

A Pilot Study of the Use and Attitudes Toward Large Language Models Across Academic Disciplines

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Abstract

This study presents a comparison between the use of and attitude towards large language models (LLMs) across different academic disciplines at UA Little Rock. Undergraduate classes in different academic disciplines, were presented with information on issues related to the ethical use of LLMs for class assignments. The primary research question was: “What are students’ perceptions of the ethical use of LLMs in college coursework?”

The research employs a mixed-methods approach. The survey of student attitudes concerning the ethical use of LLMs was conducted in courses from six different academic disciplines – engineering technology, computer science, political science, chemistry, health education and history – during the fall 2023 semester. Both quantitative data and qualitative responses on the same survey, designed to be given before and after a short learning module, were collected, as was a student assignment. Since the research centers on student perceptions of the ethical dimensions of using LLMs, the individual results of each survey were not linked. The pilot study will lead to a more comprehensive study of student attitudes and use of LLMs.

Introduction

Ideas about artificial intelligence (AI) have moved from theory to reality over the last century. Some credit science fiction author Isaac Asimov [1] with establishing the discipline via the Three Laws of Robotics in his 1942 short story “Runaround.” Others consider the birth of AI to be at a 1956 conference at Dartmouth College [2]. Since then, AI development has surged off and on. The recent public release of free large language models (LLMs) such as ChatGPT has accelerated both dialogue about AI and use of it for a wide variety of tasks. Even artificial intelligence scholars and developers find it difficult to define. Wang offers: “adaptation with insufficient knowledge and resources” [3]. Much of the current literature about AI in higher education describes aspects of how LLMs are being used from different perspectives. Researchers studied classroom use of LLMs in student writing, instructional design and teaching pedagogy [4]; authoring scholarly articles [5] and journals such as Nature have provided guidelines for its use [6]. Open AI, the company behind ChatGPT, has provided its own guidelines for educators [7].

AI has previously provided a modest threat to pedagogy at all levels. However, with the recent widespread adoption of the use of LLMs, academic literature and popular journalism have featured articles about AI throughout the last year. Zhai posits that with adjusting learning goals, student use of LLMs is not only accepted, but desired [8]. Uhlig, et al., found that an LLM (ChatGPT) performed well on class discussion board questions and in a Python programming assignment but noted the ethical dilemma for students in submitting work “co-authored” by ChatGPT [9]. Richards provides several ideas as to how LLMs might be used for programming engineering classroom assignments, but states that many of the productive uses of LLMs in

engineering are more than ten years away [10]. Heaven et al., observes that instructors need to determine how to effectively use LLMs in the classroom and for assignments, not ban it from the classroom [11].

Alternatively, an interesting aspect is the instructor's knowledge and ability to use LLMs in a productive manner. Celik has performed an interesting study on this aspect [12]. Likewise, the use of AI can cause problems. For example, Gleason provides an interesting discussion on the impact of LLMs with a particular view to academic integrity and the difference between using an LLM and hiring an outside service to write an article for a class [13].

There are also many new tools for supplementing student work available in different disciplines. One of the populations for this study was engineering technology/computer science first year students. Calabro, et al., observe that ChatGPT might be used to impact a freshman course [14] as they discuss ideas such as ability to write code and documentation. Similarly, many computer science students are introduced to Github which places a premium on collaboration. With github, students can find ready-made code for many traditional assignments but Github expects its use to be ethical.

Skjuve, et al., did an early study on general users' thoughts about ChatGPT [15]. The excellent article by [16] Tlili, et al., observes that the public has a generally positive viewpoint of LLMs and their use in education, but they also state that the proper approach is to consider how to appropriately combine human intelligence with machine intelligence.

Although researchers continue to study the impact and perceptions of LLMs in education, fewer studies have looked across academic disciplines and industry to compare ideas about in what contexts LLM use is appropriate, helpful, or ethical. In addition, while governmental agencies, K-12 and higher education, professional organizations, and businesses scramble to implement guidance for use of AI, including LLMs, few studies have looked at the efficacy of instruction about AI and LLMs.

Method

A group of faculty from multiple disciplinary fields at the University of Arkansas at Little Rock began meeting in summer 2023 to discuss generative artificial intelligence, LLMs such as ChatGPT, and their impact and application in higher education. Several faculty incorporated ChatGPT into their courses in spring and summer 2023 and their experiences with student questions and concerns prompted the development of a research protocol to explore student perceptions of LLMs. Higher education news stories and the aforementioned research studies highlighted some of the promises and pitfalls of this technology and the ways in which students and teachers were using it.

Our faculty group created materials – a video and a slides presentation with questions and examples – to explain LLMs and several of their academic uses, including brainstorming, locating information, synthesis, drafting, and revision. At the conclusion of the instructional materials, students completed an assignment in which they generated and analyzed a ChatGPT response to a question they had been studying in class.

