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Artificial Intelligence in Higher Education: Community Perceptions at a Large U.S. University

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The emergence of ChatGPT has magnified the use of artificial intelligence (AI) and has since changed the landscape in many industries including higher education. The integration of AI technology in teaching and learning is undeniable, and the impact of AI reaches curriculum, pedagogy, student engagement, and learning outcomes. To properly guide the use of AI on campus, we conducted a survey study of over 7600 students, faculty, and staff at a large U.S. university to explore the current perceptions, experiences, and usage of AI among our community. Echoing similar studies, general awareness and cautiously positive attitudes were observed, while concerns over the uncertainty and potential risks of AI were expressed. Preliminary data also suggested interesting differences between students and faculty/staff in terms of their interest and motivation in learning more about AI.

Artificial intelligence (AI) has been a part of our lives over the past decade through various technology platforms such as the Siri function in iPhones. The emergence of ChatGPT by OpenAI in November 2022 magnified the impact of AI and has significantly changed the landscape of many industries. Artificial intelligence generated content (AIGC) systems such as ChatGPT use generative AI (GenAI) to create content based on large data sets and output the result quickly.[3] Today, many companies, such as Apple and Microsoft, have AIGC systems embedded in their platforms. Higher education is no exception to this landscape change. Tremendous interest and efforts have been spent to explore the implications of AI on pedagogical innovations (e.g., interactive tutoring, personalized learning tools), learning analytics (e.g., individualized intervention, timely at-risk student identification), and learning assessment (e.g., automatic grading, plagiarism detection) (see Zahrani and Alasmari[1] for a detailed summary).

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ChatGPT, which stands for "Chat Generative Pretrained Transformer," is a language model that takes human-like text input like a "chat" and generates answers in outputs that humans can understand. Its power comes from vast pretrained data (up to 2023) and deep learning technologies. Through this tool, users can ask ChatGPT to solve basic problems and converse with it to create original content that has never been produced before. For example, students can ask questions to solve problems or produce an "A" paper and customize the answers by conversing with ChatGPT to incorporate their perspectives. ChatGPT 4.0, the update released in March 2023 that has reached over 180 million users as of July 2024, allows users to upload documents including texts or tables and ask ChatGPT to analyze or organize the information to address questions that are time consuming for humans. Similarly, this tool can help people use natural languages to produce codes in major programming languages such as C++, Python, and Structured Query Language, significantly reducing the programmer's time.[9]

As mentioned earlier, AIGC technology will continue to impact faculty teaching and student learning. For

example, faculty can use GenAI output in their curriculum and use the system to evaluate and assess their own and students' work. Students can also use AI to engage in self-assessment of their work, facilitating the learning process.[5,7] Another example is utilizing GenAI to solve homework assignments and provide new creations to students to enhance the assignments.[4] The examples of AI integration into teaching and learning practices are abundant and likely to expand, but what are the experiences and perceptions of students and faculty about this relatively novel tool in the higher education context? Answers to this question are critical to how higher education institutions approach AI, as student perceptions of the learning environment significantly impact their learning outcomes.[2]

Efforts to explore student perceptions and attitudes toward AI are taking place worldwide as we speak. Stohr, Ou, and Halmstrom[10] surveyed nearly 6000 students across Swedish universities, which suggested broad awareness and use of ChatGPT and generally positive attitudes toward the tool. At the same time, many students, especially female students, remained cautious about how AI might affect the future of education. Across the globe, Chan and Hu[4] surveyed 399 students from six universities in Hong Kong. Similarly, students seemed to have a good grasp of AI technology such as ChatGPT and were comfortable using it. They expressed concerns regarding how AI might undermine the value of higher education, the development of transferrable skills, and the opportunities to interact with others. A comparable study by Al Zahrani and Alasmari[1] surveyed 1113 students and faculty in Saudi Arabia and drew similar conclusions regarding positive attitudes toward AI and its potential in higher education. The survey respondents also expressed strong agreement that the use of AI should be guided by ethical guidelines and regulations, respect student autonomy and agency, enforce fairness and equity, and protect data privacy and security. A study focused on faculty by Ofosu-Ampong[8] in Ghana looked further into the factors that might influence their general willingness to accept AI in their teaching, suggesting that the level of acceptance is moderated by faculty experience, institutional technology infrastructure, and availability of relevant training and professional development. The EDUCAUSE AI Landscape Study[6] also confirmed that most U.S. higher education institutions are working on strategies to incorporate AI into their efforts to support students, specifically in terms of "preparing students for the future workforce, exploring new methods of teaching and learning, and improving higher education for the greater good." Academic integrity, data privacy, and data security are among the top concerns regarding AI use.

