2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION
Paper ID #53156

Student Perceptions and Use of Generative AI Tools in Engineering and Computing Classes

Dr. Henry Griffith, Alamo Colleges District
Dr. Heena Rathore, Texas State University

Heena Rathore is an Assistant Professor at the University of Texas, San Antonio. Prior to that, she was a visiting assistant professor at Texas A&M University. She also worked as a Research Scientist and Program Manager at Hiller Measurements for couple of years. Prior to that, she worked as a postdoctoral researcher for US-Qatar Joint Collaborative Project between Temple University, USA, University of Idaho, USA and Qatar University. Also, she was a visiting scholar for Wichita State University. She received her Ph.D. (with distinction) in Computer Science and Engineering Department while she was a Tata Consultancy Services Research Scholar at Indian Institute of Technology, India. She received her bachelor's in Computer Science Engineering from College of Technology and Engineering in 2010 with Honors. She has also worked professionally as Design Executive with Phosphate India Private Limited and academically as Guest/Assistant Professor with the University of Texas, Austin and SS College of Engineering, India respectively. She has been the winner of a number of prestigious awards including IEEE Achievements Award, Young Engineer Award, Global Engineering Impact Award and Graphical System Design Achievement Award. She has published more than 30 papers in peer reviewed journals and conferences in her field and is the sole author of Mapping Biological Systems to Network Systems (Springer). She was also featured on TedX, Qatar held by TedXAlDafnaEd in Qatar and her work is covered in professional and major trade publications, major media, such as Microwave Journal, Everything RF, Financial Express, Science Reporter, the Times of India, and India Today. She is IEEE senior member, Vice Chair of IEEE EMBS chapter in San Antonio and IEEE Central Texas Section in Austin. Her research interests include cyber physical systems, deep learning, machine learning, security, cryptocurrency, distributed systems, wireless networks biologically inspired systems and software defined networks.

Student Perceptions and Use of Generative AI Tools in Engineering and Computing Classes

Abstract

This paper explores students' utilization and perceptions of generative AI tools in an academic environment. Students' perceptions regarding the utility of these tools for various engineering and computing workflows, including research, code generation, and text generation are individually assessed. In addition, perceptions regarding students' trust and perceived value within their coursework are also explored. Comparative results are presented for an identical survey administered across three nearby institutions (University of Texas at San Antonio , Texas State University, and San Antonio College).

Introduction

Artificial intelligence has transformed modern workflows across all industries, including engineering and computing[1]. Academic pathways in engineering and computing have adapted to reflect this disruption. Related activities include the development of new dedicated degree programs, along with the modification of existing curriculum to integrate supporting AI skills[2].

Beyond the impact of this explicit integration of AI content within engineering and computing curriculum, the AI skills of current engineering students are further heightened by numerous additional factors. Most notably, general utilization rates among traditional college-aged students (e.g.: 18-24 years old) are strong, especially relative to older demographics[3]. Moreover, efforts to promote AI literary broadly across the academic curriculum[4], along with the availability of free training resources online, also support the development of enhanced AI skills for current engineering students.

To better understand the impact of AI on engineering and computing education, several studies have been conducted to assess student utilization and perceptions of AI. Camarillo, Lee, and Swan surveyed Civil Engineering students and found strong utilization of AI tools, along with concerns regarding ethics and accuracy[5]. Jooste, Wolff, and Joubert surveyed undergraduate and graduate engineering students regarding utilization and found similar evidence supporting strong existing utilization and ethical concerns[6].

While prior assessments efforts have provided meaningful guidance for suggested curriculum modifications and adoption strategies, further research is needed to fully capture the utilization patterns of modern engineering and computing students for various academic tasks. Moreover,

understanding how utilization and perceptions vary across academic level and institution type are also needed to support holistic recommendations for AI integration suitable for benefiting all engineering students.

