria, Horgos, and Shenouda 2023). With students less focused on learning, this has contributed to learning loss (Kaffenberger 2021; Donnelly and Patrinos 2022) and strategies to reduce the disruption to current and future undergraduate students (Black 2020; Hanson and Wachenheim 2020; Turner, Hughes, and Presland 2020; Kaffenberger 2021; Harmey and Moss 2023). Into this environment for higher education, ChatGPT and similar generative AI were released into the marketplace. With ChatGPT allowing the possibility of "personalized learning" (Firat 2023), this can be a useful tool to minimize the educational harm associated with the COVID-19 pandemic.

3 Methods

Undergraduate students at a regional teaching institution in the southeastern U.S. were invited to participate in this research on perceptions and ethical use of generative AI. These students were in a comprehensive agricultural department (i.e., offering majors in a variety of agricultural disciplines). Participating students in

agricultural economics, agricultural engineering technology, animal science, and general studies[1] completed a pre-assignment questionnaire assessing their knowledge of AI.[2] Questions addressed the extent of students' familiarity with AI and various chatbots, their ability to provide information to users, and whether students had used AI to assist with improving papers for high school or college credit. Data were also collected on students' perceptions concerning the ethics of AI in various contexts and whether the use of AI would be beneficial to their future careers. The uniform pre-assignment questionnaires were completed in the classroom. Students who were not present for the pre-assignment questionnaire were asked to visit the faculty member's office to complete the questionnaire. While participation in the AI project was mandatory in each class, it was left to each faculty member's discretion whether to provide points directly for completion of the questionnaire.

Following completion of the pre-assignment questionnaire, students watched a short video in class discussing and demonstrating generative AI using a pre-determined prompt.[3] Designed specifically for this project, the university's Office of Information Technology created and recorded the video shown to all students in the eight participating sections. All students were required to watch the video in class to ensure the video was viewed in full. Following the video, faculty discussed a course-specific assignment students would complete using generative AI. Students used the AI chatbot of their choice to complete the assignment, which was recorded on the post-assignment evaluation. The assignment was designed to reinforce course content in each of the respective courses. One example assignment involved using a chatbot to produce simple definitions for several complex terms, creating a quiz to test student knowledge and application of those terms, and engaging in an optional back-and-forth interaction with a chatbot to incorporate those complex concepts into a verbal discourse.

After the submission of the assignment, faculty administered the post-assignment evaluation. Likert-style questions on the post-assignment evaluation focused on whether students perceived the use of AI improved understanding of chatbots/AI, whether the use of AI helped the student retain content more than a traditional lecture, and whether they are more likely to use AI in the future. The Likert scale ranged from "strongly disagree" to "strongly agree." Only one question—whether students believe being proficient in AI will benefit their career—was repeated across pre- and post-assignment surveys to track changes in perception. Student responses were tied to their university student identification number, allowing us to match their responses at both points in the semester.

The Likert questions on the post-assignment evaluation are hypothesized to be impacted by the questions on the pre-assignment evaluation (familiarity with advances in AI, whether AI use is ethical in school and/or business environments, and whether the student has previously used AI for school purposes) as well as demographic variables. Given the ordinal nature of the variables, an ordered probit model is used to assess which variables impact student's opinions on the usefulness of AI to help retain knowledge.

Concerns about the external validity of Scholarship of Teaching Learning (SoTL) across universities may be present due to self-selection biases present among students when choosing a university (Lupton 2019). Even with these differences, Lupton (2019) argues that students answered similarly across universities. Bernstein (2018) argues teaching innovations, as we are proposing, should be evaluated on how well it works, and broadly, findings can be applied. The context has been discussed in this section to help readers better understand and make the determination on its applicability to their courses regardless of the type of the university or discipline similar to the discussion in Shulman (2013) and Bernstein (2018).[4]

[1] The general studies course described in this research is a course freshmen take to aid in their transition to a university setting. Each section is organized by major and discusses how to register, what courses to take, and where to go when you face various issues commonly encountered by college students.

[2] All procedures for this study were pre-approved by the university's Institutional Review Board (IRB-24-970-E05-4005).

[3] Students who missed the video watched it in the faculty member's office. The video is available upon request.

[4] We wish to thank an anonymous reviewer for raising this point about internal and external validity in SoTL research.

