

WIP: Faculty Perceptions of ChatGPT - A Survey in Engineering Education

Sara Amani

*Multidisciplinary Engineering
Texas A&M University
College Station, TX, USA
saraamani@tamu.edu*

Lance L.A. White

*Multidisciplinary Engineering
Texas A&M University
College Station, TX, USA
llwhite1@tamu.edu*

Trini Balart

*Multidisciplinary Engineering
Texas A&M University
College Station, TX, USA
tsbalart@tamu.edu*

Kristi J. Shryock

*Multidisciplinary Engineering
Texas A&M University
College Station, TX, USA
kshryock@tamu.edu*

Karan L. Watson

*Electrical Engineering
Texas A&M University
College Station, TX, USA
watson@tamu.edu*

Abstract—This work in progress research paper presents findings from a survey conducted about ChatGPT that was circulated in both spring 2023 and 2024 at an R1 engineering university, with responses from faculty doubling from the first to the second year. As Generative Artificial Intelligence (GAI) and online tools continue to reshape engineering education, it can be difficult for educators to keep up. Emerging technologies like ChatGPT by OpenAI have spurred conversations across academia, and questions about its capabilities and potential uses in the classroom have led to countless ethical discussions about academic integrity and how educators need to adapt to rapid growth in technological advancement. Understanding faculty perceptions of emerging technologies like ChatGPT by OpenAI becomes an essential part of embracing these advancements. This study aims to answer the following research question: What are the current perceptions of faculty towards emerging technologies like ChatGPT by OpenAI in engineering education, as assessed by the Technology Acceptance Model (TAM), and what factors influence their attitudes towards its potential integration into engineering curricula? The TAM assesses survey data by examining responses related to perceived usefulness and ease of use of a technology. It analyzes the extent to which these factors influence attitudes towards, and intention to use the technology, thus predicting its acceptance. Applied to the context of this survey instrument developed by the authors we should glean a good understanding of how faculty may have begun to accept the technology of GAI from the initial survey to the most current survey. Preliminary results shed light on faculty familiarity with ChatGPT and their perspectives on its potential utility for student learning as well as their concerns. By examining faculty attitudes towards integrating ChatGPT into engineering curricula, this research contributes to ongoing discussions on the role of GAI in higher education and provides insight into the extent of which educators currently embrace advancements in a technology-enhanced world.

Index Terms—Faculty, Faculty Attitudes, Faculty Development, Technology Applications, Survey

I. INTRODUCTION

In recent years, the field of engineering education has been greatly shaped by rapid technological advancements, especially with the integration of Generative Artificial Intelligence (GAI) tools such as ChatGPT by OpenAI. The integration of

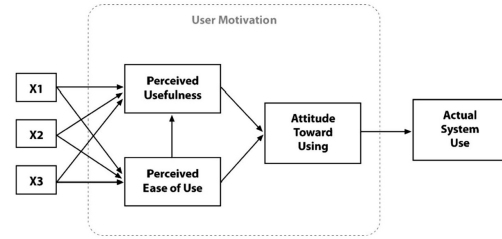


Fig. 1: Technology Acceptance Model (TAM)

these tools within academia has sparked many conversations and debates, particularly with regards to concerns about academic integrity and the development of critical thinking skills [1]. As institutions continue to adapt to the changes that come with a technology-enhanced world, it is critical to understand how educators themselves view these advancements and what it means for their classrooms. This paper investigates how faculty at an R1 engineering university perceive ChatGPT, using survey data from the spring of 2023 and 2024 [2]. The number of faculty who completed the survey increased from 95 in 2023 to 183 in 2024, respectively.

II. BACKGROUND

The rise of Generative Artificial Intelligence (GAI) technologies has introduced both benefits and challenges in higher education. ChatGPT, a notable example, has sparked widespread discussions in academic communities, particularly concerning its implications for teaching, learning, and academic integrity. The Technology Acceptance Model (TAM), a well-established and widely recognized framework for analyzing technology adoption, suggests that both perceived ease of use of the technology and its associated usefulness are essential factors in attitudes towards the technology and eventually its acceptance and continued use (see Figure 1) [3].

