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Understanding AI Literacy Among College Students: Voices from a Historically Black College and University

Krishna Bista, Surakshya Paudel, Uttam Gaulee,
Glenda Prime, Benita Threadgill, Victory Momoh,
Patricia Crispin Anderson, Ricky Gole, Sujata Sharma, Urasha Mandal,
Manish Rajput, Smriti Garbuja, Kiran Tiwari, Vandana Pandey
Morgan State University, United States

ABSTRACT

This qualitative case study explores how students at a Historically Black College and University (HBCU) perceive, use, and critically reflect on artificial intelligence (AI) within academic and personal contexts. Guided by a four-dimensional framework: conceptual understanding, application skills, ethical awareness, and critical reflection, semi-structured interviews with 28 undergraduate and graduate students from one mid-Atlantic public research university revealed both opportunities and challenges. Students viewed AI as a supportive "assistant" that enhances efficiency in writing, communication, and learning, but demonstrated limited technical knowledge and occasional uncritical reliance on outputs. Ethical concerns, particularly regarding plagiarism, bias, and data privacy, were prevalent, alongside strong calls for institutional guidance. Findings highlight the need for equity-driven, curriculum-integrated AI literacy initiatives to ensure responsible, critical, and inclusive engagement with emerging technologies.

Keywords: Artificial intelligence literacy, critical thinking, digital inclusion, ethical awareness, generative AI tools, qualitative case study, student perceptions

INTRODUCTION

Artificial Intelligence (AI) is profoundly reshaping academic and professional trajectories of today's students, transforming how they learn, create, and interact. As AI-driven tools become increasingly integrated into writing, communication, and decision-making processes, the ability to understand and critically engage with AI —often referred to as AI literacy—has emerged as a vital competency for students across various disciplines (Ng et al., 2021; Long & Magerko, 2020).

AI literacy is a multidimensional construct encompassing conceptual knowledge of AI systems, functional and application skills, ethical reasoning, and critical awareness of societal impacts (Ng et al., 2021; Kong et al., 2025). Recent reviews of AI literacy education (Kong et al., 2025) highlight the need for coherent frameworks beyond technical familiarity, emphasizing empowerment, responsibility, equal access, and opportunity. Similarly, research in K–12 education highlights the importance of fostering AI literacy early in students' academic journeys, emphasizing both the opportunities and risks associated with uncritical adoption (Lee et al., 2024). Parallel efforts in teacher education have stressed that preparing future educators to integrate AI responsibly is essential for sustainable classroom innovation (Casal-Otero et al., 2023; Zhang et al., 2025).

Despite rapid growth in AI-literacy scholarship, the evidence base still skews toward K–12 and teacher-education contexts; early syntheses found only ~13% of studies (4 of 30) centered on higher-education learners (Ng et al., 2021; Mansoor et al., 2024), as summarized in their study. Subsequent reviews continue to concentrate on school settings (e.g., Casal-Otero et al., 2023; Lee et al., 2024), while a scoping review focused on higher /adult education shows that research on university students is emerging but comparatively nascent (Laupichler et al., 2022). An umbrella review of 17 reviews further underscores the need for cross-disciplinary approaches and validated assessments across levels (Zhang et al., 2025). Moreover, the context of minority-serving institutions, such as Historically Black Colleges and Universities (HBCUs), remains underexplored. This gap is critical, as HBCUs serve diverse student populations who may face unique opportunities and challenges in accessing AI technologies. Understanding how these students define, use, and critique AI is essential for informing both institutional strategies and national conversations on AI in higher education.

This qualitative case study addresses that gap by exploring how undergraduate and graduate students at an HBCU conceptualize, apply, and critically analyze AI technologies. Drawing on the four-dimensional AI literacy framework—conceptual knowledge, application skills, ethical awareness, and critical thinking—this research foregrounds students' voices to their immediate experiences and reflections on equity and the societal implications of AI. By situating these narratives within the growing literature on AI literacy, this study provides insights into how higher education, particularly HBCUs, can integrate AI

competencies responsibly and inclusively to prepare students for an AI-driven future.

LITERATURE REVIEW

Defining and Conceptualizing AI Literacy

The concept of AI literacy has gained increasing attention across education, but definitions vary widely and often reflect the context in which they are studied. Early reviews highlighted that most research has focused on K–12 learners, where AI literacy is frequently conceptualized in terms of functional skills, such as understanding basic concepts of algorithms, data, and machine learning (Ng et al., 2021; Casal-Otero et al., 2023). Within these school-based settings, literacy often emphasizes awareness of AI as a technology rather than deeper ethical or cultural dimensions (Lee et al., 2024). Similarly, studies of pre-service teachers highlight the need to equip future educators with practical skills for integrating AI tools into classrooms; however, these works often overlook broader conceptual or societal questions (Laupichler et al., 2022).

In higher education, however, conceptualizations of AI literacy are more fragmented and emergent. Many university students can describe AI at a surface level, such as identifying ChatGPT or other generative tools, but struggle to explain how AI systems function or how data biases shape outcomes (Mansoor et al., 2024). This pattern, noting that students frequently define AI literacy through a narrow instrumental lens, focusing on usage rather than its ethical implications (Černý, 2024). Laupichler et al.'s (2022) scoping review of higher and adult education further stressed that there is no consensus on what constitutes AI literacy at the university level, with frameworks varying from technical competencies to social, cultural, and reflective dimensions.

Recent reviews advocate for more comprehensive definitions. Zhang, Prasad, and Schroeder's (2025) umbrella review synthesized 17 systematic studies and found a growing consensus that AI literacy must integrate not only knowledge of AI concepts but also critical, ethical, and cultural awareness. Salido et al. (2025) similarly argued that literacy cannot be reduced to technical proficiency, as it must also foster critical thinking, creativity, and ethical reasoning. This perspective aligns with the framing of AI literacy as a cultural transformation, where literacy practices redefine knowledge, authorship, and communication in a digital society (Kalantzis & Cope, 2024).

