# Exploring the Attitudes of First-Year Engineering Students toward Artificial Intelligence in the ChatGPT Era

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***Abstract*– This study investigates the evolving attitudes of first-year engineering students toward artificial intelligence (AI) in the era of generative AI and ChatGPT. It explores how students exposed to ChatGPT perceive AI compared to their peers with less exposure to such technologies. A mixed-methods research design, incorporating a computational thinking diagnostic and an open-ended survey question, was employed to understand students' attitudes toward AI's impact on their future careers. Preliminary results reveal that students who frequently use generative AI tools like ChatGPT tend to demonstrate stronger computational thinking skills and hold more positive views on AI. The findings also suggest that students with prior computing experience exhibit more favorable attitudes toward AI, although the correlation between computational thinking skills and AI attitudes was not statistically significant. The research highlights the critical need for introducing AI/ML (Artificial Intelligence/Machine Learning) education early in the academic journey, particularly in the first year of engineering studies, to ensure students are adequately prepared for advanced AI topics by their senior year. The study further calls for a deeper discussion on how to equip engineering students—who are likely to drive AI advancements—with the skills and mindset necessary for responsible AI development and use.***

***Keywords—Artificial Intelligence Attitudes, Computational Thinking, ChatGPT impact.***

## I. Introduction

Generative AI has disrupted various fields, including engineering education. Students are now proficient in using ChatGPT and other AI applications that instantly solve many of their tasks. Educators face the challenge of adapting their teaching to the rapid advancements in technology. Researchers across institutions are examining the relationship between computing experience and attitudes toward AI [1]. Preliminary findings suggest that before the rise of AI, students with prior computing experience held more positive attitudes toward AI. With the emergence of generative AI and ChatGPT, an international team of three researchers are investigating the following question:

**How do first-year engineering students exposed to ChatGPT perceive AI?**

To address this question, a state-of-the-art review of AI attitudes, AI/ML (Artificial Intelligence/Machine Learning) engineering education, and computational thinking will be presented. Then, a mixed-methods study is presented involving 70 first-year engineering students at an American R1 university.

### *A. Attitudes Towards AI*

We reviewed recent research on public and student attitudes toward AI, finding significant efforts to understand these perceptions. Stein et al. (2024) evaluated five existing AI attitude scales, such as the General Attitudes Towards Artificial Intelligence Scale (GAAIS) and the AI Anxiety Scale (AIAS) [2]. They introduced the ATTARI-12, which links AI attitudes to personality traits and is more concise and valid than previous measures. Their validation with over 900 participants revealed correlations between personality traits and AI attitudes. Positive attitudes were associated with traits like openness and extraversion, while negative attitudes were linked to neuroticism and conspiracy beliefs. Demographic factors also influenced attitudes, with women and older individuals expressing more negative views. These findings align with broader research showing greater concerns among women, the elderly, ethnic minorities, and less-educated groups.

In 2019, the University of Oxford's Center for the Governance of AI surveyed 2,387 Americans on their attitudes toward AI. Results showed high support for AI, especially among wealthy, educated, and tech-savvy individuals, with men showing more support than women. While respondents expected AI to disrupt the workplace, they believed the labor market would eventually stabilize. However, 12% feared AI could pose a risk to humanity.

A 2020 European survey of 4,006 people across eight countries found more positive attitudes toward AI in sectors like law enforcement and healthcare, with lower-income countries showing more favorable views than wealthier nations like France and Sweden [3]. This research highlights the need to investigate AI attitudes within the engineering and computing fields, bridging gaps to improve understanding. Our study contributes to this effort, addressing the intersection of privilege, AI attitudes, and engineering education.

### *B. Engineering Computational Thinking Diagnostic (ECTD)*

The Engineering Computational Thinking Diagnostic (ECTD) was developed to address the varying levels of entry-level knowledge among first-year engineering students and to establish a reliable baseline for tailored instructional support, particularly for those in greatest need. This diagnostic translates the computational thinking framework into a structured assessment tool. Its development, spanning from 2017 to 2021, involved extensive psychometric validation, predictive analysis, four major revisions, and participation from approximately 3,800 students [4]. The latest version consists of 20 items, with four per construct, and factor analyses confirmed a single underlying construct—engineering computational thinking. Figures 1 illustrate sample questions on Decomposition

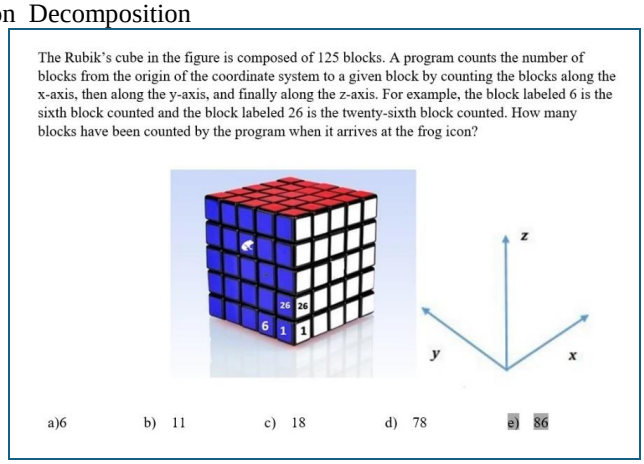


Figure 1. Sample ECTD question for Decomposition [3].

