



# Problematizing AI Literacy Access- Understanding Student AI Literacy from Student Voices

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## Abstract

Domestic undergraduate computer science students formally learn about machine learning and artificial intelligence in upper level undergraduate computing programs, yet they must navigate the lure of ChatGPT and other generative Artificial Intelligence tools that have been found to be somewhat accurate at completing early coding assignments. As AI tools proliferate, messaging about their use in academic settings are varied, and access to AI literacy is unknown. Through an investigation of interviews with Pell grant eligible college students at open access colleges, we address the following research questions: *How do low-income undergraduate interview participants describe their uses of and attitudes regarding generative AI tool use for academic purposes?* and *What elements of AI digital literacy appear to be accessible to interview participants, based on their descriptive statements?*

## CCS Concepts

• Social and Professional topics • Professional topics • Computing education • Computing literacy

## Keywords

Generative AI literacy; digital divide; AI tool use; qualitative interview; Pell-grant eligible students

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## 1. Introduction

AI tools and tool use are revolutionizing the worlds of work and of education. As generative AI tools proliferate, they transform what it means to create, and shape new understandings of supported learning [1].

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At the same time, technological tool developers make decisions that shape how AI makes meaning, and these decisions are steeped in social knowledge and experience [2]. The digital divide was conceptualized to describe differential access to computing technology in the 1990s and early 2000s based on economic and social factors [3], [4]. A similar case can be made for the ways in which social status, country of origin and income as well as socially constructed variables of difference (e.g., race, ethnicity, and gender) may constrain individuals' access to the power of generative AI. For example, a study of internet searches for generative AI tools in the United States indicates "hotspots" in searches that relate to population demographics, such as higher education, tech industry, and wealth, and "coldspots" in areas of rurality and high share of jobs in the service industry [5].

While early studies of the digital divide emphasized access to physical technological tools, later studies broadened to consider the sophistication of tool use [6]. Similarly, the concept of the digital divide in regard to generative AI has expanded to emphasize complexities in access. Carter and colleagues [7] brought to light three levels of an AI divide, specifically access to tools, capability with tools, and outcomes of using generative AI tools. They extended this view to consider variables that contribute to the division in access and use, such as demographic and economic factors, policies regarding AI use, technical skill and digital literacy, trust and risk perceptions, and access to technical infrastructure such as internet availability and speed.

Given the unprecedented speed in which artificial intelligence is integrating into work and school lives and the overall slowness of policy development to manage or guide generative AI tool use, it will be important to document whether and how individuals are adopting and adapting their generative AI tool use. Understanding low-income college students' experiences with generative AI literacy can help develop higher education policy, instructional and assessment practice, and training in ethical use.

While some studies have used closed-ended surveys to understand student attitudes towards and specific use of generative AI [9], [10] the purpose of this study was to understand how students demonstrate AI literacy through their description about using generativeAI tools for academic purposes.

We drew on the work of Annapureddy and colleagues [8] who introduced a competency model of generative AI literacy. We chose this model as it was most directly related to our research questions relatd to access to AI skills and knoweldge. We focus on the Annapureddy model because of its practicality—responses to scholarship student interview questions about academic,

pragmatic, and work-related use were aligned to the model as it emphasizes tool use skill as well as reasoning and problem solving capability related to generative AI. The modified table below reflects the elements described by Annapureddy and colleagues, with asterisks\* indicating the elements utilized in this study. See object 1.

Basic AI Literacy			
Ability to continuously learn	Knowledge of generative AI models	Knowledge of the capacity and limitations of generative AI tools*	Skill to use generative AI tools*
	Ability to detect AI generated content		
	Ability to assess the output of generative AI tools*	Skill in prompting generative AI tools*	Ability to program and fine-tune generative models*
	Knowledge of the contexts where generative AI is used*	Knowledge of the ethical implications*	Knowledge of the legal aspects

**Object 1: Twelve Generative AI Literacy Elements**

**2. Positionality Statement**

The authors work in evaluation and social science research primarily in minority-serving institutional contexts for 19 years. They attended land grant institution for undergraduate study, one as a first generation college student identifying as a Caucasian cis gender man and one as a second generation college student, a Caucasian cis gender woman. The first author studied learning sciences in a graduate program and worked in Title 1 elementary school contexts, and the second author held an industry career in technology. These experiences shape their views of the world, and their interpretations of student interviews.