When taken together, the literature suggests that while there is a broad agreement that AI literacy involves more than technical know-how, higher education researchers still struggle to establish coherent and holistic definitions. This gap is particularly salient for HBCU contexts, where literacy must be framed

not only as a technical or academic competency, but also as a tool for equity, empowerment, and societal impact.

Models of AI Literacy

The conceptualization of AI literacy has evolved from narrow, skills-based definitions towards more integrative frameworks that encompass cognitive, practical, and ethical dimensions. One of the earliest and most influential models, has identified four interrelated competencies: understanding, application, evaluation, and moral reasoning (Long & Magerko, 2020). Their framework is distinctive for advancing the argument that literacy extends beyond technical proficiency to encompass the reflective capacity to critically examine the broader social and cultural implications of AI systems. This dual emphasis has since become foundational for curricular design and pedagogical approaches that seek to prepare learners as both competent users and critical evaluators of AI technologies.

Building on this foundation, propose a student-centered orientation to AI literacy that adapts competencies to highlight cultural and ethical contexts (Long & Magerko, 2020; Ng et al., 2021). Their work examines that literacy cannot be alienated from the environments in which AI systems are embedded, as students must be able to recognize how social assumptions and values shape algorithmic outcomes. The scoping review of higher and adult education similarly concludes that definitional approaches to AI literacy remain fragmented, with some emphasizing purely technical capacities and others prioritizing critical, ethical, and cultural reasoning (Laupichler et al., 2022). The absence of consensus, they argue, has limited the coherence of AI literacy initiatives in higher education, leaving students with uneven understandings of what literacy entails.

Recent frameworks have attempted to address this fragmentation by situating AI literacy within higher education's broader civic and professional missions of higher education. Kassorla et al. (2024), identified four overlapping domains—technical, evaluative, practical, and ethical through their research, which highlights literacy as a form of discernment and responsible practice. Their account positions literacy as both a workplace and civic necessity, preparing graduates to innovate with AI while also anticipating risks and participating in governance debates. Another study reinforces this shift, identifying a growing consensus that AI literacy must integrate critical reasoning, ethical reflection, and cross-cultural perspectives alongside technical skills (Zhang et al., 2025). Collectively, these models mark a paradigmatic reorientation: AI literacy is now framed not as a discrete technical competency but as a holistic capacity that blends mastery, judgment, and ethical agency in the use and shaping of artificial intelligence.

Student Use and Perceptions

While conceptual models provide theoretical clarity, empirical studies reveal how students in higher education engage with and perceive AI technologies. Evidence consistently demonstrates that students view generative AI tools as valuable for both academic productivity and learning support, yet remain cautious about issues of reliability and ethics. A survey of 399 postsecondary students in Hong Kong found that learners widely adopted ChatGPT and similar systems for brainstorming, writing assistance, and research support (Chan & Hu, 2023). At the same time, students expressed persistent concerns about accuracy, originality, and the risks of overreliance, highlighting the tension between AI's efficiency and the integrity of academic work.

Attewell (2025) indicated that students are increasingly using AI to organize study tasks and prepare for employment, but they call for more straightforward institutional guidelines and transparent support structures. Pitts et al. (2025) further demonstrate that one of AI's most frequently cited benefits is its explanatory capacity: Students noted that AI could restate complex ideas "*in ways that are easy to understand*," thereby bridging conceptual gaps often left by conventional instruction. This aligns with constructivist learning theory, which emphasizes the importance of multiple representations in reinforcing comprehension. Beyond clarification, students identified practical benefits, including time savings, reduced cognitive load during information retrieval, and greater attention to higher-order critical thinking tasks (Mansoor et al., 2024). Nonetheless, ethical ambivalence persists. An early study indicated that students often frame their use of AI in instrumental terms, rarely engaging with questions of bias, privacy, or equity (Černý, 2024). Similarly, it can be concluded that despite increased adoption, systematic approaches to embedding ethical reflection in student practice remain underdeveloped (Zhang et al., 2025). Anecdotal accounts, such as students' reliance on AI for "formulas in Excel that [are not] committed to memory," illustrate both the everyday utility of AI and its potential to normalize dependence without fostering more profound understanding. Together, these studies underscore the dual role of AI in higher education: as an accessible tutor that scaffolds comprehension and efficiency, and as a contested site where questions of accuracy, integrity, and ethics remain unresolved.

Practical Application and Critical Appraisal

As AI literacy research matures, scholars have increasingly emphasized the need to link theoretical frameworks to empirical evidence demonstrating educational outcomes. Laupichler et al. (2023) advanced this effort through a three-domain model—technical understanding, practical application, and critical appraisal—which synthesizes earlier frameworks (e.g., Long & Magerko, 2020; Ng et al., 2021) into a structure that can be tested empirically. Their findings reveal that these domains predict not only students' capacity to produce higher-quality

academic work but also their self-efficacy in engaging with AI technologies. This move from abstract competencies to measurable outcomes marks a critical step in validating AI literacy as both a pedagogical and research construct.

Evidence from broader reviews reinforces the importance of practical application and critical appraisal. In the large-scale synthesis of 30 studies contained in recent systematic reviews, most of the research has been conducted at the K–12 level, yet even in these contexts, practical engagement with AI tools was found to shape problem-solving and collaboration skills (Casal-Otero et al., 2023; Lee & Kwon, 2024). At the university level, however, empirical evidence is comparatively sparse, as only four studies in the corpus directly examined college students consistently pointed to the role of critical appraisal in mediating students' trust in AI-generated outputs (Ng et al., 2021; Mansoor et al., 2024). This underscores the need to expand higher-education research to better understand how literacy translates into both academic performance and preparedness for professional settings.