Inspired by these efforts, we conducted a survey study of students, faculty, and staff at a large public comprehensive university in the United States. The survey seeks to explore the perceptions, experiences, and usage of AI among students, faculty, and staff, including the network usage data from the campus to AI platforms, to inform campus policies and guidelines on AI use.

METHODS

California State University, Fullerton (CSUF) is a large, comprehensive public university, enrolling over 40,000 undergraduate and graduate students and employing over 4000 faculty and staff. CSUF is part of the California State University (CSU) system, which consists of 23 campuses.

In collaboration with one of the sister campuses, San Diego State University (SDSU), CSUF administered a campuswide survey to gauge the university community's experiences with and perceptions of AI. Building upon the survey developed by SDSU, our survey served as a "broad stroke" baseline measure of how AI is perceived at large public regional universities like CSUF. The survey consisted of five main sections and included questions that capture people's awareness and understanding of AI (e.g., "I regularly follow news and updates about AI"), experience and usage of AI (e.g., "I use AI outside of my classwork"), attitudes and expectations toward AI (e.g., "I have concerns about AI's impact on job security"), education and training in AI (e.g., "I am actively seeking opportunities to learn more about AI"), and the AI tools they regularly use (e.g., ChatGPT). Most items follow a six-point Likert scale, seeking respondents' level of agreement with each statement from "strongly disagree" to "strongly agree."[5] The survey was administered to all students, faculty, and staff at CSUF for a two-week period in spring 2024, which resulted in 7616 responses including 6488 student responses and 1128 faculty and staff responses.

RESULT HIGHLIGHTS

It is interesting that the patterns of students' and faculty/staff's usage of AI tools in their studies or work are nearly identical, with less than 20% in each group regularly using AI tools. However, an additional 20% "somewhat agree" that they regularly do so. The most frequently reported AI tools used include ChatGPT, Grammarly, Adobe Express/Spark, DALL-E, Siri, and Alexa.

The majority of student and faculty/staff respondents disagree that AI is "too complex to grasp"; Less than 30% of respondents in either group expressed challenges in understanding AI technology. It echoed the findings of other similar surveys that there is general self-reported awareness of AI in the higher education environment.

Confirming the findings of other surveys, students and faculty/staff share similar concerns about AI's impact on ethics, privacy, and long-term societal impact. As Figure 1 shows, the vast majority of respondents are concerned about AI's long-term societal impact, the ethical use of AI, the impact on personal privacy, and other unforeseen risks. It appears that a slightly lower percentage of students feel this way.

It is interesting that while the AI usage and perceptions seem to be similar, faculty/staff appear to be more engaged with or interested in AI progress than students, with nearly twice as many faculty/staff reporting that they regularly follow news and updates about AI, and more than three times as many faculty/staff attending AI workshops or seminars (Figure 2).

Similarly, when it comes to actively learning more about AI, far more faculty/staff are motivated than students. For example, 79% of faculty/staff respondents are interested in receiving formal training in AI at CSUF, compared to 48% of students, and 58% of faculty/staff actively seek opportunities to

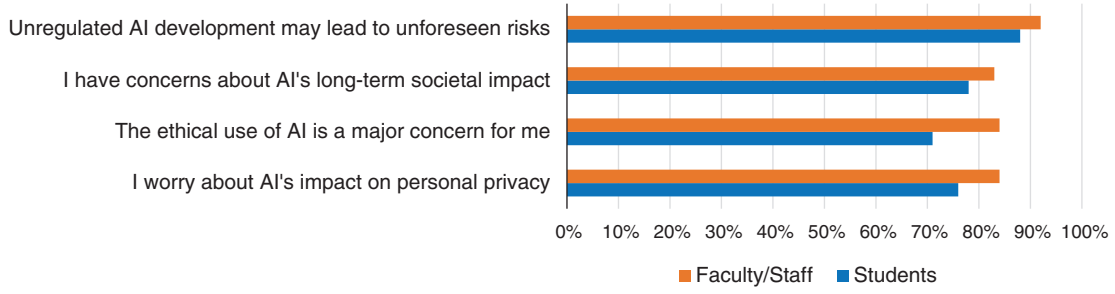

FIGURE 1. Sample responses for AI perceptions.