4 Data Summary and Results

A total of 186 students completed both surveys, with six providing inconsistent class selections across their pre- and post-assignment questionnaires. Students in this research were primarily from the southeast, with 85.5 percent from the state in which the institution is located with an additional nine states represented in our sample. Means and standard deviations for the demographic information is provided in Table 1. Three variables were significantly different at the 5 percent level between upper and

Table 1: Demographic and Summary Data.

Variable	Mean	Standard Deviation
Female	0.489	0.501
Minority Student	0.086	0.281
Junior or Senior	0.425[a]	0.496
Out of State Student	0.145	0.353
Student Earned Dual-Enrollment Credit	0.677	0.469
Student Has a Minor	0.091[a]	0.289
Semester Grade Point Average	3.184	0.658
Days Between Completing Pre- and Post-Evaluation	37.392[b]	25.797
Student Used a Chatbot Other Than ChatGPT	0.167[a]	0.374
Bard	0.016	
Sonic	0.005	
Bing ChatGPT	0.016	
Perplexity	0.011	
YouChat	0.005	
Other	0.114	
Upper Division Course	0.371	0.484
Survey Completed for:		
Agribusiness General Studies	0.200	0.401
Agricultural Engineering Technology General Studies	0.141	0.348
Veterinary Sciences General Studies	0.119	0.325
Agribusiness Courses	0.195	0.397
Agricultural Engineering Technology Courses	0.141	0.348
Animal Science Courses	0.178	0.384

Note: There were 186 total responses for the pre- and post-evaluation assessment.
a Denotes a significant difference between upper and lower division courses at the 5 percent level.
b Denotes a significant difference between upper and lower division courses at the 1 percent level.

lower division courses: (1) whether the student was a junior or senior, (2) if they had declared a minor, and (3) if they used a chatbot other than ChatGPT. One variable (days between completion of the pre- and post-assignment questionnaire) was significant at the 1 percent level, but that may be impacted by the broad ranges present in the data.

Table 2 presents means and standard deviations for the questions included on the pre- and post-assignment evaluations. Only two statements were significantly different between upper and lower division courses at the 5 percent level of significance: (1) being proficient in AI will benefit my future career on the pre-assignment evaluation and (2) the use of this assignment improved my understanding of chatbots/AI. For the question involving how proficiency in using AI would benefit students' future

Table 2: Pre- and Post-Assignment Survey Results.

Statement	Pre-Assignment Survey		Post-Assignment Survey	
	Mean	Standard Deviation	Mean	Standard Deviation
I am familiar with the latest advancements in artificial intelligence (AI) that enable users to seek information from AI systems.	3.297	1.153		
I am familiar with chatbots and AI including ChatGPT.	3.238	1.210		
I have used AI (e.g., ChatGPT, Bard) to assist with improving papers I've submitted for credit in high school or college classes.	1.778	1.053		
Submitting college assignments completely written by AI is ethical.	1.751	0.886		
Submitting assignments completely written by AI in a professional business setting is ethical.	1.800	0.902		
Being proficient in using AI will benefit my future career.	2.935[a,b]	1.082	3.373[b]	1.041
The use of this assignment improved my understanding of chatbots/AI.			3.773[a]	0.861
Using AI helped me retain content more than a traditional lecture.			3.049	0.946
Using AI helped me retain the content more than my normal study methods.			3.043	0.977
Using AI in this class resulted in me being more likely to use this technology in the future.			3.297	1.070

[a]Significantly different between upper and lower division courses at the 5-percent level.
[b]Significantly different at the 1-percent level from same question administered on the initial survey.

careers, there was a significant difference at the 1 percent level between the pre-assignment and post-assignment evaluation.

Matching student responses by their institutional identification numbers, cross-tabulation results are provided in Tables 3 to 5. Nearly three-quarters—134 of 186—of students surveyed disagreed (strongly or otherwise) that submission of a college assignment completely written by AI was ethical and likewise disagreed (strongly or otherwise) with having used AI in the past to improve a high school or college paper. Three students strongly agreed with having used AI in the past, but strongly disagreed or disagreed with AI use being ethical to completely write an assignment. Similar results are presented in Table 4 for students who disagreed (strongly or otherwise) with the statement (1) that submitting assignments completely written by AI in professional settings is ethical, and (2) they have used AI in the past for high school/college assignments (70 percent or 130 of 186 students). Fourteen students agreed (strongly or otherwise) to having used AI in the past for assignment, disagreed (strongly or otherwise) with AI's use in professional settings as being ethical.