This paper describes progressing towards addressing these aforementioned research gaps. Results from a survey of nearly 200 students across three different institution types (community college (San Antonio College), emerging research institution (Texas State University), R1 research institution (University of Texas at San Antonio) and varying academic level regarding AI utilization and perceptions are provided herein. These results are utilized to provide recommendations for integrating AI training content across engineering and computing curricula.

Literature Review

Several studies have been conducted to explore engineering students' utilization and perceptions of generative AI tools. Alkabaa and Alamri[7] assessed the effectiveness of generative AI tools within engineering education, with a specific focus on exploring gender-based differences in student experience. This work confirmed that engineering students viewed AI tools as essential and were actively utilizing them within their coursework to enhance efficiency. Participants also cited AI skills as a foundational competency for their future engineering careers.

Ovi and Fierro[8] also explored the utilization of generative AI tools across the engineering curriculum, tracking utilization for a common group of students over a two-year period. Results demonstrated a significant increase in adoption rate across the two-year study window. In addition, this study documented the utilization of AI tools by students to help understand complex concepts and stay up-to-date with relevant emerging technologies.

Simsek et al.[9] utilized experiments and surveys to assess the effect of generative AI tools among masters level systems engineering students. Although tool utilization was shown to improve assessment grades, the authors acknowledged potential risks of adoption, including potential impacts on critical thinking skills which are crucial to the field.

Vidalis et al.[10] explored the potential of generative AI tools to enhance student engagement and improve learning outcomes. Through surveys of civil engineering students, the authors demonstrated how these tools can help enhance learning, especially for scenarios involving real-world simulations, by capitalizing on limitations of traditional textbooks.

While prior efforts within the literature demonstrate high levels of utilization of generative AI tools among engineering students, along with a strong perceived value of these skills in the employment market, further exploration is needed to fully capture these trends across on a broader scale. This paper attempts to contribute to this understanding by exploring variability in perception and utilization trends across academic level and institution type.

Methods

To initiate this work, a survey was designed by the authors to assess students' utilization and perceptions of generative AI tools. The survey was designed to capture students' utilization

within their daily life and in engineering and computing coursework. Perceived utility for assisting in the completion of various course-related tasks was also assessed, along with their opinions on the specific academic benefits associated with utilizing generative AI tools. The survey closed by assessing perceived opinions on the accuracy of AI tools, their relevance within the modern engineering and computing workforce, ethical implications, and job market impact. The 12 survey questions are included within the accompanying visualizations and tables in the results section.

The survey was deployed within 4 sections of courses at three institutions within the South Texas region. While the institutions and courses were chosen on the basis of convenience based upon instructor affiliation, the associated sample of completing students offers considerable diversity with respect to academic levels, majors, and institution types as summarized below.

1. San Antonio College is a predominately two-year community college located in San Antonio, and is hereby denoted in the paper as C1. The survey was administered in two sections at C1 during the Fall 2025 semester - 1) an in-person section (10 students) of a freshmen level introductory engineering course, 2) an online section (34 students) of the same course.
2. University of Texas at San Antonio is a research-intensive University located in San Antonio, and is hereby denoted in the paper as U1. The survey was administered in one section at U1 during the Fall 2025 semester - 1) an online section of a freshmen level introduction to electrical and computer engineering course. This course is equivalent in transfer to the one in which the survey was administered at C1.
3. Texas State University is an emerging research University located in San Marcos, and is hereby denoted in the paper as U2. The survey was administered in two sections at U2 during the Fall 2025 semester - 1) an in-person section (64 students) of a junior level computer security course, 2) an in-person section (30 students) section of a junior level cryptography course.

For all 5 sections, the survey was administered electronically during the first two weeks of the course.

Results

Tool Utilization

As shown in Figs. 1 and 2, community college students were much less likely to have used generative AI tools for either general or school specific applications versus their university counterparts. University students enrolled in third-year courses were more likely to have utilized the tools versus those enrolled in first-year courses. The utilization gap between community college and university students was most noteworthy for course-based applications, with 68% of respondents from C1 noting that they had never used generative AI within their courses, versus 34% and 23% of respondents from U1 and U2, respectively. Utilization for academic purposes also increased among participants as they advanced within their program of study (51% U2 versus 21% U1 reporting daily use for academic purposes).