### C. AI/ML Engineering Education

An analysis of AI/ML within the engineering education community—spanning journals, conferences, and workshops—reveals three distinct clusters: (1) AI/ML as a research tool in engineering education, (2) AI/ML as a learning tool for engineers and computing professionals, and (3) AI/ML training focused on algorithm development.

The first cluster, **AI/ML in engineering education research**, examines how AI/ML supports research methodologies. For instance, Katz (2023) explores the use of Large Language Models (LLMs) for qualitative analysis, while Zhang & Feng (2021) apply Machine Learning to mitigate issues of quantitative overfitting.

The second cluster, **AI/ML as an educational tool**, focuses on integrating AI-powered applications into engineering and computing education. This field has seen rapid expansion, particularly in the use of generative AI for teaching and learning [5-7]. A widely discussed example is the application of ChatGPT in technical writing and design [8-9].

The third cluster, **AI/ML training for algorithm development**, is the least explored but arguably the most foundational. Unlike the previous categories, which emphasize AI/ML as a tool, this cluster focuses on training engineers and computing professionals to design and build AI/ML models themselves. Only a handful of programs offer structured pathways for AI/ML development, including initiatives at MIT in Germany [10-11].

These three clusters represent the evolving landscape of AI/ML in engineering education, as illustrated in Figure 2.

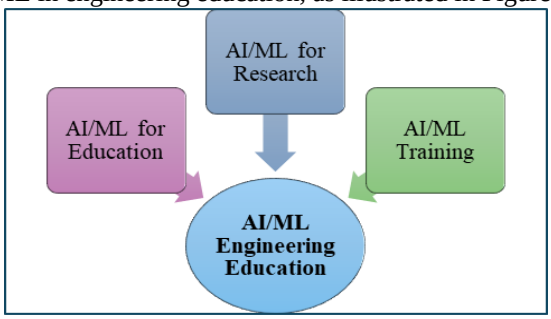


Figure 2. AI/ML Engineering Education Clusters [1]

## II. RESEARCH

### A. Setting and Research Design

During the Fall of 2024, a survey was conducted among seventy first-year engineering students from the same general introductory computing engineering course. The demographic composition of the sample included 47 males (67%), 20 females (28%), and 3 students who preferred not to disclose their gender (4%). The survey consisted of a computational thinking diagnostic and an open-ended question: "*How do you think Artificial Intelligence might affect or impact your future career prospects?*" The responses to the open-ended question were analyzed at three levels: positive, neutral, and negative as demonstrated in Table I. A mixed-methods research design was employed, integrating coded responses with ECTD scores. The results are presented below.

TABLE I
CODES TO ANALYZE OPEN-ENDED RESPONSES

| Opinions | Definitions | Examples |
|---|---|---|
| Positive ($n$ = 36; 49.3%) Code 2 | AI will be useful in professional practice and to get a job or AI embedded in engineering applications will be an enabler in society. | *"I believe that artificial intelligence can be a great resource for a majority of careers, aiding in those aspects that they are designed to perform in."* |
| Neutral ($n$ = 17; 23.2%) Code 1 | Neutral code reflects ambivalent attitudes regarding artificial intelligence or no expression of any rationale of influence at all. | *"I don't have doubts that it will help progress the fields of Aerospace Engineering, however I do doubt that AI would be able to completely take over the major do their patterns of making mistakes, which could be very detrimental in a field such as that major"* |
| Negative ($n$ = 16; 22%) (Code 0) | AI represents a risk or a threat that reduces the options of engineering practice, or it is a new paradigm that does not consider benefits for professionals, society, and individuals. | *"It might negatively affect the workforce for many different people including both employers and employees."* |

### B. Results

The answer to the research question indicate that the ChatGPT generation demonstrates stronger computational thinking skills and holds more positive attitudes towards AI than their non-ChatGPT counterparts (Table II).

TABLE II
DESCRIPTIVE STATISTICS

| Descriptive | | | |
|---|---|---|---|
| | Mean | Std. Deviation | N |
| Score | 13.69 | 4.561 | 70 |
| Attitude | 1.30 | .823 | 70 |

However, while their attitudes show a slight positive correlation with ECTD scores, this correlation is not statistically significant (Table III). This means that it appears that the more students have been exposed to coding and computation, the better attitudes they have regarding AI.

TABLE III
SPEARMAN 'S RHO CORRELATION TABLE FOR ECTD

| | Score | Attitudes |
|---|---|---|
| Score | 1 | 0.020 |
| Attitudes | 0.020 | 1 |

*p<0.05

## III. DISCUSSION

Attitudes toward AI are evolving with the rise of ChatGPT. Additionally, individuals with higher education and computing experience tend to have more positive perceptions of AI. This study supports this notion and opens a discussion on how to better educate engineering students—those most likely to advance AI—on the responsible use and development of AI tools.

The current state of AI education highlights the urgent need for training beyond basic AI literacy, emphasizing advanced topics. It also underscores the importance of introducing AI/ML concepts early in the educational journey, ideally as soon as students begin learning to code—typically in their first year of engineering studies. Early exposure to AI ensures students are better prepared by their senior year, when AI education is traditionally introduced.

This work-in-progress paper explores student readiness in an era of high AI exposure and examines the challenges this presents. The authors aim to spark discussion among the LACCEI audience

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