Table 3: Cross Tabulation of Prior Use of Artificial Intelligence and Submission of College Assignments Completely Written by Artificial Intelligence Is Ethical.

		Submitting College Assignments Completely Written by AI Is Ethical					
		Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**	**Totals**
Used AI to Improve Papers in High School or College	Strongly Disagree	60	26	9	2	0	97
	Disagree	24	24	9	1	0	58
	Neither Agree nor Disagree	1	5	5	0	0	11
	Agree	3	5	4	1	2	15
	Strongly Agree	2	1	1	1	0	5
	Totals	91	61	28	5	2	186

Table 4: Cross Tabulation of Prior Use of Artificial Intelligence and Submission of Assignments Completely Written in Professional Settings by Artificial Intelligence Is Ethical.

		Submitting Assignments Completely Written by AI in Professional Settings Is Ethical					
		Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**	**Totals**
Used AI to Improve Papers in High School or College	Strongly Disagree	58	25	11	3	0	97
	Disagree	19	28	8	3	0	58
	Neither Agree nor Disagree	1	6	2	2	0	11
	Agree	4	6	3	1	1	15
	Strongly Agree	1	3	0	0	1	5
	Totals	83	68	24	9	2	186

Table 5 presents cross-tabulation results of students' perceptions of whether AI proficiency will benefit their careers from the pre- and post-assignment evaluation. Slightly more than 20 percent of students (40 of 186) who neither agreed nor disagreed with the benefits of AI in their career felt the same across the semester. A total of 71 of 186 students (nearly 40 percent) neither agreed nor disagreed with the benefits of AI to their career at the end of the semester. Comparing the pre- and post-assignment evaluation, 44.1 percent had a more favorable view of how AI proficiency would benefit their career, 15.1 percent had a less favorable view, and 40.9 percent did not change their position.

Although not presented in the tables, the same percentage of females indicated perceiving the use of AI in school or business settings is not ethical (85.7 percent). This was a greater percentage than their male counterparts on either question. A higher percentage of students who were in lower-division courses indicated the use of AI in a business setting is not ethical (82.9 percent) compared with those in upper-division courses (78.9 percent). Prior use of AI in an educational setting was mildly correlated with lower term and college-level GPAs, with the same, albeit more muted, relationship with high school GPAs.

Table 5: Cross Tabulation of Being Proficient in Using Artificial Intelligence Will Benefit Career from Pre- and Post-Evaluation.

		Being Proficient in Using AI Will Benefit Career (Post-Evaluation)					
		Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**	**Totals**
Being Proficient in Using AI Will Benefit Career (Pre-Evaluation)	Strongly Disagree	8	5	9	4	1	27
	Disagree	0	3	11	6	3	23
	Neither Agree nor Disagree	2	6	40	28	5	81
	Agree	2	3	11	19	10	45
	Strongly Agree	0	0	0	4	6	10
	Totals	12	17	71	62	25	186

Given the ordinal nature for many of the questions posed on the post-assignment evaluation, an ordered probit model was estimated to determine the impact of demographic and pre-assignment questions on whether AI aided knowledge retention more than traditional classroom methods and whether usage in these would promote future usage (see Table 6). In Table 6, the degree to which students felt AI use in business settings is ethical and single-semester GPAs were shown to be statistically significant whether AI aided in retention more than conventional study methods and whether the assignment promoted future AI use. Dual enrollment was statistically significant in all three ordered probit models presented in Table 6. The signs for the previous independent variables were consistent each time the variable was significant, though magnitudes varied. Previous usage of AI for school assignments was statistically significant only in the model for examined factors impacting whether AI aided retention more than normal study methods. Having a minor was a statistically significant determinant of whether a student is likely to use AI again in the future.

Table 7 provides the marginal effects for significant and non-dummy variables based on the results of Table 6. As an exemplary interpretation of these marginal effects, a one-unit increase in the semester GPA (one letter-grade shift) yields a 3.3 percent increase in the student strongly disagreeing with AI aiding in knowledge retention over normal study methods. None of the marginal effects are greater than 9 percent for a one-unit change in the independent variable.