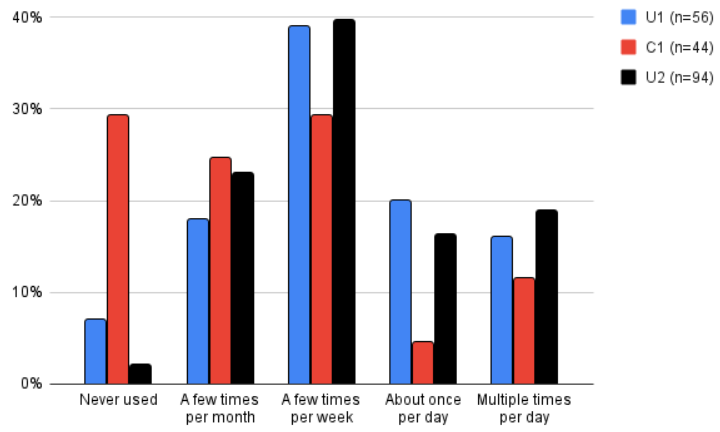

Figure 1: Responses to survey question 1 - “How frequently do you use generative AI tools (e.g.: ChatGPT, Gemini, etc.) outside of school?”

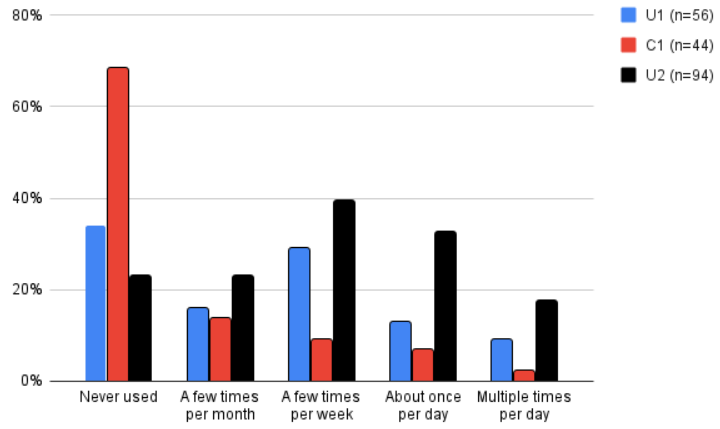

Figure 2: Responses to survey question 2 - “How frequently do you use generative AI tools (e.g.: ChatGPT, Gemini, etc.) for your engineering and computer science coursework?

Tool Utility by Task

As demonstrated in Tables 1 - 3 , respondents reported finding greater utility in utilizing generative AI tools for researching challenging concepts versus performing the assessment-specific tasks of preparing written content like discussion board posts or technical reports or generating code. A considerable gap in the reported utility for researching challenging concepts is noted between the University cohorts (85% and 78% agree or strongly agree for U1 and U2, respectively, versus 50% for C1). A utility gap was also reported for both the writing and code generation tasks.

Table 1: Responses to survey question 3 - "Please rate your agreement with the following statement: Generative AI tools are helpful to complete written assignments like discussion board posts and technical reports."

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	9%	23%	41%	21%	5%
C1 (n=44)	9%	14%	50%	23%	5%
U2 (n=94)	11%	20%	27%	40%	4%

Table 2: Responses to survey question 4 - "Please rate your agreement with the following statement: Generative AI tools are useful in helping to further research and learn challenging concepts introduced during my coursework."

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	4%	4%	7%	55%	30%
C1 (n=44)	9%	12%	30%	34%	16%
U2 (n=94)	1%	7%	14%	53%	25%

Table 3: Responses to survey question 5 - "Please rate your agreement with the following statement: Generative AI tools are useful in generating code for my coursework."