More recent work has deepened this connection between literacy and holistic student outcomes. Liu et al. (2025) found that AI literacy is positively correlated with academic performance and psychological well-being, suggesting that literacy serves as a protective factor in navigating complex learning environments. Similar conclusions were reached by Shen et al. (2024), who demonstrated that institutional supports that foster competence and autonomy encourage students to engage critically with AI, thereby enhancing both motivation and resilience. In addition, Jang et al. (2024) highlight that students' ability to appraise AI critically influences their intention to adopt generative AI responsibly, making literacy not just a cognitive skill set but also a behavioral predictor.

These findings converge on two insights of direct relevance to higher education. First, practical application and critical appraisal are indispensable for equipping students to use AI responsibly and effectively in academic contexts. Secondly, literacy has outcomes that extend beyond technical mastery, shaping students' confidence, ethical reasoning, and psychosocial resilience (Salido et al., 2025; Zhang, Prasad, & Schroeder, 2025). By situating practical and critical competencies within a validated, multidimensional framework, current research positions AI literacy as both an educational necessity and a foundation for equitable participation in an AI-driven society.

Ethical Awareness and Over-Reliance Risk

A recurring theme in the literature on AI literacy is the tension between the efficiency of AI tools and the risks of over-reliance. Pitts et al. (2025) report that students frequently accept AI outputs without question, reflecting gaps in critical appraisal skills that are essential for academic integrity. These findings align with broader concerns raised in the EDUCAUSE AI Literacy framework (Kassorla et

al., 2024), which prioritizes critical awareness and evaluative judgment as essential for preparing graduates to participate responsibly in an AI-mediated society.

Students' reflections also draw attention to wider ethical and societal risks. Chan and Hu (2023) found that participants feared AI could exacerbate inequities by privileging students with greater access to technology, thereby "widening the gap between the rich and the poor." Similar critiques are reflected in systematic reviews of K–12 and higher-education contexts, which caution against algorithmic bias and the reproduction of systemic inequalities in classrooms (Casal-Otero et al., 2023; Ng et al., 2021). These concerns extend beyond fairness in academic practice to issues of social justice, equity of opportunity, and the ethical design of AI itself.

At the institutional level, ethical risks are also framed in terms of pedagogy and classroom dynamics. Students in multiple studies expressed anxiety that heavy reliance on AI might undermine respect for teachers, especially if AI is perceived as a more reliable source of knowledge (Haroud & Saqri, 2025). This potential erosion of the student–teacher relationship highlights a more profound dilemma. While AI can enhance access to knowledge, it may simultaneously weaken the interpersonal trust and mentorship that underpin higher education. Kalantzis and Cope (2025) argue that literacy in the age of AI must therefore be conceived as both cultural and civic, requiring reimagined understandings of knowledge, authorship, and human connection.

Scholars also caution against the cognitive risks of dependence on AI dialogue systems. Zhai et al. (2024) caution that uncritical reliance may compromise students' ability to sustain critical thinking, while Cox (2024) emphasizes the importance of transparency, accountability, and awareness of bias in generative AI. Beyond higher education, studies of older learners similarly show that ethical and critical dimensions are lifelong concerns. Enam et al. (2025), Kaur et al. (2025), Ko et al. (2025), and Tang et al. (2025) demonstrate that older adults approach AI with both optimism and skepticism, seeking accessible programs that foster empowerment and digital inclusion. This body of work highlights that AI literacy must evolve beyond technical fluency to encompass ethical awareness, equity, and lifelong learning.

Potential Gaps and Rationale

Despite the rapid expansion of AI applications, several gaps remain across the literature. First, there is no widely validated instrument for measuring AI literacy, which constrains comparability and limits the development of evidence-based interventions (Lintner et al., 2024; Chiu et al., 2024). Second, although higher education has received the most attention, research in K–12, informal, and community contexts remains limited (Casal-Otero et al., 2023; Lee et al., 2024). Third, most studies rely on cross-sectional designs, which provide limited insight into how literacy evolves (Ng et al., 2021; Zhang, Prasad, & Schroeder, 2025).

Fourth, research on inclusivity continues to underrepresent marginalized groups, low-resource contexts, and learners with disabilities, despite evidence that equity must be central to AI education (Nachmias et al., 2025; Kaur et al., 2025). Finally, while cross-cultural initiatives highlight promising directions (Korte et al., 2024), comparative research across institutions and regions remains underdeveloped.

However, empirical research has not sufficiently examined how students themselves define, experience, and apply these competencies, particularly in the context of the U.S. Thus, this study of Historically Black Colleges and Universities (HBCUs), where equity-driven pedagogies provide unique opportunities to interrogate how AI literacy intersects with issues of access, identity, and empowerment, falls into an underexplored abyss.

To address this gap, the present study used a case study method in which in-depth interviews with HBCU students examined how they understand, use, and reflect on AI in their academic and personal lives. This approach amplifies voices often absent in AI-in-education discourse and provides context-specific insights that can inform both institutional policy and broader conversations on equity in digital transformation.

Research Question

How do college students at an HBCU report their understanding and experiences of AI literacy in their academic and personal lives?

RESEARCH METHOD

Research Design

A qualitative exploratory case study was conducted to explore AI literacy among students at an HBCU. A qualitative exploratory case study is a research design that investigates a bounded system in depth, using rich, contextualized data to explore under-researched phenomena. It is exploratory in nature, emphasizing the discovery of patterns, meanings, and insights rather than hypothesis testing, and is well-suited to questions that begin with “how” or “what” (Creswell, 2018; Yin, 2018). Guided by the four AI literacy dimensions: conceptual understanding, application, ethical awareness, and critical thinking, semi-structured interviews captured in-depth student perspectives (Gu & Ericson, 2025; Ng et al., 2021; Long & Magerko, 2020). This design allowed the researcher to situate individual narratives within the broader institutional and cultural context of the HBCU, illuminating how both personal experience and collective identity shape AI literacy. In addition, the approach provided flexibility to uncover emergent themes, ensuring that participants' voices remained central to the interpretation and analysis of the findings.