**3. Methods**

This study is an initial examination of undergraduate student conceptualization, understanding and use of artificial intelligence tools in their academic pursuits. Students were interviewed as part of a scholarship program for academically talented Pell-grant eligible undergraduates [11] attending open-access universities [12] in the United States. One element of the interview involves student awareness of artificial intelligence tools and their typical use in academic work. The interview team is independent of the academic institutions within which the students are enrolled, and as such hoped to mitigate social desirability biases [13]. Forty-five interviews were analyzed in this pilot study, and 38 of the interviews included text related to Generative AI literacy. Interviews took place over video call software, recorded based on student consent, and transcribed. Interview participants were primarily second and their year computer science students attending open access regional colleges from the north, southwest, and west of the United States. The table below indicates numbers of students interviewed by demographic variables and by region of the United States.

Region of US	Demographic data, interviewees
North (east coast)	3 women, 13 men
North (Midwest)	3 women, 9 men
Southwest	5 women, 5 men
West	4 women, 3 men

**Object 2: Interview Participants**

In this pilot study, we utilized a modified version of Carter and colleagues’ AI Literacy framework to code student responses regarding their impressions of AI tool use in academic and professional settings. A table below is modified from the original paper to indicate the codes as we operationalized them in our data analysis.

In addition, we were interested in the extent to which students reported positive or negative messaging regarding AI tool use for academic pursuits from faculty and instructors. The codes used were “positive faculty messaging” and “negative faculty messaging” yet the responses were nuanced and are addressed in the results and discussion sections with greater detail.

Given our interest in understanding the wide range of experiences our Pell grant eligible students report regarding AI literacy, we emphasize variety in the responses from computing students in undergraduate programs. Our analysis includes quantitative details regarding the prevalence of codes, yet also illustrates student narratives to include nuance in student perspectives of AI. The codes involving instrumentation of the AI literacy elements described in terms of student interview response.

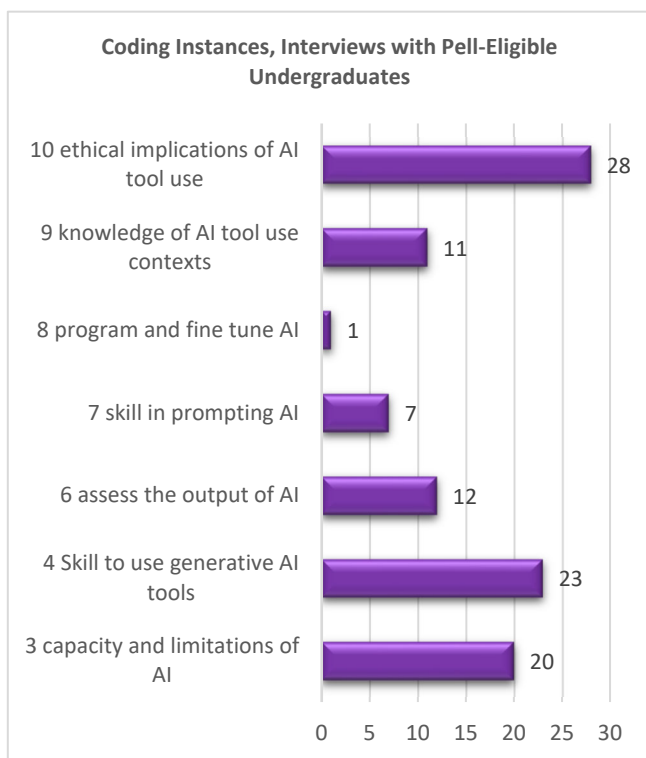
AI literacy element (Codes utilized in the paper, modified)	Instrumentation of Capacity
(3) Capacity and limitations of AI	Student describes reasoning related to AI use tasks
(4) Skill to use generative AI tools	Student tells of an instance using generative AI for an academic task
(6) Assessing output of AI tools	Student explains how they review output and decide its quality
(7) skill in prompting AI tools	Student illustrates how they become adept at asking generative AI questions or creating better queries
(8) program and fine tune AI	Student relates an instance of developing an AI language
(9) knowledge of AI tool use contexts	Student expands description of generative AI use outside of academic pursuits
(10) ethical implications of AI tool use	Student indicates ethical reasoning they employ to limit or expand their generative AI use

**Object 3: Generative AI literacy Codebook with Instrumentation of Capacity**

Qualitative coding occurred thematically with the generative AI literacy elements serving as a reference point and coding occurring deductively[14]. Meaning making for his paper occurs both in the code quantification and related frequency count as well as in the thick description and discussion of cases within the interview dataset that show how the combinations of generative AI literacy elements present in interview data [15], [16] and makes evident how Pell-grant eligible students attending open access colleges and universities make use of AI literacy in their academic lives.

#### 4. Results

The frequency of the codes used in the interview dataset appear below. The code regarding generative AI literacy utilized most was “ethical implications of AI tool use” which appeared 28 times in the 38 interviews that received a code regarding AI literacy. The next most common was “skills to use generative AI tools” which occurred 23 times in the data set. Students discussed the “capacity and limitations of AI” in 20 instances within the interviews, and in twelve occurrences interviewees “assessed the output of AI.” In eleven passages of the interviews, students brought up knowledge of AI tool use in contexts other than academic contexts, which was the focus of the interview questions, and in seven cases, interviewees mentioned specific “skill developed in prompting AI.” Only one student mentioned the ability to program and fine tune AI.