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	5%	18%	45%	30%	2%
C1 (n=44)	12%	21%	57%	9%	2%
U2 (n=94)	8%	17%	49%	22%	5%

Tool Utility by Outcome

As demonstrated in Tables 4 - 6 , respondents reported that generative AI tools were more useful for supporting deep understanding of the material versus improving their grades or accelerating assignment completion. Similar to the prior section, a considerable gap in reported utility for deep comprehension was reported between the University cohorts (U1 and U2: 74% agree or strongly agree) and community college cohorts (C1: 43% agree or strongly agree). This gap was less noteworthy across the question related to grade improvement or assignment acceleration.

Table 4: Responses to survey question 6 - "Please rate your agreement with the following statement: Generative AI tools allow me to learn material more deeply/thoroughly."

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	7%	9%	11%	45%	29%
C1 (n=44)	7%	14%	36%	34%	9%
U2 (n=94)	3%	6%	18%	51%	22%

Table 5: Responses to survey question 7 - "Please rate your agreement with the following statement: Generative AI tools help me complete my assignments more quickly."

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	5%	7%	32%	45%	11%
C1 (n=44)	12%	14%	36%	29%	9%
U2 (n=94)	4%	14%	29%	42%	12%

Table 6: Responses to survey question 8 - "Please rate your agreement with the following statement: Generative AI tools help me improve my grades"

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	5%	11%	48%	21%	14%
C1 (n=44)	16%	9%	41%	29%	5%
U2 (n=94)	6%	10%	44%	31%	10%

Accuracy Perception, Workforce Impact, and Ethical Concerns

As demonstrated in Table 7, respondents across all three cohorts demonstrated considerable concerns regarding the accuracy of information produced by generative AI. This distrust in validity was most noteworthy among the community college cohort versus the University cohorts.

As shown in Table 8, respondents across all cohorts agreed that generative AI skills were essential within the modern engineering and computing workforce. The perceived importance increased as students' academic standing advanced.

Students from all three cohorts also expressed considerable concerns about the impact of generative AI tools on the employment market as shown in Table 9, along with the ethical implications of generative AI use as shown in Table 10.

Table 7: Responses to survey question 9 - “Please rate your agreement with the following statement: I trust the accuracy of the information that is provided by generative AI tools about my engineering and computing coursework.”

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	13%	34%	43%	11%	0%
C1 (n=44)	16%	48%	34%	2%	0%
U2 (n=94)	15%	33%	41%	12%	0%

Table 8: Responses to survey question 10 - “Please rate your agreement with the following statement: Learning how to use generative AI tools is necessary in order to be prepared to enter the modern engineering and computing workforce.”

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	2%	4%	18%	45%	32%
C1 (n=44)	2%	7%	25%	38%	27%
U2 (n=94)	0%	1%	13%	42%	45%

Table 9: Responses to survey question 11 - “Please rate your agreement with the following statement: I am concerned about the impact of generative AI on the job market.”

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	2%	5%	18%	39%	36%
C1 (n=44)	2%	2%	21%	38%	36%
U2 (n=94)	1%	5%	15%	32%	47%

Table 10: Responses to survey question 12 - “Please rate your agreement with the following statement: I am concerned about the potential ethical implications of generative AI’s use in the modern world.”

	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
U1 (n=56)	0%	9%	23%	41%	27%
C1 (n=44)	0%	2%	25%	34%	39%
U2 (n=94)	1%	3%	18%	31%	47%

Discussion and Recommendations

Questions 1 and 2 surrounding tool utilization demonstrate a significant opportunity gap between community college and University students. While further investigation is necessary, this gap could be partially attributed to several factors, including both Universities having established AI across the curriculum initiatives at the point of survey administration. While a similar initiative is in process at community college, it is unlikely to be executed before Fall 2026. An additional factor explaining this potential discrepancy is socioeconomic factors, which is consistent with broader recent findings outside of higher education[11].