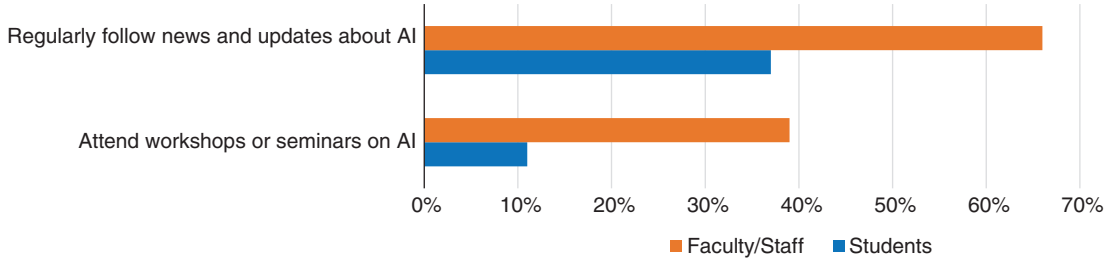

FIGURE 2. Sample responses for AI awareness.

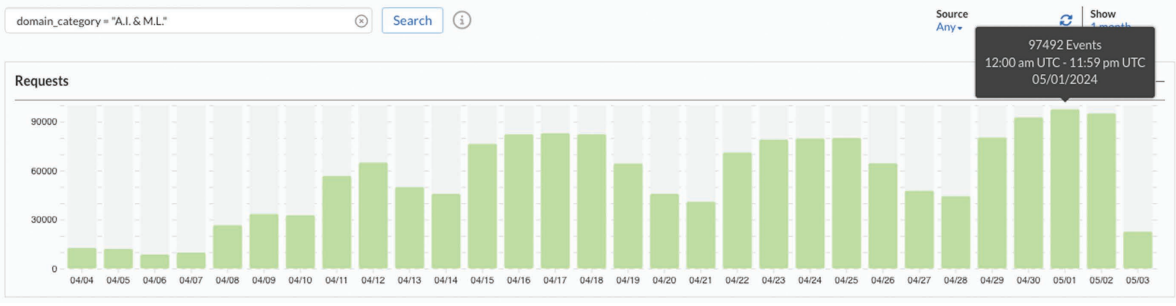

FIGURE 3. One month of AI usage—based on DNS calls (4 April 2024 to 3 May 2024).

learn more about AI, while only 34% of students reported as such.

On our campus, access to technology is prevalent, with nearly 100% of students, faculty, and staff owning smartphones and 92% having laptop computers. Additionally, over 50% of faculty and staff and approximately one-third of students have access to desktop computers. With this level of device access, it is reasonable to gauge AI use by monitoring calls made from campus servers to AI platforms. Figure 3 demonstrates AI usage by showing the number of Domain Name System (DNS) calls made to the campus servers. Nearly 100,000 calls were recorded on 05/01/2024 alone, and the usage seemed to be increasing every week, with more calls during Monday through Thursday (when most classes are in session). While we need longitudinal data to verify this trend, the graph seems to corroborate the well-established observation that AI use in higher education is becoming increasingly common.

DISCUSSION

We shared preliminary data on how our university community—students, faculty, and staff—perceive and experience GenAI in their studies and work. Our findings support and add to what other studies have shown, including a general awareness and familiarity with AI tools (especially Siri, ChatGPT, and Grammarly), an acceptance of the use or future use of AI in higher education practices, and a sense of uncertainty regarding the potential adverse effects of AI on ethics, personal and societal impact, and data privacy and security. One of the few differences we observed between our students and faculty/staff is their interest in learning more about AI either casually (e.g., news updates) or formally (e.g., training workshops). We intend to explore this difference further in our next iteration and administration of the survey.