Participant Demographics

A total of 28 students participated in the study, who were purposively sampled between March and May 2025. Participants were purposively selected for their direct involvement in an AI literacy initiative within the MetaZone project. Specifically, these students were serving as peer educators, teaching AI concepts to local school students. This role required them not only to use AI tools but also to interpret, apply, and communicate AI-related knowledge in instructional settings. The selection of this group was intentional, as they represent a unique population of students who engage with AI at both a practical and pedagogical level. Their dual role as learners and instructors provided deeper insights into how AI tools are understood, adapted, and translated for broader educational use. Additionally, including participants at the undergraduate, master's, and doctoral levels, as well as across multiple disciplines, allowed for variation in experience and perspective.

The group comprised 11 undergraduates, 10 master's students, and 7 doctoral students, representing diverse disciplines, including STEM fields (computer science, engineering, mathematics, biology, public health, and construction management), education and leadership, communication, business, and the social sciences. Participants were relatively balanced by gender, with both male and female students represented across degree levels.

All participants reported prior engagement with AI tools, with ChatGPT emerging as the most widely used application across academic levels and programs. Other frequently mentioned tools included Grammarly, Copilot, Gemini, Google Lens, Siri, Alexa, and Perplexity. At the same time, students in computing and engineering fields cited a broader range of applications (e.g., Claude, Quen, Speechify, and Facebook's AI algorithms). This variety demonstrates that students' use of AI spans both general productivity support (e.g., writing, editing, and search) and general information search.

This demographic profile (Table 1) reflects the multidisciplinary nature of AI adoption within the HBCU context, providing a rich basis for examining how students define, apply, and critically reflect on AI literacy in academic and personal settings.

Data Collection

Data were gathered through semi-structured interviews, each lasting approximately 30 minutes and conducted either via Zoom or in person. All interviews were audio-recorded with consent and transcribed verbatim for analysis. The interview protocol was informed by established AI literacy frameworks and organized around four dimensions: conceptual understanding, application, ethical awareness, and critical reflection (Chan & Hu, 2023; Ng et al., 2021).

Table 1. Demographic Information of Participants and AI Tools Usage

Name	Gender	College Major/Program	AI Tools Mentioned
Mannu	Male	MBA, Project Management	Copilot, ChatGPT, Google Lens
Deep	Male	Master, Advanced Computing	Copilot, ChatGPT, Gemini, Siri, Alexa, Google Assistant, Grammarly, Google Lens
Nabin	Male	Undergraduate, Mathematics	ChatGPT, Quen, Google AI, Gemini
Bridgette	Female	Doctorate, Community College Leadership	Google, Ask Jeeves, Grammarly, Gemini, Copilot
Tessee	Female	MBA	ChatGPT, Grammarly, Perplexity, Speechify
Pete	Male	Graduate, Public Health	ChatGPT, Copilot
Lumi	Male	PhD, Civil Engineering	ChatGPT, Siri, Grammarly, Copilot, Google, Google Lens, Bot, Calculator, and Facebook's AI algorithms.
Ryan	Male	Graduate, Advanced Computing	ChatGPT, Perplexity, Claude, Google Ads (AI-powered), Automation tools
Jana	Female	Undergraduate, Biology	ChatGPT, Grammarly, Copilot
Jina	Female	Undergraduate, Biomedical	ChatGPT (general mention)
Nig	Male	Undergraduate, Computer Science	Gemini, ChatGPT, Grok
Ato	Female	Undergraduate, Computer Information System	ChatGPT
Joe	Male	PhD, Computer and Electrical Systems Engineering	ChatGPT, Grammarly
Labi	Male	PhD, Resilience and Infrastructure Engineering	ChatGPT
Nami	Male	MSc, Advanced Computing	ChatGPT
Dan	Male	MSc, Advanced Computing	ChatGPT

Rasha	Female	Undergraduate, Psychology	ChatGPT
Vicky	Female	MS, Curriculum	ChatGPT, Grammarly
Via	Female	MSW, Social Work	ChatGPT, Grammarly
Marie	Female	BS, Computer Analysis	ChatGPT, Grammarly
Shan	Male	MS, Construction Management	ChatGPT, Google Lens, Grammarly
Ram	Male	MS, Construction Management	ChatGPT
Mia	Female	Undergraduate, Nursing	ChatGPT
Samiya	Female	Undergraduate, Psychology	ChatGPT, Grammarly
Tory	Female	MA, Global Multimedia Journalism and Communication	ChatGPT, Grammarly, Perplexity AI
Courtney	Female	Masters' Student - Public Health	ChatGPT, Co-Pilot
Wanda	Female	Doctoral, Community College Leadership	ChatGPT, Gemini, Co-Pilot, Grammarly
Sunil	Male	Undergraduate, Computer Science	Gemini, ChatGPT

Prompts invited participants to articulate personal definitions of AI (e.g., *"How would you explain AI in your own words?"*), describe their experiences with AI tools (e.g., *"Can you share an example of when you used an AI tool and what you thought about it?"*), and reflect on potential risks or ethical concerns (e.g., *"What worries, if any, do you have about AI?"*). This design provided flexibility to probe emergent themes while ensuring alignment with the study's conceptual framework.

Data Analysis

Data were analyzed using Braun and Clarke's six-phase thematic analysis, which provides a systematic framework for identifying, coding, and interpreting qualitative patterns (Braun & Clarke, 2006). Transcripts were coded both inductively, allowing themes to emerge from the data, and deductively, guided by

established dimensions of AI literacy. Coding and thematic development were supported by ChatGPT, which was used as an analytic aid to organize codes, cluster patterns, and refine thematic categories. To ensure rigor, the researcher iteratively reviewed, compared, and refined codes, engaging in reflexive discussion to verify consistency and credibility across themes. This approach enhanced transparency and provided a structured pathway from raw transcripts to final thematic interpretations.