To measure shifting student opinions on whether they felt AI proficiency would benefit their career, a change variable was developed to capture differences in pre- and post-assignment responses. Student perceptions could have decreased, meaning the change variable would have been negative. To use an ordered probit model, this variable was rescaled (the most negative change, -3, was rescaled to 0, and the most positive change, 4, was rescaled to 7). By doing so, we were able to determine which factors impacted the change in students' perception of the utility of AI in benefiting their future career. The time elapsed between the pre-assignment evaluation, course assignment, and post-assignment evaluation varied between and within classes. It may be assumed more days between the pre- and post-assignment evaluations might allow students to consider the benefits of AI and more fully integrate AI into their learning processes. However, the impact of the number of days between the pre- and post-assignment evaluations was not large or statistically significant in any model and was excluded from the results presented.

Table 6: Ordered Probit Results of Artificial Intelligence Helped Retention of Course Content.

Variable	AI Helped Retention More than Normal Study Methods	AI Aided Retention of Content More than Traditional Lecture	Using AI in This Class Resulted in Me Being More Likely to Use This Technology in the Future
	Coefficient (Standard Error)		
Intercept	1.566***	1.472***	1.213**
	(0.584)	(0.581)	(0.582)
Upper Division Course	0.012	-0.029	0.033
	(0.102)	(0.102)	(0.103)
Familiarity with Latest AI Advancements	0.102	0.068	0.074
	(0.099)	(0.098)	(0.099)
Familiarity with Chatbots	-0.120	0.007	-0.057
	(0.087)	(0.086)	(0.087)
Previously Used AI for School	0.239*	0.193	-0.045
	(0.125)	(0.124)	(0.123)
AI School Assignment Usage Ethical	0.2399	-0.061	-0.017
	(0.125)	(0.118)	(0.118)
AI Business Assignment Usage Ethical	0.213***	0.073	0.274***
	(0.082)	(0.081)	(0.083)
Dual Enrollment	0.286*	0.319*	0.316*
	(0.173)	(0.172)	(0.172)
Minor	0.269	-0.192	0.769***
	(0.280)	(0.279)	(0.286)
Semester GPA	-0.306**	-0.110	-0.231*
	(0.127)	(0.126)	(0.126)
Female	-0.176	-0.268	-0.191
	(0.166)	(0.166)	(0.166)
Minority Student	-0.157	-0.008	-0.285
	(0.289)	(0.288)	(0.286)
Junior or Senior	-0.214	-0.141	0.077
	(0.167)	(0.166)	(0.166)
Threshold Parameter 1	0.956***	1.040***	0. 747***
	(0.097)	(0.100)	(0.096)
Threshold Parameter 2	2.045***	2.216***	1.643***
	(0.104)	(0.103)	(0.098)
Threshold Parameter 3	3.523***	3.436***	3.038***
	(0.179)	(0.161)	(0.141)
N	186	186	186
McFadden's Pseudo R-Squared	0.054	0.034	0.064
Log Likelihood Function	-240.180	-242.402	-247.437

Note: Standard errors in parentheses. Three asterisks (***) denote significance at the 1 percent level, two asterisks (**) at the 5 percent level, and one asterisk (*) at the 10 percent level.

Table 7: Marginal Effects of Independent Variables on AI Helping Retention More than Normal Study Methods.

	Marginal Effects for AI Helped Retention More than Normal Study Methods				
	Strongly Disagree	**Disagree**	**Neither Agree Nor Disagree**	**Agree**	**Strongly Agree**
Previously Used AI for School	-0.026	-0.051	-0.010	0.071	0.015
AI Business Assignment Usage Ethical	-0.023	-0.045	-0.009	0.064	0.014
Semester GPA	0.033	0.065	0.013	-0.091	-0.020
	Use of AI Increased Likelihood of Using in the Future				
	Strongly Disagree	**Disagree**	**Neither Agree Nor Disagree**	**Agree**	**Strongly Agree**
AI Business Assignment Usage Ethical	-0.030	0.025	-0.034	0.070	0.040
Semester GPA	0.025	0.038	0.029	-0.059	-0.033

Note: The marginal effects represent the percentage change of the dependent variable given a one unit change in the rating of the independent variable. Only significant and non-dummy variables from Table 6 are shown.