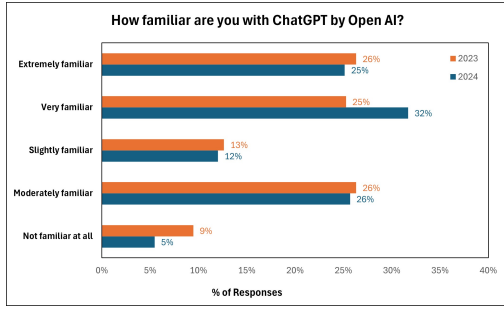


Fig. 2: Comparison of Faculty Familiarity with ChatGPT Between 2023 and 2024

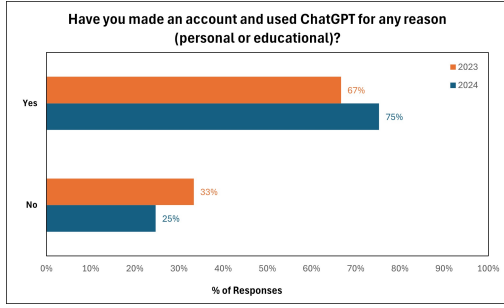


Fig. 3: Comparison of Faculty Member Accounts on ChatGPT Between 2023 and 2024

This model serves as the theoretical framework for analyzing the survey data collected in this study. Faculty members, as key stakeholders in educational institutions, play a pivotal role in the adoption and integration of new technologies into curricula. However, while technology brings new opportunities and benefits to educators in their teaching practice, a significant number of teachers resist adopting new technologies, and this resistance from educators can be a key barrier to technology adoption and use [4]. In this case, their attitudes towards tools like ChatGPT not only reflect their willingness to embrace these tools but also shape the future directions of technology-enhanced learning environments.

This work-in-progress study, by revisiting the faculty's perceptions across two years, seeks to identify shifts in attitudes and uncover factors influencing the integration of ChatGPT into engineering education. By utilizing the TAM, this study reveals significant insights into the evolving attitudes of faculty. One main factor contributing to the perceived ease of use and usefulness of ChatGPT begins with faculty experience with the technology. Between 2023 and 2024, the shift in perceptions and more nuanced views may be due to an increased familiarity with this tool. Figures 3 and 4 below provide a comparison of faculty familiarity with ChatGPT and their actual use of the tool. It can be seen that overall, the familiarity has increased and the percentage of faculty with accounts on ChatGPT have increased from 67% to 75% within the year.

Also, the doubling of faculty responses in the second year suggests an increased engagement and perhaps a growing recognition of the tool's potential in academic settings. This shift could indicate that as faculty members became more

familiar with the capabilities and limitations of ChatGPT, they may have reassessed its utility in pedagogical contexts. Such changes could stem from observed benefits in student learning or challenges in managing academic integrity, reflecting broader discussions in technology adoption in education. This evolving acceptance and the factors influencing it, as predicted by TAM, offer valuable insights into how rapid technological advancements are assimilated into higher education frameworks.

III. METHODS

The survey was distributed to all faculty and staff at a large R1 university during the spring semesters of 2023 and 2024, resulting in 248 responses in 2023 and 883 responses in 2024. For this work-in-progress, we focused exclusively on responses from faculty members which were 95 and 183, respectively.

The data cleaning process involved tabulating responses from the Likert scale into numerical form, converting each level of agreement or disagreement into a corresponding numeric value. Not all questions from the survey instrument were used as several were demographic questions determining whether or not faculty were academic professional track (APT) faculty or Tenured or Tenure-Track faculty. Additionally there were qualitative questions that have been omitted from this analysis due to the nature of those questions. A total of fourteen questions were used in this analysis. The full survey instrument can be found in previous work by the authors [2].

Exploratory factor analysis (EFA) was used to assess the survey responses from 2023 and 2024 with the intention of understanding what difference might exist between resplendent responses at a point where Generative AI was a relatively recent discussion in the public compared to a year later where Generative AI tools can now be found in many sectors, including higher education [5]. EFA was chosen for its effectiveness in reducing data dimensionality and detecting structure in the relationships between variables. This approach enabled us to uncover important factors emerging from the faculty responses. This analysis was conducted using the JASP (Jeff's Awesome Statistical Program) opensource statistical software package [6]. The same parameters were used for each study year, the number of factors derived from a Parallel analysis based on Factor Analysis, an Oblique rotation using the promax rotation, a base analysis using a correlation matrix, a factoring method using maximum likelihood, and a factor size loading above 0.3. A Bartlett's Test was also used to ensure suitability of the method application [7]. The work displayed here is centered on understanding the proportion of variance that is represented with the factors found. The results section will further discuss these proportions of variance along with the relevance behind each factor found while completing EFA on these data sets.