The group focused our research inquiry on student perceptions of the ethics of AI. The aims of the investigation were to stimulate a campus discussion about large language models in higher education and career preparation, to expose students and faculty to content and questions surrounding the ethical use of LLMs, and to generate questions and directions for future research. We formulated questions for a survey to gauge undergraduate students' knowledge and perceptions about the ethics and use of LLMs in academic coursework. One section included demographic questions about students' majors, ages, academic years, and grade point averages, another asked student's questions about their familiarity with the use of LLMs such as ChatGPT in academic settings and their views on ethical uses of LLMs in education. A mixed-methods approach was used, with both quantitative and qualitative questions.

We recruited faculty to participate in the study by discussing it with those in our artificial intelligence working group and those in a faculty teaching and learning workshop in the fall. The seven faculty who participated were from a range of academic disciplines: engineering technology, computer science, political science, chemistry, health education and history. These faculty received instructions for using the optional teaching materials (video, slides presentation, in-class assignment) and an announcement to place in their Blackboard course shells with a link to the survey. Although most faculty members used the teaching materials with their entire classes, students in those classes had to consent to participate in the survey and collection of the in-class assignment. Student participation in the survey was not incentivized, leading to a relatively small sample size. Survey data was examined by the research group once the fall 2023 semester concluded and grades were posted.

We used quantitative and qualitative analysis to examine the survey responses. Since this is a pilot study, we will refine the survey questions based on this initial data and recruit additional participants in 2024.

Results

There were a total of 48 participants in this pilot study. A majority of the participants were first-year students (n=17, 30%) while the next closest were juniors (n=15, 25%). The majority of the participants were male (n=41, 75%) and females were fewer (n=13, 25%). About two-thirds of the participants had self-reported a grade point average of 3.0 or higher. Although the project was initially designed to compare student responses both before and after completion of the teaching module, and instructors sent reminders to students to complete the survey a second time, only a few students did so. Thus, we will present the results of initial student surveys regarding LLM use.

Most of the participants (n= 40, > 80%) reported feeling 'comfortable' or 'somewhat comfortable' using technology such as digital platforms, collaborative tools and online research. However, very

few of the participants (n=19, 39%) mentioned that they were ‘familiar’ or ‘somewhat familiar’ with the use of large language models (LLMs) such as ChatGPT or Bard in education.

When asked how likely were they to use LLMs in an academic setting for various tasks, the majority (n=29, 61%) indicated they would use LLMs for brainstorming topic ideas, while a smaller percentage said they would use LLMs to locate information (n=23, 49%). Some of the participants (n=19, 40%) mentioned that they would use LLMs for ‘editing an assignment draft’ while only a small number said they would use LLMs for writing an assignment draft (n=10, 21%) or writing a bibliography (n=11, 24%).

When asked if they considered it ethical to use LLMs in an academic setting, again a majority indicated that they considered LLM use ethical for locating information (n=37, 78%), and brainstorming topic ideas (n=34, 73%) while fewer participants considered using it ethical for writing an assignment draft (n=13, 28%) or writing a bibliography (n=11, 14%). More than half of the participants found it ethical to use an LLM in editing an assignment draft (n=25, 54%).

When participants were asked to provide examples of ethical usage of LLMs in an academic setting, examples included topics such as generating ideas for a paper topic, proofreading their work, or summarizing and synthesizing information from a reading selection. Student examples of unethical usage of LLMs in an academic setting included generating essay drafts, writing a full or a draft paper, taking tests, writing a bibliography, and copying direct language or content from ChatGPT and characterizing it as one’s own. An upperclass history major noted, “it would be wrong to use AI to generate the first draft of a paper or to make serious structural changes on your behalf,” while an upperclass biology major responded, “I think it’d be unethical to take a quiz or homework, enter the words on the paper and just copy down what you’re given.” However, one first year student studying cybersecurity disagreed, writing, “if the tool is available why shouldn’t we use it? We are getting an education for our own development and worth in a work environment... We should be using it now, as we will be at work in the very near future. But unethical uses: developing malware or using it to break into systems or places you shouldn’t be.”

Discussion

The primary purpose of this study was to assess student perceptions about ethical use of LLMs in college coursework. A secondary purpose was to determine whether teaching about LLMs enhances student understanding of plagiarism and ethics in specific content areas. We also intended to stimulate discussion among faculty and students about the ethics of LLM use in academic settings and the workplace.

Preliminary results from our cross-sectional survey conducted among college students clearly established that they perceive generating ideas, exploring creativity and editing drafts as ethical uses of LLMs such as ChatGPT. The quantitative and qualitative responses (convergent design mixed-methods) [17] including side-by-side comparison analyses demonstrated that study participants viewed content copying, answering quiz questions and writing an entire essay using LLMs as unethical. Participants were mainly in agreement over the ethical usage of LLMs for generating ideas, editing drafts, and use in grammar and spell-checking and proofreading. Some

students also expressed concern about accusations of plagiarism if they used LLM assistance on academic work. The phrase “writing a bibliography” may have been ambiguous, so students may have read this prompt either as generating a bibliography or as formatting a bibliography given specific sources. We will clarify this question going forward, using the language “format bibliographic citations.”