Consistent with utilization data, a similar gap is observed between community college and University students in the context of perceived utility for academic tasks, along with the perceived trust in accuracy of generative AI output. Integrating training content regarding tool utilization to enhance productivity, along with strategies for validating the accuracy of outputs, within AI-focused curriculum can help ensure that graduates are prepared to effectively utilize these tools as they enter the employment market[12].

The importance of AI skills in engineering and computing jobs, along with concerns regarding the potential ethical implications of increasing AI utilization was reported across all cohorts. This supports the importance of ensuring the integration of AI training within traditional engineering educational pathways which includes ethics content. This observation is consistent with prior related studies in this area[5]. Concerns across all respondents regarding the potential impact of AI on the job market emphasize the importance of addressing these concerns both within the engineering curriculum and supporting wrap-around student services, including career advising.

References

[1] Sundeep Teki and Stanford Digital Economy Lab. Canaries in the coal mine? six facts about the recent employment effects of artificial intelligence. Technical report, Stanford University, August 2025.

[2] Samuel Olugbenga King. How electrical engineering and computer engineering departments are preparing undergraduate students for the new big data, machine learning, and ai paradigm: A three-model overview. In *2019 IEEE Global Engineering Education Conference (EDUCON)*, pages 732–740. IEEE, April 2019. doi: 10.1109/EDUCON.2019.8725110.

[3] Courtney Gregoire. Increased uptake of generative AI technology brings excitement and highlights the importance of family conversations about online safety, says new research from Microsoft, 02 2024.

[4] Jane Southworth, Kati Migliaccio, Joe Glover, Jaime Glover, David Reed, Christopher McCarty, Joel Brendemuhl, and Aaron Thomas. Developing a model for AI across the curriculum: Transforming the higher education landscape via innovation in AI literacy. *Computers and Education: Artificial Intelligence*, 4:100127, 2023. doi: 10.1016/j.caeai.2023.100127.

[5] Mary Kay Camarillo, Luke S. Lee, and Ciara Swan. Student perceptions of artificial intelligence and relevance for professional preparation in civil engineering. In *2024 ASEE Annual Conference & Exposition*, Portland, OR, USA, June 2024.

[6] Johannes L. Jooste, Karin E. Wolff, and Jan G. Joubert. Engineering students' perceptions and use of generative artificial intelligence. *Computer Applications in Engineering Education*, 33(4):e70064, 2025. doi: 10.1002/cae.70064.

[7] Abdulaziz Saud Alkabaa and Nawaf Mohammad Alamri. Exploring the effectiveness of generative AI as a learning tool in engineering education: An analysis of student experiences and perceptions. *Computer Applications in Engineering Education*, 33(6):e70110, 2025. doi: 10.1002/cae.70110.

[8] Jesan Ahammed Ovi and Gabriel Tomas Fierro. Assessing student adoption of generative artificial intelligence across engineering education from 2023 to 2024. In *ASEE Annual Conference & Exposition*, 2024.

[9] Metehan Simsek and et al. Chatgpt dilemma: Effects of generative AI on higher education in systems engineering. In *INCOSE International Symposium*, Copenhagen, Denmark, 2025.

[10] Sofia M. Vidalis, Rajarajan Subramanian, and Fazil T. Najafi. Revolutionizing engineering education: The impact of AI tools on student learning. *International Journal of Engineering Education*, 2025. Special Issue on AI in Civil Engineering.

[11] Katharina Neufeld, Stephanie Steinmetz, Pajtim Ramosaj, and Mario Gilli. Analyzing the role of family socio-economic status, education and work characteristics in times of generative artificial intelligence and digital divide. *Career Development International*, pages 1–19, 2025.

[12] Lareina Yee, Anu Madgavkar, Sven Smit, Alexis Krivkovich, Michael Chui, María Jesús Ramírez, and Diego Castresana. Agents, robots, and us: Skill partnerships in the age of ai. Technical report, McKinsey Global Institute, November 2025.