IV. RESULTS

The EFA on the 2023 and 2024 faculty data sets revealed two factors for 2023 and three for 2024. The two factors

from the 2023 data set account for 55.3% of the proportional variance in the rotated solution. These factors focus on faculty perceptions of ChatGPT’s impact on student behavior and performance. Faculty familiarity with ChatGPT has the least positive correlation with the factors, while the perception that ChatGPT enables academic dishonesty is cross-loaded between both factors but negatively correlates with factor 1. Factor 2 is specifically related to questions about academic dishonesty, both before and after ChatGPT’s release, including the cross-loaded perception of its role in enabling dishonest behaviors.

TABLE I: Factor Characteristics 2023

Factor	Eigenvalues	SumSq. Loadings	Proportion var.	Cumulative
1	6.835	5.841	0.417	0.417
2	1.683	1.906	0.136	0.553

TABLE II: Factor Characteristics 2024

Factor	Eigenvalues	SumSq. Loadings	Proportion var.	Cumulative
1	6.621	3.286	0.235	0.235
2	1.618	2.904	0.207	0.442
3	1.016	1.762	0.126	0.568

In the 2024 data set, however, three distinct factors emerged. These factors together account for 56.8% of the proportional variance for the rotated solution, a very similar quantity to that of the 2023 data. The first factor shares many of the same questions as the 2023 first factor, but it leaves out questions related to student’s intrinsic motivation, engagement, and teamwork and deposited those questions in factor 2 with one question cross loading between the factors related to academic performance. That question related to academic performance does however correlate more strongly with factor 2 than factor 1. Factor 3 houses the same questions as factor 2 in the 2023 data related to academic dishonesty pre- and post-ChatGPT’s release with the same question of ChatGPT enabling academic dishonest behavior cross loading with the same but opposite direction correlation for factors 1 and 3.

A. Factor Interpretation

Faculty of 2023 Factor 1 for the faculty data in 2023 demonstrates strong correlations between items related to student characteristics while also including items examining the faculty familiarity with ChatGPT and perception of ChatGPT’s role in the classroom. Factor two in this data set explicitly breaks away items related to academic dishonesty with one item cross loaded between the two factors, negatively correlating with factor 1 and positively correlating with factor 2. We can interpret that factor 1 is faculty perceptions of ChatGPTs impact on students lives while factor 2 is concerns about academic dishonesty. More succinctly, factor 1 can be summarized as *Student Experiences* and factor 2 as *Academic Dishonesty*.

TABLE III: Factor Loadings 2023

*=ChatGPT Impact on	Factor 1	Factor 2	Uniqueness
Self Efficacy*	0.869		0.335
Intrinsic Motivation*	0.859		0.251
Student Engagement*	0.794		0.414
Academic Performance*	0.783		0.380
Problem Solving*	0.767		0.262
Comfort w/ ChatGPT in course	0.751		0.471
Teamwork*	0.716		0.487
Critical Thinking*	0.710		0.421
External Resource Access	0.503		0.650
Test Anxiety*	0.473		0.573
ChatGPT Familiarity	0.439		0.847
ChatGPT will enable academic dishonest behaviors	−0.363	0.343	0.636
Honor code violations Post-ChatGPT		0.911	0.095
Honor code violations Pre-ChatGPT		0.841	0.431

Note. Applied rotation method is promax.

Faculty of 2024

Factor 1 for the faculty data in 2024 is somewhat similar to factor 1 of 2023 with major differences being the items that crossed out of factor 1 and into factor 2 for this population of respondents.

Factor 1 for the 2024 data focuses on faculty perceptions of ChatGPT’s impact on students’ cognitive abilities, such as critical thinking and problem-solving. This factor is about specific essential skills rather than overall student experiences. Factor 2 in 2024 includes traits related to a positive learning environment, like intrinsic motivation, engagement, teamwork, and academic performance. These traits reflect the overall learning environment and student success. Factor 3 maintains the same items from 2023 to 2024 and can continue to be characterized as *Academic Dishonesty*. However, the split of items from factor 1 in 2023 into the factors 1 and 2 in 2024 necessitate a reevaluation of factor descriptions. Factor 1 can be considered *Student Experiences in a Course* while factor 2 is better summarized as *Traits for Student Success*. This delineation separates what would have previously been only student experiences into what faculty have a more direct impact on in their classroom and what students have to manage on their own, but what are often indicators of what a good student should have.