To encourage participation, we administered the survey anonymously and thus were unable to disaggregate the data to gain further insights into possible between-group differences. We will incorporate demographic and other relevant variables in our next survey to gain a more nuanced understanding of our community members' experiences and capture any possible changes to the observed trends.

Intellectual curiosity aside, this effort is meant to inform our university-wide AI-related policies, guidelines, and strategies, with the ultimate goal of supporting student learning. We are actively engaging appropriate campus constituents and committees to increase campus AI awareness, build AI infrastructure and tools, strengthen AI integration in curriculum and pedagogy, and expand the incorporation of AI in business practices to improve effectiveness and efficiency. This survey provides foundational information for these efforts, and we anticipate further iterations of data gathering. Only by grounding our efforts in data can we ensure that our institutional AI strategies provide our students with the best AI technology to succeed in and out of the classroom.

REFERENCES

1. A. M. Al-Zahrani and T. M. Alasmari, "Exploring the impact of artificial intelligence on higher education: The dynamics of ethical, social, and educational implications," *Humanities Social Sci. Commun.*, vol. 11, no. 1, 2024, Art. no. 912, doi: 10.1057/s41599-024-03432-4.
2. J. B. Biggs, *Teaching for Quality Learning at University: What the Student Does*. New York, NY, USA: McGraw-Hill Education, 2011.
3. Y. Cao et al., "A comprehensive survey of AI-generated content (AIGC): A history of generative ai from GAN to ChatGPT," 2023, *arXiv:2303.04226*.
4. C. K. Y. Chan and W. Hu, "Students' voices on generative AI: Perceptions, benefits, and challenges in higher education," *Int. J. Educ. Technol. Higher Educ.*, vol. 20, no. 1, 2023, Art. no. 43, doi: 10.1186/s41239-023-00411-8.
5. D. Goldberg, E. Sobo, J. Frazee, and S. Hauze, "Generative AI in higher education: Insights from a campus-wide student survey at a large public university," in *Proc. Soc. Inf. Technol. Teacher Educ. Int. Conf.*, Las Vegas, NV, USA: Association for the Advancement of Computing in Education (AACE), 2024, pp. 757–766.
6. R. Robert, "EDUCAUSE AI Landscape Study," EDUCAUSE, Boulder, CO, USA, Res. Rep., Feb. 2024. [Online]. Available: https://www.educause.edu/ecar/research-publications/2024/2024-educause-ai-landscape-study/introduction-and-key-findings
7. O. Kolade, A. Owoseni, and A. Egbetokun. "Assessment on trial? ChatGPT and the new frontiers of learning and assessment in higher education." ResearchGate. Accessed: Jul. 15, 2024. [Online]. Available: https://www.researchgate.net/profile/OluwaseunKolade/publication/369974458_Assessment_on_trial_ChatGPT_and_the_new_frontiers_of_learning_and_assessment_in_higher_education/links/64376dc720f25554da29ad9f/Assessment-on-trialChatGPT-and-the-new-frontiers-of-learning-and-assessment-in-higher-education.pdf
8. K. Ofosu-Ampong, "Beyond the hype: Exploring faculty perceptions and acceptability of AI in teaching practices," *Discovery Educ.*, vol. 3, no. 1, 2024, Art. no. 38, doi: 10.1007/s44217-024-00128-4.

9. E. L. Ouh, B. K. S. Gan, K. J. Shim, and S. Wlodkowski, "ChatGPT, can you generate solutions for my coding exercises? An evaluation on its effectiveness in an undergraduate java programming course," in *Proc. Conf. Innov. Technol. Comput. Sci. Educ. V. 1.*, 2023, pp. 54–60, doi: 10.1145/3587102.3588794.
10. C. Stöhr, A. W. Ou, and H. Malmström, "Perceptions and usage of AI chatbots among students in higher education across genders, academic levels and fields of study," *Comput. Educ. Artif. Intell.*, vol. 7, Dec. 2024, Art. no. 100259, doi: 10.1016/j.caeai.2024.100259.

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