Our findings regarding student perceptions of the ethics of LLM use align with recent research which assessed student concerns and perceived ethics of ChatGPT usage [18]. In a recent study of college engineering students’ use and application of LLMs for generating essays was found to be permissible while balancing the human and artificial intelligence components [19].

Participants in this study alluded to concerns of ‘plagiarism’ such as the use of an LLM to draft an entire essay or provide citations or bibliography for their course work. The American Psychological Manual defines plagiarism as, “an act of presenting the words, ideas or images of another as your own” [20]. Additionally, every higher education institution has a policy or code regarding academic integrity for students to follow in their coursework. Combining the policy or code and the plagiarism definition, what constitutes ‘plagiarism’ while using and applying LLMs in coursework is a matter of considerable discussion and contention as it involves ambiguity and confusion not only for the students but also for faculty and higher education administrators. Our university’s academic integrity policy, included in the slide presentation that was part of materials provided to faculty who distributed the survey, states that “students shall not...adopt and reproduce as one’s own, appropriate to one’s own use, and incorporate in one’s own work without acknowledgement of the ideas or passages from the writings or works of others.” In addition, the academic dishonesty policy forbids collusion, “obtaining from another party, without specific approval in advance by the professor, assistance in the production of work offered for credit, to the extent that the work reflects the ideas of the party consulted rather than those of the person in whose name the work is submitted.”

Because there was not unanimous agreement about the ethics of using LLMs for any specific task, and students responded with concerns and differing opinions about acceptable uses, this study highlights the need for course instructors and academic institutions to clearly define the ways in which LLM use is acceptable and unacceptable. Higher education faculty also need to converse with industry officials to ensure that students are prepared for the ways in which LLMs are used for workplace tasks so that students learn how to responsibly manage and leverage this technology within the bounds of ethical use. Leaving students to interpret academic integrity policies on their own without a discussion of specific ways in which students, faculty, and industry are making use of LLMs leads to ambiguity and uncertainty.

Limitations

This study had certain limitations. First, the sample size was not very large (as we considered this a pilot study) and hence findings of this study cannot be generalized to larger audiences across the university or externally to departments at other higher education institutions. Second, the initial design involved two identical surveys conducted at two different time points in a semester (before and after using some or all of the teaching materials provided). Since our research question was

about the student perceptions of ethical usage of LLMs, and not about the efficacy of these materials, these two surveys were not linked. It is not clear why most students who consented to the initial survey did not take the survey a second time, but our results were limited by not having more data about student perceptions after being exposed to the teaching materials we developed. Since this was a cross-sectional survey study, participant responses may have a social desirability bias [21] inherent in their responses to survey questions. We used a mixed-method design. Future studies will lead to more comprehensive analyses of participant responses by academic discipline and by level of exposure and proficiency in LLM use. Future studies may also examine how student perceptions of use of LLMs impact their college coursework.

Recommendations

This was a pilot study to gauge the students' awareness and perceptions of ethical usage of LLMs in their coursework. We presumed that students understand what ethics and morality means in the use and application of technology in their course work. The use and application of LLMs in higher education needs to be an ongoing discussion between faculty, administrators, students, and professionals in the fields where our graduates will work. A team approach should be used to design and implement policies which integrate discussion of LLMs in student coursework [22].

Because our pilot study revealed that some students view the use of LLMs to draft or write assignments (28%) or bibliographies (14%) as ethical, and the use of an LLM to generate these is unethical according to our university's academic integrity policy, faculty should review academic dishonesty with students and be very clear about their expectations and rules regarding LLM use on all types of academic tasks.

Summary, conclusion, and future work

At the 2023 ASEE Engineering Dean's Institute, a dean commented that, "engineers, doctors, and lawyers will not be replaced by AI. They will be replaced by engineers, doctors, and lawyers that know and use AI." [23]. This would seem to be an appropriate approach moving forward both for students and practitioners. The students in this study were generally consistent across disciplines as to what uses of LLMs were ethical and which were not. It should be noted that there is a certain 'formative' nature to this study in which students were forced to consider the ethical nature of the use of technology in general and of LLMs specifically. We believe that the survey itself may have helped form student views of the use of technology in their class assignments.

In the future, we plan to involve more students in the study. With a larger sample size, we will be better able to compare student perceptions by academic discipline. We also plan to submit a research protocol for a separate faculty survey, which will allow us to compare faculty perceptions and concerns with those of students. We will continue to hold discussions among faculty, students, and administrators on our campus regarding LLMs and generative artificial intelligence.

Future work will also observe their classroom experience via quantitative repeated measures designs, and/or mixed-methods designs [17] with larger sample sizes to enhance the validity and

generalizability of study findings. In the future, we will also provide more specific instructions for a consistent timeline, asking instructors to provide the survey at the start of the semester, then use the teaching materials, and then administer the survey again at the end of the semester. This will allow us to better compare pre- and post- instruction surveys and determine whether instruction in LLMs has an effect on student perceptions of ethics. As more students gain familiarity with LLMs such as ChatGPT, we will look for differences in student response based on their level of exposure to and familiarity of use with LLMs.

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