V. DISCUSSION

The EFA results reveal that faculty perceptions regarding ChatGPT’s impact on student behavior, performance, and academic honesty have changed between 2023 and 2024. The emergence of an additional factor in 2024 reflects a more nuanced understanding and separation of concerns, particularly regarding team work, student engagement, and intrinsic motivation. The similar proportional variance explained by the factors in both years (55.3% in 2023 and 56.8% in 2024) suggests that while the underlying dimensions of faculty

TABLE IV: Factor Loadings 2024

*ChatGPT Impact on	Factor 1	Factor 2	Factor 3	Uniqueness
Critical Thinking*	0.705			0.295
Comfort w/ ChatGPT in course	0.673			0.413
ChatGPT Familiarity	0.643			0.739
Problem Solving*	0.641			0.227
Self Efficacy*	0.530			0.394
External Resource Access	0.484			0.746
Test Anxiety*	0.456			0.717
Academic Performance*	0.384	0.419		0.428
ChatGPT will enable academic dishonest behaviors	-0.330		0.330	0.495
Intrinsic Motivation*		0.886		0.209
Student Engagement*		0.805		0.254
Teamwork*		0.723		0.576
Honor code violations Post-ChatGPT			0.983	0.050
Honor code violations Pre-ChatGPT			0.742	0.508

Note. Applied rotation method is promax.

perceptions remain stable, the categorization and emphasis of these perceptions have become more refined.

The smallest factor across both years is related to faculty respondent concerns about ChatGPT and academic dishonesty. With regards to the variance, this factor accounted for 13.6% in 2023 and 12.6% in 2024 of proportional variance for these respondents. It is evident through the examination of these factor loadings that there is a strong correlation with faculty perception of academic dishonest behaviors pre- and post-ChatGPT release, while the question relating to ChatGPT enabling academic dishonesty is considerably less correlated in that same factor. However, that question is the least correlated of any factor for either year with it being below the nominal loading threshold of 0.4 that is commonly used as a cutoff. That threshold was lowered in this study to 0.3 in order to capture more of the nuanced relationships between measurement items.

VI. LIMITATIONS

This study is limited to self-reported data from faculty experiences which can come with a particular set of biases and varying levels of familiarity with ChatGPT. Comparably, faculty were more familiar with ChatGPT in 2024 than in 2023. The results of this study cannot be generalized to the larger population given the limitation in context and institution. Future research should aim to include a broader range of institutions and stakeholders to enhance the robustness and applicability of the results.

VII. CONCLUSIONS AND FUTURE WORK

The results from this EFA indicate that faculty perceptions of ChatGPT over the past two years have remained somewhat consistent, but the transition from two factors to three factors suggests that as ChatGPT becomes better understood and faculty become more familiar with the technology that their perceptions will evolve as generative AI continues to play a role in the lives of our faculty and students in engineering education and higher education at large.

Initially, perceptions were primarily divided into two broad categories: 1) general impacts on student behavior and performance and 2) concerns about academic dishonesty. By 2024, these perceptions had expanded, separating the impact on teamwork, student engagement, and intrinsic motivation into a distinct factor. This new development may be indicative that faculty are beginning to perceive a difference in how ChatGPT affects some of the student characteristics differently with characteristics related to what makes a student an inherently good student (Intrinsic Motivation, Student Motivation, Academic Performance, and Teamwork) in comparison to the characteristics in factor 1, which are more aligned with what would be commonly expected as traits related to success in engineering (Critical Thinking, Problem Solving, etc.) Future work would warrant an investigation into this distinction to further explore effects of how generative AI can impact this factor in educational settings.

This study aims to understand the current perceptions of faculty towards GAI technologies such as ChatGPT, assessed through the lens of TAM, by identifying the factors that influence their attitudes towards its potential integration into engineering curricula. Through this investigation, this work-in-progress paper contributes to broader discussions on the role of GAI in higher education and offers insights into how educators are adapting to a technology-enhanced world.

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