ChatGPT was used as a supportive analytic aid to help organize codes and refine themes, while the researchers made all final coding decisions and interpretations. This approach enhanced efficiency but required careful oversight; outputs were cross-checked with transcripts to ensure accuracy and mitigate bias. AI thus served as a supportive tool, not a substitute for researcher judgment, maintaining the rigor and reflexivity expected in qualitative analysis. Table 2 is an example of an interview theme matrix used to generate themes and results for this study.

Table 2: Interview Themes Matrix

Theme	Sub-Theme	Description	Illustrative Student Codes/Quotes
Conceptual Understanding	AI as Everyday Assistance	Students define AI in terms of usefulness in daily life (writing, navigation, Q&A).	"AI is like an assistant—it helps you get things done faster." – Tory; "To me, AI means a machine doing something that normally requires human thinking, like Google Maps finding the fastest routes." – Deep
	Shallow Technical Grasp	Knowledge is often expressed through analogies or simplified views.	"I just know it predicts the next word or gives you options, but I don't really know the back end." – Mannu; "It looks at patterns in the data, like showing a child pictures of cats and dogs." – Deep
Application Skills	Convenience and Efficiency	Students use AI to improve writing, translate, brainstorm, or polish resumes.	"I used Grammarly and ChatGPT to refine my essays—it gave me more confidence." – Tessee; "I use ChatGPT for essays and Google Lens to translate signs." – Deep; "I asked ChatGPT to draft emails because it's faster." – Lumi
	Uncritical Reliance	Students sometimes rely on AI outputs without verifying accuracy.	"Sometimes I just take the answer because it saves time, but later I find mistakes." – Ryan; "ChatGPT

Theme	Sub-Theme	Description	Illustrative Student Codes/Quotes
			gave me wrong information in math once…" – Nabin
Ethical Awareness	Emerging Concerns, Limited Knowledge	Concerns about plagiarism, bias, and privacy, but limited ethical understanding.	"I do worry about what happens to the data we give to these tools." – Deep
	Desire for Institutional Guidance	Students want clear rules and training from faculty and institutions.	"Professors need to tell us what is acceptable…" – Tessee; "Schools could include a workshop…" – Deep; "We don't really have any official guidance…" – Bridgette
Critical Thinking and Societal Impact	Opportunity and Risk Awareness	Students see AI as both opportunity and threat to learning and employment.	"AI can help prepare us for jobs, but it could replace some of them." – Ram; "If students rely too much, they might stop thinking critically." – Deep
	Equity and Access Concerns	Unequal access to AI tools creates disparities among students.	"Some of us pay for subscriptions…that creates inequality." – Jana; "AI assumes everyone has fast internet and good devices." – Mannu

RESULTS

Analysis of interviews with 28 student participants generated a nuanced account of how HBCU students perceive, engage with, and reflect upon artificial intelligence in their academic and personal contexts. Although participants differed in disciplinary background and prior experience with AI, their narratives consistently converged on four overarching themes: conceptual understanding, application skills, ethical awareness, and critical reflection on societal impact. These themes capture the dual nature of students' experiences, highlighting the opportunities AI provides for learning and productivity, while also revealing persistent uncertainties, ethical tensions, and questions about its broader role in higher education and society.

Theme 1: Conceptual Understanding

Students' conceptualizations of artificial intelligence (AI) ranged from describing it as a practical "everyday assistant" to expressing only a shallow grasp of its underlying mechanics. Across interviews and focus groups, participants consistently situated their understanding of AI in relation to its role in their daily academic and personal routines.

AI as Everyday Assistance

For many students, AI was primarily understood as a tool that simplifies tasks, functioning as a form of "everyday assistant." Vicky noted AI in these terms: "AI *is like an assistant—it helps you get things done faster."* This framing of AI as an intelligent companion rather than a complex technological system was echoed by several others. Deep, a graduate student in advanced computing, similarly emphasized its functional role: *"To me, AI means a machine doing something that normally requires human thinking, like Google Maps finding the fastest routes."* These descriptions reflect a utilitarian orientation, where AI is valued for efficiency and convenience rather than conceptual depth.

Such responses highlight how students link their understanding of AI to familiar applications that save time and provide efficiency. Instead of abstract definitions, students grounded their explanations in tangible tools such as navigation apps, voice assistants, and writing aids. As Tessee explained, *"When I think about AI, I just think about something that helps me fix things in my work or shows me how to improve it."*

New voices extended this theme. Wanda explained, *"I would describe it as a personal assistant. I always use it in that way…basically at your fingertips."* Tory added, *"AI is just like it helps…to make work faster, more effective, and more productive."*

Together, these responses reveal that students often grounded their explanations in tangible uses—navigation apps, productivity aids, and writing support—illustrating a pragmatic orientation toward AI.

Shallow Technical Grasp

While students could easily describe AI's usefulness, fewer demonstrated knowledge of its technical processes. Several participants admitted to having only a surface-level understanding of how AI functions. Mannu, an MBA student, reflected, "I *just know it predicts the next word or gives you options, but I don't really know the back end."* Similarly, Nabin, an undergraduate in mathematics, acknowledged the limits of his comprehension: *"I know it works by using a lot of information, but I don't understand exactly how."*

Even those with more exposure to technology resorted to simplified analogies. Deep, drawing on his computing background, explained, "It *looks at patterns in the data, like showing a child pictures of cats and dogs. After seeing hundreds of them, it can tell the difference."*

Other participants also offered simplified definitions. Nami stated, *"Artificial Intelligence, or AI, is when computers or machines are designed to think and make decisions like humans… Behind the scenes, AI works by collecting and analyzing a lot of data to learn patterns and make decisions."* Pete reflected on its human-centered foundations: *"AI is actually…built upon pre-existing*

knowledge, human knowledge…at a very fast rate to kind of bring it to our fingertips, make it more accessible to human beings."