#### Avoiding AI and learning independently

One student described an aversion to generative AI use in academic settings, and a choice to avoid the tools in an effort to learn on one’s own. The interviewee mentions “not wanting to cheat” –the ethical implications of AI generative tool use clearly addressed by the student in the dialog with the interviewer. When asked about using AI tools, the interviewee stated:

“Yeah. I’m not a fond of cheating. I think it’s like the moral code in me or something. I don’t want to cheat, **I don’t want to get my degree that way**, but I hear a lot of students that use it and they can use it not in a cheating way, if that makes sense. If they’re making an essay and they just go on and they’re like, pitch me a topic that talks about this, and then they have a topic for the essay and then they just run with it and that takes off a whole step of the process and makes it easier. But yeah, I don’t know. **I don’t use that. I don’t use chat GPT. It also gives you the answers and I just don’t want to get it that way.**”

#### AI tool use for alternative explanations of assignments

An interviewee describes how they did not know of the tool early in its widespread availability to the public, yet in a time of academic struggle, the student used AI to better understand an assignment in college. The student notes how the possibility exists for AI tools to complete homework and how that capability is ethically problematic.

“No. So the first year and a half, two years, when it came out, I didn’t really know much of it, so I didn’t use it. But then I saw its capabilities last year when I was struggling with an assignment once, and then I was like, well, that’s really helpful. **So even when I’m just trying to understand a problem or something, it’s useful.** So I feel like, yeah, there is bad sides to, I mean, you can just copy and paste the homework into it and kind of just do it for you. So I can see why in terms of school it’s bad, but if you don’t use it for those purposes, it’s really useful.”

#### Navigating faculty messages regarding AI tool use

Another interviewee described how they are navigating AI tool use in academic settings given the different messages received across courses and departments. The participant describes faculty with blanket statements forbidding its use, compared to AI faculty who describe particular ways students could employ AI tools to support learning. The student explains how they use it for help and mentions ethical versus non-ethical modes of AI tool use.

“So I’m taking four classes right now. **I think two out of four of those professors, they highly discourage using AI in their assignments, and if they caught, they would report it to the dean.** But one of those professors, he teaches AI and he supports using AI only if you for help, not just passing code or something in as your homework, just using it to kind of get a rough outline of what you want and stuff. ...It is pretty easy to notice when it was straight up AI. I can recognize if something is AI generated now. So just knowing how to ask the right questions to an AI will help you more. **It’s like learning from it, not just copying.**”

#### Assessing Output

A student describes how they can use generative AI to support learning and save time for coding, yet without some conceptual understanding of the content area, a student could go stray with poor output. The participant describes how without the content knowledge of the user, assessing the output could be problematic.

“Yeah, because they know they can save time. But sometimes, listen, this is if you don’t know what you’re doing (regarding coding) and you are

using (generative AI) if you don't know what you're doing, you can say, 'oh, this is right. This is perfect, this is good code'. **But no, when you know what you're doing, you can see, oh, what the hell did you do (AI tool), this is awful.** You're going to get a template. You can correct it a little, but for basics and stuff, it's good for some things, but for others, it's awful."

## 5. Limitations and Assumptions

This pilot study utilizes interviews with undergraduate students and analyzes their self-report of generative AI literacy practices to better understand nuances in student reasoning regarding generative AI. It is limited by this methodological choice. The assumptions analysts made regarding student free response in an interview were that students would be truthful regarding their use of generative AI, particularly because the interviewers had no direct connection to the institutions and departments the students attended as outside social science researchers funded by the National Science Foundation.

## 6. Discussion and Next Steps

In this pilot study, we tested an instrumentation of select generative AI literacy elements from the literature to see how they aligned with student interview responses regarding generative AI literacy. The population under study are theorized to experience a lack of access to generative AI literacy, based on their low-income status and their enrollment in open access universities and colleges, which tend to be under-resourced. Initial interview data indicates that early undergraduates have varied access to AI literacy, that AI literacy is a complex concept with overlapping elements, and that low-income undergraduate students can and do reason about using generative AI for academic purposes. In particular, we note that ethical use of AI was co-coded with many other elements of literacy, such as assessing output. Students who are developing their generative AI literacy do so in ever-changing academic environments, where faculty messages are mixed regarding AI tool use. In future studies, we hope to understand how computing departments can develop guidelines for proper student use of generative AI tool use, and create resources that acknowledge the digital divide in accessing generative AI tools for academic development.

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