

GenAI Competencies in Higher Education: An Analysis of Existing Literacy Frameworks

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ABSTRACT

As part of a larger project to develop a generative artificial intelligence (GenAI) literacy framework and toolkit for higher education, this poster presents an analysis of seven literacy frameworks relevant to GenAI literacy in academic contexts. Through thematic analysis, we identified 10 competencies essential for GenAI-literate students in higher education. These competencies are organized into four progressive stages: (1) understanding GenAI at conceptual and technical levels and its capabilities and limitations; (2) using GenAI tools purposefully, effectively, and appropriately; (3) analyzing and evaluating various GenAI models and tools for performance and societal, ethical, and legal impacts, and (4) customizing or creating GenAI tools to address specific needs and generate innovative applications or theoretical insights. We discuss key implications of the results and next steps for developing a GenAI literacy framework for higher education.

KEYWORDS

generative artificial intelligence, AI, literacy, competency, higher education

INTRODUCTION

Use of generative artificial intelligence (GenAI) tools, such as ChatGPT and Copilot, has surged among college students, with nearly 60% incorporating these technologies into various academic tasks, including writing, summarizing learning materials, and debugging code (Bharadwaj et al., 2024). Among regular users, 44% have opted for paid subscriptions to access advanced GenAI features, demonstrating the perceived value of these tools and strong commitment to using GenAI despite institutional restrictions (Bharadwaj et al., 2024).

Alongside their growing use and opportunities of AI augmented learning, GenAI tools present considerable challenges. One challenge is that students lack technical skills, such as crafting and refining prompts for academic work, and thus often fail to produce meaningful and contextually appropriate responses, diminishing the tools' effectiveness (Bharadwaj et al., 2024; Flaherty, 2024). A second prominent challenge is that students struggle to analyze and assess the quality and credibility of AI outputs critically (Choi et al., 2025; Wu et al., 2024).

Many academic libraries have responded to the growing use of GenAI by incorporating AI literacy content into instructional materials, research guides, and classroom discussions (Ko & Chiu, 2024; Ndungu, 2024). However, GenAI literacy instruction remains largely fragmented and lacks a strong theoretical foundation (Bongiovanni et al., 2024; Laupichler et al., 2022).

GenAI literacy refers to a set of competencies that enable individuals to understand, critically assess, effectively interact with, and responsibly apply GenAI technologies across diverse contexts (Annapureddy et al., 2025; Long & Magerko, 2020). Originally introduced as an alternative to intelligence for predicting task performance (McClelland, 1973), the concept of competency has been defined as "an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation" (Spencer & Spencer, 1993, p. 9). In the context of GenAI literacy, competencies encompass not only technical knowledge and skills but also attitudes and values needed to use evolving GenAI tools effectively and ethically.

As part of a larger project to develop a theory-grounded, evidence-based framework and corresponding toolkit for librarians to integrate GenAI literacy in higher education, this study analyzed frameworks relevant to GenAI literacy in higher education with the following research question: How do current literacy frameworks inform the identification and structuring of core competencies for students' GenAI literacy in higher education?

METHODS

We conducted thematic analysis of literacy frameworks aligned with our broader objective to develop a GenAI literacy framework for higher education. We searched academic databases and consulted experts in information literacy framework design and library information services to identify relevant frameworks. We selected seven frameworks published in academic papers or reports (Annapureddy et al., 2025; Hervieux & Wheatley, 2024; Hibbert et al., 2024; Mills et al., 2024; Ng et al., 2023; The University of Adelaide, 2024; UNESCO, 2024) based on the following criteria: the frameworks (a) focus on GenAI or AI literacy, (b) are relevant to college students or

broader student populations, and (c) are published in English. We excluded frameworks that (a) focus on information or digital literacy without an emphasis on GenAI or AI, (b) target general public or nonstudent populations (e.g., library workers), or (c) are published in languages other than English.