The focus group further reinforced this theme, with one participant summarizing: "I think it's just smart enough to answer us, but I don't really know how it learns." Another added: "Sometimes it feels like magic—it gives you an answer, and you just accept it." Pete echoed this sense of mystery, remarking, "It is really… the world is intriguing. "Vicky, meanwhile, emphasized the human effort behind AI systems: "The intelligence in AI comes from people…subject matter experts answer questions, link resources, and build the data. It's humans doing the work, and the AI engine just pulls from those resources."

Taken together, the interviews suggest that students conceptualize AI primarily through its functional role in their lives. AI is framed as a supportive assistant that offers convenience, efficiency, and immediate utility. However, beneath this pragmatic orientation lies a limited technical understanding of AI systems. Students' reliance on analogies and surface-level descriptions indicates that, while they are enthusiastic users, their conceptual understanding of how AI operates is underdeveloped.

Theme 2: Application Skills

Students' discussions highlighted how AI has become embedded in their everyday academic practices, primarily as a tool for convenience and efficiency. Participants across majors described using AI to draft essays, refine grammar, translate material, generate ideas, and even prepare resumes. At the same time, some students admitted to relying on AI outputs without adequate verification, underscoring gaps in critical evaluation skills.

Convenience and Efficiency

Students most often described AI as a time-saving resource that supported them in writing and communication. Deep, a graduate in computer science, said, "I *used Grammarly and ChatGPT to refine my essays—it gave me more confidence in my writing."* Similarly, Nabin, an undergraduate mathematics major, emphasized how AI lightened his workload: *"When I'm writing assignments, I use ChatGPT for ideas and to help outline my paper. It saves me a lot of time."*

AI also extended beyond coursework into practical tasks. Deep noted, "I *use ChatGPT for essays and Google Lens to translate signs. It helps me with things inside and outside school."* For some, AI was an equalizer in academic communication. As Deep reflected, *"English is not my first language, so these tools help me express myself more clearly."*

The focus group echoed these sentiments, with one participant sharing, *"I asked ChatGPT to draft emails because it's faster, and then I just edit them."*

Collectively, these accounts underscore that students see AI as a reliable support system that improves efficiency and reduces barriers in academic performance.

Pete described using AI beyond academics: *"Sometimes, I ask ChatGPT to help draft my presentations or summarize journal articles—it makes the process smoother."* Wanda explained its role in job preparation: *"I use AI to help me refine my resume and cover letters. It's like having a coach giving me feedback instantly."* Vicky emphasized communication support: *"I use Grammarly and ChatGPT when I email professors, so I don't sound unprofessional."* Mia noted, *"I've used ChatGPT to check my nursing notes—it helps me make sense of complicated terms."*

Uncritical Reliance

Alongside these benefits, however, participants acknowledged moments of uncritical dependence on AI outputs. Tori raised concerns about the temptation to lean too heavily on AI: *"If you just copy what it gives you, you're not really learning—but sometimes it's hard not to because it makes things so easy."*

Additional accounts deepened this concern. Nami admitted, *"Sometimes I just copy what ChatGPT gives me for coding exercises, even though I don't fully understand it."* Joe reflected on similar risks: *"AI is useful, but in my field, if you don't double-check the outputs, you can end up with big errors."* These reflections reveal a tension between efficiency and accuracy, as students balance the convenience of AI with the responsibility of verifying its outputs.

In short, application skills emerged as a central dimension of students' AI literacy. On one hand, AI offered students enhanced productivity, language support, and new ways to manage academic tasks efficiently. On the other hand, the tendency to trust AI without critical evaluation highlighted the need for greater awareness of its limitations. The theme suggests that while students are enthusiastic adopters of AI tools, they require structured guidance in developing strategies for critical engagement.

Theme 3: Ethical Awareness

Although students eagerly adopted AI tools, their interviews revealed persistent uncertainty about what constitutes ethical use. While many voiced concerns about plagiarism, intellectual property, and data security, they also emphasized the lack of clear guidance from faculty and institutions. This theme unfolded through two sub-patterns: *emerging but limited ethical knowledge* and a *desire for structured guidance*.

Emerging Concerns, Limited Knowledge

Participants recognized the ethical gray areas of AI use, especially around academic integrity. Vicky, for instance, confessed, "I'm *not sure if it's plagiarism*

if I use AI—I just try to rephrase the words." This uncertainty was common across the sample, as students expressed concern but lacked concrete definitions or frameworks.

Several also raised concerns about biases or hidden processes within AI systems. Deep explained, "I *do worry about what happens to the data we give to these tools. We don't know who is behind it or what they are doing with it."* Similarly, a focus group participant noted, *"Sometimes it feels like the AI has a bias—like it gives answers in one direction and ignores others."*

Even students who used AI heavily admitted to a vague awareness rather than a confident understanding of ethical issues. As Tessee put it, "I *know we're supposed to use it responsibly, but no one ever taught me what that really means."* Wanda reflected, *"I think AI is good, but it can make you lazy…there's a danger when students stop thinking critically and just accept it."* Joe, a doctoral student, worried about accuracy and integrity: *"AI can be misleading. If you don't verify, you might be spreading misinformation without knowing it."* Namii added, *"I always wonder who owns the work after AI generates it—me or the system? That's confusing."* Mia, an undergraduate nursing student, noted, *"Sometimes I feel guilty using ChatGPT because I don't know if it's considered cheating."*

Desire for Institutional Guidance

Across the interviews, students consistently called for universities to provide explicit instruction on the ethical use of AI. Bridgette explained, "We *don't really have any official guidance; we're just guessing."* Tessee echoed this sentiment, observing that inconsistent expectations across classes created confusion: *"Professors need to tell us what is acceptable; otherwise, every class has different rules."*

Deep went further, suggesting a proactive institutional approach: *"Schools could include a short workshop in the first week of classes on how to use AI responsibly."* Focus group participants also reinforced the need for faculty-led guidance, with one noting, *"If the university gave us clear rules, it would make things a lot easier for everyone."*

Other participants reinforced this call. Vicky explained, *"It would help if professors showed us how to use AI properly, instead of just telling us not to."* Pete emphasized the need for consistency: *"Right now, every instructor has a different opinion, so students are confused. The university should make one policy."*

Samiya, an undergraduate psychology student, added, *"We need workshops that show the right way to use it, because otherwise people will misuse it without even realizing."*

Summing up this theme, ethical awareness was present among students, but remained fragmented and underdeveloped. While participants identified issues like

plagiarism, bias, and privacy, they lacked a clear framework for evaluating ethical boundaries. Their strong call for faculty and institutional guidance suggests that students are not resistant to ethical rules but instead eager for structured, consistent training. This theme underscores the importance of higher education institutions in shaping responsible AI use.