Familiarity with chatbots, beliefs about whether AI usage is ethical in business settings, semester GPA, and whether the student is a female were statistically significant in explaining changes in students' feelings about the career benefits of AI proficiency (see Table 8). It is interesting to note that the sign on the degree to which students believe use of AI is ethical in business settings is negative compared to positive in the models presented in Table 6. This variable (use of AI is ethical in business settings) had the largest impact on changing opinions on the usefulness of AI in their future careers. The marginal effects of these significant, non-dummy variables are presented in Table 9. As most of the changes ranged between a one-unit decrease and a two-unit increase (92 percent of observations), the marginal effects are centered around no change in feelings. A significant portion of students (76) did not change their opinion of AI's benefits to their career.

5 Conclusions

Generative artificial intelligence is disrupting university classrooms in its ability to help students find information and edit assignments. The ability of generative AI to aid in retention of knowledge was the subject of this research. Newness of this technology may have resulted in students neither agreeing nor disagreeing on its ability to aid in retention of knowledge delivered in courses, as over 80 percent of students disagreed with having used AI previously for a high school or college assignment. Students may not have understood the ability of AI to master agricultural concepts due to lack of awareness of the technology for these types of applications. Student concerns over regenerative AI not being current on information and making up information was not controlled in this study, and may have contributed to the results discussed in this paper.

The nature of the assignments used in the classes covered in this research may have contributed to students being uncertain on its ability to help retain knowledge, but it did result in improved understanding of this technology. Increased exposure to technology may further increase students' likelihood to use this new technology in the future, especially when students are asked to initiate the use as they were in the assignment for this research (EDUCAUSE Center for Analysis and Research 2018, p. 18–20).

Table 8: Ordered Probit Results of Change in Feelings Toward Artificial Intelligence Aiding.

Variable	Coefficient (Standard Error)
Intercept	6.284***
	(0.598)
Upper Division Course	0.069
	(0.103)
Familiarity with Latest AI Advancements	-0.072
	(0.099)
Familiarity with Chatbots	-0.154*
	(0.088)
Previously Used AI	0.069
	(0.125)
AI Assignment Usage Ethical	-0.116
	(0.119)
AI Business Assignment Usage Ethical	-0.723***
	(0.085)
Dual Enrollment	0.160
	(0.174)
Minor	0.435
	(0.282)
Semester GPA	-0.247*
	(0.128)
Female	-0.522***
	(0.168)
Minority Student	-0.376
	(0.291)
Junior or Senior	0.090
	(0.168)
Threshold Parameter 1	0.601***
	(0.168)
Threshold Parameter 2	1.532***
	(0.133)
Threshold Parameter 3	3.078***
	(0.113)
Threshold Parameter 4	4.261***
	(0.133)
Threshold Parameter 5	5.226***
	(0.201)
Threshold Parameter 6	6.336***
	(0.435)
N	186
McFadden's Pseudo R-Squared	0.048
Log Likelihood Function	-266.956

Table 9: Marginal Effects of Independent Variables on Change in Feelings Toward Artificial Intelligence Aiding Career.

	Marginal Effects							
	Largest Decrease in Feelings (Y = 0)	**(Y = 1)**	**(Y = 2)**	**No Change in Feelings (Y = 3)**	**(Y = 4)**	**(Y = 5)**	**(Y = 6)**	**Largest Increase in Feelings (Y = 7)**
AI Business Assignment	0.004	0.016	0.092	0.171	-0.169	-0.095	-0.019	-0.001
Usage Ethical Familiarity with Chatbots	0.001	0.003	0.020	0.036	-0.036	-0.020	-0.004	-0.000
Semester GPA	0.001	0.006	0.032	0.059	-0.058	-0.033	-0.006	-0.000

Note: The marginal effects represent the percentage change of the dependent variable given a one-unit change in the rating of the independent variable. Only significant and non-dummy variables from Table 8 are shown.

As business and industry embrace the use of AI in the workplace, educators need to provide exposure and guidance on its uses. It is unknown the extent to which universities are actively recruiting students based on their opinions of AI and is a potential area of future research. Clear guidelines on when it is acceptable to use generative AI and how to use it will increase student confidence in the future given the difficulty faculty experience in detecting its use with existing AI detection tools. This is an area for future research to determine what employers consider responsible use of this technology.

Our study is limited by the fact we did not compare perceptions of AI between agricultural and non-majors at our university. All of the classes in which the questionnaire was distributed were agricultural science courses. There might be significant differences between the types of classes (e.g., general education or major classes). This is in addition to potential differences between land-grant universities and regional, teaching institutions. Both of these are areas for future research as AI technology continues to evolve and student adoption of this technology increases.

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