One author independently analyzed the selected frameworks using *a priori* codes derived from well-established and influential literacy frameworks from library and information science and related disciplines, such as the ACRL Framework (Association of College & Research Libraries, 2015) and DigComp 2.2 (Vuorikari et al., 2022). We also employed inductive coding to allow new themes to emerge. We organized identified competencies into four progressive levels based on Bloom's taxonomy (Krathwohl, 2002): (1) understand, (2) apply, (3) analyze and evaluate, and (4) create. We adopted Bloom's taxonomy as the overarching organization schema for three reasons. First, it is a widely adopted framework in education for structuring learning objectives and outcomes, making it well-aligned with the instructional goals of the GenAI literacy framework. Second, its progression from basic understanding to advanced creation provides a structured way to assess varying levels of GenAI literacy mastery, reflecting the original definition of competency emphasizing criterion-referenced performance that demonstrates observable achievement (Spencer & Spencer, 1993). Third, the taxonomy is likely familiar to educators who will be using the framework (e.g., instructional librarians). The research team met weekly to discuss codes, resolve discrepancies, and develop competencies. This iterative process continued until all frameworks were analyzed and mapped onto the final competency list. We used NVivo 15 to facilitate the analysis.

FINDINGS AND CONCLUSION

Our analysis of seven literacy frameworks identified 10 competencies critical to GenAI literacy in higher education. These competencies are structured across four progressive stages based on Bloom's taxonomy (Krathwohl, 2002), each reflecting increasing depth of engagement with GenAI tools and concepts. At the foundational level, students are expected to develop both conceptual and technical understanding of GenAI and how these systems work, including their capabilities and inherent limitations. The second stage, apply, emphasizes purposeful, effective, and contextually appropriate use of GenAI tools across academic tasks. The third stage, analyze and evaluate, highlights students' ability to assess GenAI tools regarding their technical and broader societal, ethical, and legal implications, such as bias, accountability, autonomy, privacy, and intellectual property. The final stage, create, focuses on advanced engagement, wherein students not only adapt or customize GenAI tools to meet specific needs but also propose novel applications or theoretical insights (Figure 1).

| Progression | Competency | Definition |
|-----------------------|---|---|
| 4. Create | 4.2 Ideate and theorize novel applications of GenAI | Generate creative ideas and theoretical frameworks for innovative uses of GenAI in diverse domains. |
| | 4.1 Customize or develop GenAI tools | Modify existing GenAI tools or create new ones to meet specific needs. |
| 3. Analyze & Evaluate | 3.3 Justify or critique the use of GenAI tools | Formulate well-reasoned arguments for or against the use of GenAI tools in specific situations. |
| | 3.2 Evaluate the societal, ethical, and legal implications of using GenAI tools | Assess the broader impacts of GenAI use by examining potential societal consequences, ethical concerns, and legal considerations. |
| | 3.1 Assess the appropriateness of GenAI models and tools | Compare and contrast the features, performance, and limitations of various GenAI models and tools for specific goals. |
| 2. Apply | 2.2 Document and acknowledge the use of GenAI | Record the use of GenAI tools and provide proper attribution or disclosure in accordance with academic and professional standards. |
| | 2.1 Apply task-appropriate GenAI tools | Select and use a suitable GenAI tool to complete a defined task, using known procedures or guidelines to produce and evaluate results that meet task-specific requirements. |
| 1. Understand | 1.3 Understand the current and future capabilities and limitations of GenAI | Describe the current and emerging capabilities of GenAI tools, along with their limitations, risks, and appropriate use contexts. |
| | 1.2 Understand the technical foundations of GenAI | Explain the underlying technical mechanisms of GenAI systems, such as training data, model architecture, and output generation process. |
| | 1.1 Develop a conceptual understanding of GenAI and recognize GenAI systems | Know what GenAI is and the ability to identify when and where GenAI is being used in digital tools, applications, or services. |

Figure 1. GenAI Competencies for College Students

GENERATIVE AI USE

We confirm that we did not use generative AI tools or services to author this submission.

AUTHOR ATTRIBUTION

Wonchan Choi: conceptualization, methodology, investigation, data curation, formal analysis, visualization, writing – original draft, writing – review & editing; Hyerin Bak: conceptualization, methodology, investigation, formal analysis, writing – original draft; Besiki Stvilia: conceptualization, methodology, investigation, formal analysis, writing – original draft; Yan Zhang: conceptualization, methodology, investigation, formal analysis, writing – original draft.

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