Theme 4: Critical Thinking & Societal Impact

Beyond their personal use of AI, students reflected critically on the broader consequences of integrating AI into higher education and society. Their reflections revealed both optimism and caution: AI was seen as a tool that could expand opportunities and prepare them for future careers, but also as a force that could exacerbate inequalities and undermine critical thinking skills if used without balance.

Opportunity and Risk Awareness

Several students recognized AI's potential to support workforce readiness and innovation. Ram noted, *"AI can help prepare us for jobs, but at the same time it could replace some of them."* Similarly, Tory reflected on the tension between efficiency and learning:

> *"If you just copy what it gives you, you're not really learning—so even if it makes working easy, you should go back and filter what you have been given and check for accuracy to avoid plagiarism and bias."*

Other students worried about the long-term academic consequences of overreliance. Nabin, a mathematics undergraduate, explained, "If *people depend on it too much, they might forget the basics—like solving problems on their own."* Tessee echoed this sentiment from a business perspective: *"In the MBA program, we need to think critically and make decisions. If AI makes those decisions for us, we're not building that skill."*

Even students who valued AI's productivity voiced concern that it might erode essential learning. As Deep emphasized, *"It saves time by doing repetitive tasks, but if students rely too much, they might stop learning how to think critically. That's the danger I see."*

New voices added to this pattern. Pete highlighted its dual nature: *"AI can be used for good or bad. It depends on how much people rely on it without thinking for themselves."* Joe reflected from an engineering perspective: *"If AI does all the calculations, then students may stop questioning results, and that weakens innovation."* Wanda similarly warned, "AI *makes things easy, but too much of it reduces your ability to reason on your own."*

Equity and Access Concerns

Another recurring thread was the recognition that access to AI tools was uneven, raising equity concerns. Mannu highlighted the financial barrier: *"Some*

of us pay for subscriptions, while others can't. This creates inequality." Focus group participants echoed this concern, with one noting, *"AI is useful, but it assumes everyone has fast internet and good devices. That's not true for everyone here."*

Bridgette also connected access to larger systemic inequities: *"If only some students are getting the benefits of AI and others are left behind, then it just adds to the inequality we already see in education."* Tessee pointed to institutional responsibility, arguing, "The *university should make sure everyone has equal training and access, not just the people who already know about these tools."*

The focus group discussion reinforced the urgency of equity issues. Jana explained: *"When some students know how to use AI well and others don't, it makes the gap bigger. It's not fair if only a few people get ahead because they have access."* Additional participants deepened this theme. Vicky explained, "If *AI is going to be part of education, schools need to make sure everyone has equal opportunity to learn it—otherwise the gap just widens."*

Mia added from a nursing perspective, "Not *everyone has the same devices or internet. That means some students fall behind even if they want to use AI."*Nami observed, "Access *is not equal. Some students know advanced tools, while others are left with the basics. That creates an unfair advantage."*

Summing of this theme, students demonstrated significant critical awareness of AI's societal implications. While they saw AI as a powerful tool for learning and career development, they also voiced concerns about overreliance, diminished critical thinking, and widening inequities in access. The consistent call for balance—between using AI for efficiency and maintaining independent skills, between expanding opportunities and ensuring fairness—reflects a nuanced understanding that situates AI literacy within broader questions of equity, justice, and the future of higher education.

DISCUSSION AND CONCLUSIONS

The findings of this study contribute to the growing body of scholarship on artificial intelligence (AI) literacy by highlighting how students at an HBCU conceptualize, apply, and critically evaluate AI in their academic and social lives. Consistent with recent calls for more systematic integration of AI literacy into education (Kong et al., 2025), students in this study articulated both opportunities and risks associated with AI use, ranging from efficiency in daily tasks to concerns over ethical dilemmas and equity in access. Four interconnected themes emerged—Conceptual Understanding, Application Skills, Ethical Awareness, and Critical Thinking & Societal Impact—that reinforce and extend insights from recent scholarship.

Conceptual Understanding

Students' limited yet evolving conceptual grasp of AI mirrors what Long and Magerko (2020) describe as the foundational challenge of AI literacy: moving beyond surface-level engagement to a deeper understanding of algorithmic and systemic aspects. In this study, participants frequently framed AI as a supportive assistant that enhances convenience, but they rarely demonstrated a confident sense of how underlying processes function. This finding resonates with Ng et al. (2021), who noted that across multiple contexts, students could describe AI's everyday functions but struggled to articulate its mechanics.

Past studies confirm this trend: most learners—whether in K–12 or higher education—defined AI pragmatically rather than conceptually (Casal-Otero et al., 2023; Lee et al., 2024). Zhang et al., (2025) further argue that conceptual literacy underpins all other dimensions of AI engagement yet remains underdeveloped in empirical work. Laupichler et al. (2022) similarly stress that higher education lacks consistent frameworks for cultivating this deeper knowledge.

These results highlight a persistent gap: while students recognize AI's usefulness, they lack the technical and systemic understanding needed for critical engagement. Addressing this requires curricular models that teach not just *how to use AI*, but also *how AI works* and *why it matters*.

Application Skills

Study participants used AI extensively for writing, translation, and communication support, reflecting the "pragmatic literacy" dimension identified in diagnostic studies with younger learners (Shen & Cui, 2024; Sperling et al, 2024). However, instances of uncritical reliance also emerged, echoing concerns raised in K-12 and higher education contexts about the tension between efficiency and critical evaluation (Lee & Kwon, 2024; Ng et al., 2021). The findings suggest that while AI supports productivity, structured training is needed to cultivate discernment and resilience against misinformation.

Recent work in higher education similarly documents that students rely on AI to streamline academic writing and routine tasks yet often do so without questioning its accuracy (Chan & Hu, 2023; Pitts et al., 2025). Attewell (2025) also demonstrates that undergraduates value AI primarily as a time-saving tool, which parallels our participants' reliance on Grammarly, ChatGPT, and Copilot for efficiency. At the same time, Laupichler et al. (2023) demonstrate that higher levels of application literacy can predict improved performance only when paired with critical appraisal, reinforcing the risks of overreliance observed in this study.

These findings point to a dual reality: AI enhances productivity and accessibility, but without explicit guidance, students risk becoming passive users. Embedding training that balances efficiency with critical evaluation remains essential for sustainable academic practice.

Ethical Awareness

The theme of ethical awareness, particularly regarding plagiarism, data privacy, and bias, aligns closely with the literature that frames AI literacy as inseparable from ethical reasoning (Ng et al., 2021; Kong et al., 2024). Students' calls for institutional guidance underscore Kong, Cheung, and Zhang's (2021) argue that AI education must move beyond technical skills to address responsible use explicitly. Our participants' uncertainties mirror global trends where learners recognize ethical issues but lack frameworks for consistent decision-making (UNESCO, 2023).

Past studies highlight the same ambiguity among university students, who often conflate AI-assisted writing with plagiarism but receive little clarity from faculty or policy (Chan & Hu, 2023; Pitts et al., 2025). Kassorla et al. (2024) emphasize that ethical literacy must be embedded at the curricular level, noting that inconsistent expectations across courses leave students confused. Zhai et al. (2024) and Cox (2024) further caution that overreliance without explicit norms risks normalizing biased or opaque outputs. Our participants' repeated requests for workshops and clear guidelines align with these findings, underscoring the urgent need for institutional leadership in articulating responsible AI use.

In sum, students' uncertainty about what constitutes ethical AI practice reflects a broader gap in higher education. While awareness of issues like plagiarism and bias is growing, frameworks for consistent decision-making remain underdeveloped—making institutional guidance essential for fostering ethical resilience.

Critical Thinking and Societal Impact

Perhaps the most significant contribution of this study lies in the students' reflections on the societal implications of AI. Their concerns about equity, overreliance, and workforce disruption directly parallel the societal and sustainable development dimensions of AI literacy described by Kong et al. (2025). Similarly, calls for equity in access reflect broader critiques that AI risks exacerbating digital divides if left unaddressed (Ng et al., 2021; Luckin et al., 2016). Importantly, students' emphasis on maintaining critical thinking skills aligns with ongoing debates about the balance between augmentation and automation in education (Dieterle et al, 2022).

These findings also echo Attewell's (2025) student survey, which reported widespread concern that AI creates "winners and losers" in learning environments, depending on who has access to advanced tools. Laupichler et al. (2023) observed similar tensions, noting that while AI can enhance learning outcomes, uncritical dependence risks eroding core problem-solving abilities. Pitts et al. (2025) reinforce this duality, demonstrating that students often value AI for its efficiency but remain wary of its long-term effects on creativity and independence.

Collectively, these insights situate HBCU students' reflections within a global conversation about AI as both a democratizing and divisive force.

Current results highlight that students view AI as a double-edged sword: it offers opportunities for equity and workforce readiness but also risks widening digital divides and weakening critical thinking. Addressing this tension requires institutions to integrate AI literacy as both a technical and civic competency.

IMPLICATIONS

Findings from this study reinforce the argument that AI literacy must be understood as a multidimensional construct encompassing conceptual, functional, ethical, and critical dimensions (Ng et al., 2021; Kong et al., 2024). For HBCUs and other minority-serving institutions, this study also highlights equity considerations that align with global discussions on inclusion in AI education (Kong et al., 2024; UNESCO, 2023). Students' desire for structured guidance suggests that higher education institutions should integrate AI literacy explicitly into curricula—not as an optional add-on but as a core competency for academic and professional success.

Recent scholarship echoes this call for integration. Kassorla et al. (2024) emphasize that embedding AI literacy into higher education requires linking technical fluency with ethical reasoning and civic engagement. Laupichler et al. (2023) demonstrate that literacy outcomes are strongest when curricula intentionally balance practical application with critical appraisal, a point reinforced by Pitts et al. (2025), who caution that uncritical use undermines student learning. For HBCUs, where issues of equity and access are paramount, these findings align with UNESCO's (2023) framework, which advocates for inclusive AI education to reduce digital divides and promote workforce readiness.

Thus, AI literacy should be treated as a core competency across disciplines, with institutions, particularly HBCUs, positioned to lead by embedding equitable, critical, and ethically grounded approaches to AI within their curricula.

CONCLUSION

This study examined how students at an HBCU conceptualize and engage with artificial intelligence, revealing a multidimensional view of AI literacy that encompasses conceptual understanding, application skills, ethical awareness, and reflections on societal impact. While students demonstrated enthusiasm for AI's practical benefits, they also expressed uncertainty about its technical foundations and ethical boundaries and voiced concerns about overreliance and inequitable access.

These findings underscore the importance of higher education institutions, particularly those serving underrepresented populations, to systematically

integrate AI literacy into their curricula. Doing so not only prepares students for an evolving workforce but also ensures equitable access to the skills and critical perspectives needed to navigate an AI-driven society.

The study is limited by its focus on one institutional context, and future research should expand to include comparative perspectives across different types of institutions and student populations. Nevertheless, the insights presented here underscore that AI literacy is not simply about technical skills but about fostering informed, critical, and equitable engagement with emerging technologies.

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